The New Zealand Society for
RISK MANAGEMENT Inc.
Improving the knowledge and practice of risk management in New Zealand

www.risksociety.org.nz

PO Box 5890 Wellington 6145 New Zealand

Evidence to the Canterbury Earthquakes Royal Commission

Submission by the New Zealand Society for Risk Management in Respect of the discussion Paper: Building Management after Earthquakes

Date: 26 July 2012

Introduction

1. This submission responds to a request from the Royal Commission for comment in respect of the issues raised in its Discussion Paper: Building Management after Earthquakes.

2. The submission is made by resolution of the Management Committee of the New Zealand Society for Risk Management Inc ["the Society"]. The Society's Management Committee is its governing body and is established by election from the Society's members.

3. Following the Society's normal practice, a technical advisory committee was established to draft the submission, and then an opportunity was provided for the total membership of the Society to comment on the draft of evidence produced by the committee, before the submission was formally approved by the Management Committee. In this instance the technical committee included Society members with experience in geophysics, civil and structural engineering, civil defence and emergency management, design of legislation and institutions for risk management, and the operation of logistics organisations.

4. Also following the Society's established practices, this evidence was formulated without input from or involvement by the Society's sponsors.

Summary of the submission

5. The management of buildings after earthquakes is no more or less than a situation where certain objectives are sought in conditions of uncertainty. This is risk management, so the Society is of the view that that the disciplines of contemporary risk management practice should be applied to this activity.

6. Current practices for managing buildings after earthquakes contain what in technical risk management terms would be called controls. These controls appear to have worked well in the initial phases after each of the major events in the Christchurch earthquakes but could made to work better at later phases. This improvement should be achieved by the application of the risk management discipline to the full process of managing buildings within the overall objective of providing for the continuity of the community following earthquakes. This discipline requires at each stage of managing buildings after earthquakes:

    a. clearly stated objectives

    b. defined criteria for assessing risks

    c. completeness of recording and information management systems

d. clear definition of who to communicate with when and about what

e. clear mechanisms for transfer of responsibility for managing risks during the various phases of recovery from earthquakes.

7. These elements need to be as far as possible put in place before the event. They require a well defined and understood risk management context for each phase of the community's recovery from earthquakes (or indeed any other significant natural disaster). This risk management context will have different ingredients depending on the stage of recovery from the event, leading to different objectives, different criteria for assessing risks, different responsibilities for managing risks, etc at each phase. The Society considers that there will be at least three such phases.

8. We also recommend against the use of the terms safety in managing buildings after earthquakes, particularly in a way which might imply that buildings can or should be managed for absolute safety. Buildings can only be built and maintained to a performance level (often expressed through highly complex codes and other procedural documents) which does not and cannot ensure absolute and in all circumstances safety for people or valued items.

9. This evidence makes a number of specific recommendations in the sections below. However our key recommendation is that the process for building management after earthquakes should be overhauled on the basis of contemporary risk management process, as set out in *AS/NZS ISO31000: 2009 Risk Management Principles and Guidelines*, to provide pre-defined sets of procedures to be used in all stages of the recovery of communities from earthquakes. This overhaul can and should be based on the currently available controls such as the placarding system of the current Society of Earthquake Engineering procedures. Such an overhaul may require small changes to existing laws and regulations but we consider that the current legislative environment provides most of the necessary powers and responsibilities.

The Society

10. The Society was established in 2000 for the purpose of '*Improving knowledge and practice of risk management in New Zealand*'. As a matter of policy, the Society does not take a particular viewpoint in questions of policy, law, regulation or codification of good practice (whether such codification has regulatory force or not). The Society's overarching concern therefore is that, irrespective of subject, practices related to managing risk (whether documented or not) reflect contemporary risk management knowledge and practice.

11. The Society's current membership is approximately 300 individual members and 60 corporate members drawn from a wide range of sectors and disciplines. These include: engineering, insurance, legal and auditing professionals, technology managers, environmental specialists, government officials, local authority managers, academics and others.

12. From these two membership classes the Society regularly reaches and obtains opinions from some 800 professionals in these disciplines, all of whom are involved in the management of risk.

