DESIGNING SUSTAINABLE URBAN FUTURES:
Presenting a Design-led Methodology for Sustainability Research

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INTRODUCTION

To 'flourish' in a rapidly urbanising world with limited resources we need to imagine different ways of living: increasing density, using passive energy, turning objects into services, and perhaps most importantly imagining new systems of living our everyday urban lives. There is so much we do not know and have not yet imagined both about what is at stake and the extent of future possibilities. Have we given ourselves the time and space to imagine? The value of public imagining provides a path for designing sustainable urban futures. 'Design is important', as attested by a ten-year-old's comment published by the British Design Council, because 'if it were not designed it would not be made' (Fletcher, 1994, p.413). If we can change the way we live in cities by design, then this is not about a profession which designs products it is about collaborative designs for our culture of living.

The idea of sharing, which extends to collaboration, is a reoccurring concept across sustainability disciplines. Sustainable design theory talks about sharing objects by turning them into services in design oriented product service systems (see Morelli, 2002). The interdisciplinary nature of sustainability research promotes sharing ideas and collaborating on projects (see Sherren, et.al., 2009). This sharing concept is about a network of involvement: of making ideas, theories and skills accessible, actively passing them on, encouraging others to engage and collaborate on generating new outcomes. Each of us, from the 'house wife/husband', 'blue/white collar worker' to the 'professor' or 'artist' have something to share, an ability to contribute and an important part to play in a co-design for urban sustainability. In this way, co-design can subvert the 'expert' paradigm by capturing public imagination, build creative capacity and facilitate a design process to change the way we live in cities, 'not merely survive but also express and expand [our] cultural and spiritual possibilities' (Manzini,1992, p.6). Growing global acceptance of the need to change towards a more sustainable manner of human development means a fundamental change in how we design our future. This requires an open conversation on what to do; a conversation which requires approaches to very messy and uncertain issues. If we as a society require the creative capacity to dream of, and subsequently create, a better future, then design-led approaches are of significant value.

The word 'design' has many meanings. When I talk about design I am talking about a creative discipline and a process we all engage in. That is, although there are 'professional designers' and a field of practice, everyone engages in the act of designing to some extent. As a consequence, the ubiquity of design gives the design discipline an opportunity to share. In particular, in the area of research, sharing a designerly approach opens up opportunities both for socially oriented research, knowledge construction and the discipline of design. A design approach is playful. It places the designer's personality as central to the process. It is iterative. It moves from the general to the specific. It works within ambiguity and fluidity of meaning. It is open to unforeseen circumstances. It engages with the messiness of everyday life. Design outcomes aim to facilitate our everyday practices, helping to create and recreate our culture of living. In this paper a design-led methodology, Bigamatics, is used to prompt further discussions into the potential of designerly approaches to research. Often creative practices are dismissed because they do not articulate their research practices in terms comparable with more traditional forms of research. This explanation attempts to go some way in bridging this 'disciplinary divide'. The paper concludes by suggesting future directions to continue the conversation about the value of sharing designerly approaches across a socially oriented research context.

A DESIGN-LED METHODOLOGY

Bigamatics is the name I gave to a design-led methodology developed through my Phd study. The name Bigamatics comes from the Italian baking term 'biga' (pronounced with a long 'i': *BEE-ga*). A biga is pre-fermented dough used in bread making. Before the advent of commercial yeast, bread was leavened with a batter of flour and water hosting a live culture of wild yeast, called a 'mother', which is still used in the production of sough-dough bread. Modern commercial yeasts offer quicker fermentation than with a traditional mother at the cost of the texture and flavour of the finished bread. A biga is a technique for enhancing bread made with commercial yeast. It is made from left over dough, fermented over night and used to improve the flavour and texture of the bread. Hence, biga adapts an old practice of bread making (ie. the mother culture used in sough-dough) to make a new practice work better (i.e. the use of commercial yeast). Similarly, Bigamatics proposes a design-led methodology which takes a creative 'old practice' which

was established pre-enlightenment, specifically design, and applies it to a 'new practice', that of research. In this case 'work better' is defined as more creatively. Bigamatics is like a starter culture for generating proposals for changes to our culture of living. The purpose of presenting Bigamatics is to prompt conversations about designerly approaches to research. This design-led approach attempts to encourage discussion into the significance of the design discipline in research, the uptake of such approaches and the inclusion of design researchers in interdisciplinary projects. That is, this explanation of Bigamatics acts as an example of the nature and characteristics of a designerly approach to research.

Emerging research in the design discipline has been exploring forms of research *through* design. These approaches are project-based and practice-based research, which imbied the research in a design project. Bigamatics is one form of research *through* design. The development of this methodology took the practice of design as a process of constructing knowledge for an artefact and remoulded it into a process that constructs knowledge for socially oriented research outcomes. The resulting Bigamatics methodology is a compilation of design practice, research and sustainability to provide a creative approach to formulating practical socially oriented research outcomes.

