

Guidelines for Adaptive Management:

Outcomes of the OzAM 2003 workshop, Brisbane.

Collaboratively developed during an OZAM workshop held on
24-25 July 2003 at the Bardon Centre, Brisbane

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Table of Contents

Introduction	1
Adaptive Management.....	2
<input type="checkbox"/> What is adaptive management?.....	2
<input type="checkbox"/> Important Principles of Adaptive Management	5
Workshop Procedures	7
Adaptive management checklist and guidelines	9
Workshop Evaluation	14
References	16
Appendices I and II	17

Introduction

This is a report from the second OzAM (Australian Adaptive Management Network) workshop held in Brisbane, Queensland on the 24th and 25th of July 2003. The Murray-Darling Basin Commission (MDBC) in conjunction with the University of Queensland's School of Natural and Rural Systems Management used the OzAM forum to consider ways of institutionalising Adaptive Management within the MDBC. Adaptive management has been adopted by the Murray-Darling Basin Ministerial Council to ensure that investment in The Living Murray and other operations can be formally evaluated and optimised.

Thirty national and international practitioners and experts in natural resource management and adaptive management attended the OzAM workshop (Appendix I). The principal aims of the workshop were to evaluate how the MDBC management currently operated relative to an adaptive management framework, and to develop a checklist and guidelines that can be used at multiple levels to implement adaptive management within the MDBC. This workshop report details the procedures and outcomes of the two-day workshop. It is accompanied by a summary document, which introduces adaptive management and presents a "checklist" for adaptive management derived from the workshop activities.

Adaptive Management

■ What is adaptive management?

What is the difference between adaptive management and management? There are many specific definitions of adaptive management. However, a central theme is that adaptive management provides a framework that emphasises learning from management actions. Being adaptive and responsive in management is critical in complex and unpredictable environments. Rarely do managers have perfect knowledge to base management decisions on, yet decisions have to be made. An adaptive management framework accepts and embraces this and converts the management action / decision into a “trial” or series of trials that are evaluated so that future management is improved; learning is central. The main steps in adaptive management are summarised by the questions (see Fig 1):

1. What is the current state of affairs?
2. Where do we want to be in the future?
3. How do we get there?
4. How do we know if we are getting there?
5. What have we learnt?
6. How can we change?

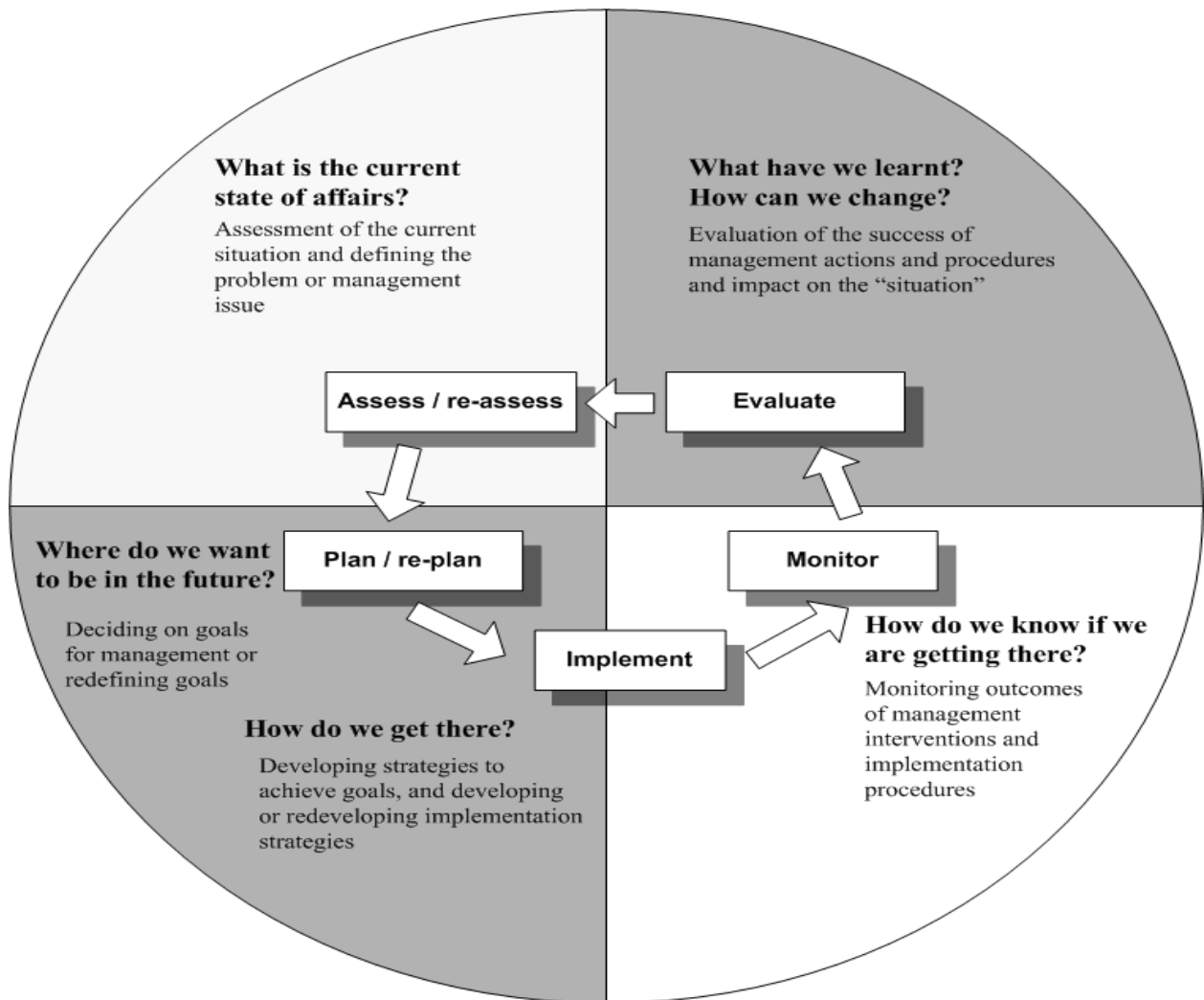


Figure 1. The main stages in an adaptive management cycle.

More formal definitions have been expressed in the natural resource management, adult learning and problem solving literature, such as:

"Adaptive management is a cyclic, learning-oriented approach to the management of complex environmental systems that are characterised by high levels of uncertainty about system processes and the potential ecological, social and economic impacts of different management options" (Jacobson, 2003).

Adaptive management is often represented as a circle to emphasis the closing of the management cycle through evaluation and reassessment of the situation. This is an important transition from linear thinking in management and planning.

Management activities and decisions are nested within larger systems. These may include the organisational, political, social and physical environments. Thus the

adaptive management system is nested within a larger adaptive organisational system that also must be considered (Fig 2).

The distinction between the adaptive management cycle and the larger organisational system is useful for emphasising the strategic and tactical decisions related to manipulating the resource, while the organisational system can be thought of as the other activities that need to occur to permit management to happen. For example, manipulation of hydrological flows and duration of flooding is a management activity at the adaptive management cycle level. Communications and reporting procedures are activities at the organizational level. Both these need to be adaptive.

