



Integrated Risk Management

Its importance in protecting people
and their livelihoods



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1. Introduction

The increasingly networked nature of modern society, rising dependency on critical infrastructures, high concentrations of assets, and a growing population mean that disasters and emergency situations are causing ever more damage. Mounting risks must be reduced to an acceptable level in a balanced process which systematically identifies hazards, evaluates the risk associated with them, and assesses their acceptability. Risks which are deemed unacceptable must be reduced with appropriate measures. A certain level of residual risk is unavoidable, however, and has to be accepted.

Integrated risk management (IRM) is a central element in many of the risk-oriented planning guidelines¹ used by the Federal Office for Civil Protection (FOCP). It is also applied by other federal offices², cantons and organisations³, and is described in a variety of publications. However, the term “integrated risk management” has become a buzzword in recent years, and has lost some of its original meaning.

Frequently, integrated risk management is used only in connection with the cycle of measures that is depicted in the diagram on the right. However, this fails to cover the aspects and meanings of the concept that are not shown explicitly in the diagram.

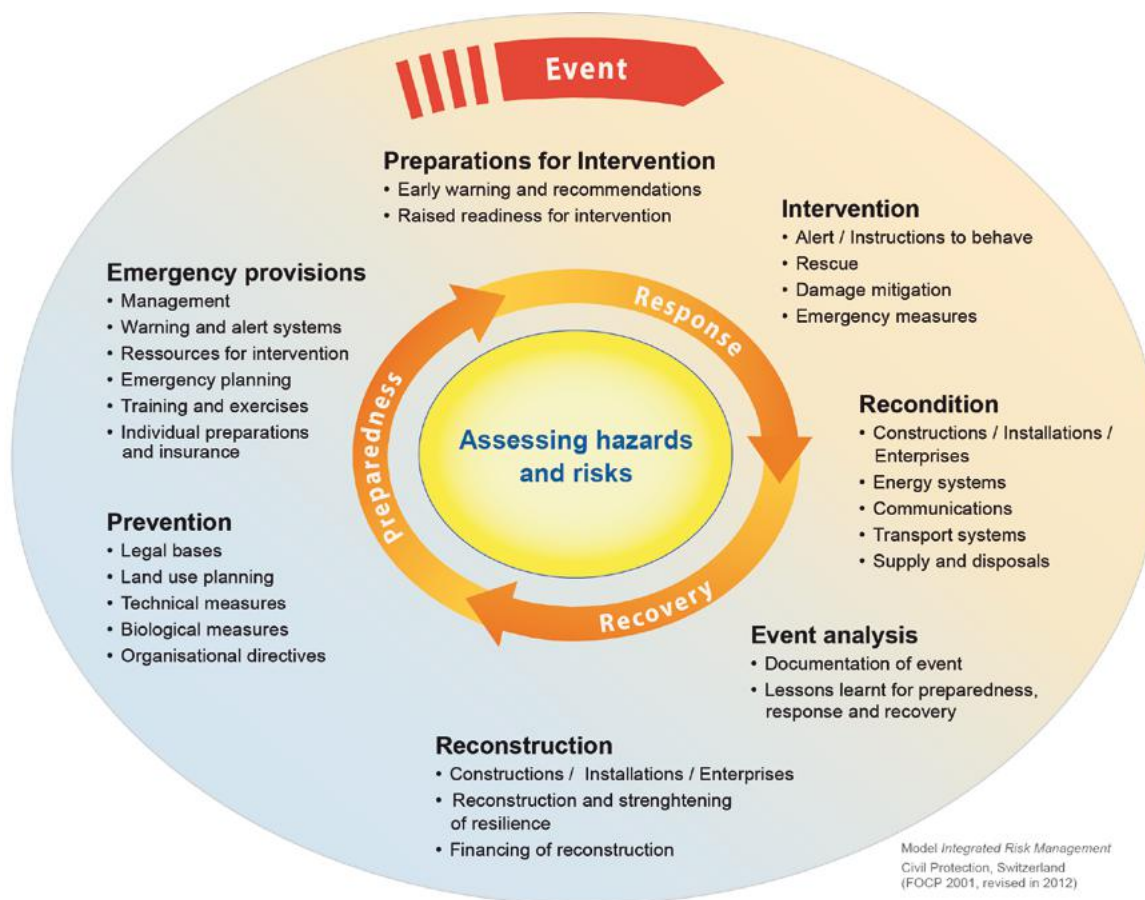
This document explains the different components and aspects of integrated risk management means. It is intended to support a better understanding of its meaning and its relevance to different areas. The document is aimed primarily at civil protection representatives in charge of disaster and emergency response measures, i.e. decisionmakers, members of staff organisations, representatives of partner organisations, and specialist units.

