

Consensus Building through Systems Thinking Modelling A Case Study

Kambiz Maani

Department of Management Science and Information Systems

Auckland Business School

The University of Auckland

Auckland

New Zealand

Phone: (64-9) 373 - 7599 voicemail 8813

Fax : (64-9) 373 - 7430

Email : k.maani@auckland.ac.nz

ABSTRACT

Routinely, so much well-intentioned effort is thwarted and morale is destroyed in organisations because of the lack of commitment to decisions. The likelihood and consequence of this is greatest where divergent groups, ie, different divisions, department or units are involved. This paper discusses a Group Model Building case study using qualitative system dynamics to create consensus, team learning and shared vision in a public organisation. The case involves determining planning priorities for a division of the Ministry of Health in New Zealand, leading to the creation of a business plan.

The methodology involves a three-step process starting with structured brainstorming using the partial KJ (Jiro Kawakita) technique to identify priority areas and clustering them into 'affinity' groups. Next, the priority clusters are condensed into 'variables' and used by the participants to construct causal loop diagrams representing '*systems of priorities*' (in contrast to *list* of priorities). Finally, through a group process, leverage points or key priorities are identified and translated into a business plan. Strong group resistance was encountered at this stage when attempting to *reduce* the number of priority areas as suggested by the traditional priority matrix technique. Systems thinking approach was used to alleviate this problem.

The approach offers significant promise in using qualitative system dynamics with non-systems experts. The methodology can be applied to any change management initiative and complex decisions such as restructuring, reengineering, and supply chain design. The expected outcomes are greater commitment and shared vision.

Key Words: Group Model Building, Team Learning, Consensus Building, Qualitative System Dynamics, Change Management, Planning

Literature Review

Messy problems are defined as situations in which there are large differences of opinion about the problem or even on the question of whether there is a problem (Ackoff, 1974; 1979). 'Messy situations' make it difficult for a management team to reach agreement. System Dynamics (SD) modelling with groups known as Group Model Building (GMB) is a powerful tool for dealing with messy problems. SD and GMB are especially effective in dealing with semi-structured and ill-structured decision situations.

GMB offers an opportunity to align and share piecemeal mental models (Huz et al. 1997) and create the possibility of assimilating and integrating partial mental models into a holistic system description (Vennix 1995; 1996). GMB and SD can help uncover 'illusions' that may occur due to the fact that the definition of a problem may be a socially constructed phenomenon that has not been put to test.

Vennix (1999) identifies two sources of messy problems, namely, the individual, and the group/team that give rise to the existence of messy situations. Limited information processing capacity (Vennix 1990), and perceptions and reality constructions (Schutz 1962) are the main contributors to the individual sources of messy problems. Increasing the information processing capacity not only affects the dynamics of a system but also its causal feedback structure (Dorner 1980). One of the implications of this individual source on GMB is that both qualitative and quantitative modelling are important (Coyle 1999; Vennix et al. 1993).

The group sources of messy problems relate to deficiencies in group interaction, and the self-fulfilling nature of reality construction in groups. People not only construct reality in their minds, but their behaviour also causes their mental model to become reality in their environment. Deficiencies in group interaction are in the form of mixing up of cognitive tasks (Rogers & Roethlisberger 1988), lack of critical investigation (Janis & Mann 1977), and the way team members communicate (Argyris, 1990).

The above points highlight the need for a group facilitator in the GMB process. A facilitator is a person who acts as a 'role model' for the group, a person who can avoid the common deficiencies in group interaction, which negatively affect the quality of the decision (Vennix et al. 1993). Systems thinking interventions will be much more effective if SD and MB tools are skilfully combined with adequate facilitation (Senge, 1990).

Critical characteristics of an effective facilitator include a primary concern with procedure and process and only indirectly with the content, i.e. with the how rather than what. Both attitudes and skills are important characteristics of the 'ideal' facilitator (Vennix 1996,1999). Some of the facilitation attitudes are a helping and inquiring attitude (asks questions rather than provide answers), which, at the same time is neutral with regard to the content of discussion. A facilitator should be able to foster reflection and learning in a team by discouraging defensive communication, while maintaining his/her own integrity and authenticity.