Bigamatics outlines how to collaboratively construct the sagacity needed to achieve serendipitous discoveries. However, this methodology goes further than just coming up with a good idea; it moulds the idea into a proposition for implementation. In this context, a good idea is sustainable, supports the system of everyday life and in so doing improves our culture of living. Bigamatics uses a design approach to socially oriented research which defines a process of designing proposals for positive social change. The methodology lies within a constructionist epistemology, under a post-industrial design perspective and utilises participatory design methods.

Being a collaborative methodology, Bigamatics enables all participants to be part of the design process. It is a methodology that is self generating with each step in the process designing the next step until a design outcome is reached. This self generating attribute allows for the research approach to be designed specifically for the context of each study. It is a methodology that is like forming an open studio for research, where the researcher becomes the facilitator of the design process – a process which engages participants in designing the research outcomes.

The Context
Bigamatics enables design from within the system of the everyday. This system is the complex interconnected networks of people living their day to day lives in a community within a natural and cultural environment. Enabling design is about engaging participants collaboratively in a design process. This methodology aims to maximise involvement in designing proposals for possible futures. This collaboration is formed with representatives of the system being studied to design outcomes which are well suited to that system. The three following diagrams describe this context for Bigamatics.

The Three-Bodied Design sketch-model (Fig.1) is derived from the physics term 'three bodied problem'. The interaction of two bodies is predictable but more than two becomes unpredictable. The three bodies in this design model are the natural, un-natural and artificial. The natural refers to the physical world around us. The artificial is the aspect of the physical world created by us and the un-natural is non-material; the realm of thought, theory and ideas. Design lies within the intersection of the three. These interconnecting, networked systems make up the system of the everyday.
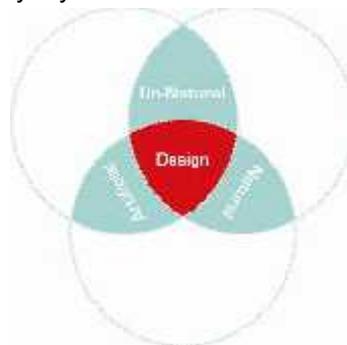

Figure 1: The Three-Bodied Design Sketch-Model

The Expert v's Co-Design sketch-models (Fig.2) conceptualises a move from the expert to a collaborative model of design. The Expert sketch-model (A) is describing the use of design to move current practice towards changed practice. That is, whether the design outcome is a material or non-material artefact, the intended purpose is to come up with something new that has an effect on the way we do things. In this

model a designer is brought into a situation as an *expert* to create innovation. The innovation is implemented into the complexity of the everyday context and interacts with that context in unpredictable ways through undefinable processes, represented by the black box (described by Glanville, 2007, as a symbol of all that is uncertain, unknown and unknowable). This process produces varying degrees of disorder as the context is affected by the design outcome. The desired result is for this disorder to change the practice; however, often due to the unpredictable nature of implementing the design outcome in the everyday context, the disorder can turn into discomfort which requires amendments to the innovation or which causes the process to revert back to its current practice.
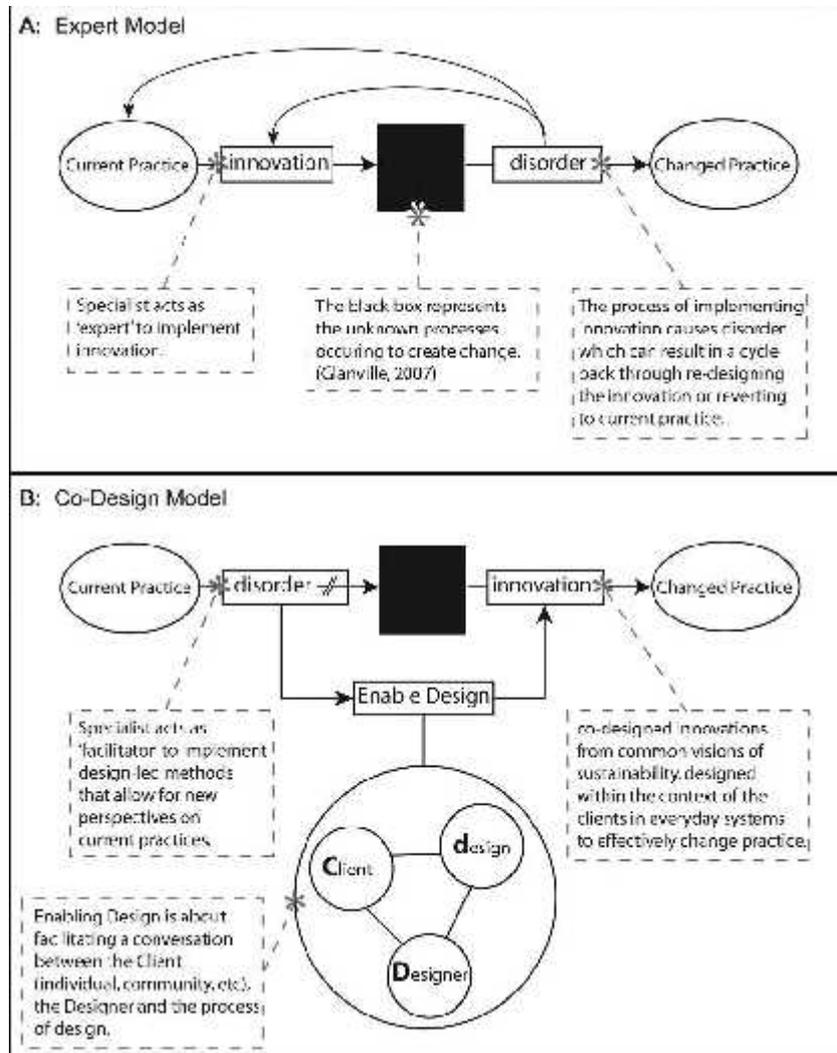