13. Further details of the Society can be obtained from its website www.risksociety.org.nz.

Building management after earthquakes is risk management

14. In our view the management of buildings after earthquakes (or indeed any other event likely to affect the performance of buildings) is no more or less than a situation where certain objectives are to be sought in the face of a set of uncertainties. As the Society has pointed out in its previous evidence to the Commission, the effect of this uncertainty on objectives is, in a professional context, termed 'risk'. The term however is frequently more loosely and generally used to mean chance, likelihood, consequence or impact. The term is used in its professional context in this evidence, as are a number of other terms as defined in Appendix 1.

15. We therefore contend that the process of building management after earthquakes should be undertaken as well informed taking and managing of risk. This applies equally to both the individual structure (the focus of the paper issued by the Commission) and the services (e.g. water and electricity supply) required for that building to achieve its intended purposes.

16. Managing buildings after earthquakes is therefore a risk management process and best practice in risk management should be systematically used.

17. The Society advised in its previous evidence to the Commission that risk management should follow contemporary best practice. This internationally accepted best practice in risk management is laid out in documents produced through the standards setting processes of the International Standards Organisation (ISO).

18. Of particular importance is avoiding the difficulties arising from the imprecise use of terms when describing and then undertaking risk management activities. We therefore recommend, and follow in this evidence, the terminology laid out in:

    AS/NZS ISO31000:2009 Risk Management - Principles and Guidelines

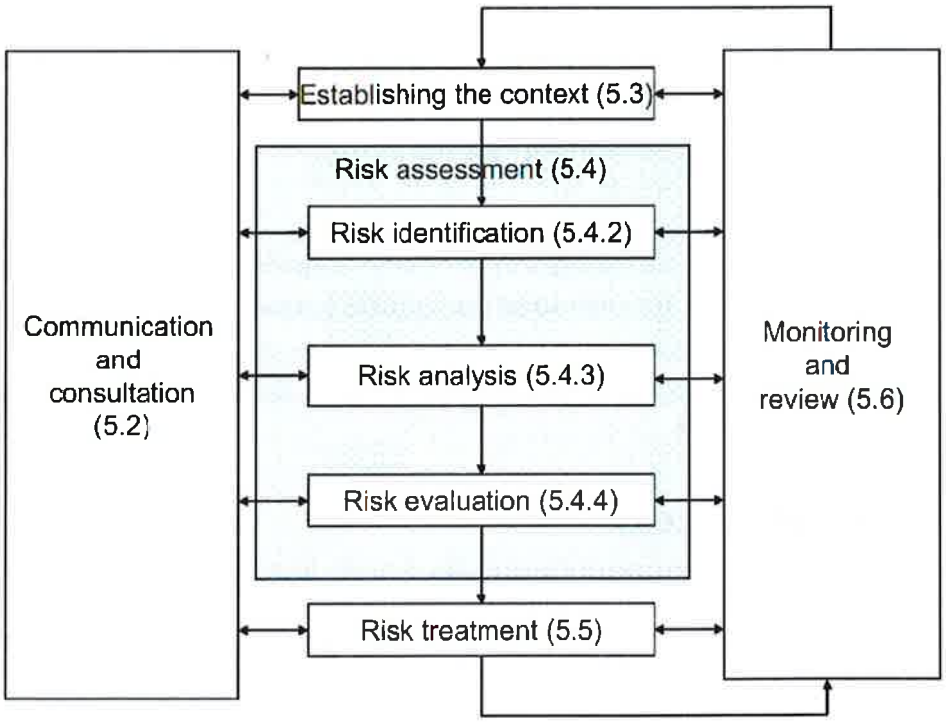
    and in its companion definition of terminology document:

    ISO/IEC Guide73: 2009 Risk management - Vocabulary

19. For the Commission's convenience we have quoted some key terms from these documents in Appendix 1.

20. The Society is of the view that the processes and principles set out in this international standard can and should be applied to the management of buildings in a much more rigorous way than is indicated by the summary set out in the Commission's discussion paper.