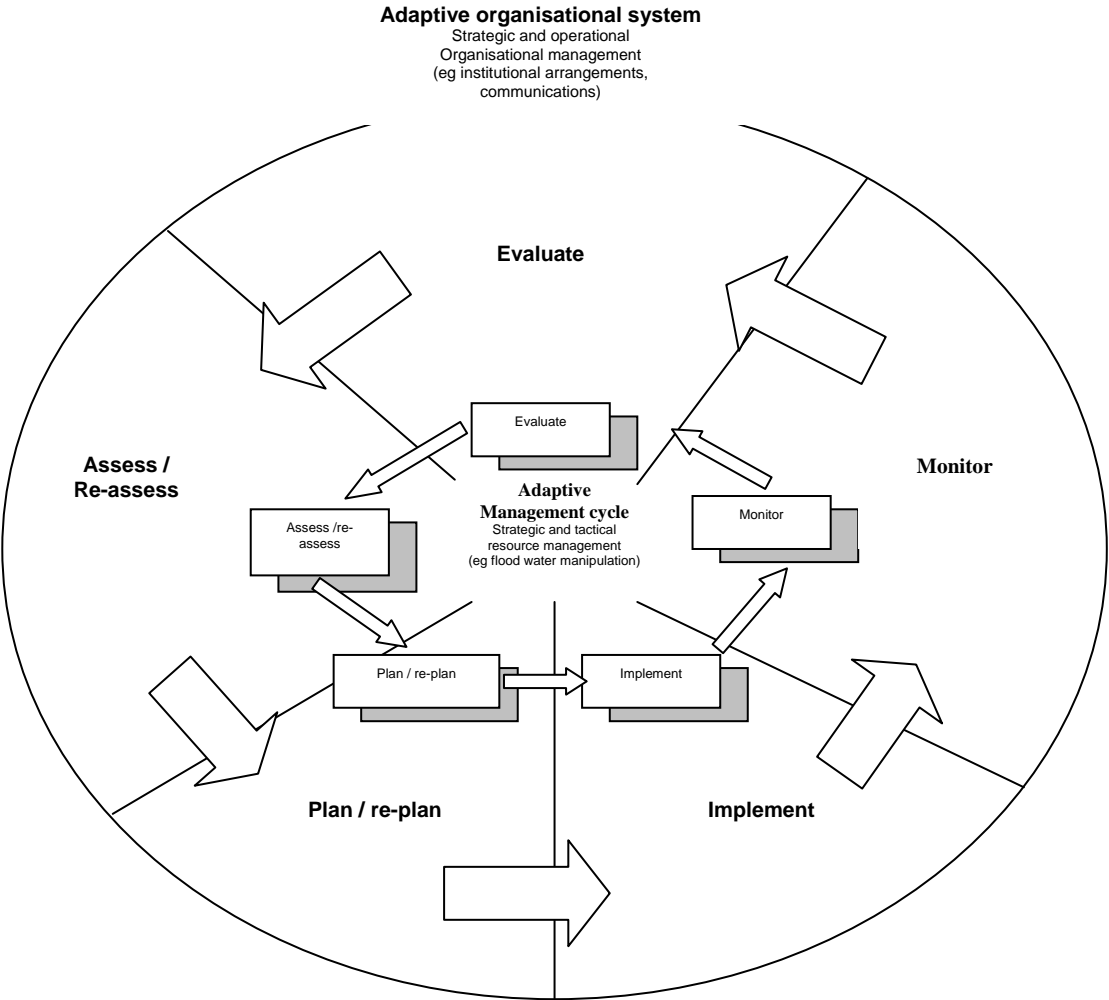


Figure 2. Adaptive management at the resource management level is nested within a larger organisational system.

■ Important Principles of Adaptive Management

The adaptive management approach has become a useful alternative to deal with complex systems and uncertainty. Natural systems are complex, and their management takes place against a dynamic background where change is continuous and unpredictable. Walter and Holling (1990) explain adaptive management as treating management strategies and policies as experiments that are conducted to learn more about the ecosystem's processes and structures. The results are then used to refine the strategies and policies over time. Adaptive managers therefore have the combined roles of defining desired realities, generating options and applying measurements that allow adjustments to be made to the management strategy.

Adaptive management requires collaboration across disciplinary and professional boundaries (Dovers and Mobbs, 1997) and therefore forces the creation of linkages between science, management and policy. It leads to greater participation and stakeholder engagement, and improves reciprocal valuing of different forms and sources of information. This integrative nature of the adaptive management approach has become a useful framework for linking science, policy and management.

The adaptive management process provides opportunities for "learning-by-doing". Such learning reveals how ecosystems respond, what the managers are doing, which strategies are successful, and whose interests are served (Lee, 1999). Learning is information intensive and requires active participation from those most likely to be affected by management or policies being implemented (Lee, 1999). This again stresses the integrative nature of the adaptive management process.

Information gathering and learning through evaluation are effective ways for an ongoing process of knowledge creation. However, the cost-effectiveness of adaptive management as a mechanism for this process will depend on the institutional arrangements to allow this to happen. Collaborative learning environments or forums are needed to transform findings into usable knowledge for different types of users and their goals (Bosch et al, 1996). Sharing protocols are required to avoid information sharing barriers such as mistrust between stakeholder groups, and the exercising of power by professionals to defend their own fields. McLain and Lee (1996) regard the creation of "an institutional framework that promotes the coordination of management activities undertaken by many loosely connected, but interdependent institutions" as an essential problem to address.

A valuable contribution to the creation of new knowledge would come from the opportunities that adaptive management provides to detect "surprise" through systematic monitoring. Lee (1999) regards "surprise learning" as essential to expand the boundaries of understanding. The highly complex nature of natural systems suggests that even small or simple interventions may yield surprising outcomes

through integrated assessment, which would add significantly to the creation of new knowledge about systems and their management.

Table 1. *A summary of main principles of what adaptive management is, and what it requires (based on workshop outcomes and literature)*

Adaptive Management is:	Adaptive Management requires:
<ul style="list-style-type: none"> • An approach when managing within uncertain environments, • “Learning by doing” (Walters and Holling 1990), • Treating management interventions as experiments for testing and improving, • Problem focused management, • A mechanism for knowledge building and co-learning (including surprise learning). 	<ul style="list-style-type: none"> • Clarity of the problem and identifying whose problem it, • Participation and stakeholder engagement – involving all those who affect or are affected by your issue, • Continuous involvement of stakeholders in the adaptive management cycle, • Collaboration between disciplinary and professional boundaries, • Making sense of knowledge by all those involved, • Suitable institutional arrangements for adaptive management to happen.

Workshop Procedures

The 2003 OzAM workshop was introduced by Prof. Ockie Bosch (University of Queensland) with an outline of Adaptive Management (summarised above). This was followed by a presentation by Catherine Allen (Charles Sturt University) who provided a background to the OzAM network and the previous year's workshop. Following this general introduction Tony McLeod, Mark Siebentritt and Leanne Wilkinson (all from the MDBC) provided an overview of the operations and activities during the 2000 flood event around Lock 5 on the River Murray in South Australia (sessions 1 and 2). The case study was used to provide some detail and context on the way that MDBC operations have been conducted, and to provide an example for the workshop to focus on. The remainder of the workshop (sessions 3 to 6) was aimed at using the collective experience and skills of the participants to develop a checklist that could be used by the MDBC and any other organization as a tool to improve adaptive management. The aim for the MDBC in particular was to use the expertise available to develop guidelines (in the form of a checklist) that could be used to help institutionalise Adaptive Management into operations and on-ground works.

The working sessions for the workshop were organised using steps in an adaptive management cycle, as indicated in Figure 3. The steps used were those of Nyberg (1999) because some members of the MDBC were already familiar with his framework. Participants were divided into three groups and in each session, they were assigned a step in the adaptive management cycle (eg assess, plan, etc.) to work on. Participants first were asked the questions "what are the barriers or requirements to make adaptive management work at this step of the cycle". The individual outcomes from this brainstorming exercise were pooled and the groups built these into a diagram (using coloured cards) mapping out the factors required to achieve that step. The procedure used to develop a group diagram was based on a Logical Framework Approach (see AusAid 2000 for details). The resulting group diagram indicated all factors that were perceived to contribute to (or inhibit) that particular step of the adaptive management cycle. These diagrams were then further analysed for key points and themes for incorporation into a "checklist".

After the first session (assess, design), one group stepped out of each session to synthesise findings from the diagrams produced in the previous session. By the final sessions, after some people had left, the small groups combined into larger ones. The groups responsible for reviewing the diagrams from previous sessions identified a number of key generic points that could be regarded as essential for inclusion in a

final checklist that can be used to help institutionalise the adaptive management approach.

An evaluation of the workshop was conducted in the final session to gain an appreciation of how each of the participants evaluated the two days. All participants wrote down comments that summed up the three best features and three features of the workshop that could be improved next time.