Other important facilitation skills are a thorough knowledge of SD and MB as well as group process techniques. The latter requires an awareness of the existence of various cognitive tasks that a group can encounter. Conflict handling and efficient two-way communication are other important facilitation skills (Vennix 1999).

Group model building need not lead to model quantification and simulation. Vennix (1999) argues that, due to existence of persistent cognitive and social barriers to learning (Argyris 1990; 1994; Senge 1990), simulations are not ultimate solutions. In fact, quantification will either add to understanding the issue or will be dangerously misleading (Wolstenholme 1992; 1999; Coyle 1999). Active construction of the model

is just as important as playing it. Thus, it is important to recognise that in a number of cases it is not always useful or even desirable to go through the whole model-building cycle.

In summary, when conducting interventions through GMB, one should be aware that cognitive limitations, differences in perceptions (leading to multiple realities) and ineffective communication patterns (which block productive discussion of these multiple realities) play a key role in the success of the intervention. At the educational level, this requires teaching facilitation skills and group dynamics in SD programmes to engender appropriate attitudes and skills for effective GMB facilitation (Haslett et al. 1999).

The following sections describe a case study using group model building and facilitation in real life situation.

Introduction

The case study reported here is based on a Ministry of Health (MoH) project involving operational and business planning for one of its divisions. The division employs staff with diverse professional and policy backgrounds and varying periods of tenure with the division.

While the project brief required the use of systems thinking approach, it also specified that this had to be conducted in an indirect and implicit manner. Given the short time periods allotted for planning workshops and the lack of familiarity of the participants with systems thinking, this posed a facilitation challenge. Therefore, in consultation with division manager, a series of workshops were designed to accommodate division's requirements. The overriding question was to determine key priority areas (6-7) to focus the limited resources and efforts of the division.

Identification of Issues

The first step was to establish a common ground for discussion and group dialogue. This required a shared understanding of what the real and perceived barriers to progress were. Using the KJ methodology or affinity technique (Maani and Cavana, 2000), the following question was phrased for brainstorming.

“What is preventing us from making faster progress”

A total of fifty ‘raw’ statements were generated (five per participant). The participants then, using the silent mode of KJ, clustered these statements into nineteen headings or key issues as shown in Figure 1. This exercise served as a lead or mental preparation for the next step, namely, identification of priority areas. The question of priority setting in organisations is always a contentious issue as it implies that trade-offs have to be made,

hence creating winners and losers. Often, this results in open challenges and, even worst, silent resentments that lead to loss of commitment in individuals and groups. It is therefore critical that the issue of priority setting is managed in a holistic (systemic) manner.

In the next step, a second workshop was devoted to this question. The brainstorming question was phrased as follows:

What are the priorities in health policy in terms of where the Division should be placing its greatest efforts ?

Again the KJ methodology was used to identify ‘raw’ priorities by each individual participant and then cluster these in fewer priority areas by the group. It is important to note that the silent mode of KJ clustering is very beneficial in this process. Not only it avoids awkward verbal disagreements and contradictions, the method converges very quickly yielding visible group consensus. Furthermore, the participants often see the process as ‘fun’, adding another impetus towards teambuilding. Again as the group was diverse in terms of organisational hierarchies and professional backgrounds, it was important that no priorities were missed or reduced early on and prematurely. The KJ process thus ensured that all contributions were included. This process resulted in 42 ‘raw’ priority statements, which were clustered into 19 priority areas as shown in Figure 2.

Priority selection

As the management desired to have only a set of 6-7 priority areas, this seemed to be too large for any practical purpose. Therefore, it was necessary to reduce the initial set of 19 to 6-7 areas. In order to proceed, a set of criteria was needed for priority selection. This was achieved through a multi-pick method whereby participants contributed verbally to constructing a list of criteria. These criteria were later defined more accurately by the group. The resulting criteria list is shown below in Table 1.