21. This risk management process can be illustrated by the following diagram which is taken from AS/NZS ISO 31000:2009. (The numbers in the diagram correspond to sections of the parent standard.)



22. In the context of this diagram we also draw the Commission's attention to the principles for effectively managing risks as set out in section 3 of the Standard. The subsequent sections of this evidence draw attention to particular parts of the process especially relevant to building management after earthquakes, as well as referring these principles. We list these principles in appendix 2, although we recommend reference to section 3 of AS/NZS ISO 31000 for the full explanation of each principle.

23. The risk management process can and should be embedded in procedures which are specific to and useful within the environment which they are to be used in. For example much of the risk management in airline operation results in checklists used both by those who maintain aircraft and

those who operate them. However we emphasise that such procedures should always be based on a well specified context (including clear objectives and well specified risk criteria).

Current building management after earthquakes

24. The Royal Commission's paper describes the current 'system' for managing buildings after earthquakes, noting what are in risk management terms objectives of:
    - Ensuring buildings are safe before allowing public access
    - Getting the community and business recovering from the disaster as soon as possible.
25. In our reading, the paper points out that the systems already in place (called controls in risk management terms) were largely effective in the early phases of managing buildings after earthquakes, but encountered some limitations in the later phases particularly where the second objective in the preceding paragraph became more important. This is a vital point as, as controls become less effective, the amount of risk (in this case) the community is exposed to increases. As shown in the above diagram, the putting in place of controls (the result of treating risks) requires the disciplined application of prior steps in the risk management process.
26. In the following sections we describe elements of the risk management process and how they might be applied to improve the current controls framework for buildings after earthquakes. We also consider that an objective of 'ensuring buildings are safe' (in the absolute sense apparently used in the paper) is not realistic. We comment further on that matter in paragraphs 53 ff of this evidence.
27. The Society would like to acknowledge to work done by the Society of Earthquake Engineering in developing the initial building safety evaluation process. This generally appears to have worked well during the period of declared civil emergency. Certainly the experience of our members suggests that, without such as system, the impact of the earthquakes could have been much more severe. However even these elements of the present process are in our view lacking some of the core elements of effective risk management including:
    a) clearly stated objectives
    b) defined criteria for assessing risks (for example the guidelines referenced point to items in a building to consider but in our reading provide no criteria against which to consider them)
    c) completeness of recording and information management systems
    d) clear definition of who to communicate with when and about what
    e) clear mechanisms for transfer of responsibility for managing risks during the various phases of recovery from earthquakes.

The importance of context

28. A fundamental aspect of any process to manage risks is clarity about the context in which risks are being managed. Simply, context can be thought of in three parts:
    a. Clearly specifying the objectives to be achieved in a given situation or operation. In this case the situation is that applying after a seismic event or events (or indeed we would contend any other manifestation of a natural hazard which affects building performance - e.g. floods, major storm events etc.)
    b. Specifying the criteria to be used in assessing the risks to the objectives specified
    c. Clearly understanding and spelling out at the appropriate level of detail the 'environmental' factors in which objectives are set and criteria specified. These factors go beyond the strictly physical environment and include social and governance (both legislation and institutional) dimensions. In the case of managing buildings after earthquakes these factors will include;
        i. the applicable legislative framework including at least the Building Act, Civil Defence and Emergency Management Act, Resource Management Act and the Health and Safety in Employment Act

ii. council policies with respect to buildings not complying with current building standards

iii. community expectations

iv. available resources which can be called on.

29. Context is not a matter to be defined once. In the case of managing buildings after earthquakes, the Society sees at least three separate contexts, (more may be required) some of which may be repeated, as earthquakes may not be single events - as was the case in Christchurch. These contexts may be thought of as:

    a. Immediate response - usually within the scope of the provisions of the civil defence legislation

    b. Investigation and evaluation of the state of buildings

    c. Community recovery

30. Each context will require different sets of objectives and other aspects. These aspects may include different criteria for assessing risk, different allocation of responsibilities for action and different requirement to communicate and consult with affected parties.