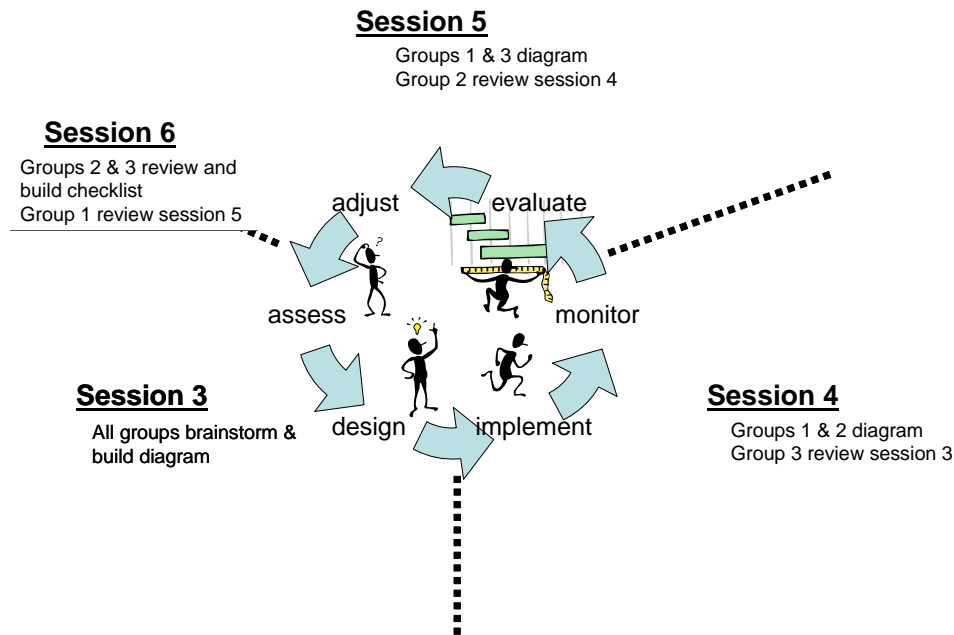


Figure 3. Working sessions 3 to 6 of the workshop based on Nyberg's (1999) model of adaptive management used to break up the activities of the groups.

Adaptive management checklist and guidelines

The primary aim of the workshop and subsequent consultancy was to develop a checklist and guidelines to assist in the institutionalisation of adaptive management. These were synthesised from the group diagrams produced by the workshop participants for each step in the Adaptive Management cycle. The content of each diagram (see Appendix II) captured the factors seen as contributing to or inhibiting adaptive management. Since there was not enough time in the workshop to fully develop a checklist based on the outcomes of these diagrams, a final checklist including some new content was developed subsequently from these diagrams by the authors of this report.

The checklist is intended as a guide to understand the process of adaptive management and also to identify tasks that need to be carried out for each stage of the adaptive management cycle to be successful. The checklist is not an exhaustive recipe to be followed. As Nyberg (1999) has said “adaptive management is like painting: knowing the steps is important, but it isn’t enough to create great art”. When using the guide it is important to read all components to understand where you are within the cycle. Similarly, check for linkages and relationships to previous and following actions. It may be that several steps are occurring simultaneously.

The checklist has three columns. The first indicates the major steps of adaptive management, stated as questions. The second column is the checklist defining the most essential factors involved in each stage. We have then provided more detailed guidance and prompts in the third column that would usually be necessary to complete the second column. These offer advice on the task, but as each circumstance and management issue is distinct we cannot be prescriptive as to how to carry out these tasks.

TASK	CHECKLIST		GUIDELINES
<p>ASSESS</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px 0;"> <p>What is the current state of affairs?</p> </div>	<p>Have you identified/clarified the real management issue? OR Is the management issue still current if it has been identified in the past?</p>	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ It is important to understand the system in which you are operating in order to identify the core issues and interconnections among them (cause-effect models, mind mapping, considering historic operating rules could be useful). ▪ Identify and engage those stakeholders who need to be involved in issue identification in this analysis, to gain the benefit of their insights and ensure ownership of the adaptive management process. ▪ Determine the extent (appropriate level) and purpose of stakeholder engagement. ▪ Develop a process for effective stakeholder engagement and conflict resolution.
	<p>Have you identified whose issue it is?</p>	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ It is important to identify who has responsibility for each aspect of the issue, and who has other reasons for involvement, including regulatory roles, resources. ▪ As part of the system analysis, allow stakeholders to discover their relationships to the issues. ▪ Identify who cares about the issue even if it is not directly their responsibility to solve.
	<p>Have you assessed the current state of the issue, in its biophysical, economic and social dimensions?</p>	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Compile baseline information to enable you to identify the current state of affairs, using existing knowledge. ▪ Decide on data needed through discussion with stakeholders, and obtain it. ▪ Identify uncertainties in the system. ▪ Assess current level of understanding of the issue within the community.

<p>PLAN</p> <p>Where do you want to be in future?</p> <p>Treat your planned action as a hypothesis for</p>	Do you know what you want to achieve?	<input type="checkbox"/>	<ul style="list-style-type: none"> Identify desired outcomes for each of the different stakeholder groups, including your own organisation, as they could differ. It is important to ensure the objectives are clear and measurable.
	Have you identified strategies for achieving these outcomes?	<input type="checkbox"/>	<ul style="list-style-type: none"> Identify possible management interventions with stakeholders, as options for an action plan. Define criteria to evaluate the options for intervention (including costs, benefits, availability of resources, capacities). Consider any risks and potential hazards associated with options (social, economic, biophysical). Use appropriate evaluation tools (eg cost-benefit analysis) then choose the most promising options.
	Have you developed a plan for how these options will be implemented?	<input type="checkbox"/>	<ul style="list-style-type: none"> Identify the people who will be responsible for implementing the option, and develop implementation plans with them to ensure ownership and efficiency. Include responsibilities, contingency plans and resources required in your plan.
	Does your implementation plan have an appropriate level of public support?	<input type="checkbox"/>	<ul style="list-style-type: none"> Develop a public communication plan and feedback procedures.

	Will you know when you have achieved the desired outcomes, and whether your implementation went according to plan?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Design a monitoring program, involving those who will conduct the monitoring and those who will benefit from the information. ▪ Identify what to monitor – to know outcomes of your management actions, whether the implementation process went according to plan, and public responses to the intervention. ▪ Develop monitoring protocols if required (eg sharing of data, access to private property, handling of IP). ▪ Where possible, ensure consistency with existing monitoring programs. ▪ Consider how the monitoring data will be used and what the indicators of success or progress are. ▪ Assess what baseline information is relevant to the monitoring, available, or needs to be initiated. ▪ Establish / prepare a data management system.
IMPLEMENT Just do it!	Do the people who need to know understand the implementation plan?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Check communication among internal and external stakeholders, referring to the implementation and communication plans.
	Has anything happened to change the implementation plan?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Check against the implementation plan. ▪ Be ready to address contingency plans.
	If the implementation plan needs changing, have you updated the monitoring plan accordingly?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Check against the monitoring plan.
	Are all the resources in place to implement?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Check against the implementation plan; assemble missing resources if necessary.
MONITOR Find out how well it worked	Do the people who need to know understand the monitoring plan?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Check against monitoring plan; improve communications if necessary. ▪ Ensure monitoring protocols are followed. ▪ Ensure monitoring is co-ordinated between different agencies and individuals involved in data collection.

	Has anything happened to change the monitoring plan?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Check against monitoring plan. ▪ Be ready to address contingency plans.
	Are all the resources in place to monitor?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Check against monitoring plan; assemble missing resources.
<p>EVALUATE (AND RE-ASSESS)</p> <p>How did your management 'hypothesis' work out?</p> <p>Adapt</p>	Have you identified who should be included in evaluation and re-assessment steps?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Include those who will benefit, those who can help make sense of the monitoring results, and those who need to carry the learnings into future cycles.
	Have you achieved the desired outcomes? Do the monitoring results indicate you are on the right track?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Find explanations for outcomes, collaboratively. ▪ Test your management 'hypothesis'. Can you improve it?
	Did the implementation and monitoring processes go according to plan?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Identify what could be done better next time round.
	Is there anything you need to change?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ Do you need to redefine the management issue (you may even decide it is no longer an issue and wind up the activity). ▪ If necessary, restate the management objectives/desired outcomes. ▪ Adjust management strategies on the basis of the evaluation. ▪ Adjust implementation plans, monitoring plans, and indicators of success if necessary. ▪ Is there the capacity to adjust?
	Have you a way of capturing what you have learnt?	<input type="checkbox"/>	<ul style="list-style-type: none"> ▪ To avoid re-inventing the wheel, it would be good practice to capture the learnings in an accessible form (eg a data base, decision support system, manuals) so that newcomers to your team can join the process easily, and so that others, elsewhere, can benefit from your findings.
YOU ARE NOW READY TO START THE NEXT ADAPTIVE MANAGEMENT CYCLE			

Workshop Evaluation

The full list of evaluation comments is presented in the table below. In general there was a very positive response towards the location and the mix of participants, which people felt was conducive to learning and sharing of ideas. A common thread among the negative comments was a lack of time spent clarifying and defining what was meant by Adaptive Management and that there was too much focus on generic discussion. Balancing discussion of definitions and generic versus specific cases is important and perhaps reflects different expectations of participants for the purpose of the workshop. Perhaps this could have been communicated more clearly prior to the workshop. Clearly most participants enjoyed the networking opportunity and exchange of ideas.



