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Risk management — Principles and guidelines on implementation

Management du risque — Principes et lignes directrices de mise en application

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64 **Foreword**

65 ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies
66 (ISO member bodies). The work of preparing International Standards is normally carried out through ISO
67 technical committees. Each member body interested in a subject for which a technical committee has been
68 established has the right to be represented on that committee. International organizations, governmental and
69 non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the
70 International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

71 International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

72 The main task of technical committees is to prepare International Standards. Draft International Standards
73 adopted by the technical committees are circulated to the member bodies for voting. Publication as an
74 International Standard requires approval by at least 75 % of the member bodies casting a vote.

75 This standard may be revised after 5 years on the basis of practical experience. Committees writing standards
76 are invited to inform the ISO Central Secretariat of any difficulties encountered with the implementation of its
77 provisions.

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78 Introduction

79 Organizations of all types and sizes face a range of risks that can affect the achievement of their objectives.

80 These objectives can relate to a range of the organization's activities, from strategic initiatives to its
81 operations, processes and projects, and be reflected in terms of strategic, operational, financial and
82 reputational outcomes and impacts.

83 All activities of an organization involve risks. Risk management aids decision making by taking account of
84 uncertainty and its effect on achieving objectives and assessing the need for any actions.

85 Risk management process involves applying logical and systematic methods for:

86 — communication and consultation throughout the process;

87 — establishing the context;

88 — identifying, analyzing, evaluating and treating risk associated with any activity, process, function, project,
89 product, service or asset;

90 — monitoring and reviewing risk; and

91 — recording and reporting the results appropriately.

92 This International Standard recognizes the variety of the nature, level and complexity of risks and provides
93 generic guidelines on principles and implementation of risk management. To apply these generic guidelines in
94 a specific situation, this International Standard sets out how an organization should understand the specific
95 context in which it implements risk management.

96 Risk management can be applied to the entire organization, across its many areas and levels, at any time as
97 well as to specific functions and activities.

98 When implemented and maintained in accordance with this International Standard, risk management enables
99 an organization to, for example:

100 — encourage proactive rather than reactive management;

101 — be aware of the need to identify and treat risk throughout the organization;

102 — improve identification of opportunities and threats;

103 — comply with relevant legal and regulatory requirements and international norms;

104 — improve financial reporting;

105 — improve corporate governance;

106 — improve stakeholder confidence and trust;

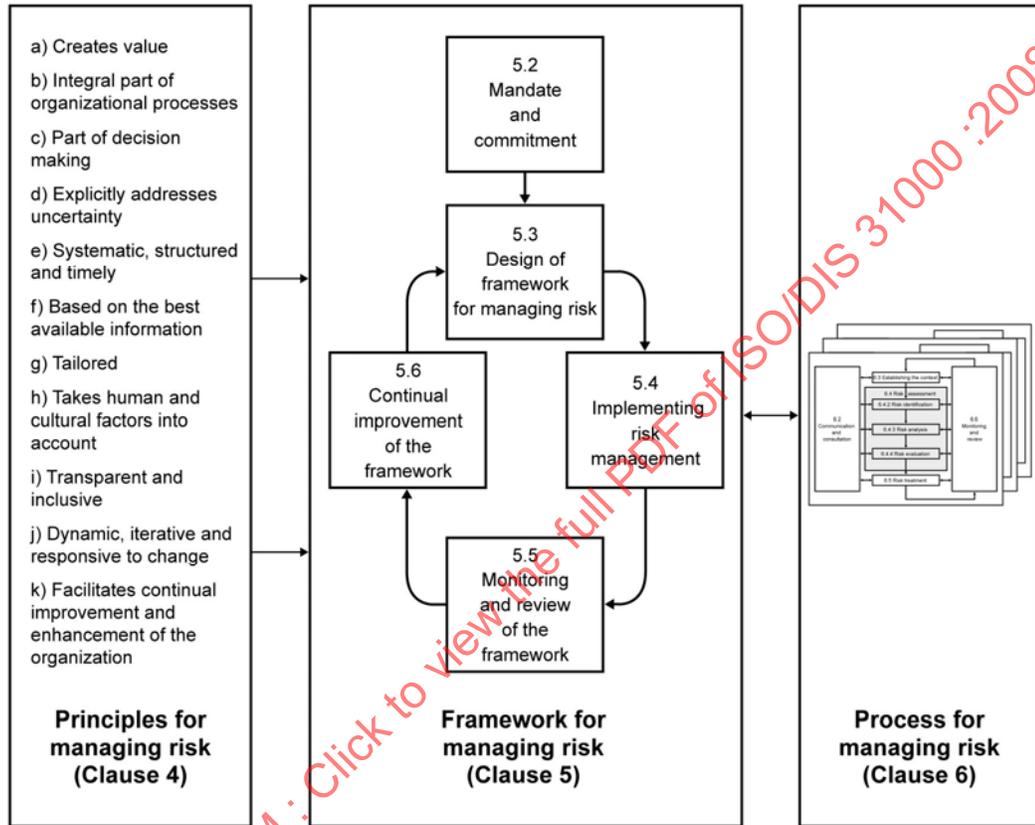
107 — establish a reliable basis for decision making and planning;