Figure 2: The Expert v's Co-Design Sketch-Models

Then, in swapping the order of innovation and disorder morphs the Expert sketch-model (Fig.2A) into a Co-design sketch-model (Fig.2B). In the Co-design model the participants are enabled to design and the designer becomes the facilitator of the design process. Disorder is used to make a break with current practice to imagine change and allow new perspectives and ideas to be generated. This break lets the designer act as a facilitator of a conversation between the participant (client), the design process and the designer. These innovations are, hopefully, better suited to changing practice because they have been designed in collaboration with participants from that particular context. This sketch-model attempts to consider the use of a collaborative approach to design more appropriate outcomes by more effectively immersing the process in the complexity represented by the black box.

The central circle in the diagram describes a conversation (essential to design practice) between the designer, client and the design process. This is, however, an interaction that needs to be made more collaborative. In any design project there is a conversation between the designer and the client whom may be a single person, a group or an organisation. There is also a conversation between the designer and the activity of design. Both these conversations are well represented within the discourse of design practice. The conversation least represented is the one between the client and design. That is to say, the client is also part of the design process. Enabling design is about facilitating the meta-conversation that engages all three (designer, client and design) in a collaborative process.

The final Culture of Living sketch-model (Fig.3) describes a systems approach to design. Here 'culture' is used as the metaphor for a network of interconnecting systems that forms patterns inherent in the practices of everyday life and 'living' is at the core of the systems 'purposiveness'. The 'culture of living' then implies a network of interconnecting systems that characterise a way of life in any one time and place. This systems metaphor describes the interplay of natural, artificial and un-natural systems enacted to form our everyday lives. Putting this phrase, 'culture of living', into action: our western consumerist culture of living has proven to be detrimental to our world and hence we need to find a sustainable culture of living.
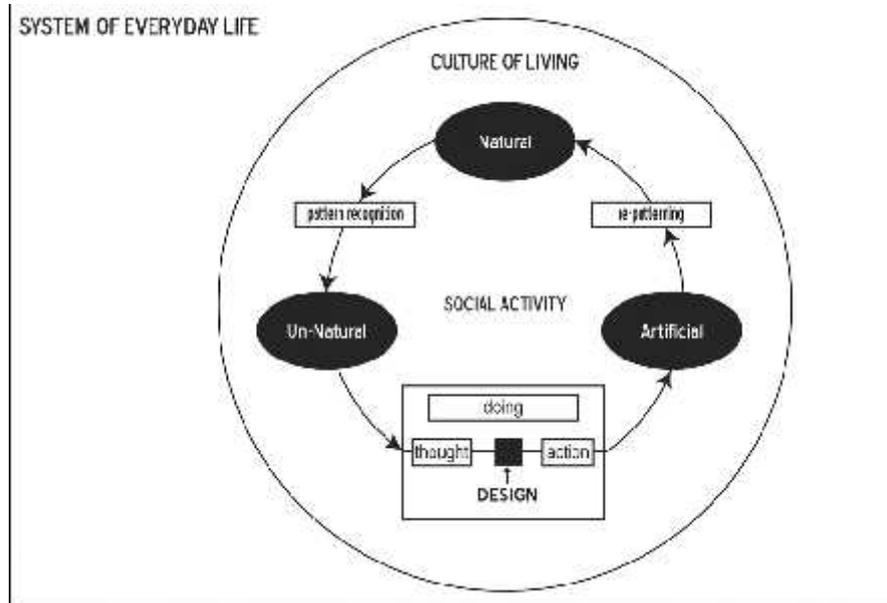

Figure 3: Culture of Living Sketch-Model

This sketch-model is used as an aid to conceptualise design's place in the system. The diagram describes a cyclic process were we understand and act in our 'natural' world through pattern recognition; this forms our 'un-natural' world of thought, theory and concept. We utilise our 'un-natural' world for doing, designing and making, which forms our 'artificial' world and in turn re-patterns our 'natural' world. Here the 'culture of living' is both the context of 'social activity' and facilitated by 'social activity'. The design act of 'doing' is represented as an element in the cyclic process of 'social activity' acting as a link in the integration of the 'natural', 'artificial' and 'un-natural' systems that generates our 'culture of living'. This diagram highlights *design* as a vital link in creating and recreating our 'culture of living' in the system of everyday life and assists in conceptualising a context for how design can play a role in contributing to positive social change, like sustainability.