Not having a chance to get to work as a large group before working in small groups – could have “defined” adaptive management first better.

Would have been better to define each stage of adaptive management cycle in a logical sequence.

Facilitation could be improved. Targeted discussions would have been better than general discussions → time constraints.

Interpretation of checklists difficult.

Did the MDBC learn enough specific to them.

Too close to reinventing the wheel.

Ideally should have a good mix of backgrounds within groups e.g. not all scientists in one group.

Workshop exercises vague at times – too much time on exercises without anchoring them to cases.

Needed a clearer definition of the various



Cool. The weather in Brisbane. The wine at dinner.

Good mix of perspectives/skills.

Valuable opportunity to unpack a misused buzz word.

Direct interaction with people grappling with similar problems using different approaches, and the commonality of the experience is invigorating.

Location great! Format encouraged discussion.

Good learning across science/social science paradigms.

Learned lots! Enjoyed participants and their background.

Enjoyable, interesting conversations.

Broad spectrum of opinions and expertise and background.

<p>adaptive management definitions at the start of the workshop.</p>	<p>Great group of participants. Good capture mechanism for ideas.</p>
<p>Not enough group discussion.</p>	<p>Brainstorm good.</p>
<p>More full group discussions – 1½ day → tighten, shorter. Day 1: evening session 1 & 2 (&3?) Day 2: remainder.</p>	<p>Good to get practitioners together. Good to have a real case study.</p>
<p>More change in types of activity to keep interest and energy high.</p>	<p>Diversity of minds.</p>
<p>Need context for adaptive management.</p>	<p>Impressive participants.</p>
<p>Discussion contained within context of single experiment/event. Assumption that start with “assess” every time.</p>	<p>The use of the case study. Openness of MDBC in inviting criticism of something they have probably done better than most the participants.</p>
<p>Adaptive management was workshopped in a reductionist/(segmented) way. There could have been much more discussion of how when and why adaptive management is employed in an organisation and how it is integrated into the existing strategy/policy environment.</p>	<p>Small group workshop sessions – 4 → 5 people groups tended to work better than 8 → 10.</p>
<p>Card method is not cost effective and lacks quality assessment.</p>	<p>Good venue. Good catering. Friendly setup. Good method for getting participation i.e. use of cards, butcher paper etc.</p>
<p>Too much on general principles rather than moving debate further. Should have spent more time at beginning establishing understanding of what we mean by adaptive management.</p>	<p>We developed a useful checklist. Lots of time for networking. Venue was good. MDBC support. UQ support – fantastic.</p>
	<p>Good, better best. Never let it rest ‘till your good is better and your better best.</p>

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Appendices

Appendix I **Record of attendees at OzAM workshop**

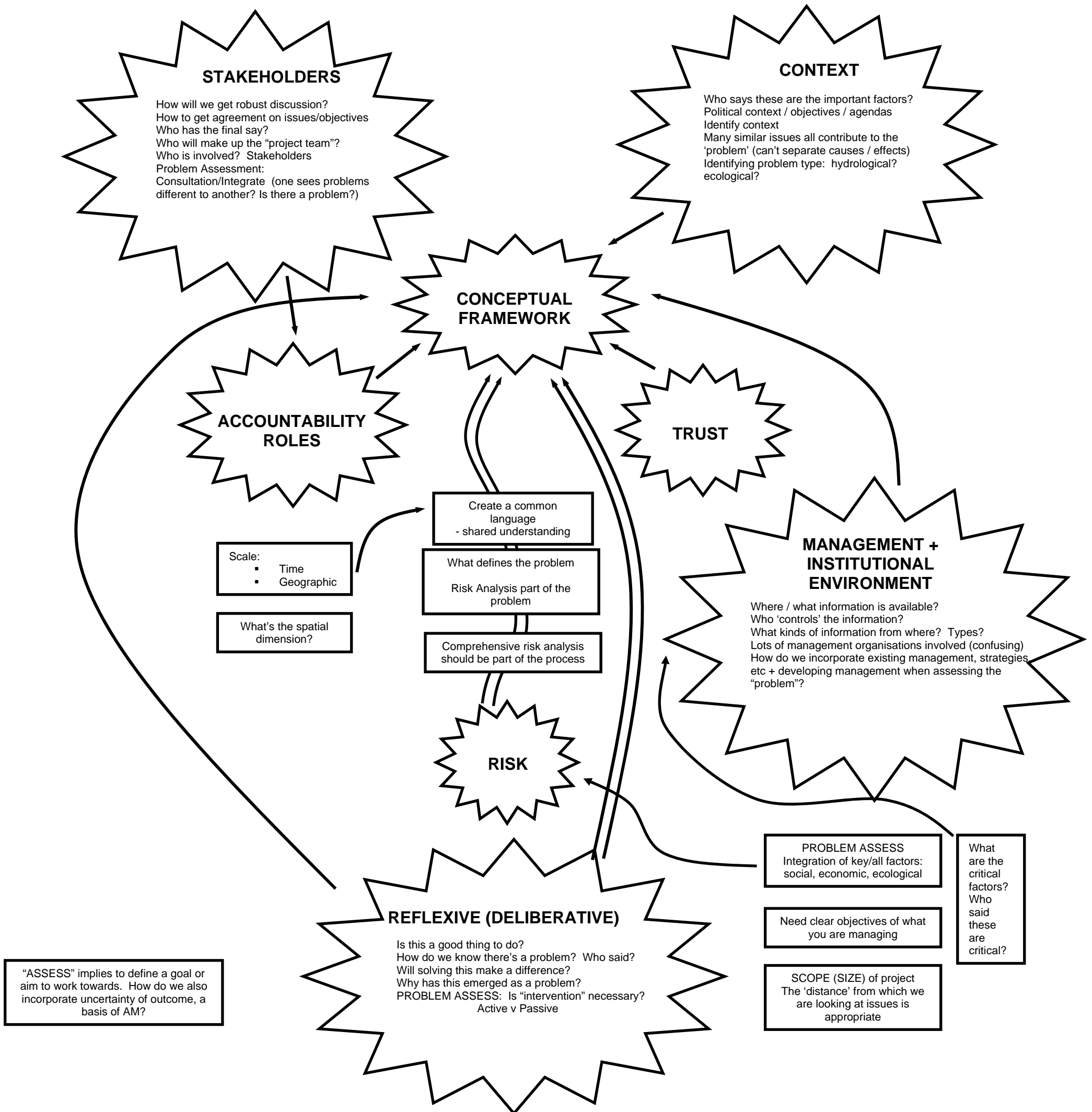
Appendix II **Group Diagrams of Factors Influencing Adaptive Management**

Transcripts were captured electronically from poster-sized diagrams and are presented, with a synopsis, below. Each synopsis contains key elements in bold. During the development of the final checklist constant reference was made to the original workshop diagrams and these summaries to ensure that the final product reflected the participant's ideas and insights.