1 Such as the KATAPLAN guideline and the associated KATAPLAN-Risk tool, or the Nationale Gefährdungsanalyse von Katastrophen und Notlagen Schweiz (National hazard analysis of disasters and emergencies in Switzerland).

2 e.g. Federal Office for the Environment (FOEN), Swiss Agency for Development and Cooperation (SDC)

3 e.g. Swiss National Platform for Natural Hazards (PLANAT)

2. The objective of integrated risk management



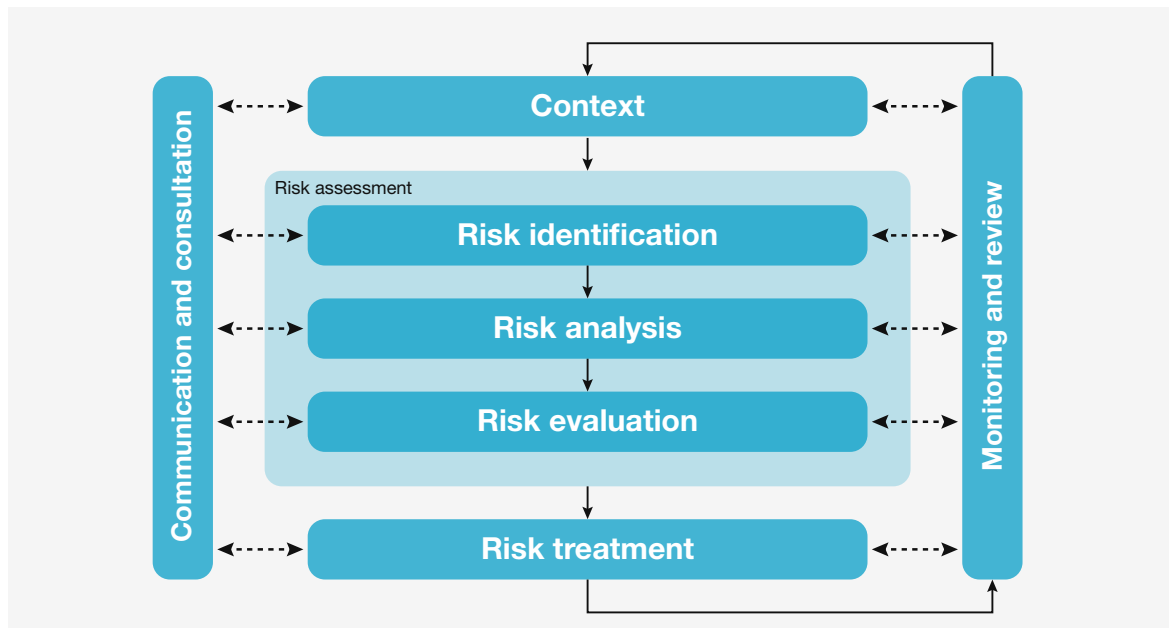
(Source: FOCP: KATAPLAN guideline, 2013)

The fundamental objective of integrated risk management (IRM) is to ensure that risks to people and their livelihoods are kept as low as possible or within acceptable bounds. Time and again, this raises the question of “how safe is safe enough?” – in other words, how much should be spent on measures to improve security for people and their livelihoods, and what should be accepted if an event were to occur? Measures to reduce risk must thus be planned from a holistic perspective, coordinated with each other, and based on the relevant risks. The cost/benefit effect of the selected measures is an important aspect of IRM, although sustaina-

bility, acceptability, feasibility, reliability and legal foundation also play an important role.

As it applies to civil protection, IRM should permit an optimum and comparable degree of security throughout the society, including crossregional cooperation, and taking into account the requirements and contributions of the central government.

3. Elements of integrated risk management



IRM process as described in ISO 31000

3.1 The concept of risk management

In 2009, the International Organization for Standardization (ISO) published ISO standard 31000:2009 *Risk management – Principles and Guidelines*, as well as further guidelines on vocabulary (ISO Guide 73:2009) and risk analysis techniques (ISO/IEC 31010:2009). These documents describe risk management as a systematic process which follows the steps in this diagram.