31. From this it is clear that managing of buildings after earthquakes requires a clear and current understanding by all those involved when and how transition from one context to another occurs. This will include at least:

    a. Clear definition of the objectives which apply for each context

    b. The use of consistent criteria to asses risks in each context

    c. Mechanisms for clear communication of which context is being used (including the objectives, assessment criteria, allocation of responsibilities and accountabilities etc)

32. We also further reinforce the importance of a common understanding of these transitions as (as occurred in the Christchurch earthquakes) multiple events may require a return from an 'investigation and evaluation' context to an 'immediate response' context, perhaps several times. In addition we draw attention to the need for such systems to be readily scalable. Society member experiences suggest that systems which were effective in the recent Gisbourne earthquake (e.g. depending heavily on the placard systems) were less so in the very much larger multiple Christchurch earthquakes.

Objectives for building management after earthquakes

33. To manage risks in regard to buildings after earthquakes, the first and most fundamental thing is to be clear about the objectives to be sought. The Society accepts that the overall objective of planning to deal with any emergencies, such as earthquakes, must be community continuity: to protect, assist, sustain and enhance the community so that a vibrant entity ultimately emerges from the crisis. Objectives for managing buildings need to be within the scope of this objective, although tailored to be specific to buildings.

34. We therefore consider it is at the very least useful, and we would argue essential, to define clear objectives for each stage of building management after earthquakes.

35. The Society does not see such a clear statement of objectives in the material assembled and referenced in the Royal Commission's paper. For example the first stage, which we have labelled 'immediate response', could include both fact finding or reconnaissance, and rescue of the injured and prevention of further injury or death to persons. At this phase, there does not appear to be any justification for objectives in relation to other factors such as business continuity or maintenance of heritage values.

36. The objectives agreed for this phase would then limit the useful life of devices such as building placards, as their further use would be outside the objectives. The objectives would also help define what skills would be required at this stage.

37. Our primary purpose in suggesting such objectives is not to create a definitive list but rather to reinforce the need for clear objectives. These objectives will need to agreed, predefined and properly documented.

38. At later stages the objectives to be sought will undoubtedly change. For example at the stage of investigation and evaluation (as we have labelled it) at least objectives in relation to the following will need to be considered:

    a. Maintaining individual safety - i.e. prevention of further injury to community members including both those assessing buildings and those who have ownership or occupancy interests in the buildings

    b. Maintaining heritage values including for example preserving and restoring buildings of high significance to the community

    c. Business continuity and/or restart so that the community's economic activity can be recovered.

39. The above list is intended to be illustrative not exhaustive. A moment's reflection will also show that this list contains conflicts. For example, meeting business continuity objectives may require entry to buildings which may lead to individuals being subject to further injury. The key thing is to be clear about the objectives to be achieved and work through the inherent conflicts using the other risk management process steps, including the setting of clear criteria to assess risks and providing means of communicating and consulting with those affected.

40. Defining objectives is neither a rapid nor simple process, and for events such as earthquakes the necessary thinking should be done ahead of the event. The Society therefore **recommends** that:

    any reconfiguration of the processes and procedures should require the prior (i.e. as part of emergency planning) definition, agreement, and proper documentation of clear unambiguous objectives for building management in the overall framework of response to and recovery from these emergencies. This definition should state both overall objectives, and objectives for particular stages (or contexts) of the process.

Risk assessment criteria

41. At the 'sharp end' of any process for managing buildings potentially affected by earthquakes as the assessment of the state of the building. The Society acknowledges that this assessment is a matter requiring very substantial expert judgement by people with high levels of qualifications and experience (expertise). The Society does not hold itself out as expert in matters of the structural integrity of buildings.

42. We therefore do not intend to provide any advice on the specific criteria to be used in assessing the state of buildings prior to taking other actions. We do however point out that to be useful, the assessment of risks at each phase of post earthquake management of buildings requires clear criteria which must be applied consistently. These criteria need to be as specific as possible to each context in the overall building management process.

43. We also note that it will generally be useful to provide advice on particular techniques for risk identification consistent with the objectives developed as described above.