Appendix I

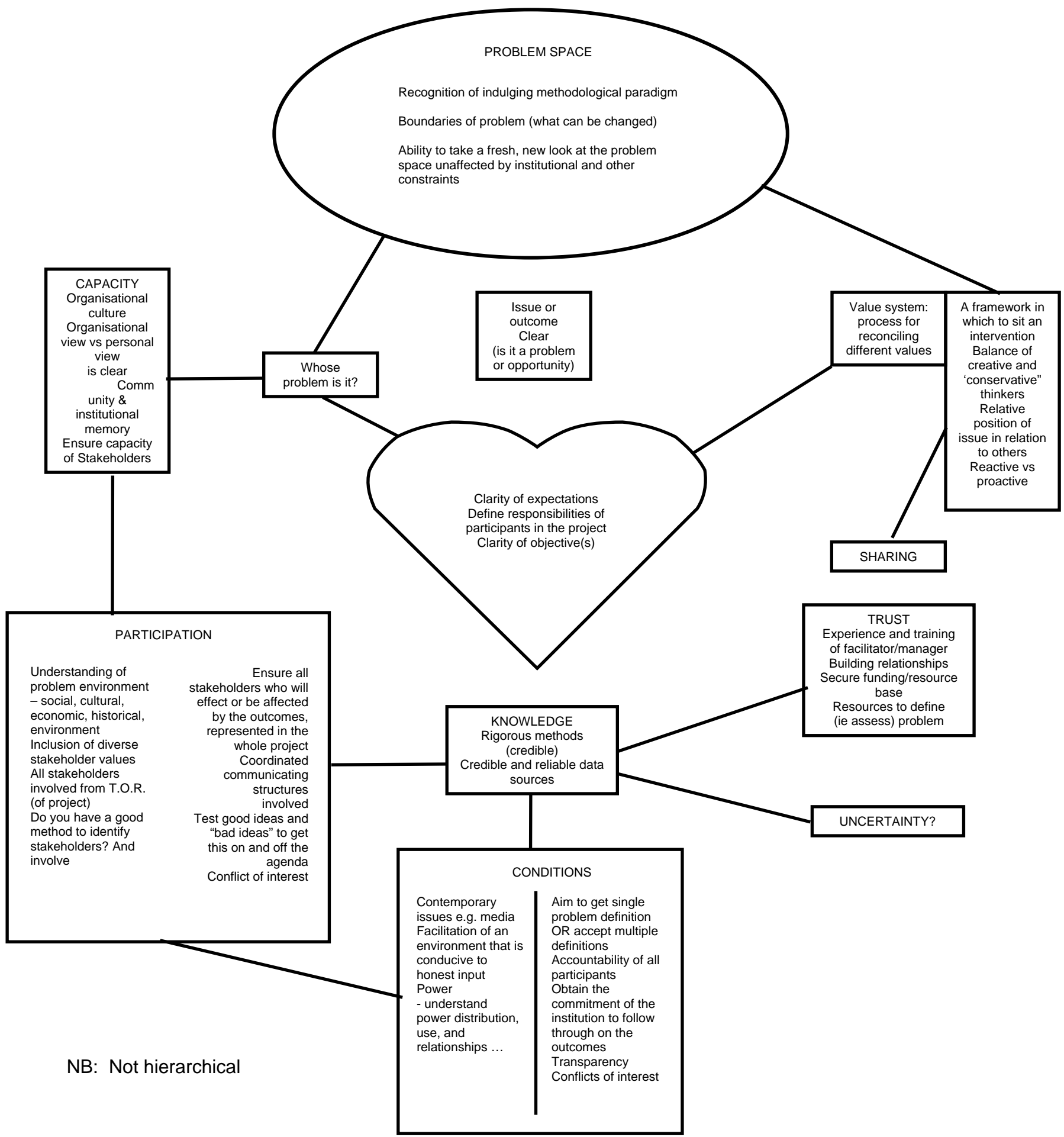
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ASSESS (group 1)

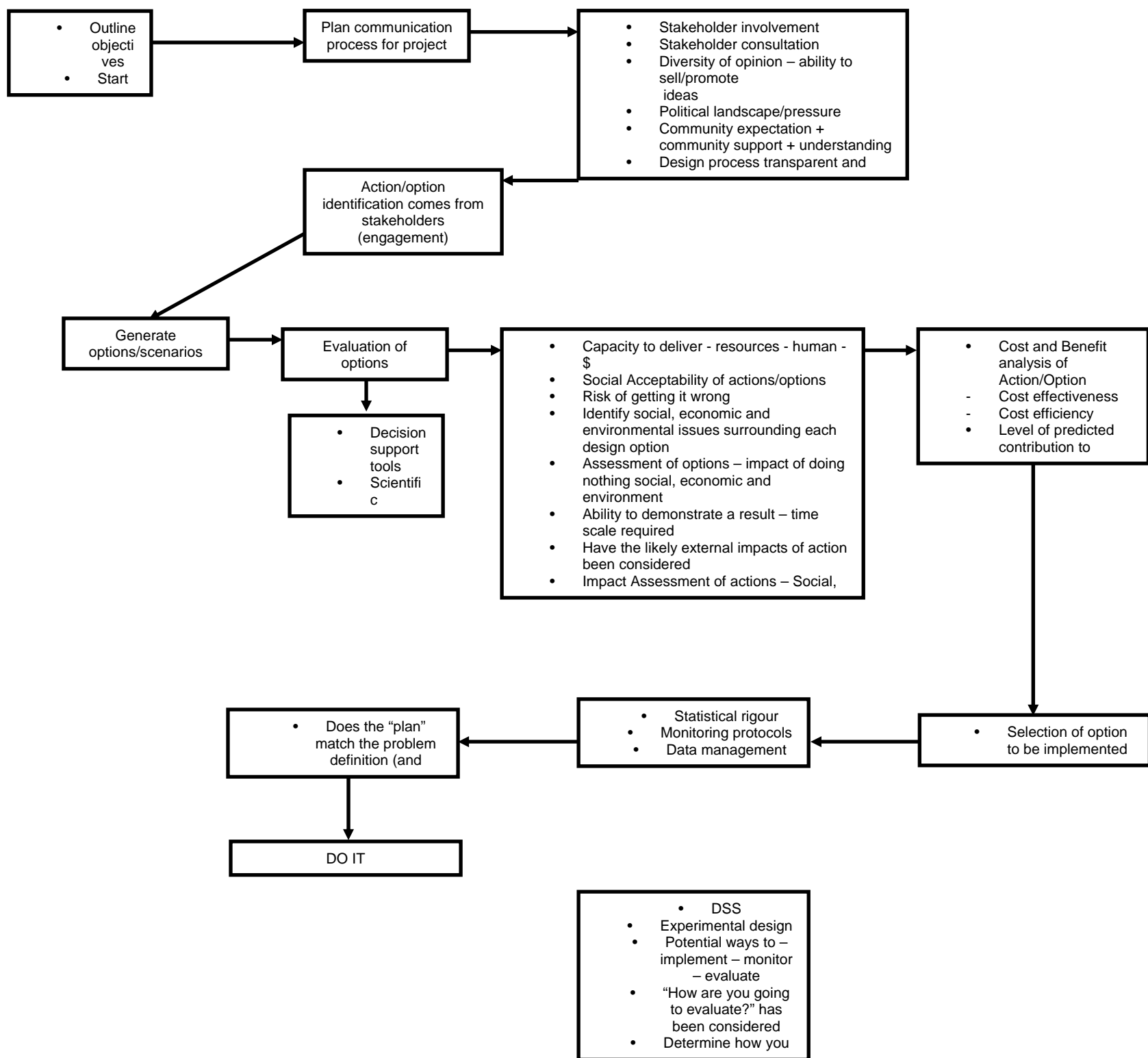
This group highlighted **stakeholder participation** and associated **accountability** roles, and the importance of the **context** including the management and institutional environment. They advocate a conceptual framework, and a deliberative process. The issue of **risk** is considered, and how problems should be assessed in terms of **social, economic and ecological** dimensions of the issue.