108 — improve controls;

- 109 — effectively allocate and use resources for risk treatment;
 - 110 — improve operational effectiveness and efficiency;
 - 111 — enhance health and safety;
 - 112 — improve incident management and prevention;
 - 113 — minimize loss;
 - 114 — Improve organizational learning; and
 - 115 — Improve organizational resilience.
- 116 Risk management should ensure that organizations have an appropriate response to the risks affecting them.
117 Risk management should thus help avoid ineffective and inefficient responses to risk that can unnecessarily
118 prevent legitimate activities and/or distort resource allocation.
- 119 To be effective within an organization, risk management should be an integrated part of the organization's
120 overall governance, management, reporting processes, policies, philosophy and culture.
- 121 The same risk management approach can be adopted for all activities of an organization including projects,
122 defined functions, assets, and products or activities and will in turn strengthen the linkages between these
123 activities and the organization's overall objectives.
- 124 This International Standard is intended to be used by a wide range of stakeholders including:
- 125 — those responsible for implementing risk management within their organization;
 - 126 — those who need to ensure that an organization manages risk;
 - 127 — those who need to manage risk for the organization as a whole or within a specific area or activity;
 - 128 — those needing to evaluate an organization's practices in managing risk; and
 - 129 — developers of standards, guides, procedures, and codes of practice that in whole or in part set out how
130 risk is to be managed within the specific context of these documents.
- 131 Many organizations' existing management practices and processes include components of risk management
132 and many organizations have already adopted a formal risk management process for particular types of risk or
133 circumstances. Management can decide to critically review their existing practices and processes in light of
134 this standard.
- 135 Although the practice of risk management has been developed over time and within many sectors to meet
136 diverse needs, a generic approach consisting of a framework of essential components can help to ensure that
137 risk is managed effectively and coherently across an organization. The generic approach described in this
138 International Standard provides guidelines on implementing essential components for managing risk in a
139 transparent and credible manner within any scope and context.
- 140 Each specific sector or application of risk management brings with it individual needs, audiences, perceptions
141 and criteria. Therefore a key feature of this International Standard is the inclusion of "establishing the context"
142 as an activity at the start of this generic process of risk management. This feature will capture the diversity of
143 criteria as well as the nature and complexity of risk and other factors that need to be considered and managed
144 in each case.
- 145 Some areas of risk management within, for example, the areas of safety, human health and environment,
146 impose criteria that reflect an aversion to negative consequences. Such criteria can be contained in legal and
147 regulatory requirements and international norms. The application of the risk management approach described
148 in this International Standard helps to ensure that those criteria are identified and applied. Therefore, this

149 International Standard can also help an organization to comply with legal and regulatory requirements and
 150 international norms as well as to improve an organization's performance.

151 The relationship between the principles for managing risk, the risk management framework and the risk
 152 management process described in this standard is shown in Figure 1.



153

154 **Figure 1 — Relationship between the risk management principles, framework and process**

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155 **Risk management — Principles and guidelines on**
156 **implementation**

157 **1 Scope**

158 This International Standard provides principles and generic guidelines on implementation of risk management.

159 This International Standard can be applied to any public, private or community enterprise, association, group
160 or individual. Therefore, this International Standard is generic and not specific to any industry or sector.

161 NOTE For convenience, all the different addressees of this International Standard are referred to by the general term
162 “organization”.

163 This International Standard can be applied throughout the life of an organization, and to a wide range of
164 activities, processes, functions, projects, products, services, assets, operations and decisions.

165 Although this International Standard provides generic guidelines, it is not intended to impose uniformity of risk
166 management across organizations. The design and implementation of risk management will depend on the
167 varying needs of a specific organization, its particular objectives, context, structure, products, services,
168 projects, the operational processes and specific practices employed.