Approach
Bigamatics applies a designerly approach: about play, looking around, collecting, selecting, distilling ideas, entering into conversations, transforming idea into action and giving them form. Sources of ideas and inspiration can come from anywhere, books, pictures, objects, movies, walks, so there is a need to be open to possibilities. The researcher's personality should not be hidden; instead it should be a core part of the project and visible through the aesthetics and intentions.

The diagram below (Fig.4) describes the rhythm of the design approach. It starts with nothingness; this is where the brief initiates the project. The mess of chaotic multi coloured lines then draws a wide and entangled path representing the scope of background research where everything relevant and irrelevant is explored. Then this large unwieldy mass is distilled into a concept, a single idea that encapsulates the project and will drive the rest of the project. The lines then pull out to form globules of multi-coloured masses to represent the many ideas that are developed from the concept. The black rings represent the specifications for the project which start to mould the concept development into an appropriate form until a design outcome is achieved. This outcome is then packaged for presentation. The presentation uses a variety of possible communication techniques to express what the outcome should look like, how it could work and why it ought to be of value.

The design approach is a process of thinking by doing, illustrated in the drawing below (Fig.5), a playful interaction between the imagination, cognitive process, the eye's observations, the hand's touch and action and the formation being constructed. This approach is conversation like and iterative: imagining, doing,

observing, reflecting and doing some more. The person in the drawing is immersed in the activity; the object in their hands represents the construction which need not have a physical form. With this approach it is important to try different things: different actions, different configurations, random juxtapositions. The rigour comes from the breadth of experimentation and the project will benefit by the diversification from the first idea.
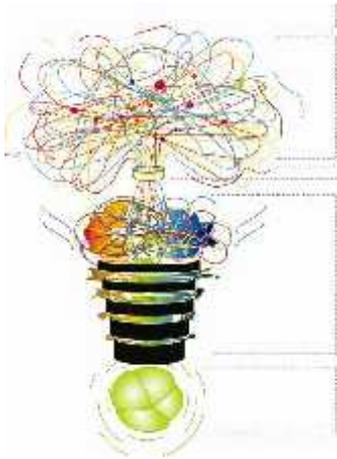

Figure 4: Design Approach

Figure 5: Thinking by Doing

The notion 'well considered' is a design studio term referring to the rigour of the design process, about how effectively the outcome has been developed. The assessment of how well considered an outcome has been reflects the depth of exploration and the extent of play. There is a value in engaging with the whole extent of the design process however elaborate it may seem. The diagram below (Fig.6) illustrates the difference between immersion in the activity of design and taking short cuts. The activity of design can be bypassed by taking a short cut from interpreting the specifications of the brief, coming up with an idea and then translating it into a form for presentation, more often than not this leads to superficial styling. Nothing new is created, just a repetition and minor variation on existing forms. To form a well considered project that generates innovative outcomes requires an engagement with the full design process. This is a process that takes direction from the brief to explore a wide range of research; towards the generation of a concept that will hold everything together, from which each component is considered and which directs the development of the outcome. Then the concept is developed towards a design outcome conforming to the specifications of the brief. The outcome is then presented.

Designing can create a disorienting feeling. The illustration below (Fig.7) represents the disorientation caused by a messy confusion of ambiguous possibilities surrounded by nothingness. Designing requires an engagement with ambiguity, uncertainty, a fluidity of meaning, the unknown and unknowable. The design approach requires a 'leap of faith' and to dare to fail. Creative practitioners often quote the Samuel Beckett sentiment from *Worstward Ho* of 'Ever tried. Ever failed. No matter. Try again, Fail again, Fail better'. When introducing non-designers to the design approach I suggest that this is a normal feeling and is something designers and other creative practitioners learn to manage.
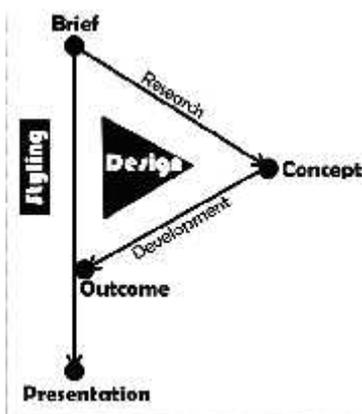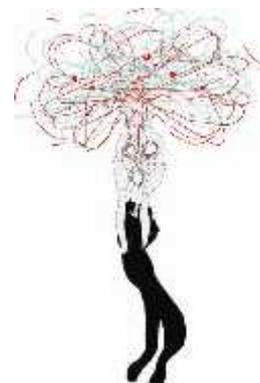

Figure 6: Design v's Styling

Figure 7: Dare to Fail

Because the collaborative aspect of Bigamatics seeks to maximise involvement, participants also need to be engaged in this designerly approach. This means the project needs to build creative capacity and support this feeling of disorientation expressed above.

Applying this design approach, the Bigamatics structure moves from the general to the specific. There is no sense in pre-empting the outcome so it starts with an open and slightly ambiguous research question and then the structure becomes more defined and specific as the process continues until a design outcome is achieved. The structure follows the design process (Table 1). Although this process could be defined in different ways, the following phases represent a generally accepted outline: brief, background research, concept, concept development, design outcome, presentation.