NB: Not hierarchical

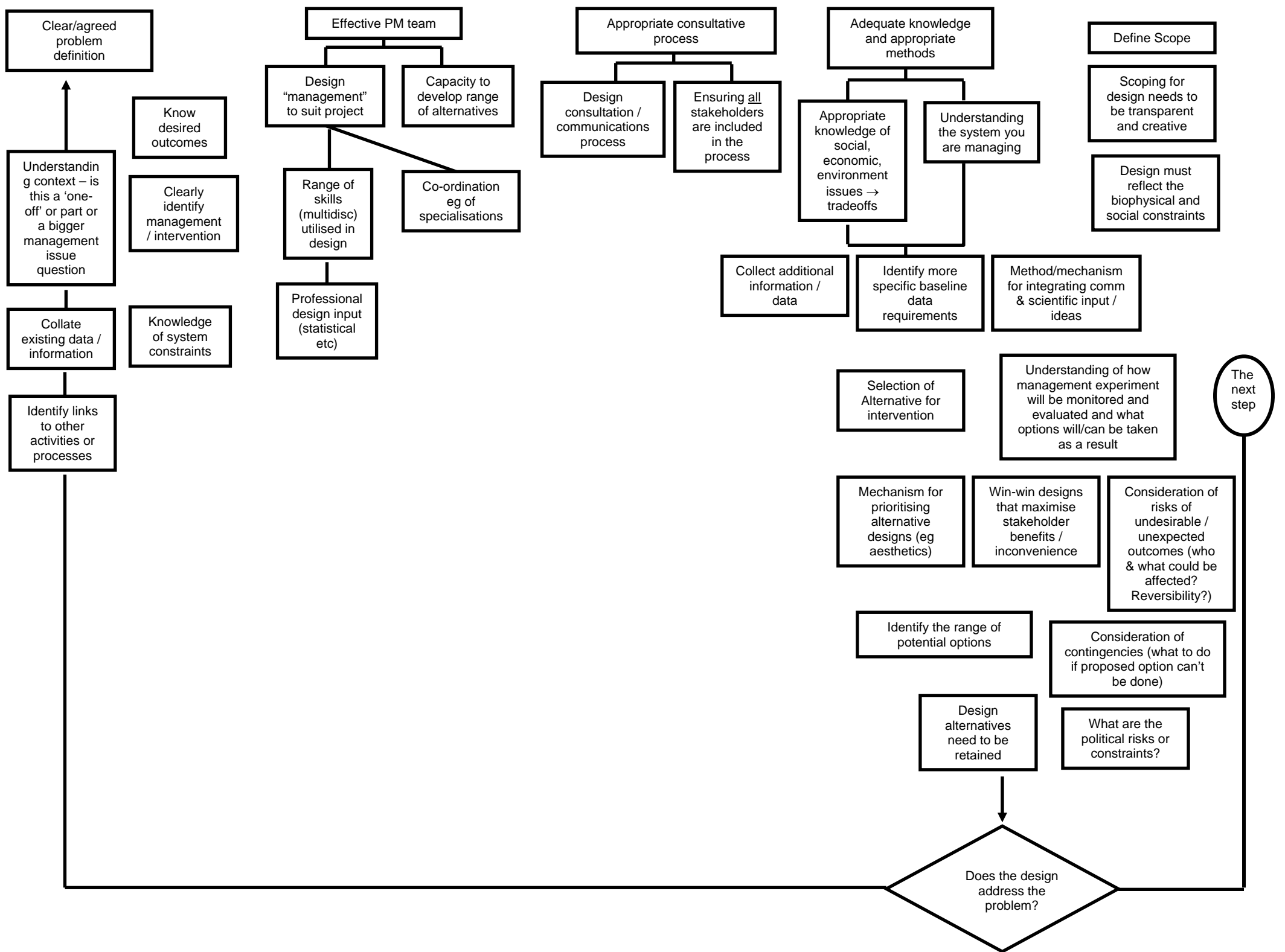
ASSESS (group 3)

The literal heart of this diagram is **clarity of expectations, objectives and responsibilities**. This group highlights **participation** by all stakeholders, to ensure inclusion of diverse **stakeholder values**. They are interested in **whose problem** it is, as well as emphasising the importance of the **boundaries and scale** of the problem. They also highlight the need for all stakeholders to have sufficient **capacity** to participate effectively, and **organisational culture** as an aspect of capacity.



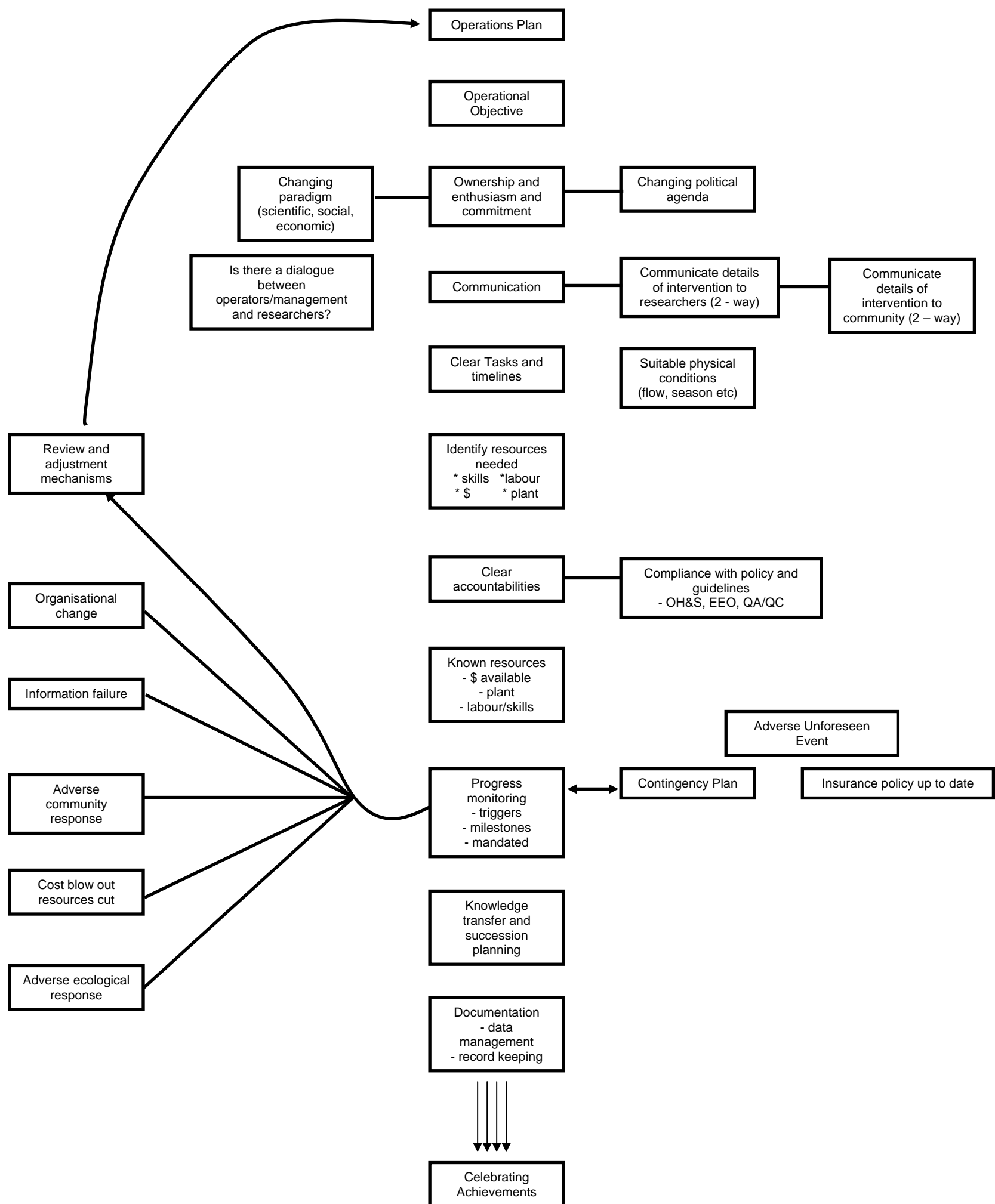
DESIGN (group 1)

This group arranges its elements of planning into useful steps, beginning with the **objectives, communication and stakeholder involvement**. This participation assists in the generation and **evaluation of options**. They emphasise the importance of the **capacity to deliver**, listing important factors. They advocate a **cost-benefit analysis**. As a check, they ask whether the **plan matches the problem definition and stakeholder expectations**.