169 This International Standard intends to harmonize risk management processes in existing and future standards.
170 It provides a common approach in support of standards dealing with specific risks and/or sectors, and does
171 not replace those standards.

172 This International Standard is not intended to be used for the purpose of certification.

173 **2 Normative references**

174 The following referenced document is indispensable for the application of this document. For dated reference,
175 only the edition cited applies.

176 ISO/IEC Guide 73, *Risk management — Vocabulary*¹.

177 **3 Terms and definitions**

178 For the purposes of this document, the terms and definitions given in ISO/IEC Guide 73 apply.

179 **4 Principles for managing risk**

180 To be most effective, an organization's risk management should adhere to the following principles.

181 a) Risk management creates value.

¹ To be published.

182 Risk management contributes to the demonstrable achievement of objectives and improvement of, for
183 example, human health and safety, legal and regulatory compliance, public acceptance, environmental
184 protection, financial performance, product quality, efficiency in operations, corporate governance and
185 reputation.

186 b) Risk management is an integral part of organizational processes.

187 Risk management is part of the responsibilities of management and an integral part of the normal
188 organizational processes as well as of all project and change management processes. Risk management is
189 not a stand-alone activity which is separate from the main activities and processes of the organization.

190 c) Risk management is part of decision making.

191 Risk management helps decision makers make informed choices. Risk management can help prioritize
192 actions and distinguish among alternative courses of action. Ultimately, risk management can help with
193 decisions on whether a risk is unacceptable and whether risk treatment will be adequate and effective.

194 d) Risk management explicitly addresses uncertainty.

195 Risk management deals with those aspects of decision making that are uncertain, the nature of that
196 uncertainty, and how it can be addressed.

197 e) Risk management is systematic, structured and timely.

198 A systematic, timely and structured approach to risk management contributes to efficiency and consistent,
199 comparable and reliable results.

200 f) Risk management is based on the best available information.

201 The inputs to the process of managing risk are based on information sources such as experience, feedback,
202 observation, forecasts and expert judgement. However, decision makers should be informed of and should
203 take into account any limitations of the data or modelling used or the possibility of divergence among experts.

204 g) Risk management is tailored.

205 Risk management is aligned with the organization's external and internal context and risk profile.

206 h) Risk management takes human and cultural factors into account.

207 The organization's risk management recognizes the capabilities, perceptions and intentions of external and
208 internal people that can facilitate or hinder achievement of the organization's objectives.

209 i) Risk management is transparent and inclusive.

210 Appropriate and timely involvement of stakeholders and, in particular, decision makers at all levels of the
211 organization, ensures that risk management remains relevant and up-to-date. Involvement also allows
212 stakeholders to be properly represented and to have their views taken into account in determining risk criteria.

213 j) Risk management is dynamic, iterative and responsive to change.

214 As internal and external events occur, context and knowledge change, monitoring and review take place, new
215 risks emerge, some change, and others disappear. Therefore an organization should ensure that risk
216 management continually senses and responds to change.

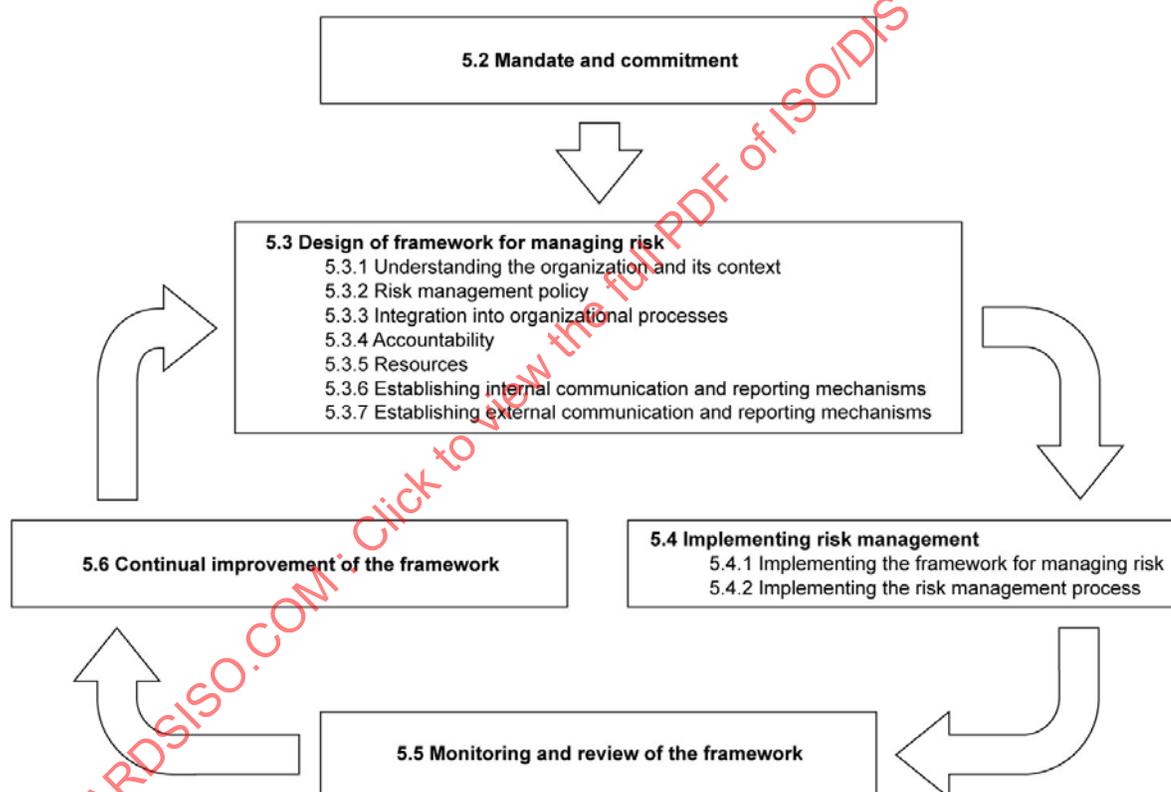
217 k) Risk management facilitates continual improvement and enhancement of the organization.