Table 1: Design Process

1. Brief
Comprises of the specifications derived from the project details and include area of interest, question and chosen system of the everyday.

2. Background Research
Includes a wide ranging exploration of ideas and possibilities initiated by the brief, then collected and synthesised for distilling into a concept in the next phase

3. Concept
The concept is generated from translating the background research into a core idea.

4. Concept Development
The core idea generated in the previous phase is developed towards a variety of possible design ideas for the next phase.

5. Design Outcome
The design ideas in the previous phase are transformed into possible design outcomes which are then consolidated into the main ideas for a design proposal in the next phase

6. Presentation
The outcome is communicated as a design proposal: to present what this outcome could look like, how it should work and why it ought to be of value.

These phases form a self generating process. This means, the purpose of each phase is to design the next phase until a design outcome is established and then the outcomes can be refined for presentation. In addition, this process uses a collaborative approach which enables participants to engage with the design process. Hence, participatory design methods are slotted into the phases to facilitate collaboration.

Operationalise
The first two components to be identified are the system of everyday life and the research question relevant to that context. If the project is commissioned then the question will arise from the specified directions. If the project is constructed by the researchers then the question should be derived from an exploration of their areas of interest.

Appropriate questions for this methodology are ones about the future, about what could, should or ought to be. Although these questions are linked to the present and look for outcomes that are possible, they focus on the future and seek responses in the form of 'fictional possibilities' (Wood, 2008). That is, they ask about the formulation of 'good ideas' to imagine positive change – what might be better or how to improve – which relate to social contexts within everyday systems of life.

Finding the best question is not necessary. As long as it is the appropriate kind of question and is generally focusing on an area of interest, then it should be good enough. The question chosen needs to be viewed with a high degree of uncertainty, even though it reflects an understanding of the issues involved, there is no way of being sure that this question is the right one to be asking (Rittel,1972). An understanding will arise as the project proceeds; consequently, the question needs to be open enough (eg. very general, slightly ambiguous and highly interpretive) to accommodate these changes.

For example, I conducted a project in the rural town of Tumut, called 'Project Tumut', where I asked a question about imagining sustainable wellbeing for the town's future. Sustainability and wellbeing are both

ambiguous terms, having different connotations to different people. This ambiguity allows the question to be highly interpretive. The question focused on my area of interest in positive social change towards sustainability and was open enough to explore what kind of change the community would identify.

Operationalising a Bigamtics project requires choosing appropriate methods for each phase so that it enables a collaborative design approach. These methods need to facilitate the phases of the design process and build the creative capacity of participants to aid their engagement with this design-led approach. Different methods will be appropriate for different phases (Table 2). The choice will be determined by the nature of the research project, its context and the characteristics of the researchers and collaborators.

Table 2: Choosing Methods

Phase 1 - brief:
The method for this phase should be designed to generate a conversation around the question or in order to develop a question which suggests an area of investigation.

Phase 2 - background research
The method for this phase should be designed to collect a wide range of ideas, concepts, information and imagery. It is also a chance to try out different creative techniques and see which ones are most appropriate for participants from the chosen system of everyday life.

Phase 3 – concept
The method for this phase should aid in forming a pattern out of the background research. The method should allow for the distillation of a complex generalisation into a single idea that encapsulates the project.

Phase 4 - concept development
The method for this phase needs to be designed to enable participants to play with the concept. It needs to allow for an exploration of all the different hopes, dreams and aspirations held by participants and moulding these into different kinds of possibilities.

Phase 5 - design outcome
The method for this phase should be designed to consolidate the concept development into a number of different fictional possibilities and allow them to be discussed. The method should allow for a variety of possible ways of consolidating the outcome. Perhaps one outcome can be chosen or a number of outcomes could be merged or a set of outcomes could be selected.

Phase 6 – presentation
The method for this phase should help communicate the outcomes generated, what it looks like, how it works and why it is of value for implementation. The method should also help generate discussion on the outcome.

Choosing a method is dependent on which phase it is for and the results from the previous phase. An existing design-led method could be chosen for the first phase and developed for that specific context, whereas later phases may allow more opportunities for designing the methods more thoroughly.

Design-led Methods
There are a number of existing and emerging participatory design-led methods that can be adapted for use within a Bigamatics methodology, and design education tools could also be utilised. Examples of useful methods are: cultural probes, game formats, scenario building, critical design, studio workshop, or designing your own method.

Cultural Probes are usually packs consisting of a number of different creative activities. This method makes use of disordering techniques to enable participants to see their everyday lives from a new perspective and imagine change (see Hielscher, Fisher & Cooper, 2007). These packs might include a camera with a set of instructions, a mapping exercise, a voice recorder as well as a set of visual prompts and questions (see Gaver, Dunne & Pacenti, 1999). Examples from my Project Tumut work, of cultural probe like activity packs, are illustrated below (Fig 8).

Figure 8: cultural probe like activity packs

This pack is an example of my take on cultural probes. It is made out of coloured and plain A4 paper which is cut and folded to size to look like a small gift and which asks participants to respond. The pack contained details about the project and a series of activities for participants to engage with, document their responses and return by mail.