Risk management is defined as a systematic process for the comprehensive treatment of risks.⁴ It encompasses measures to systematically identify, analyse, evaluate and assess risks. It also includes communication about hazards and their related risks that might affect a community, as well as relevant response, monitoring and review measures. Risk management is an established process in society and business alike, but it is applied differently according to its particular context.

⁴ Risk is a measure used to evaluate a hazard, and factors in the frequency or probability of an undesirable event, as well as the extent of the damage that it would cause. It allows different hazards to be compared in a civil protection context.

Risk management essentially covers the following themes:

1. Establishing the context:

define and delimit the system.

2. Conducting a risk assessment,

which itself comprises the following steps:

– *Risk identification:*

compile a catalogue of hazards.

– *Risk analysis:*

define and analyse scenarios.

– *Risk evaluation:*

evaluate the probability of and extent of damage of the scenarios.

The purpose of risk assessment is to determine whether a risk may be regarded as tolerable, and is therefore accepted, or whether it is classified as too high and therefore action to reduce it should be taken.

3. Risk treatment:

preparedness, response, recovery

4. Communication and consultation

with the key agencies and offices responsible as well as with the affected population.

5. Monitoring and review

as an ongoing process.

This basic risk management process as defined in ISO 31000 provides the foundation for the following remarks on IRM.

3.2 The concept of integrated risk management

Applied in conjunction with the ISO 31000 risk management process described above, in the context of civil protection *IRM* refers to an overall risk assessment process and its components (risk identification, risk analysis and risk evaluation), as well as risk treatment (preparedness, response, recovery). Risk management is described as *integrated risk management* when four conditions are fulfilled:

- All of the hazards that are relevant to a society, and their related risks, are considered in the sense of an *integrated hazard analysis*.
- Sophisticated damage indicators as well as ecological, economic and social sustainability criteria are applied to produce an *integrated evaluation and assessment of the hazards and their related risks, as well as of the impact of planned measures to reduce those risks*.
- In monitoring and reviewing the hazards and their related risks, the full spectrum of available preparedness, response and recovery measures are considered, in the sense of *integrated action planning*.
- In the interest of an *integrated participation*, all relevant decision-makers, specialists and those who are affected are involved in the IRM process.

4. Integrated hazard analysis and risk assessment

4.1 The goal of the integrated hazard analysis and risk assessment

Integrated risk management to protect people and their livelihoods begins with an analysis of what types of hazard might inflict relevant damage on a community. The first step is always a hazard analysis which evaluates the risks involved and then leads on to a risk assessment.

4.2 Integrated hazard analysis

The hazard analysis answers the question: *what could happen?*

A *hazard analysis* may be described as integrated if it takes into account *all* of the risk management-related hazards which might affect a community or enterprise. In principle, this means that every potential hazard, whether natural, technical or societal in origin, is factored into the analysis, and none is excluded beforehand. For the purposes of civil protection, the freely accessible catalogue of hazards⁵ published by the Federal Office for Civil Protection, is a useful tool. The catalogue currently lists almost one hundred potential risks from the three domains – natural, technical and societal – and illustrates them with examples. This catalogue may be seen as comprehensive, although an analysis of political power-related hazards (political and economic developments) might also consider additional factors. Furthermore, it is crucial that any integrated hazard analysis also looks at new hazards that might arise from possible developments in the future.⁶ For this reason, in the interests of integrated participation it

is worth including all relevant decision-makers and specialists in the hazard analysis process.

4.3 Integrated risk evaluation and assessment

Risk evaluation and assessment answers the question: *what can be allowed to happen?*

Effective risk management has to do more than simply address a list of potential hazards, however. Instead, the risks attached to these hazards must be evaluated in a further step in the process, and their acceptability assessed in view of the subjects of protection (people, assets, values etc.).

A *risk evaluation* may be described as integrated if it, on the one hand, properly covers the full spectrum of potential events or developments, in the form of appropriate scenarios. And, on the other hand, if it determines the frequency or probability of, as well as the extent of damage caused by, these undesirable events or developments. Estimates of the extent of damage must be based on ecological, economic and social sustainability criteria, and thus give a picture as realistic as possible of all damage affecting individuals, the environment, the economy and society (subjects of protection).