218 Organizations should develop and implement strategies to improve their risk management maturity alongside
219 all other aspects of their organization. Annex A "Attributes of enhanced risk management" provides further
220 information.

221 **5 Framework for managing risk**222 **5.1 General**

223 To be successful, risk management should function within a risk management framework which provides the
 224 foundations and organizational arrangements that will embed it throughout the organization at all levels. The
 225 framework assists an organization in managing its risks effectively through the application of the risk
 226 management process (see Clause 6) at varying levels and within specific contexts of the organization. The
 227 framework should ensure that risk information derived from these processes is adequately reported and used
 228 as a basis for decision making and accountability at all relevant organizational levels.

229 This clause describes the components of the framework for managing risk that are necessary and the way in
 230 which they interrelate as shown in Figure 2.



231

232

Figure 2 — Components of the framework for managing risk

233 This framework is not intended to describe a management system; but rather, it is to assist the organization to
 234 integrate risk management within its overall management system. Therefore, organizations should adapt the
 235 components of the framework to their specific needs.

236 If an organization's existing management practices and processes include components of risk management or
 237 if the organization has already adopted a formal risk management process for particular types of risk or
 238 situations, then these should be critically reviewed and assessed against this International Standard as the
 239 basis for determining their adequacy.

240 **5.2 Mandate and commitment**

241 The introduction of risk management and ensuring its on-going effectiveness requires strong and sustained
242 commitment by management of the organization as well as strategic and rigorous planning. Management
243 should:

- 244 — articulate and endorse the risk management policy;
- 245 — determine risk management performance indicators that align with organizational performance indicators;
- 246 — ensure alignment of risk management objectives with the objectives and strategies of the organization;
- 247 — ensure legal and regulatory compliance;
- 248 — assign management accountabilities and responsibilities at appropriate levels within the organization;
- 249 — ensure that the necessary resources are allocated to risk management;
- 250 — communicate the benefits of risk management to all stakeholders; and
- 251 — ensure that the framework for managing risk continues to remain appropriate.

252 **5.3 Design of framework for managing risk**

253 **5.3.1 Understanding the organization and its context**

254 Before starting the design and implementation of the framework for managing risk, it is important to
255 understand both the internal and external context of the organization since these can influence significantly
256 the design of the framework.

257 Aspects of the organization's external context include, but not limited to:

- 258 — the cultural, political, legal, regulatory, financial, technological, economic, natural and competitive
259 environment, whether international, national, regional or local;
- 260 — key drivers and trends having impact on the objectives of the organization; and
- 261 — perceptions and values of external stakeholders.

262 Aspects of the organization's internal context include, but not limited to:

- 263 — the capabilities, understood in terms of resources and knowledge (e.g. capital, time, people, processes,
264 systems and technologies);
- 265 — information systems, information flows, and decision making processes (both formal and informal);
- 266 — internal stakeholders;
- 267 — policies, objectives, and the strategies that are in place to achieve them;
- 268 — perceptions, values and culture;
- 269 — standards and reference models adopted by the organization; and
- 270 — structures (e.g. governance, roles and accountabilities).

