Using soft systems methodology to support extension program development in the dairy industry

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Introduction: levels of decision making and implications for developing change management programs

Decision making on dairy farms can be viewed as a hierarchy (Drysdale et al. 2009). These 'levels of decision making' provide a platform for understanding what appropriate interventions to support change might be. Table 1 summarises these levels.

Table 1: Levels of decision making framework

Level of Decision Making	Description
5. Beyond farm decisions	Decisions extend beyond the farm enterprise and take into account the goals underpinning the entire financial portfolio.
4. Whole farm system decisions	Involves significant change to the farm resource base to improve farm profitability and/or risk management
3. Sub-system decisions	Focus is on managing the interactions between components to achieve an improvement in profitability
2. Farm system components	Focus is on best management practice of a single component to achieve an improvement in profitability eg Cow nutrition
1. Product choice decisions	Expert advice sought regarding product choice decisions.

Source: Adapted from Drysdale et al. 2009

To date the Dairy Extension Centre (DEC), through its Profitable Feeding Systems (PFS) project, has worked to provide farmers with the capacity to adjust their feeding systems to optimise efficiency. Programs such as Feeding Pastures for Profit (FPFP), dairy cow nutrition and soils and fertilisers, has focused extension work on providing farmers with the underpinning knowledge to make the most of their resources (i.e. land, water, cows and labour). Using the levels of decision-making framework we can say that such work has been targeting levels 1-3 of the decision-making hierarchy. However rapid change within the dairy industry, brought about through factors such as deregulation and ongoing drought, has highlighted that working at these levels of decision making though important for providing base skills and knowledge, is inadequate for supporting farmers making critical resource allocation decisions into the future.

The key question driving development within the PFS groups was therefore: What does an extension program targeting level 4 decision making look like? More specifically we were interested in what the role of government extension is in supporting farmers to design, develop and manage new responsive feeding systems. Given that we were operating in a relatively new developmental space, existing approaches to project development were deemed inappropriate. Hence the project team looked to develop a new approach that would encourage us to think beyond what we had always done and explore opportunities for extension from alternative viewpoints.

Planning for change using Soft Systems Methodology

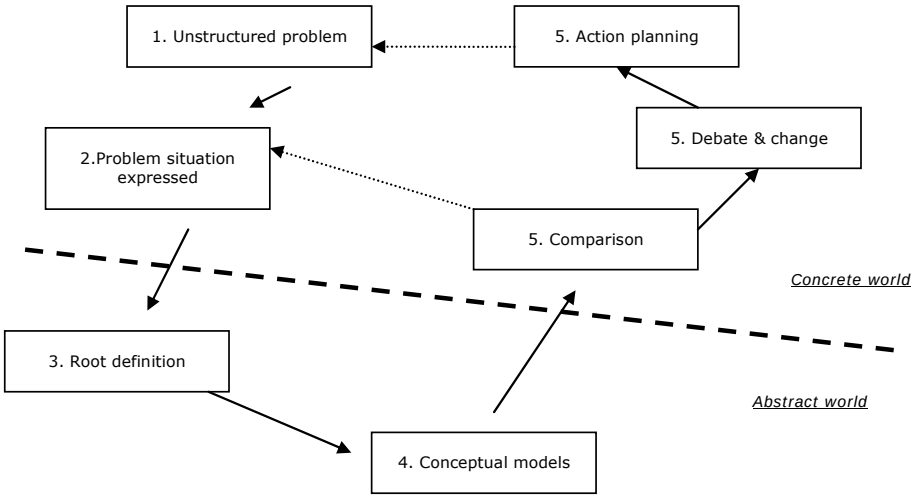
Soft Systems Methodology (SSM) (Checkland 1981; 2000) has a theoretical position that classical reductionist methods are incapable of improving complex problem situations on their own. Without both analysing the social, cultural and historical context within which problems are embedded, purely technical or 'hard' systems analysis will never bring about adequate responses to highly complex issues. To do such analysis requires those interested in a problem area to operate in both the concrete and abstract world and acknowledge that socio-technical systems (Kline 1995) are a complex mixture of classical facts and social constructions. Checkland (2000) suggests that the methodology has four fundamental tasks:

1. Finding out about the problem situation
2. Formulating models of potential activity to address the problem
3. Debating the situation using the models to test ideas against the real world
4. Taking action to improve the problem situation

The key task in 1 is the development of a 'rich picture' of the problem situation. In most cases this takes the form of a literal picture or 'map' of the problem setting. In task 2 the idea is to develop conceptual models of what purposeful activity in the midst of such a problem setting may be. A critical element of this is the development of 'root definitions' for activity models using the structure of: what needs to be done (P), how to do it (Q) and why do it (R). This provides focus to the brainstorming task. Task 3 is the critical element of the methodology where thinking in the concrete and abstract world meet. It is in effect the reality test of the thinking that has gone before. The mnemonic CATWOE (Customer, Actors, Transformation, Worldview, Owner, Environment) is often used to ensure the social and political elements of a problem and its possible solutions are examined. Task 4 is action planning that is built upon the now expanded view of the problem area and potential activities to improve it.

These four tasks have traditionally been described through the seven stages of SSM diagram shown in Figure 1. The attraction of SSM lay in its ability to enable abstract thinking. Since we hadn't developed formal projects that supported level 4 decision making there was a chance that 'lock in' could occur around the methods used at levels 1-3. However the language used to describe SSM meant the methodology would have been inaccessible to our development team. Therefore we developed the approach and language to make it more useful for our purposes.

Figure 1: Seven stages of SSM



The approach taken for our planning workshop using SSM was as follows.

Task 1 – Develop a rich picture of the problem situation

- Describe the current 'feeding systems principles' as have emerged through the FPFP program to date.
- Develop a detailed description of the situation we are working in through 'mapping' the environment.
- Describe the 'problem situation' that is demanding an extension response.

Task 2 – Brainstorm potential responses

Capture ideas around ideal areas of activity using the P. Q. R. technique that could contribute to improving the problem situation.

Task 3 – Test these ideas against the real world

Analyse these activity systems using an adapted CATWOE method.

Task 4 – Action planning

Develop initial action plans to be used as a basis for future action strategies.

Developing the rich picture – outcomes from task 1

Central to engaging the group and contexting our discussion was a presentation from the project leader articulating the difference between level 3 and level 4 decision making in the feedbase area. Fundamentally this relates to the farmer moving from optimising their current set of resources employed on the farm to designing and implementing new systems that enable

appropriate risk exposure for the situation the farmer currently faces. From an extension point of view this represents a significant step up in competency.