⁵ Catalogue of potential hazards from the Federal Office for Civil Protection: www.risk-ch.ch / Gefährdungskatalog

⁶ e.g. Trendanalyse Bevölkerungsschutz 2025 (ETH Zurich, 2014)

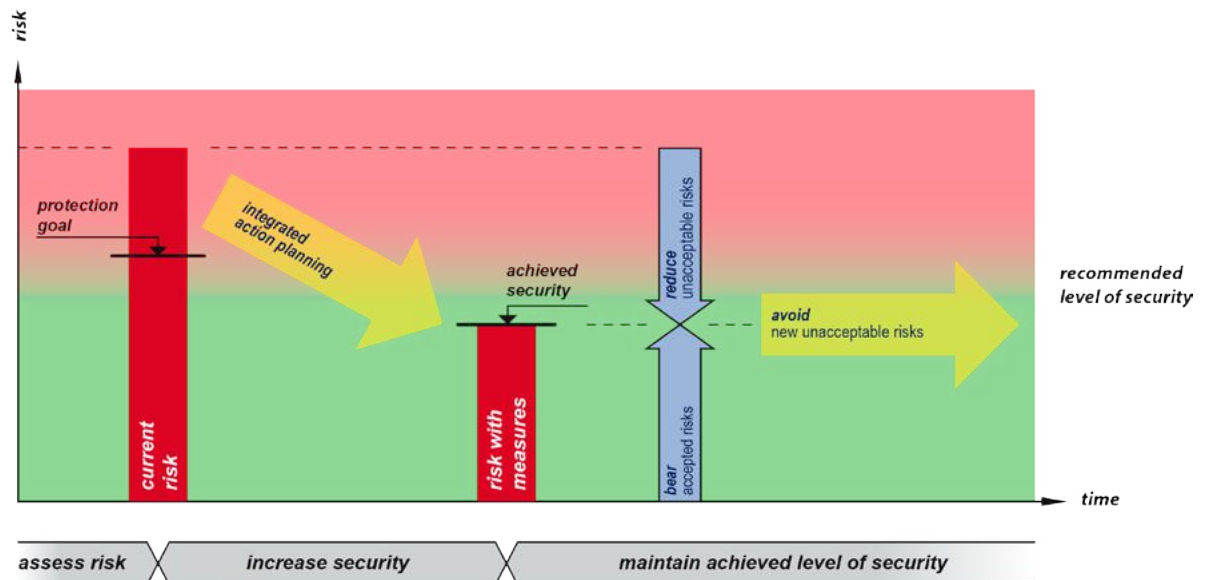
The scope of the risks that have been identified ultimately forms the basis of the *risk assessment*, which classifies risks in terms of their acceptability or relevance. High risks do not necessarily mean that major action must be taken, however. The objective of the risk assessment is more to determine whether a risk may be regarded as tolerable, and thus accepted, or whether it is classified as too high, so that action to reduce it should be planned. Questions as to what reduction measures might be employed are secondary at this stage. An evaluation of risk reduction approaches is conducted later on, as part of integrated action planning.

A risk assessment may be described as integrated if the process to determine acceptance levels or protection objectives⁷ considers ecological, economic and social sustainability criteria. The process must also be conducted as part of a risk dialogue involving decision-makers, specialists and the affected population.

Ultimately, assessing the acceptability of risk is a political process which must include all of those concerned.

⁷ The protection goal is the fundamental level of security that the respective decision-makers endeavour to achieve within their area of responsibility. In practice, the protection goal also serves as a review criterion that is used to assess the action needed to achieve the target level of security. (Source: PLANAT: Sicherheitsniveau für Naturgefahren, 2013)

5. Integrated action planning and implementation



(Source: PLANAT: Sicherheitsniveau für Naturgefahren, 2013)

5.1 The goal of the integrated action planning and implementation

Action planning answers the question: *what can be done?*

If the integrated hazard analysis, risk evaluation and risk assessment processes have shown that risks are unacceptable, and that measures to reduce them must therefore be planned, then integrated action planning must be conducted for these risks. The illustration above provides an outline of this process:

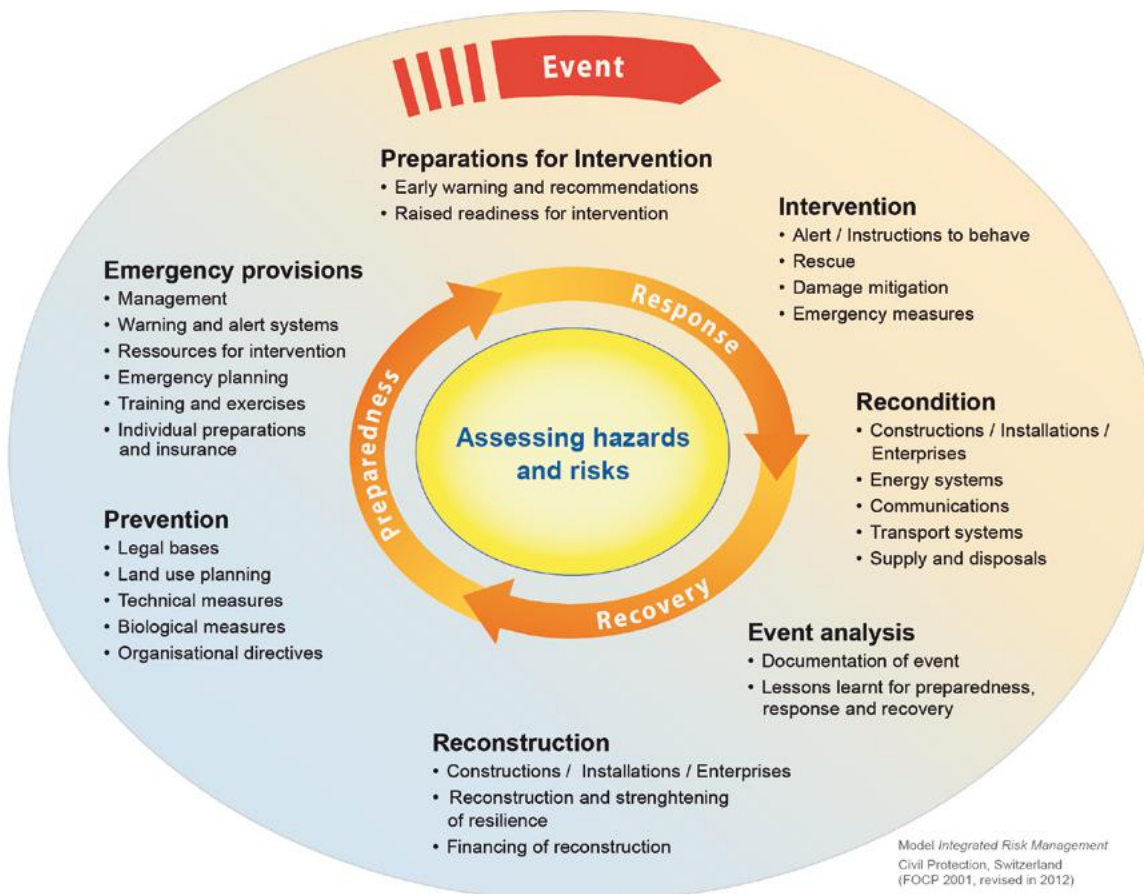
- *Risks are assessed* by comparing them with protection goals.
- *More security* is created by reducing risks to a level that is deemed acceptable in an integrated action planning process.
- *The level of security that has been achieved is maintained* by all of the parties involved by making a concerted effort not to create any new and unacceptable risks.

Action planning may be described as integrated, if

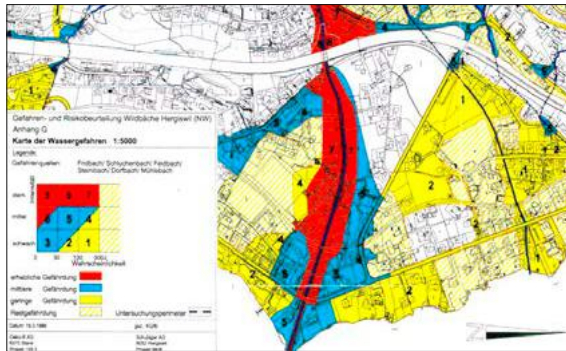
- *all possible measures* for preparedness, response and recovery have been considered when determining the optimum plan of action, and the best of these or a balanced combination has been chosen that offers a good cost/benefit ratio and complies with the legal framework.
- *all ecological, economic and social sustainability criteria* have been given due consideration in the optimisation process.
- *all decision-makers, specialists and those affected* have been involved and support the measures that have been chosen, and will take care in the future not to create any new and unacceptable risks.