271 5.3.2 Risk management policy

272 The risk management policy should clarify the organization's objectives for and commitment to risk
273 management and should specify the following:

- 274 — links between the risk management policy and the organization's objectives and other policies;
- 275 — the organization's rationale for managing risk;
- 276 — accountabilities and responsibilities for managing risk;
- 277 — the way in which conflicting interests are dealt with;
- 278 — the organization's risk appetite or risk aversion;
- 279 — processes, methods and tools to be used for managing risk;
- 280 — resources available to assist those accountable or responsible for managing risk;
- 281 — the way in which risk management performance will be measured and reported;
- 282 — commitment to the periodic review and verification of the risk management policy and framework and its
283 continual improvement; and

284 The risk management policy should be communicated appropriately.

285 5.3.3 Integration into organizational processes

286 Risk management should be embedded in all the organization's practices and business processes so that it is
287 relevant, effective and efficient. The risk management process should become part of and not separate from
288 those organizational processes. In particular, risk management should be embedded into the policy
289 development, business and strategic planning and change management processes.

290 There should be an organization-wide risk management plan to ensure that the risk management policy is
291 implemented and that risk management is embedded in all the organization's practices and business
292 processes.

293 5.3.4 Accountability

294 The organization should ensure that there is accountability and authority for managing risks, including the
295 implementation and maintenance of the risk management process and ensure the adequacy and
296 effectiveness of any risk controls. This can be facilitated by:

- 297 — specifying who is accountable for the development, implementation and maintenance of the framework for
298 managing risk;
- 299 — specifying risk owners for implementing risk treatment, maintaining risk controls and reporting of relevant
300 risk information;
- 301 — establishing performance measurement and internal and/or external reporting and escalation processes;
302 and
- 303 — ensuring appropriate levels of recognition, reward, approval and sanction.

304 5.3.5 Resources

305 The organization should develop the practical means to allocate appropriate resources for risk management.

306 Consideration should be given to the following:

- 307 — people, skills, experience and competences;
- 308 — resources needed for each step of the risk management process;
- 309 — documented processes and procedures; and
- 310 — information and knowledge management systems.

311 **5.3.6 Establishing internal communication and reporting mechanisms**

312 The organization should establish internal communication and reporting mechanisms. These should ensure
313 that:

- 314 — key components of the risk management framework, and any subsequent modifications, are
315 communicated appropriately;
- 316 — there is adequate internal reporting on the framework, its effectiveness and the outcomes;
- 317 — relevant information derived from the application of risk management is available at appropriate levels and
318 times; and
- 319 — there are processes for consultation with internal stakeholders.

320 These mechanisms should include processes to consolidate risk information where appropriate from a variety
321 of sources within the organization taking into account its sensitivity.

322 **5.3.7 Establishing external communication and reporting mechanisms**

323 The organization should develop and implement a plan as to how it will communicate with external
324 stakeholders. This should involve:

- 325 — engaging appropriate external stakeholders and ensuring an effective exchange of information;
- 326 — external reporting to comply with legal, regulatory, and corporate governance requirements;
- 327 — making legally required disclosures;
- 328 — providing feedback and reporting on communication and consultation;
- 329 — using communication to build confidence in the organization; and
- 330 — communicating with stakeholders in the event of a crisis or contingency.

331 **5.4 Implementing risk management**

332 **5.4.1 Implementing the framework for managing risk**

333 In implementing the organization's framework for managing risk, the organization should:

- 334 — define an appropriate timing and strategy for implementing the framework;
- 335 — apply the risk management policy and process to the organizational processes;
- 336 — comply with legal and regulatory requirements;

337 — document justified decision making, including the development and setting of objectives which are aligned
338 with the outcomes of the risk management process;

339 — hold information and training sessions; and

340 — communicate and consult with stakeholders to ensure that its risk management framework remains
341 appropriate.

342 **5.4.2 Implementing the risk management process**

343 Risk management is implemented by ensuring that the risk management process outlined in Clause 6 is
344 applied at all relevant levels and functions of an organization as part of the organization's practices and
345 business processes.

346 **5.5 Monitoring and review of the framework**

347 To ensure that risk management is effective and continues to support organizational performance, the
348 organization should:

349 — establish performance measures;

350 — periodically measure progress against, and deviation from the risk management plan;

351 — periodically review whether the risk management framework, policy, and plan are still appropriate given
352 the organizations' internal and external context;

353 — report on risks, progress with the risk management plan and ensure how well the risk management policy
354 is being followed; and

355 — review the effectiveness of the risk management framework.