Game Formats are methods that use game play to engage participants in exploring ideas and concepts. One form of game requires participants to interact within a predetermined framework; like in most popular card or board games. This means that variations are compiled rather than creating something new. However, there are other games like role play or simulation that open games up to constructing new ideas. Traditional and popular games can also be remoulded into forms that facilitate more creativity. Game formats aim to give structure to a creative interaction and orient participants within popular themes that they have experienced like comic book heroes (see Jacobs,et.al.,2005) or mythological stories. Examples from my Project Tumut work of games are illustrated below (Fig.9).

Figure 9: Storyscape Game

This game had two parts. One was an interaction with a three dimensional object, Larry the story tree creature. Participants were given leaf packs and asked to write a sentence about their everyday lives on each leaf. The other part was a card and board game which used the stories on the leaves and asked participants to create future stories which were combined and linked on a board.

Scenario Building methods use visual ways of designing and communicating ideas on every day practices. They use storyboarding techniques to visualise changes to everyday life (see Manzini & Jégou, 2003). These visualising techniques allow participants to imagine what different kinds of everyday life might look like and how it could work. This allows the scenario's possibilities and potential value to be assessed. Examples from my Project Tumut work of visualising scenarios are illustrated below (Fig.10)
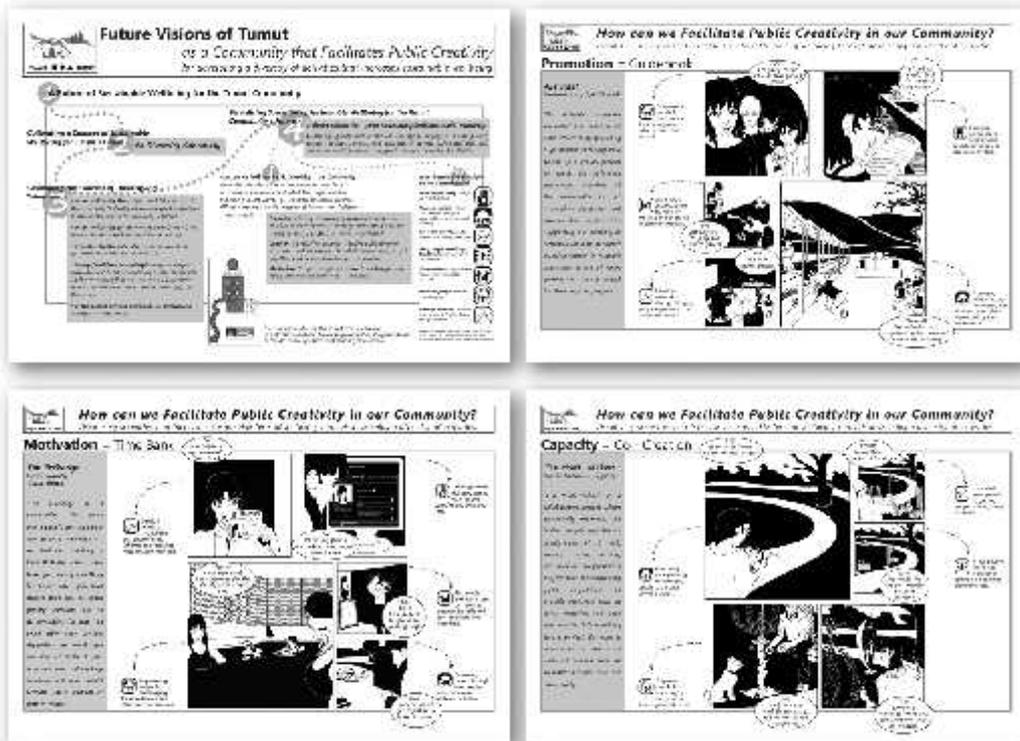
Figure 10: Visualising Scenarios of Sustainable Wellbeing

Critical Design methods use the design of provocative or thought provoking artefacts to encourage conversations about imagining change (see Bowen, 2009). This mainly deals with physical three dimensional objects that allow participants to imagine its disruptive influence on everyday life, which could be good or bad. These need not be possible or plausible objects since the aim is to provoke reactions, responses and engage participants in concepts and possibilities.

A research team could also use Studio methods to collaboratively engage in the project phases. This includes sketching, constructing sketch-models, mock-ups, colour coded maps and diagrams using coloured paper and pens. These are all techniques used in design studios for education and practice.

The methods chosen need to be re-designed and applied in such a way as to build the participants creative capacity in order to enable them to engage with the design approach. New methods can also be designed; below (Table 3) is one example of how to develop new ideas for design-led methods, which comes from a workshop I developed for participatory resource management students.

Table 3: Making Design-led Methods

Step 1: Write a list of participatory methods from social research and then a list of cultural activities.

For example:

Participatory Methods	Cultural Activity
Unstructured Interview	Cleo Quiz
Focus Group	Tarrot Cards
Survey	Board Game

Step 2: Then choose (at random or on purpose) one from each column. Consider the similarities and differences between the two activities. Consider the intersection between the two and what kind of method this might suggest.