5.2 Consider all risk-reduction measures

The principle that all possible preparedness, response and recovery measures must be considered when determining the optimum action plan is illustrated below. Since the boundaries between these three domains are fluid where the actual measures themselves are concerned, seven more detailed sub-domains are set out below. These are *prevention*, *emergency provisions*, *preparations for intervention*, *intervention*, *recondition*, *event analysis*, and *reconstruction*.



(Source: FOCP: KATAPLAN guideline, 2013)



5.2.1 Prevention

Prevention measures serve primarily to reduce vulnerability. In other words, damaging events do not happen at all, or their impact is limited. Prevention measures therefore take effect before an event has occurred, or reduce the magnitude of that event.

A distinction may be drawn between the following groups of prevention measures:

- *Legal requirements*
(e.g. hygiene standards; fire safety; building regulations)
- *Land use planning*
(e.g. changes to land use by eliminating hazardous zones on the basis of risk maps; and implementation of risk maps in zoning and land use plans)
- *Construction / technical measures*
(e.g. building in redundancy; flood barriers; security fences around dangerous facilities; defence measures for buildings)
- *Biological measures*
(e.g. management of protective forests; amended land use; creation of natural retention areas; release of natural enemies to fight pests)
- *Organisational measures*
(e.g. violence prevention programmes; recognition of and response to social change; temporary ban on naked flames in forests; disinfection; quarantine)



5.2.2 Emergency provisions

Emergency provisions serve to prepare the response to disasters and emergency situations. They do not take effect until the damaging event is actually taking place, or thereafter. They aim to limit the extent of damage or to avert or mitigate it as far as possible, and to cope with the after-effects of the event as soon as is feasible. They are thus geared to the types of damage which may still be sustained despite preventive action. As a rule of thumb, the more emergency provisions there are in place, the less prevention is required – and viceversa. However, the nature of the hazard will always determine what type of action is at all possible, and capable of mitigating the risk cost-effectively. Before emergency provisions can be planned to deal with the events, the nature, scope and procedures of the emergency forces' tasks and performance must be known. Emergency plans are the key output of provision planning. These must be developed for all of the hazards that are deemed to be relevant by the hazard analysis.



5.2.3 Preparations for intervention

A distinction may be drawn between the following groups of emergency provision measures:

- *Management*
(management structures of the individual emergency teams; coordination via a joint emergency management body; assuring means and channels of communication)
- *Warning and alert systems, incl. monitoring equipment and early warning systems*
(installation and technical operation of such systems; content of recommendations or instructions on appropriate conduct)
- *Resources for intervention*
(staffing of emergency teams; inventories of material and other resources)
- *Emergency planning*
(warnings and alerts; call-out arrangements for emergency teams; management structure in case of intervention; tasks of the emergency teams; potential developments and interdependencies; rosters for those properties for which intervention has been planned)
- *Training and exercises*
(specialist training; combined training; staff office training)
- *Individual preparations and insurance*
(insurance coverage and any property protection requirements imposed by the insurer, as well as personal precautionary measures taken by the general population)

Preparation measures for intervention are put into action (shortly) before an event occurs. Their purpose is to warn the persons in charge and those who are affected, to put them on alert, and where necessary to issue recommendations on appropriate conduct. These measures are intended to ensure that swift, well-considered and thus well-prepared action can be taken should an event occur. By acting quickly, preparations for intervention also aim to limit the extent of damage, or to avert or mitigate it as far as is possible. Such preparations depend heavily on the hazard concerned, however, and will be based on the emergency provisions that have been put in place. These preparations must also have been laid down in advance in the relevant emergency plans.

A distinction may be drawn between the following groups of preparation measures for intervention:

- *Early warning and recommendations on appropriate conduct*
(e.g. broadcast instructions to keep windows and doors closed, avoid personal contact where possible, or move valuable assets to upper floors)
- *Increased readiness for intervention*
(e.g. mobilise members of the emergency management body, put intervention teams on standby, get materials ready for use, and prepare property protection measures)



5.2.4 Intervention

Intervention measures are deployed once an event has occurred. Their primary aim is to protect and to rescue individuals, animals and both tangible and intangible assets, and to limit damage to the environment as much as possible. They also include immediate action to prevent further damage, and measures to protect important infrastructure facilities or, where necessary, to enable them to continue their operation in an emergency mode. These intervention measures are also determined to a great extent by the hazard concerned. As far as is possible, they must be laid down in advance in the relevant emergency plans.