Table 1 - Criteria for priority selection

1. Realistic – can we marshal the resources? Is it reasonable and compatible with the Government’s direction/ political environment ?
2. Impact – direct impact on Maori health
3. Quick visible results – within a few weeks or months (maximum 6 months)
4. Alignment – with Division's mission and other stakeholders
5. Fundamental cause – cause not symptom focus
6. Existing initiatives – capitalises on existing initiatives
7. Planning Horizon – short, medium or long

In order to minimise subjectivity, it was deemed pertinent to apply the above criteria objectively. It was suggested and agreed by the group to use a priority matrix to rank order the priorities. However, it was decided that, initially, not to assign importance ranking amongst the criteria. Thus, a scaled ordinal ranking of 1-5 was adopted where 1 indicated lowest priority and 5 denoted highest priority. The group then proceeded to rank each of the 19 priority areas against the seven criteria stated above. The outcome of this process, or the priority matrix, is shown in Table 2.

According to this priority matrix, a clear set of rank ordered priorities emerged. As all the participants had agreed to every step of the process to this point, it was expected that top priority areas would be selected from the priority matrix. Contrary to this expectation, strong resistance was encountered by most participants! This was both surprising and enlightening. It is important to bear in mind that in groups where diversity of tasks and purposes are present this resistance exists whether or not voiced. In this case no individual participant was prepared to 'let go' of his or her area of work. Of course, at this stage it was possible for the manager to intervene and use her authority to 'force' or coerce the opposing 'camps' into acceptance. But it soon became apparent that any 'reduction' of priority areas would be counterproductive and damaging to the group's integrity and unity.

System of Priorities

To break this impasse, it was agreed to adopt *all* priority areas. However, this was an impracticable solution and contrary to management's initial objective. At this stage, in order to resolve this apparent conflict it was suggested to use the systems thinking approach. The underlying philosophy of systems thinking is the primacy of relationships rather than individual parts. In the context of this case, this was in contrast to treating priorities as independent and conflicting, as they were originally perceived. Rather, the group needed to view them as part of a *priority system*, where all priority areas were regarded as indispensable elements of the system. In such a system, while all elements are important for the working of the whole, relative importance of the parts are nevertheless recognised and considered. This is done through the identification of 'leverage' points in system. Thus, areas that were deemed to have a fundamental (or cause) effect on the rest were identified as leverage points. In practical terms, the groups would tackle these 'levers' first, as any positive intervention in leverage points will introduce a chain of influence in the system. In effect, this changed the priority selection from a reductionist ordinal scale to a holistic time-based system. Having accepted this philosophy and approach, the group converted the priority matrix into a CLD of priorities. This is shown in Figure 3. In this CLD, variables identified by 'L' indicate leverage points in the systems, where *earlier* attention and focus will be devoted.

Conclusion

This case illustrated the application of group model building using qualitative system dynamics in a division of the Ministry of Health in New Zealand. Causal loop modelling was employed as a tool for consensus building and team learning. A contentious issue, namely, reducing priority areas, was overcome by converting a traditional priority selection model (priority matrix) into a priority system represented by a causal loop diagram. This approach helped to create, from 'piecemeal mental models', a shared commitment to the issues and the challenges facing the organisation.

References

- Ackoff RA. 1974. *Redesigning the Future: a Systems Approach to Societal Problems*. Wiley: New York.
- Ackoff RA. 1979. The future of Operational Research is past. *Journal of the Operational Research Society* 30(2): 93-104.
- Argyris C. 1990. *Overcoming Organizational Defenses, Facilitating Organizational Learning*. Allyn and Bacon: Boston.
- Argyris C. 1994. *Good communication that blocks learning: A Theory of Action Perspective*. Addison-Wesley: Reading, MA.
- Coyle G. 1999. Qualitative modelling in system dynamics or what are the wise limits of quantification? *Keynote address to the conference of the System Dynamics Society*, Wellington, New Zealand.
- Dorner D. 1980. On the difficulties people have in dealing with complexity. *Simulation and Games* 11(1): 87-106.
- Haslett T, Barton J, Sarah R. 1999. The use of group modelling techniques as a teaching tool. In *Proceedings of the 1999 International conference of the System Dynamics Society*. Wellington, New Zealand.
- Huz S, Andersen DF, Richardson GP, Boothroyd R. 1997. A framework for evaluating systems thinking interventions: an experimental approach to mental health system change. *System Dynamics Review* 13(2): 149-169.
- Janis IL & Mann L. 1977. *Decision Making: A Psychological Analysis of Conflict, Choice and Commitment*. The Free Press: New York.
- Maani K & Cavana R. 2000. *Systems Thinking and Modelling – Understanding Change and Complexity*, Prentice Hall: Auckland.
- Rogers CR, Roethlisberger FJ. 1988. Barriers and gateways to communication. In: John J. Gabarro, People: Managing your most important asset. *Harvard Business Review*, Special Edition of articles, 19-25.
- Schutz A. 1962. *Collected Papers I: The Problem of Social Reality*. Martinus Nijhoff: The Hague.
- Senge P, 1990. *The Fifth Discipline: The Art and Practice of the Learning Organization*. Doubleday: New York.