356 **5.6 Continual improvement of the framework**

357 Based on the review, decisions should be made on how the risk management framework, policy and plan can
358 be improved. These decisions should lead to improvements in the organization's risk management, and risk
359 management culture.

360 **6 Process for managing risk**

361 **6.1 General**

362 The risk management process should be an integral part of management, be embedded in culture and
363 practices and tailored to the business processes of the organization. It comprises the activities described from
364 6.2 to 6.7. The risk management process includes five activities: communication and consultation, establishing
365 the context, risk assessment, risk treatment, monitoring and review as shown in Figure 3. These activities, as
366 well as recording the risk management process, are described in this clause.

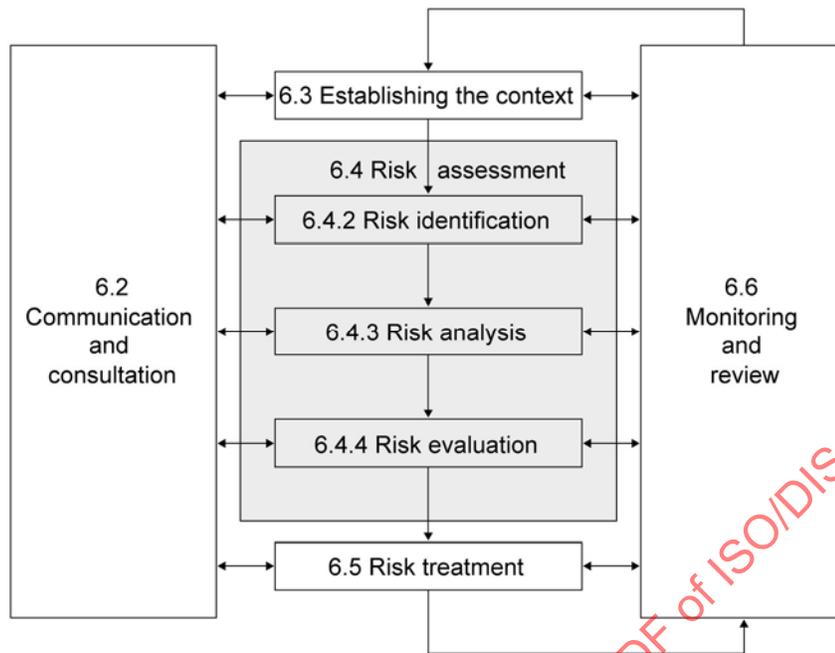


Figure 3 — Risk management process

367

368

369 **6.2 Communication and consultation**

370 Communication and consultation with internal and external stakeholders as far as necessary should take
 371 place at each stage of the risk management process.

372 Therefore, a plan to communicate and consult with both internal and external stakeholders should be
 373 developed at an early stage. This plan should address issues relating to the risk itself, its consequences (if
 374 known), and the measures being taken to manage it.

375 Effective internal and external communication and consultation should take place to ensure that those
 376 accountable for implementing the risk management process and stakeholders understand the basis on which
 377 decisions are made, and the reason why particular actions are required.

378 A consultative team approach is useful to, but not limited to:

- 379 — help define the context appropriately;
- 380 — ensure that the interests of stakeholders are understood and considered;
- 381 — bring different areas of expertise together for analyzing risks;
- 382 — help ensure that risks are adequately identified;
- 383 — ensure that different views are appropriately considered in evaluating risks;
- 384 — enhance appropriate change management during the risk management process;
- 385 — secure endorsement and support for a treatment plan; and
- 386 — develop an appropriate internal and external communication and consultation plan.

387 Communication and consultation with stakeholders is important as they make judgements about risk based on
 388 their perceptions of risk. Perceptions of risk can vary due to differences in values, needs, assumptions,
 389 concepts and concerns of stakeholders. As their views can have a significant impact on the decisions made, it
 390 is important that the stakeholders' perception is identified, recorded, and taken into account in the decision
 391 making process.

392 The communication and consultation plan should:

- 393 — be an exchange of information between stakeholders;
- 394 — convey messages which are honest, accurate, understandable and based on evidence; and
- 395 — be useful; and the value of the contributions be assessed.

396 **6.3 Establishing the context**

397 **6.3.1 General**

398 By establishing the context the organization defines the internal and external parameters to be taken into
 399 account when managing risk, and setting the scope and risk criteria for the remaining process. The context
 400 should include both internal and external parameters relevant for the organization. While many of these
 401 parameters are similar to those considered in the design of the risk management framework (see 5.3.1), when
 402 establishing the context for the risk management process, they need to be considered in greater detail and
 403 particularly how they relate to the scope of the particular risk management process.