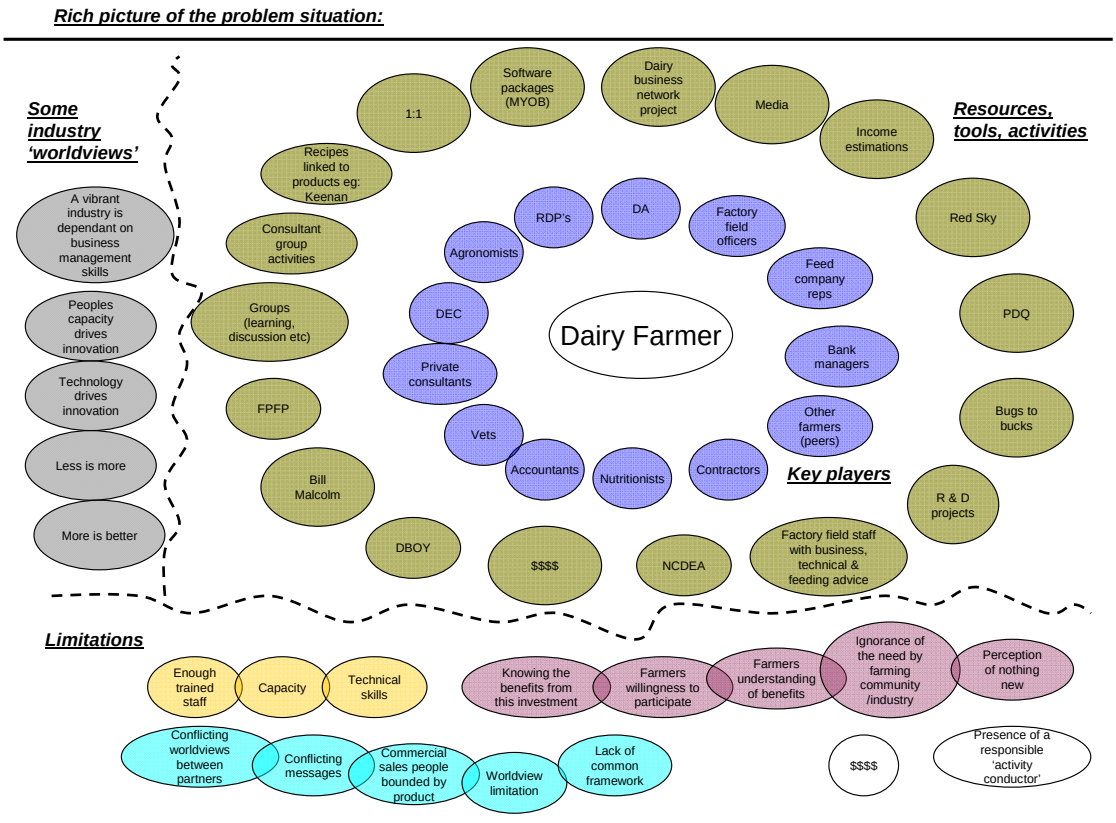
In discussing the challenges associated with this several key issues emerged:

- Where would any extension product fit relative to others? Will it just add to the mess?
- Is there a shared view of what 'profitable feeding' is in the industry?
- Developing business management skills is time consuming. Can we afford to do this on a large scale?
- Worldviews associated with increasing milk production clashes with the view of much of the industry around maintaining viability and managing risk.
- "Due diligence" is required by the extension provider on a farm by farm basis when working at 'level 4'. This is a costly exercise. Is it a legitimate role for extension?
- There is a big difference between someone 'understanding' this to then imparting principles to others. Who trains the trainer?

A discussion was also had around whose objective it was to see farmers design and implement systems that enable appropriate risk exposure and what assumptions underpin it. It was concluded that key stakeholders were: RD&E investors such as Dairy Australia and Governments, DEC staff, and a small number of farmers who would be demanding it. It was seen as a desirable goal given that it could result in sustainable growth of milk flow, sustainable communities, votes for governments and farmers being more in control of their business.

The group was then asked to take these thoughts and use them as a foundation for creating a 'map' of the problem situation. To aid this process, participants were guided to think in terms of the following: who are the key players? What resources, tools and activities are employed in this domain? What are the limitations to change? What worldviews underpin/thwart action in this area? The rich picture is shown in Figure 2.

Figure 2: rich picture of the problem situation facing the PFS development group



Through developing this rich picture the group recognised that we were not facing a shortage of tools or resources to help farmers improve farming systems design - the rich picture highlighted a well-serviced industry. We concluded that given the relatively poor financial performance of the industry over the last 15 years (ABARE 2005), the issue related more to the *quality* of dairy farmers' risk management strategies captured in the following problem definition:

> The industry is not enabling an acceptable standard of risk management at the farm level through the use of appropriate feeding systems.