Vennix JAM. 1990. Mental models and computer models: design and evaluation of a computer-based learning environment for policy making. Ph.D. dissertation, University of Nijmegen, Netherlands.

Vennix JAM, Scheper W, Willems R. 1993. Group model-building: what does the client think of it? In the Role of Strategic Modelling in International Competitiveness, Proceedings of the 1993 International System Dynamics Conference, Sepada E., Machuca J. (eds). Cancun: Mexico; 534-543.

Vennix JAM. 1995. Building consensus in strategic decision making: system dynamics as a support system. *Group Decision and Negotiation* 4(4): 335-355.

Vennix JAM. 1996. *Group Model-Building: Facilitating Team Learning using System Dynamics*. Wiley: Chichester. Chapter 5.

Vennix JAM. 1999. Group Model Building. *System Dynamics Review* 15(4): 379-401.

Wolstenholme EF. 1992. The definition and application of a stepwise approach to model conceptualisation and analysis. *European Journal of Operational Research* 59: 123-136.

Wolstenholme EF. 1999. Qualitative vs quantitative modelling: the evolving balance. *Journal of the Operational Research Society* 50: 422-428.

Figure 1: Issues Clusters

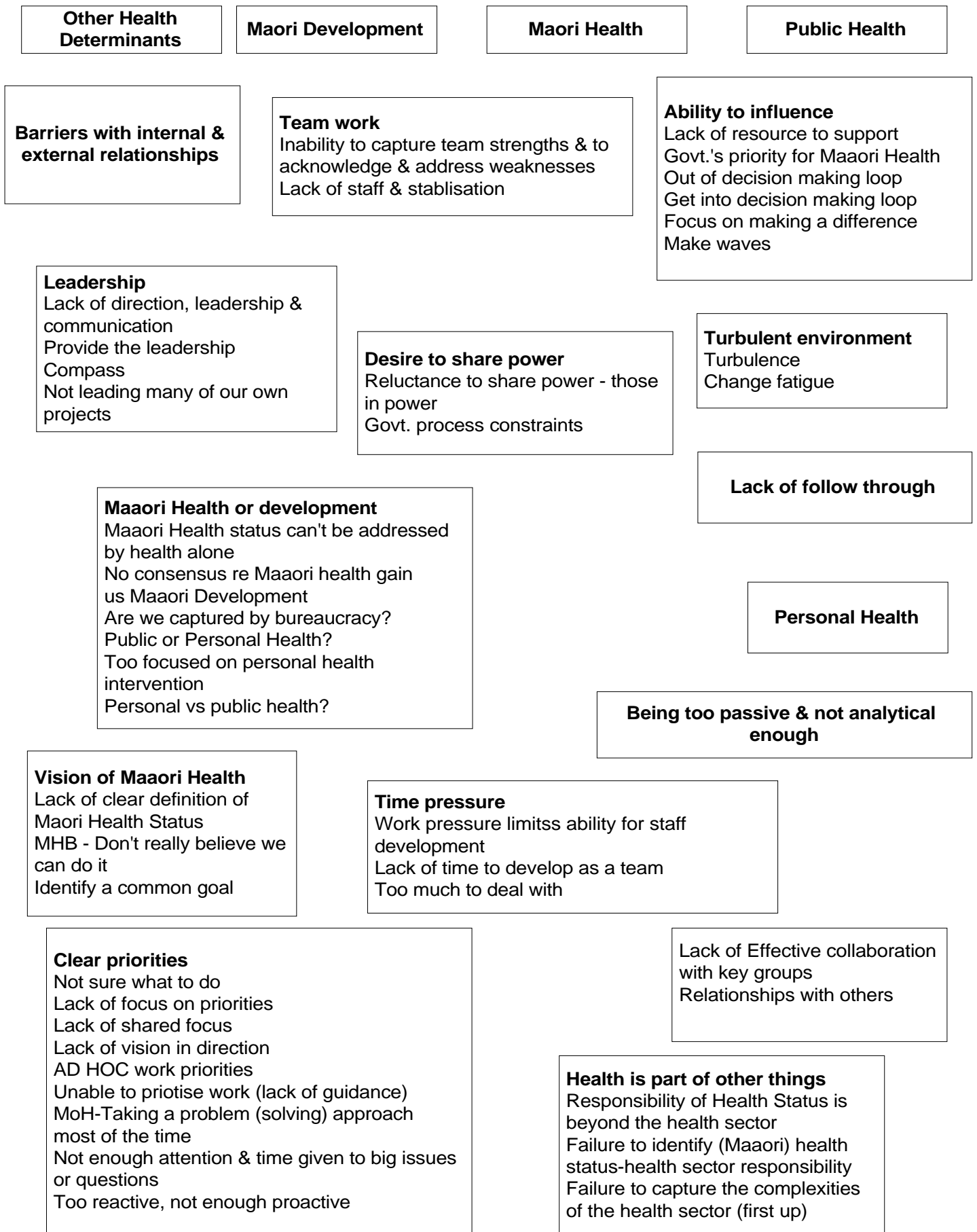


Figure 2 - Priority Areas

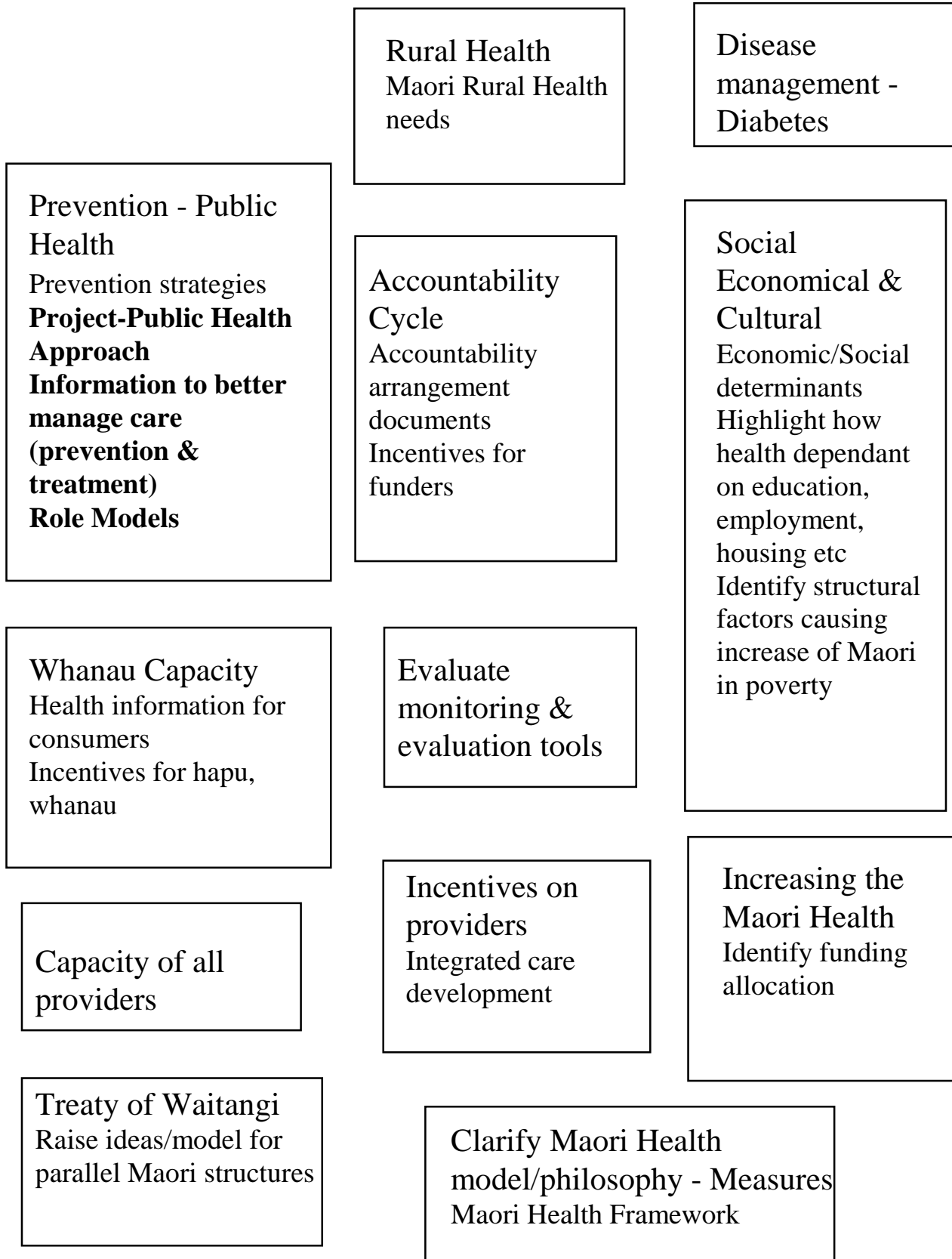


Figure 2 - Priority Areas (con't)

Maori Provider Development
advocate funding (at least 5 years) for
Maori Health providers
Maori provider workforce development

Maori Workforce Capacity
Maori Workforce
NZMC Rep-MoH
Establish Maori advisors in
each Branch of MoH

High Priority Diseases
Biggest Killers
Most Common Morbidities
Diabetes
High Priority Health issues
affecting Maori

Health Service-Access Barriers,
\$, cultural, geographical
-Research, Service utilisation by
income levels

Child & Youth
Youth Health
Maori Youth, Mental Health,
Suicide profile
Child Health
The Future - Nga Tamariki
Tamariki Ora focus yr 1

**Communication & Relationship
& Collaboration**
Maintaining communication with
Providers
Support Maori Providers
Manage relationship with HFA - on
Maori Health
Regular MoH Publications - Health
sector developments
Collaborate with HFA, TPK,
Treasury, Social Services etc...
Stakeholder collaboration
(effective)