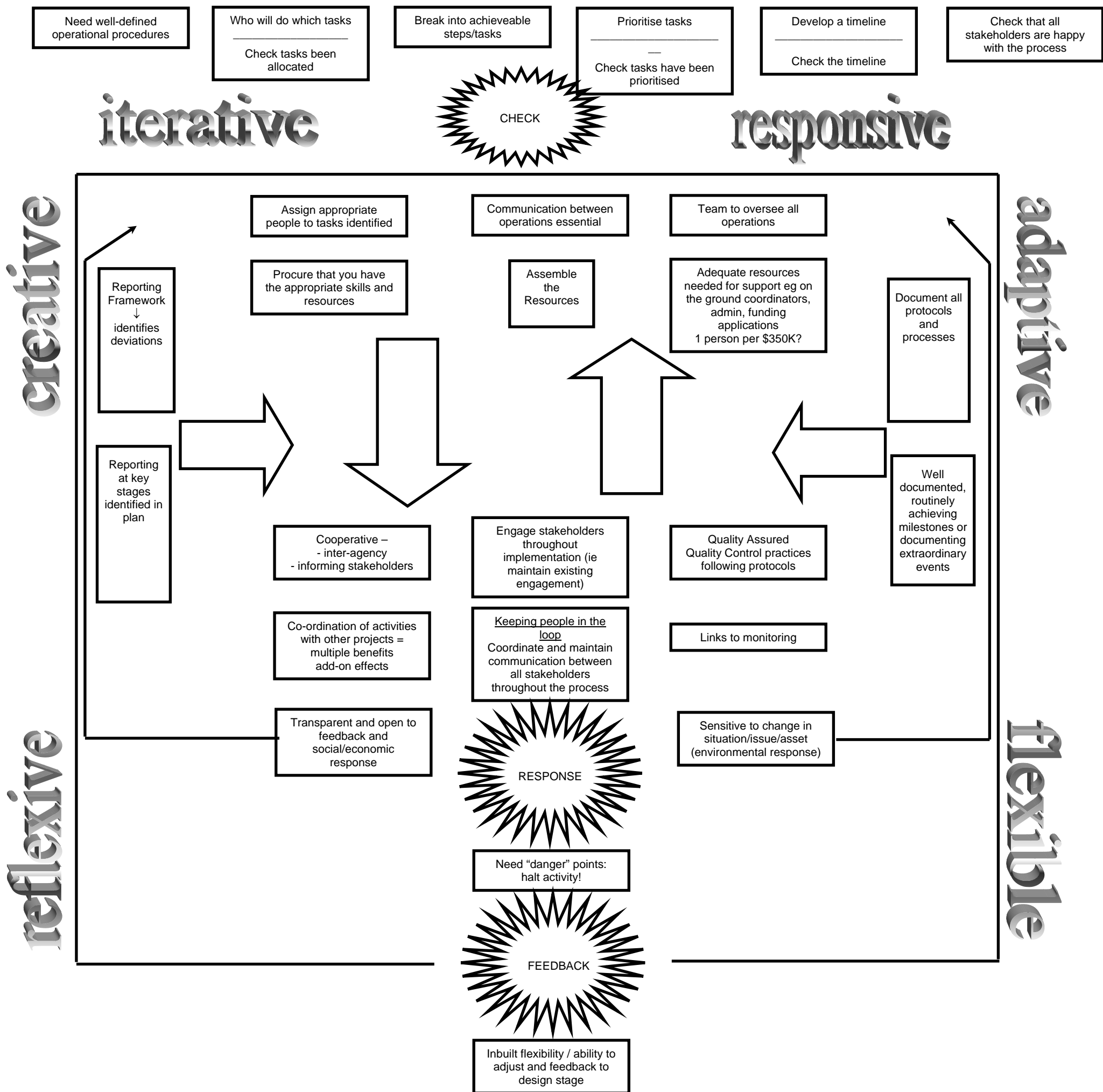
DESIGN (group 2)

This group also starts from assuming that you need to know the **desired outcomes**. They emphasise that an effective **team** needs a **capacity** to develop a range of **alternatives**. This will require **adequate knowledge** of **social, economic** and **environmental** issues. They identify the importance of understanding how the management experiment will be **monitored and evaluated**. They also recognise the need for an appropriate **consultative process**. A key question for this group is '**does the design address the problem?**'



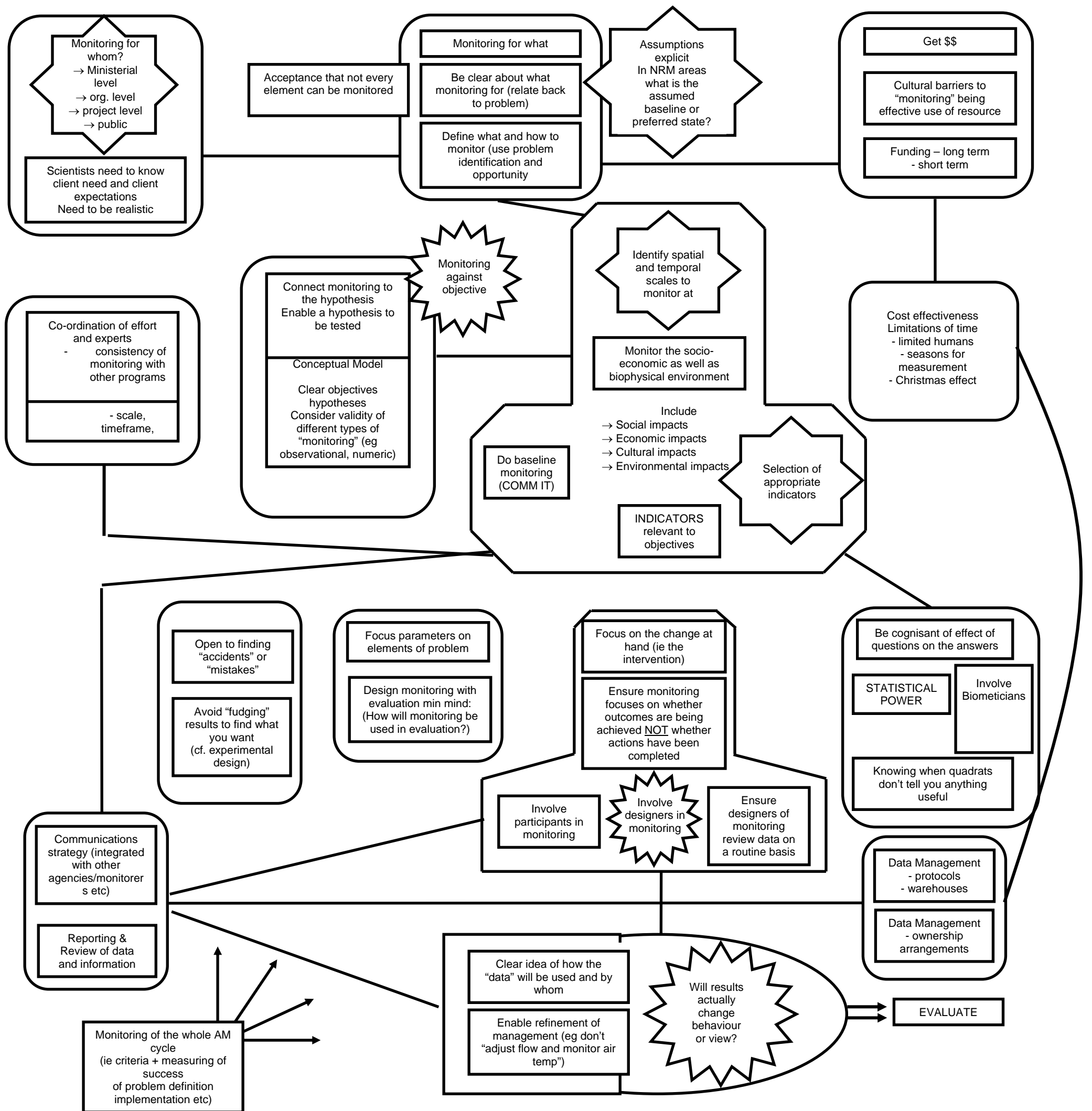
IMPLEMENTATION (group 1)

For this group, starting with a clear **operational plan** that is owned by the stakeholders, communication, identification of resources needed and handling contingencies are pre-requisites for implementation. This group also anticipates later steps in the Adaptive Management cycle by including **monitoring**, **review and adjustments** to the operational plan, and the importance of documenting learnings for knowledge transfer. They remember to celebrate achievements, an important way of maintaining momentum in participatory processes.