Step 3: Construct a mock-up of a method from the ideas generated in step 2

Step 4: Try out your mock-up on someone else to refine the design of your method

One of the students from a workshop chose 'tarot card' and 'unstructured interview'. The student formed an idea for asking people questions that would be answered by randomly selecting cards with images and interpreting the images to formulate a response. The student created a mock-up by drawing a variety of different images on cards. Then tried out the method by asking fellow students to choose five cards and tell the fortune of Kosciusko National Park. This generated conversations about people's personal understanding of the situation of this particular park, the implications of change and what they imagine the future could hold. The student refined the method by asking fellow students to create their own images on cards and then ask another student to tell the fortune for a particular subject. This kind of method could be useful for the early phases of the project, such as the brief or the background research phase, when the methods need to uncover general ideas about the system of everyday life being investigated.

Research Design

There are many different ways a Bigamatics research project could be designed. First the design structure (brief, background research, concept, concept development, design outcome, presentation) could be seen as establishing six phases of the project or twelve if you count the transitions. Then design-led methods need to be chosen to slot into each of the phases. These methods could go in or between the phases and they could be collaborative or researcher specific. The diagrams below explore a number of examples.

Example A (Fig.11) describes a set of participatory design methods slotted into each step of the design process. This means that the critical design method is used to construct the brief. The use of visual diaries is employed to collect the background research. Cultural probes are used to generate the concept. Game formats are applied to develop the concept. Scenario building is engaged to construct design outcomes and an exhibition is produced to deliver the presentation.
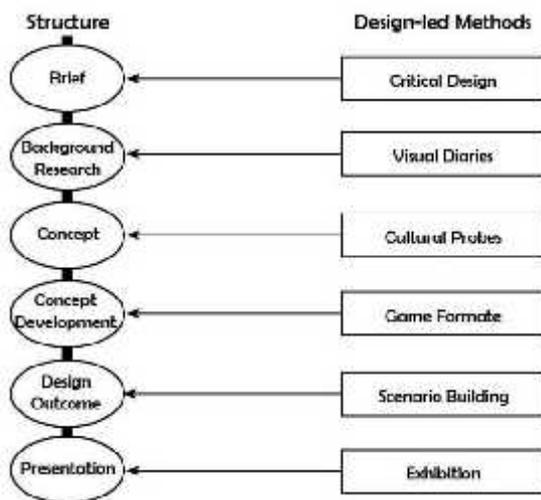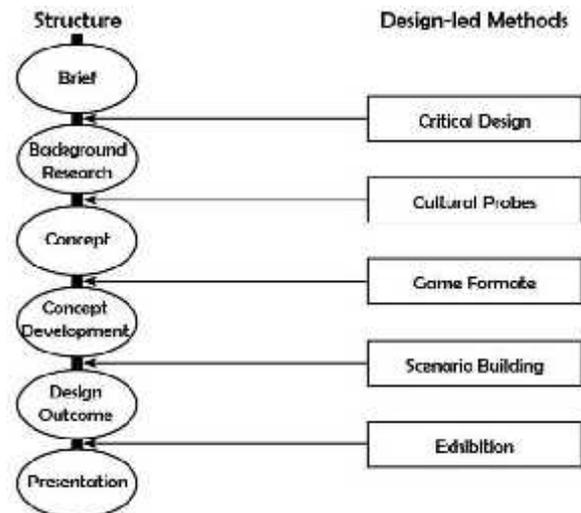

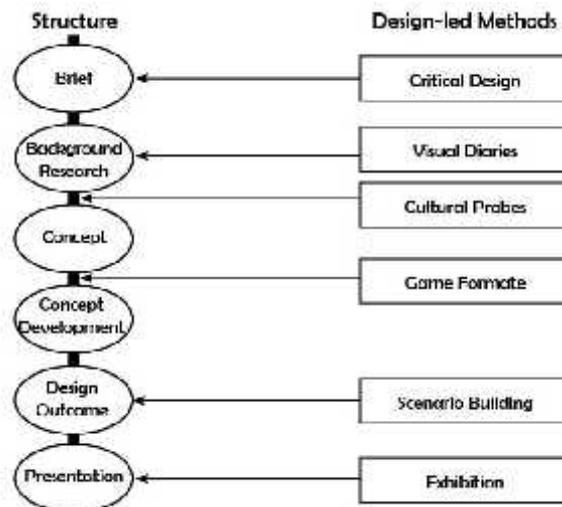**Figure 11: Example A**

Figure 12: Example B

Figure 13: Example C

In Example B (Fig.12) participatory design methods are slotted in the transition between the design steps. This means the participatory methods provide the components for the research team to conduct the

translation and transformation parts of the process. Critical design is used to interpret the brief and generate the scope of the background research. Cultural probes are used to generate the components to be distilled in the concept step. Game formats are used to play with the concept and uncover possibilities to be developed into design ideas in the concept development step. Scenario building is used to develop these ideas into possible design outcomes. A studio workshop is used to consolidate these ideas into a presentation of the final design proposal.