A distinction may be drawn between the following groups of intervention measures:

- *Alerts and instructions on appropriate conduct*
(e.g. evacuate individuals, animals and valuables; property protection; instructions on appropriate conduct)
- *Rescue*
(e.g. recover those at risk, the injured, fatalities and, where possible, also animals; care for victims and their relatives; disinfection)
- *Damage mitigation*
(e.g. protect valuables; contain or prevent spread of damage)
- *Emergency measures / emergency operation*
(e.g. clear transport routes; ensure supplies of essential goods such as water and food, electricity and telecommunications; offer emergency accommodation)



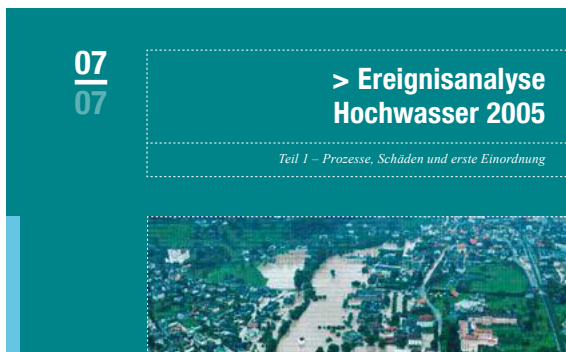
5.2.5 Recondition

Reconditioning measures are designed to get essential facilities and transport routes up and running again as quickly as possible. In some cases, this will be done on a provisional basis at first. Unlike the reconstruction phase, reconditioning means quickly setting up provisional solutions. After a certain time and following careful planning, these arrangements will then have to be transformed to sustainable, longterm solutions.

A distinction may be drawn between the following groups of reconditioning measures:

- *Buildings / facilities / businesses*
(e.g. hospitals; schools; government; residential buildings; industry and commerce)
- *Energy supply*
(e.g. electricity; gas; fuels)
- *Communication systems*
(e.g. mobile networks; telephone; internet)
- *Transport systems*
(e.g. roads; railway lines; airports)
- *Supplies and utilities / waste disposal*
(e.g. drinking water; wastewater; foodstuffs; medicines; waste)

It is particularly important to restore critical infrastructures as quickly as possible.



5.2.6 Event analysis

A detailed analysis of an event provides a foundation of information so that the right lessons can be learned from what has happened and then applied to the reconstruction phase and to future planning. It is important that post-event analysis begins (at least with data collection) before the clean-up, while the impact of the event is still visible.

A distinction may be drawn between the following elements of the event analysis:

- *Documentation of the event*
(e.g. record how the event developed and compare with previous events)
- *Lessons for preparedness, response and recovery*
(e.g. highlight room for improvement; reduce the vulnerability of buildings and infrastructures and apply stricter building standards and planning requirements to properties in risk areas; review the activities of emergency management bodies and emergency teams, and propose improvements)

5.2.7 Reconstruction

Reconstruction measures are designed to restore facilities to their previous functional levels, wherever possible increasing their resilience and also improving their functionality.

A distinction may be drawn between the following elements of reconstruction:

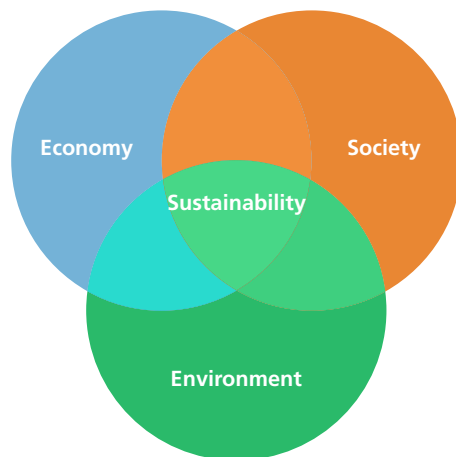
- *Buildings / facilities / businesses*
(e.g. repair; rebuild; decide not to use anymore)
- *Reconstruction and strengthening resilience*
(e.g. improve earthquake safety; create redundancies)
- *Financing of reconstruction*
(e.g. with existing insurance policies; own reserves; loans; specific funds)

5.3 Address all aspects of sustainability

Measures to protect against hazards must satisfy a wide range of often conflicting technical safety, social, economic and environmental demands. From a sustainability perspective⁸, an optimum balance must be found between these opposing aspects. All efforts to reduce risks must therefore always be geared to sustainability criteria. They must meet ecological, economic and social entitlements, on the one hand, while also taking into account a long-term (next generation) perspective.