Key elements of this definition are underlined:

- The *industry* as a whole - pockets are enabling this, but over all, the standard of risk management occurring at the farm level is not seen as high enough
- *Enabling* - recognises that there is an enabling environment that supports the farmer. It is not just all about the farmer. In fact the majority of 'the industry' is made up of people other than farmers.
- *Acceptable standard* – highlights that it is not that services aren't currently available purporting to do this. The issue is around quality. If there wasn't an issue here we wouldn't be thinking about a 'problem situation' that needs 'improvement'.
- *Risk management at the farm level* - we are not focusing on risk management at the industry level around market security or pest and disease etc. We are focused on the viability of the farm.
- *Appropriate feeding systems* – this again bounds the focus to the feed management area, rather than looking at areas such as off farm investment.

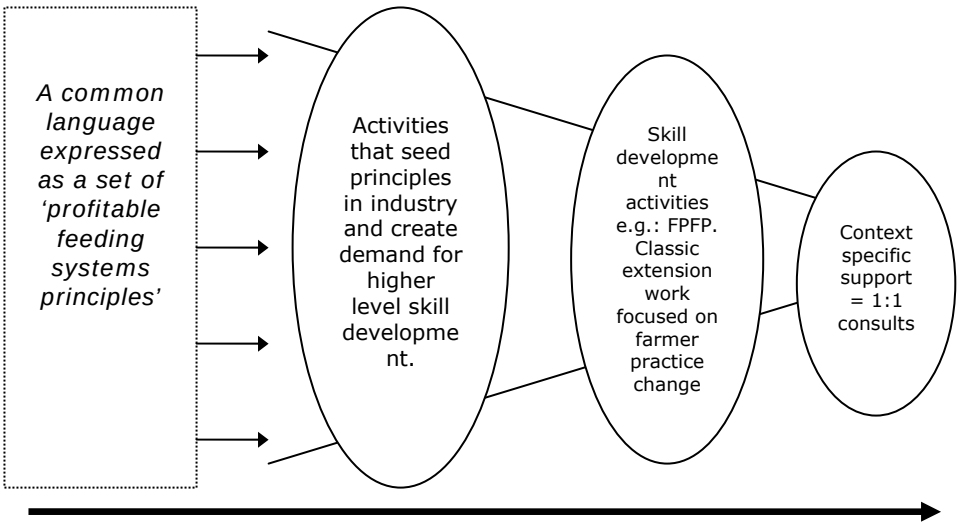
Formulating relevant activity systems – outputs from task 2

In light of this, the question was asked:

> "Given our understanding of the problem situation, what are the key 'areas of activity' (activity systems) required to improve it?"

To explore this question we developed an initial conceptual model of what might be required. This was captured in the 'focusing eye' concept diagram (Figure 3).

Figure 3: Focusing eye concept diagram to guide development of activity systems



From group & industry based learning to tailored support (1:1)
From a large number of 'superficial' farm contacts, to fewer 'high quality' farm contacts
From level 1 to level 4 decision making
From extension having a high level of control on content & approach to a low level of control
From; "farmers managing their current resources" to; "farmers designing and managing new responsive systems."

Using the framework of what (P), how (Q) and why(R), the descriptions of activity systems were developed (Table 2), each being prefaced by the statement: An activity system that……

Task 3 - Test activity systems against the real world

Once we had developed a 'wish list' of potential activity, it was time to test these against the real world. To do this the following aspects of each system were explored. These were derived from the SSM 'CATWOE' approach but adapted for our own purposes:

1. Who might the beneficiaries of the system be?
2. Who are the key players/actors?
3. What are the inputs and outputs of the system?

4. What are the worldviews that make the activity system meaningful?
5. Who owns it? Who could kill it off?
6. Real world constraints
7. Efficacy - What would we need to measure to know the job was done?
8. Efficiency - What would we need to measure to know we couldn't have got the same result easier and cheaper?
9. Effectiveness - How would we know the job was worth doing?

An example of the output from this process is shown in Table 3.