44. Risk criteria are typically made up of two components

    a. A consequence which relates directly to the objectives sought

    b. A likelihood of this consequence occurring

45. For example, if the sole objective of managing buildings in a particular context is to recover those injured in an earthquake and prevent further injuries or death, then the only meaningful criteria will be those related to this objective. In this case an example of possible consequence and likelihood criteria is:

    Consequence

Descriptor	Definition
Extreme	Multiple fatalities through structural failure
High	Single fatalities through structural failure
Medium	One or more life threatening or permanently disabling injury through

	structural failure
Low	Recoverable injury through structural failure
Very Low	Minor injury through structural failure

Likelihood

Descriptor	Definition
High	failure is almost certain
Likely	failure is expected in most circumstances
Possible	failure is probable in some circumstances
Unlikely	failure would be an infrequent occurrence
Rare	failure is extremely unlikely

From criteria of this type consistent risk levels can be defined as a combination of consequence and likelihood and pre-defined actions can be set out, including for instance using particular levels of placarding.

46. Even at the early stages post earthquake, single objectives are generally unduly simplistic as (for example) practical building management systems will be constrained by the availability of resources.

47. The situation becomes more complex when there are multiple and potentially conflicting objectives, as is common later in the overall (affected) building management process.

48. The Society did not see clear criteria for assessment of risks in the processes summarised in the Commission's paper. We did observe lists of 'things to look at' in some of the checklists referenced, but their relationship to either consequences (e.g. for individual safety) or likelihood of the consequence occurring are not clear in the material of the paper, or in the documents it references.

49. The development of criteria requires considerable time effort and expertise. The Society therefore **recommends** that;

In improving the procedures for managing buildings after earthquakes, specific risk criteria be developed for each context in the overall process of managing buildings after earthquakes. Specific criteria should be developed for at least the following contexts:

a. **Immediate response to an event with a focus on recovering the injured and preventing further injury**

b. **Investigation and evaluation with criteria likely to include both prevention of injury and consideration of community recovery (e.g. business and service continuity)**

c. **Community recovery with criteria to include those in (b) but likely to also include consideration of heritage values, community cohesiveness etc**

The importance of clear communication and effective consultation

50. The Society's reading of some of the issues raised in the Commission's discussion paper suggests that current process for managing buildings after earthquakes undervalue the importance of clear communication and consultation. For example we note that building placards were assumed to communicate more information than actually intended, and that the shift in responsibility for the continued use of specific buildings was not clearly understood or acted on by some stakeholders.

51. The Society therefore wishes to emphasise the importance of clear and pre-determined communication protocols for the management of buildings. These protocols need to cover at a minimum the following factors.

    a. What is to be achieved by each type of communication (e.g. is the communication simply providing or seeking information or does it include a transfer of responsibility)

    b. Within each context in managing buildings who is to be communicated with and about what

    c. What methods of communication are to be used

    d. A required level of assurance that particular communications are received and understood (e.g. including 'check that the message is received' type protocols)

    e. Under what circumstances is consultation required and about what.

52. To be effective communication and consultation in the inherently difficult circumstances following earthquakes needs to be as far as possible pre-defined. The Society therefore **recommends** that

    processes for managing buildings following earthquakes should include pre-defined communication and consultation protocols extending throughout all phases which provide for, specific to each phase, all of the matters covered in 51 a - e above.

Building management and uncertainty

53. The Society is particularly concerned with one aspect of the Commission's discussion paper. The paper makes continued references to building safety as if this is some sort of absolute. Nothing could be further from the truth. Buildings are built to a performance level (often expressed through highly complex codes and other procedural documents) which does not and cannot ensure absolute and in all circumstances safety for people or valued items. The Society is of the view that this 'elephant in the room' needs to be faced up to, acknowledged and dealt with. Even in normal circumstances, buildings in New Zealand are not in absolute terms safe in earthquake situations. Buildings can and do withstand earthquakes of a certain magnitude and may maintain enough integrity to allow people and their contents to survive larger earthquakes. This is not absolute safety.