The different aspects of sustainability are particularly important in two fields within integrated risk management:

- Estimates of the extent of damage for different event scenarios must factor in all types of damage to the environment, the economy and society as objectively and comprehensively as possible.
- Action plans must consider the impact of individual measures on the environment, the economy and society.



5.4 Involve all relevant actors and decision-makers

Involving all the relevant actors and decision-makers, as well as the general public, where appropriate, is crucial to the success of integrated risk management. In particular in the context of civil protection, hazards and their related risks, as well as the risk reduction measures, often affect many groups and sectors of a society.

Longterm and sustainable success can only be achieved with a concerted and joint effort by various actors:

- *Authorities at the federal or central level* (e.g. government and parliament; specialist offices as well as regulatory and supervisory bodies within the federal administration; national research institutions)
- *Authorities at cantonal or regional level* (e.g. government and parliament; specialist offices as well as regulatory and supervisory bodies within cantonal governments; cantonal civil protection authorities and their partner organisations (police, fire service, health services, technical services and civil defence); cantonal emergency management bodies)
- *Authorities at communal level* (e.g. communal executive authority; specialist communal units; communal emergency management bodies)
- *Private sector* (e.g. industry; services; infrastructure operators; insurers)
- *Individuals* (e.g. land and property owners; others affected by risks)

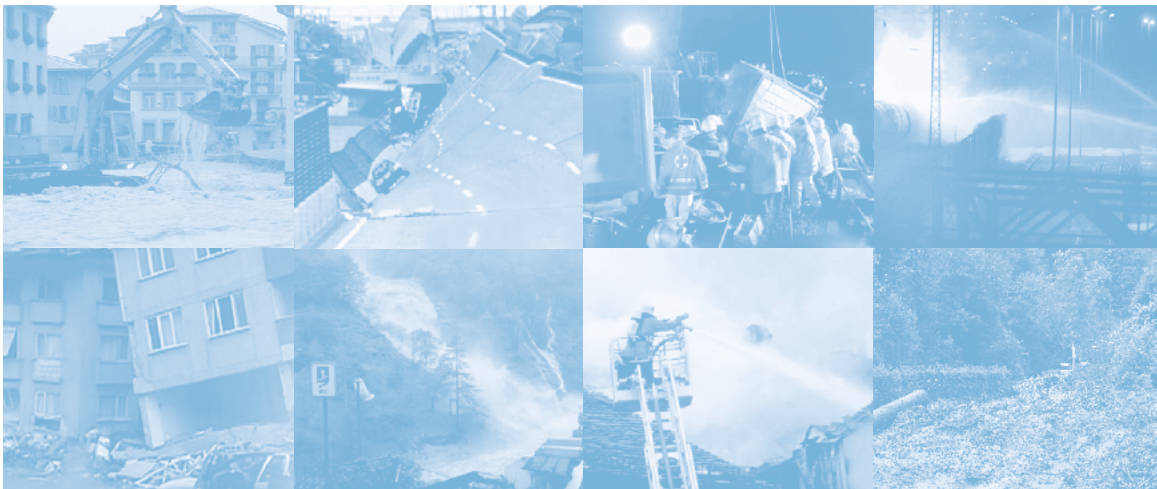
A risk dialogue between all of those concerned raises the general awareness of risk, improves knowledge about hazards and their related risks, and sensitises those who may be affected in some way to such an extent that they will often bear some of the responsibility for risk reduction themselves.

⁸ cf. also Article 73 of the Swiss Federal Constitution: "The Confederation and the Cantons shall endeavour to achieve a balanced and sustainable relationship between nature and its capacity to renew itself and the demands placed on it by the population."

6. Concluding remarks

Integrated risk management (IRM) is a proven general *methodology* for treating hazards and their related risks with appropriate actions in a systematic and comprehensive way that complies with the principles of sustainability. At the same time, IRM also expresses a certain *mindset* to addressing the challenges posed by the wide range of hazards and their risks: comprehensive, transparent, and comprehensible, as well as in cooperation with all relevant decision-makers, others concerned, and those who are affected. However, integrated risk management also implies a pragmatic flexibility to adapt to changing circumstances, rather than dogmatically applying its elements and principles.

Its primary goal remains the long-term reduction of risks that have been identified and deemed unacceptable, by means of financially justifiable and environmentally compatible measures that enjoy broad public support and a sound legal foundation. In so doing, it achieves an acceptable level of security for the people and their livelihoods.



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