**Capacity & Capability of
MoH to respond**
TPK review of MoH

Table 2: Priority Matrix

Priority Area	Realistic	Impact on Māori Health	Quick Visible Results	Alignment	Fundamental Cause	Capitalise on other initiatives	Planning Time	Score
Accountability Cycle	5	4	5	5	2	5	s	26
Developing Māori Models	4	3	3	5	5	4	s	24
Evaluate monitoring & evaluation tools	4	4	3	5	2	4	s	22
Rural Health	3	4	2	3	3	4	l	19
Māori Provider Development	5	4	2	5	3	5	s,m,l	24
Māori workforce capacity	4	4	2	5	3	5	s,m,l	23
Communication, relationship & collaboration	5	3	5	5	2	5		25
Increase Māori Health Pūtea	3	3	1	5	4	4		20
Disease Mngnt	2	5	2	5	3	3		20
High Priority Diseases	2	5	2	5	4	3		21
Incentive on Providers	3	2	2	2	3	3		15
Capacity & capability of MōH to Respond	3	2	3	4	2	3		17
Social, Cultural & Economic	3	4	1	5	5	5		23
Child & Youth	4	5	4	5	5	4		27
Access Barriers	2	5	2	5	4	3		21
Whānau Capacity	3	3	2	5	5	3		21
Treaty of Wāitangi	3	4	3	5	5	3		23
Capacity of all Providers	3	3	2	3	3	3		17
Prevention, public health	4	4	3	4	5	4		24
								0

Scale
 1=low 5=high
 1=no 5=yes
 s=short term
 m=medium term
 l=long term

Figure 3 - Priorities CLD