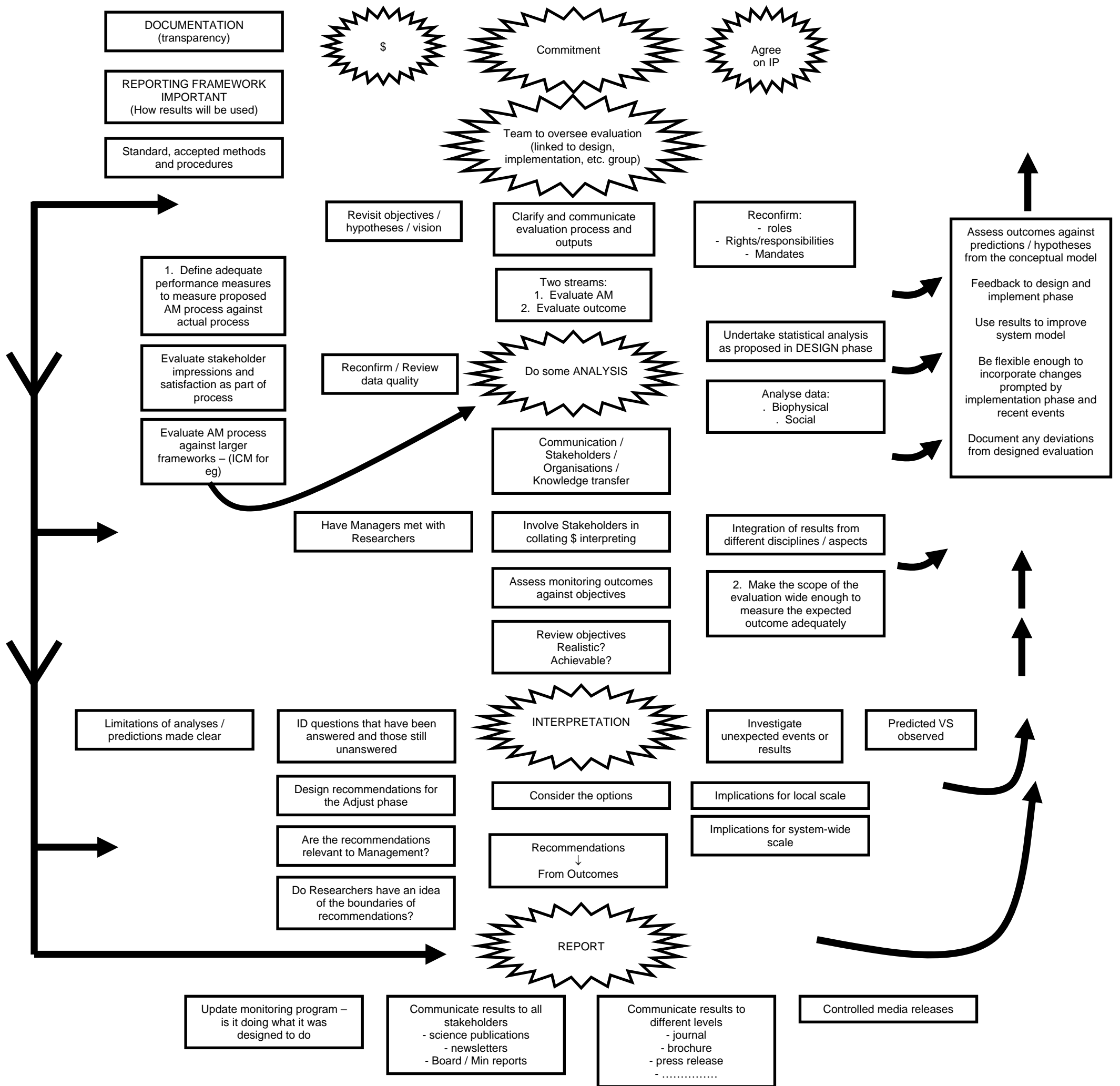
IMPLEMENTATION (group 2)

This diagram starts with operational requirements such as procedures, **who will do the task**, **prioritising** the tasks, **timelines** and **stakeholder satisfaction**. Features of an adaptive management cycle surround the description of an implementation process which features responses (contingencies) and feedbacks. The group notes the need for a **team approach**, with appropriate **skills and resources**, **communication**, **engaging stakeholders** throughout implementation, and **coordination** of activities with other projects. It provides for **links to monitoring**, and advocates **documenting** all protocols and processes.



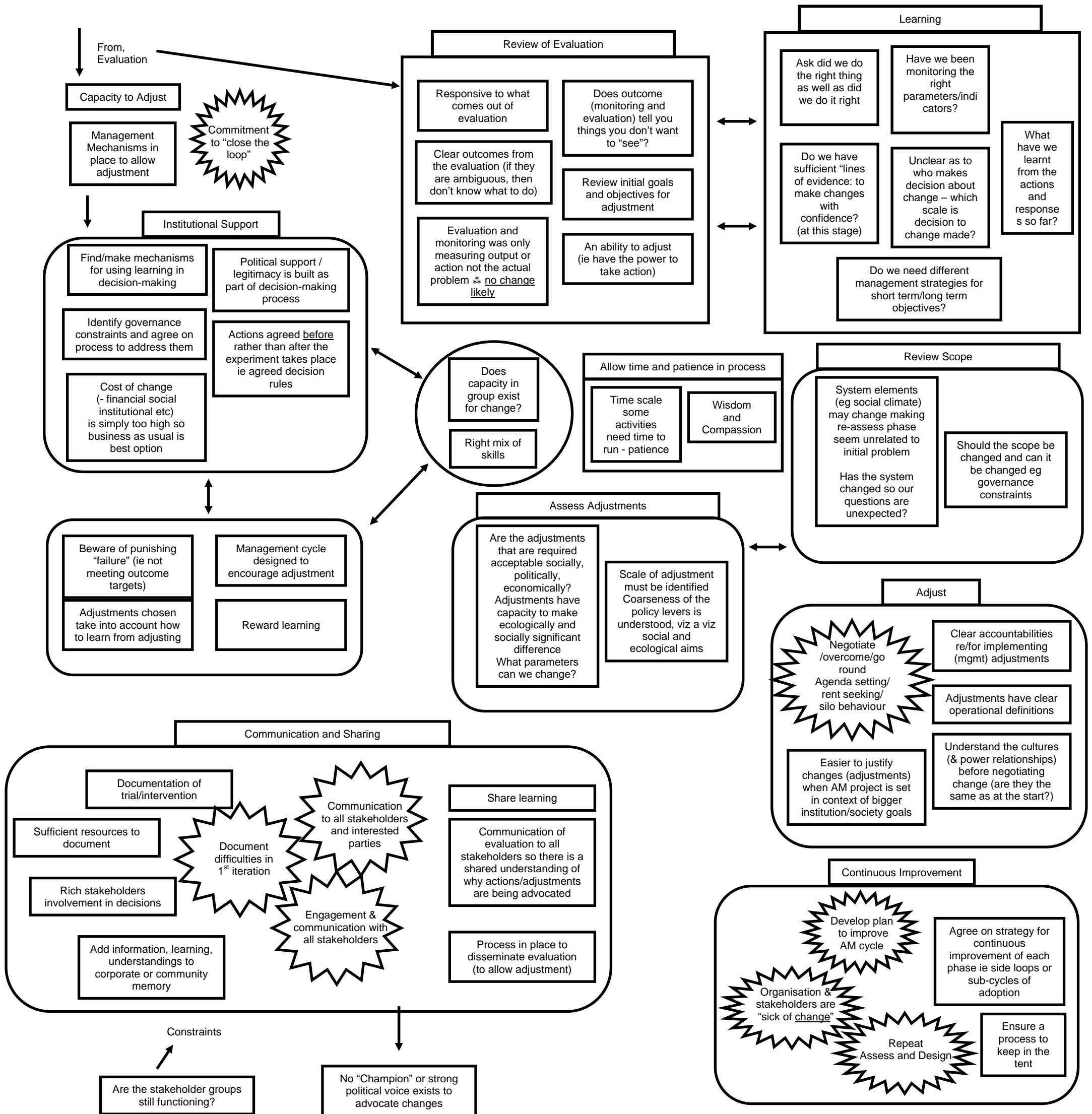
MONITORING

The group considers **who** and **what** the monitoring is for. There is acceptance that not every element can be monitored: what is important is that monitoring should **enable the management 'hypothesis' to be tested**. They expect to monitor the **social, economic and biophysical** environments (outcomes), and the **success of the entire Adaptive Management cycle** (process) against **criteria for success**. They see the value of accidental findings and learning from mistakes. Funding, time limitations, and cultural barriers to monitoring are important to what is achievable. They anticipate the next step, arguing that the monitoring should be **designed with evaluation and behaviour change in mind** (how will the monitoring be used in evaluation? Will results actually change behaviour?) They recognise a need for **data management and monitoring protocols**.



EVALUATION

This group highlights **commitment to evaluation** as distinguishing Adaptive Management from many other management approaches. They advocate a **team approach**, and **including stakeholders in collating and interpreting** information. Managers need to meet with the researchers. They recommend **assessing monitoring outcomes against the objectives**, and then reviewing whether the **objectives** were **realistic and achievable**. They recognise two ‘streams’, **evaluation of the Adaptive Management process and its outcomes**. The group emphasises the elements of analysis, interpretation and reporting. **Integration of results from different disciplines** and aspects is seen as an important feature of the evaluation process. Evaluation leads to **updating the monitoring program**, **communicating the results** to all stakeholders and **capturing the learnings**.



ADJUST

This group's analysis reflects back across the entire Adaptive Management process! It features commitment to **'closing the loop'**, and the Adaptive Management ethos of **continuous improvement**. They regard reviewing the evaluation, learning, and reassessing the scope of the problem, communication and sharing, as key elements underlying adjustment after each Adaptive Management cycle.