Table 2. Descriptions of activity systems developed using P, Q, R framework

What	How	Why
…develops an agreed set of feeding systems principles and a process for their refinement….	….through the establishment of a bridging mechanism between research and extension….	….to develop a 'shared language' and improve the efficiency of the RD&E process.
…challenges current feeding systems….	….by delivering a series of workshops….	….to create demand from farmers for more information, skills and practices.
…changes the way farmers manage their grazing/feeding practices…	….by delivering a series of principles, skills and practices…	…to improve operational efficiency and develop a shared language between the farmer and the deliverer.
….develops a generation of feeding systems experts…	…by providing structured training, practical experience and mentoring….	…to support the industry in enabling an improved standard of risk management at the farm level.

Task 4 – Action planning

Having tested the 'hypothetical' activity systems against the real world the group was then encouraged to move toward a more concrete action planning stage. The process used for this step was to list between 5 and 9 activity statements central to making the system 'work'. These were then listed in a logical flow and linked in model form. Appropriate monitoring and control elements were then included. The project team then took this activity models and used them as a basis for developing project plans which the PFS team is now in the process of developing into delivery plans.

Discussion and conclusions

Designing extension programs to support level 4 decision making is something the PFS team had not faced in the past. SSM was looked to as an approach that would enable some 'out of left field' thinking to occur and ensure that approaches used to support decision making at levels 1-3 were not automatically applied to more complex decision making. However SSM is not the easiest of methodologies to understand and apply in relatively short time frames and had to be adapted for our purposes. The four tasks that are central to SSM – problem definition, scenario planning, testing and action planning - are in many ways obvious elements of good project planning. What the methodology did provide the development team was a level of analysis within these tasks that was new. In particular the use of the P Q R framework for describing potential activity systems and the adapted CATWOE approach meant that the team added a layer of depth to its thinking that otherwise would not have occurred. These tools will be applied further in ongoing development work within the Dairy Extension Centre (DEC) as a whole meaning that this experiment using SSM will leave a legacy for other development teams in the organisation.

The description above shows how SSM can be taken and adapted for project development purposes, something which is in keeping with the theoretical underpinnings of SSM. Through doing this the PFS team managed to develop a program of work that would not have otherwise materialised. A clear 'supply chain' of change has been identified and the role of government extension in improving level 4 decision making has been articulated. This formed the basis of an investment prospectus that went to investors and was signed off in May 2009, providing evidence of its success.

Table 3: Example output from adapted CATWOE analysis for potential actions to address the problem situation

Activity system 1: An activity system that develops an agreed set of feeding systems principles and a process for their refinement through the establishment of a bridging mechanism between research and extension so as to develop a 'shared language' and improve the efficiency of the RD&E process.	
1. Beneficiaries	Key researchers Key extension agents Feeding systems practitioners/experts Major investors – DA, DPI Farmers
2. Key players	Key researchers Key extension agents Feeding systems practitioners/experts
3. Inputs	Current knowledge and experience New knowledge and experience $$$ Peoples time & commitment Value proposition for all involved
4. Outputs	Agreed feeding systems principles An established process for the CI&I of the principles Improved extension/research alignment through the process
5. Worldview	A formal bridging mechanism between research and extension is required to improve the efficiency of RD&E investment activities Research and extension need to lead the industry through developing a clear position on what 'profitable feeding' is.
6. Ownership	Funders – DPI & DA Key players – if they don't commit to participating and following through
7. Constraints	Lack of appreciation of the value associated with a formal bridging mechanism Time Ability to 'agree' on principles Distance/geography – travel = time, $$$
8. Efficacy	Evidence of a shared language = a documented set of agreed principles A 'club' that regularly meets to progress/refine principles
9. Efficiency	B/C analysis in relation to: speed of response by RD & E to emerging issues, more targeted research, bigger pool of investors with buy in.
10. Effectiveness	Extension & research seen to 'hit the mark'. Researchers feel that their wok is valued Extensionists feel that the research work is relevant and helps them meet the needs of farmers Extensionists have an improved capacity to apply research insights to their work area.

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