54. This situation is compounded when buildings remain intact or partially intact after earthquakes. Following an earthquake what is uncertain is whether or not the previous assumptions about the integrity of the building need to be modified in some way. This matter of uncertainty needs to be acknowledged as such. The application of the risk management processes and principles referenced in the preceding sections enables this uncertainty to be measured and responded to.

55. What the Society is therefore advocating is that the existing procedures for managing buildings after earthquakes be rebuilt so that:

    a. The objectives to be met by the post earthquake building (at each stage of a community recovery) are spelled out clearly

    b. There is a clear and as far as possible pre-agreed set of predefined measures as to the extent these objectives are or are not being met by the building in its state

    c. Those with an interest in the building are able to obtain a clear understanding of the uncertainties about the state of the building and the consequences of those uncertainties eventuating

    d. The relevant people are able to make informed decisions about the actions they could take in response to those uncertainties

56. To provide some grounding of this in practicality, some case examples may be helpful.

57. Case 1. In the days following an earthquake a large public institution is faced with a decision on whether to resume activities affecting a large number of people and a significant part of the local economy. The powers exercised during the civil emergency have been rescinded in the area. The building involved is relatively new and expert inspection has shown low likelihood of further loss of building function in the event of further reasonably likely earthquakes. Both the owner of the building and those occupying it must decide what to do. The people concerned clearly require the

clear and adequate information based on known criteria to make this decision. The building management system should provide for both the clear transfer or responsibility and a clear basis on which to decide. In addition the decision should be possible with in all of the laws affecting the building.

58. Case 2. A family operated business is located in a building which has only been subject to a preliminary inspection in an area cordoned off under powers exercised under civil defence legislation. The family can restart this business in another location but this will be dependent on retrieving information and specilaised tools from inside the building. They judge that the business will be lost to overseas competitors in a matter of a few weeks unless it is restarted. The building management system should be capable of providing the needed information and constraints for them to be able to make the decision about whether or not to enter the building for the time needed to retrieve the needed items and the legal machinery necessary to allow the decision to be made.

Conclusion

59. The Society considers that the current building management framework can be improved by the use of the disciplines of contemporary risks management processes and principles. In particular we consider that the current framework and processes should:

    a. Have clearly set out contexts including clear objectives and pre-defined risk criteria appropriate to each stage of managing buildings within the overall goal of community recovery

    b. Provide for clear protocols for communication and consultation with all those with a stake in the building's future

    c. Provide clear decision making pathways enabling actions to be take to manage the risks from the state of buildings post earthquake

60. The Society considers that doing this will require considerable specialised expertise and that this expertise is beyond that available in the Society's membership. We have therefore not commented on matters of specific technical detail - e.g. in building assessment or seismology.

61. The Society therefore recommends that

    the current processes for building management after earthquakes be subject to an overhaul, using the risk management process as a basis, with the objective of pre-defining tools specific to building management covering the matters set out in paragraph 59 above.

62. This overhaul should be led by a government agency and (perhaps the Department of Building and Housing) and include both other government agencies and professional bodies with the needed technical expertise. The Society considers that this can be done within the existing legislative framework (i.e. including the Building Act, Civil Defence and Emergency Management Act, and Resource Management Act) although some minor changes may be required to these and related Acts.

Declaration

63. This statement is true to the best of my knowledge and belief and is made by me on behalf of the Society knowing that it may be used as evidence for the purposes of the Royal Commission of Inquiry into Building Failure caused by Canterbury Earthquakes.

S R Vaughan
Executive Director

Appendix 1: Key definitions of risk management terms and concepts from AS/NZS ISO 31000:2009

risk	effect of uncertainty on objectives
NOTE 1	An effect is a deviation from the expected – positive and/or negative.
NOTE 2	Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process).
NOTE 3	Risk is often characterized by reference to potential events and consequences, or a combination of these.
NOTE 4	Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence.
NOTE 5	Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of an event, its consequence, or likelihood.
risk management	coordinated activities to direct and control an organization with regard to risk
risk assessment	overall process of risk identification, risk analysis and risk evaluation
risk identification	process of finding, recognizing and describing **risks**
NOTE 1	Risk identification involves the identification of risk sources, events, their causes and their potential consequences.
NOTE 2	Risk identification can involve historical data, theoretical analysis, informed and expert opinions, and stakeholder's needs.
risk analysis	process to comprehend the nature of risk and to determine the level of risk
NOTE 1	Risk analysis provides the basis for risk evaluation and decisions about risk treatment.
NOTE 2	Risk analysis includes risk estimation.
risk evaluation	process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable
NOTE	Risk evaluation assists in the decision about risk treatment.
risk criteria	terms of reference against which the significance of a risk is evaluated
NOTE 1	Risk criteria are based on organizational objectives, and external and internal context.
NOTE 2	Risk criteria can be derived from standards, laws, policies and other requirements.