404 **6.3.2 Establishing the external context**

405 External context is the external environment in which the organization seeks to achieve its objectives.

406 Understanding the external context is important to ensure that external stakeholders, their objectives and
 407 concerns are considered when developing risk criteria. It is based on the organization wide context but with
 408 specific details of legal and regulatory requirements, stakeholder perceptions, and other aspects of risks
 409 specific to the scope of the risk management process.

410 The external context can include, but is not limited to:

- 411 — the cultural, political, legal, regulatory, financial, technological, economic, natural and competitive
 412 environment, whether international, national, regional or local;
- 413 — key drivers and trends having impact on the objectives of the organization; and
- 414 — perceptions and values of external stakeholders.

415 **6.3.3 Establishing the internal context**

416 Internal context is the internal environment in which the organization seeks to achieve its objectives.

417 The risk management process should be aligned with the organization's culture, processes and structure.
 418 Internal context is anything within the organization that can influence the way in which an organization will
 419 manage risk. It should be established because:

- 420 — risk management takes place in the context of the objectives of the organization;
- 421 — objectives and criteria of a particular project or activity should be considered in the light of objectives of
 422 the organization as a whole; and
- 423 — a major risk for some organizations is failure to achieve their strategic, project or business objectives, and
 424 this risk affects ongoing organizational commitment, credibility, trust and value.

425 It is necessary to understand the internal context, in terms of, for example:

- 426 — the capabilities, understood in terms of resources and knowledge (e.g. capital, time, people, processes,
427 systems and technologies);
- 428 — information systems, information flows, and decision making processes (both formal and informal) ;
- 429 — internal stakeholders;
- 430 — policies, objectives, and the strategies that are in place to achieve them;
- 431 — perceptions, values and culture; and
- 432 — standards and reference models adopted by the organization.
- 433 — structures (e.g. governance, roles and accountabilities).

434 **6.3.4 Establishing the context of the risk management process**

435 The objectives, strategies, scope and parameters of the activities of the organization or those parts of the
436 organization where the risk management process is being applied should be established. The management of
437 risk should be undertaken with full consideration of the need to justify the resources used in carrying out risk
438 management. The resources required, responsibilities and authorities, and the records to be kept should also
439 be specified.

440 The context of the risk management process will vary according to the needs of an organization. It can
441 involve, but is not limited to:

- 442 — defining responsibilities for the risk management process;
- 443 — defining the scope, as well as the depth and breadth of the risk management activities to be carried out,
444 including specific inclusions and exclusions;
- 445 — defining the activity, process, function, project, product, service or asset in terms of time and location as
446 well as its goal and objectives;
- 447 — defining the relationships between a particular project or activity and other projects or activities of the
448 organization;
- 449 — defining the risk assessment methodologies;
- 450 — defining the way performance is evaluated in the management of risk;
- 451 — identifying and specifying the decisions that have to be made; and
- 452 — identifying, scoping or framing studies needed, their extent and objectives, and the resources required for
453 such studies.

454 Attention to these and other relevant factors should help ensure that the risk management approach adopted
455 is appropriate to the situation of the organization and to the risks affecting the achievement of its objectives.

456 **6.3.5 Developing risk criteria**

457 The organization should develop criteria that are used to evaluate the significance of risk. The criteria can
458 reflect the organizations values, objectives and resources. Some criteria can be imposed by, or derived from,
459 legal and regulatory requirements and other requirements to which the organization subscribes. Risk criteria
460 should be consistent with the organization's risk management policy (see 5.3.2). Risk criteria should be
461 developed at the beginning of any risk management process and continually be reviewed.

- 462 When defining risk criteria, factors to be considered should include the following:
- 463 — nature and types of consequences that can occur and how they will be measured;
 - 464 — how likelihood will be defined;
 - 465 — the time frame(s) of the likelihood and/or consequence;
 - 466 — how the level of risk is to be determined;
 - 467 — the level at which risk becomes acceptable or tolerable;
 - 468 — what level of risk requires treatment; and
 - 469 — whether combinations of multiple risks should be taken into account.