Example C (Fig.13) describes a combination of uses for participatory design methods in and between the design steps. This means participants can be engaged in collecting ideas and for translating and transforming them into design possibilities. In this example critical design methods are used to construct a brief. Visual diaries are used to both collect and synthesis information for the background research. Cultural probes are used to generate components to be distilled into a concept. Game formats are used to play with the concept and develop possibilities for the design outcome. Scenario building is used in a studio format to construct and consolidate design outcomes. Finally an exhibition is used to present the design proposal.

Collaborative Potential
In a Bigamatics project there are a number of different kinds of collaboration that could be used such as the collaboration: between the research team, between participants, and between participants and the research team. In the Bigamatic approach the only distinction made between types of collaborators is the level of responsibility.

Theorist Val Brown (2008) explores collective forms of knowledge construction. Brown identifies five western knowledge cultures: individual, local, specialist, strategic and holistic. She suggests, for social change, there is a need to synthesise these into a nested knowledge system: 'collective knowledge' where each knowledge culture is networked together. Brown's list suggests the different kinds of collaboration that can be formed and ideally a Bigamatics project would use combinations of all these approaches. The project team could form a collaboration of specialist knowledge. The participatory methods could form collaborations between local, specialist and strategic knowledge. There could be parts that rely on individual knowledge, like when the researcher works in isolation to form segments of the project. There could be other collaborative events to form holistic knowledge that uses participants spanning a number of different knowledge groups. The previous section has provided examples of the different ways these collaborations could be included into the research design.

The Outcome
The outcome of a Bigamatics project is a design proposal for a fictional possibility. These outcomes do not explain what exists in the world but propose potential change for the future. Therefore, the outcomes need to be subjectively assessed in terms of good or bad because they cannot provide right/wrong or true/false answers (Rittel,1972). These outcomes should be possible and plausible and should outline how they would be applied to the system of the everyday they were designed for. However, the process of implementing these outcomes goes beyond the scope of this Bigamatics methodology in its current form. The outcome could take a number of possible paths: the proposal could initiate a wider research project to generate further new ideas; it could be taken up by the community to implement themselves or a new project (eg. an action-research project) could be generated to implement the proposal; additionally, Bigamatics could be extended to include a process of implementation.

CONCLUSION

At the conclusion of the Project Tumut field study component of this research, discussions with local councillors who expressed their confusion as to how design could be anything other than a generator of 'pretty stuff', highlighted that there is still a long way to go before design is more widely accepted as having a significant, legitimate and valid role to offer as a catalyst for social change. The object is still the obstacle for design. In the research community, a perception of design as being solely about the artefact and the product becomes a barrier: isolating the discipline, impeding it from contributing more widely to sharing, collaborating and being perceived as having significant value in constructing knowledge for socially oriented research. Although the objects of design have created our contemporary world including many remarkable outcomes and 'environmentally friendly' products, in the realm of research, design can and should contribute more than just 'responsible products', it can share an approach and collaborative abilities as part of re-imagining urban living towards designing more sustainable futures. A wider acceptance of design-led research methodologies can only be gained through continuing this discourse within the research community, by sharing approaches, engaging in collaborations and further non-object applications of design-led methodologies in research practice.

By presenting Bigamatics as an example, this paper has attempted to contribute to discussions about the potential of designerly approaches to research and the value of design within a wider socially oriented research context. The Bigamatics design-led methodology illustrates how a design approach can contribute, beyond the object, to socially oriented research like sustainable urban futures, and in so doing has attempted to make designerly approaches more accessible to those outside the discipline, prompting a more active engagement in cross-disciplinary conversations. Two key aspects of this Bigamatics approach are its *culture of living* context and *self-generative* quality. Firstly, the context, presented as a series of sketch-models, avoids a problematic preoccupation with new products and styles by identifying the purpose of design as a vital link in constructing and re-constructing our culture of living, by placing design in a wider systemic context. This context allows the approach to generate socially oriented research outcomes that construct knowledge about the future in terms of what could/should/ought to be. Secondly, the flexibility of the methodology allows for choices of methods and even the invention of new methods to be made 'on the fly' during the operation of a project. This helps to keep the approach both dynamic and applicable to the time, place and participants being engaged. The potential of such an approach is to enable design from within the system of everyday life, engage public imagination, build creative capacity and open up a research process for constructing fictional possibilities – to visualise sustainable urban futures. The limitations of the methodology lie in the implementations of the outcomes, which fall short of considering how the propositions of possible futures could be taken further: as a catalyst for creating sustainable social change, which can guide participants through messy socio-cultural change processes to implement outcomes and effectively start to shift object-oriented prejudice off design research. This is a failing more of the Bigamatics methodology than the design approach in general and represents a gap in this conversation.

To progress past these limitations requires further conversations into repositioning design within socially oriented research as constructing knowledge about 'what next?' and as a catalyst for social change. These conversations should include further cross-disciplinary discussions about how design approaches and collaborations with design researchers are of value to research, for example, into urban sustainability. In addition, I propose that more creative practices (art, craft, creative writing, drama, music, dance, etc) be part of this continuing conversation to restore a balance in the plethora of forms of knowledge construction that are considered legitimate research (however that is a subject for another paper).

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