risk treatment process to modify risk

NOTE 1 Risk treatment can involve:

- avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk;
- taking or increasing risk in order to pursue an opportunity;
- removing the risk source;
- changing the likelihood;
- changing the consequences;
- sharing the risk with another party or parties (including contracts and risk financing); and
- retaining the risk by informed choice.

NOTE 2 Risk treatments that deal with negative consequences are sometimes referred to as "risk mitigation", "risk elimination", "risk prevention" and "risk reduction".

NOTE 3 Risk treatment can create new risks or modify existing risks.

Establishing the context defining the external and internal parameters to be taken into account when managing risk, and setting the scope and risk criteria for the risk management policy

external context external environment in which the organization seeks to achieve its objectives

NOTE External context can include:

- the cultural, social, political, legal, regulatory, financial, technological, economic, natural and competitive environment, whether international, national, regional or local;
- key drivers and trends having impact on the objectives of the organization; and
- relationships with, and perceptions and values of, external stakeholders

internal context internal environment in which the organization seeks to achieve its objectives

NOTE Internal context can include:

- governance, organizational structure, roles and accountabilities;
- policies, objectives, and the strategies that are in place to achieve them;
- the capabilities, understood in terms of resources and knowledge (e.g. capital, time, people, processes, systems and technologies);
- perceptions and values of internal stakeholders;
- information systems, information flows and decision-making processes (both formal and informal);
- relationships with, and perceptions and values of, internal stakeholders;
- the organization's culture

control measure that is modifying risk

NOTE 1 Controls include any process, policy, device, practice, or other actions which modify risk.

NOTE 2 Controls may not always exert the intended or assumed modifying effect.

event occurrence or change of a particular set of circumstances

NOTE 1 An event can be one or more occurrences, and can have several causes.

NOTE 2 An event can consist of something not happening.

NOTE 3 An event can sometimes be referred to as an "incident" or "accident".

NOTE 4 An event without consequences can also be referred to as a "near miss", "incident", "near hit" or "close call".

consequence outcome of an **event** affecting objectives

NOTE 1 An event can lead to a range of consequences.

NOTE 2 A consequence can be certain or uncertain and can have positive or negative effects on objectives.

NOTE 3 Consequences can be expressed qualitatively or quantitatively.

NOTE 4 Initial consequences can escalate through knock-on effects.

likelihood chance of something happening

NOTE 1 In risk management terminology, the word "likelihood" is used to refer to the chance of something happening, whether defined, measured or determined objectively or subjectively, qualitatively or quantitatively, and described using general terms or mathematically (such as a probability or a frequency over a given time period).

NOTE 2 The English term "likelihood" does not have a direct equivalent in some languages; instead, the equivalent of the term "probability" is often used. However, in English, "probability" is often narrowly interpreted as a mathematical term. Therefore, in risk management terminology, "likelihood" is used with the intent that it should have the same broad interpretation as the term "probability" has in many languages other than English.

Appendix 2: Principles of contemporary best practice in risk management

(See also section 3 AS/NZS ISO 31000: 2009. Risk Management Principles and Guidelines)

Properly conducted contemporary risk management:

a) creates and protects value
b) is an integral part of all organizational processes
c) is part of decision making
d) explicitly addresses uncertainty
e) is systematic, structured and timely
f) is based on the best available information
g) is tailored
h) takes human and cultural factors into account
i) is transparent and inclusive
j) is dynamic, iterative and responsive to change
k) facilitates continual improvement of the organization.