470 **6.4 Risk assessment**

471 **6.4.1 General**

472 Risk assessment is the overall process of risk identification, risk analysis and risk evaluation.

473 **6.4.2 Risk identification**

474 The organization should identify sources of risk, areas of impacts, events and their causes and their potential
 475 consequences. The aim of this step is to generate a comprehensive list of risks based on those events that
 476 might enhance, prevent, degrade or delay the achievement of the objectives. It is also important to identify the
 477 risks associated with not pursuing an opportunity. Comprehensive identification is critical, because a risk that
 478 is not identified at this stage will not be included in further analysis. Identification should include risks whether
 479 or not their source is under control of the organization.

480 The organization should apply risk identification tools and techniques which are suited to its objectives and
 481 capabilities, and to the risks faced.

482 Relevant and up-to-date information is important in identifying risks. This should include suitable background
 483 information where possible. People with appropriate knowledge should be involved in identifying risks. After
 484 identifying what might happen, it is necessary to consider possible causes and scenarios that show what
 485 consequences can occur. All significant causes should be considered.

486 **6.4.3 Risk analysis**

487 Risk analysis is about developing an understanding of the risk. Risk analysis provides an input to risk
 488 evaluation and to decisions on whether risks need to be treated and on the most appropriate risk treatment
 489 strategies and methods.

490 Risk analysis involves consideration of the causes and sources of risk, their positive and negative
 491 consequences, and the likelihood that those consequences can occur. Factors that affect consequences and
 492 likelihood should be identified. Risk is analyzed by determining consequences and their likelihood, and other
 493 attributes of the risk. An event can have multiple consequences and can affect multiple objectives. Existing
 494 risk controls and their effectiveness should be taken into account.

495 The way in which consequences and likelihood are expressed and the way in which they are combined to
 496 determine a level of risk will vary according to the type of risk, the information available and the purpose for
 497 which the risk assessment output is to be used. These should all be consistent with the risk criteria. It is also
 498 important to consider the interdependence of different risks and their sources.

499 The confidence in determination of risk and their sensitivity to preconditions and assumptions should be
 500 considered in the analysis, and communicated effectively to decision makers and other stakeholders if

501 required. Factors such as divergence of opinion among experts or limitations on modelling should be stated
502 and may be highlighted.

503 Risk analysis can be undertaken with varying degrees of detail depending on the risk, the purpose of the
504 analysis, and the information, data and resources available. Analysis can be qualitative, semi-quantitative or
505 quantitative, or a combination of these, depending on the circumstances. In practice, qualitative analysis is
506 often used first to obtain a general indication of the level of risk and to reveal the major risks. When possible
507 and appropriate, one should undertake more specific and quantitative analysis of the risks as a following step.

508 Consequences can be determined by modelling the outcomes of an event or set of events, or by extrapolation
509 from experimental studies or from available data. Consequences can be expressed in terms of tangible and
510 intangible impacts. In some cases, more than one numerical value or descriptor is required to specify
511 consequences for different times, places, groups or situations.

512 **6.4.4 Risk evaluation**

513 The purpose of risk evaluation is to assist in making decisions, based on the outcomes of risk analysis, about
514 which risks need treatment to prioritize treatment implementation.

515 Risk evaluation involves comparing the level of risk found during the analysis process with risk criteria
516 established when the context was considered. If the level of risk does not meet risk criteria, the risk should be
517 treated.

518 Decisions should take account of the wider context of the risk and include consideration of the tolerance of the
519 risks borne by parties other than the organization that benefit from the risk. Decisions should be made in
520 accordance with legal, regulatory and other requirements.

521 In some circumstances, the risk evaluation can lead to a decision to undertake further analysis. The risk
522 evaluation can also lead to a decision not to treat the risk in any way other than maintaining existing risk
523 controls. This decision will be influenced by the organization's risk appetite or risk attitude and the risk criteria
524 that have been established.

525 **6.5 Risk treatment**

526 **6.5.1 General**

527 Risk treatment involves selecting one or more options for modifying risks, and implementing those options.

528 Risk treatment involves a cyclical process of assessing a risk treatment; deciding whether residual risk levels
529 are tolerable or not; if not tolerable generating a new risk treatment; and assessing the effect of that treatment
530 until the residual risk reached complies with the organization's risk criteria.

531 Risk treatment options are not necessarily mutually exclusive or appropriate in all circumstances. The options
532 can include the following:

- 533 — avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk;
- 534 — seeking an opportunity by deciding to start or continue with an activity likely to create or enhance the risk;
- 535 — removing the source of the risk;
- 536 — changing the nature and magnitude of likelihood;
- 537 — changing the consequences;
- 538 — sharing the risk with another party or parties; and
- 539 — retaining the risk by choice.