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Innovation management — Tools and methods for strategic intelligence management — Guidance

Management de l'innovation — Outils et méthodes de management de l'intelligence stratégique — Recommandations

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 279, *Innovation management*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 General

Organizations operate in a volatile, uncertain, complex and ambiguous environment which is characterised by expanding knowledge flows, increasing global competition and rapid rates of change. This creates the need to anticipate change, influence the environment and make timely and informed decisions regarding innovation.

Global knowledge and information-based environments require strategic-thinking leaders to utilise this knowledge to define their organizational and innovation strategy. This supports organizations in responding to changes in their environment, e.g. social, technological, market, regulatory, policy.

To this extent, it is necessary to isolate or synthesize data and information with high confidence and to convert it into knowledge for driving strategic decisions.

Strategic intelligence is the outcome of a structured process for collecting, processing and communicating data, information and knowledge to decision-makers, that can be applied continuously or to specific projects to be launched.

The process backbone lies on the capability of ensuring objectiveness and appropriateness of scope and criteria, reliability of data sources and information derived, transparency of the actions performed to interpret and communicate the knowledge. As such, it is both an element of risk reduction as well as strategic growth and it enables organizations to set strategic direction and implement their innovation initiatives.

An organization can leverage strategic intelligence as an enabling factor to achieve its business objectives and to implement innovation initiatives for a range of purposes such as:

— identifying new business opportunities and alliances;

— increasing competitive advantage;

— anticipating risk and uncertainty;

— enabling technology transfer opportunities;

— forecasting societal, political, technological and business drivers;

— seeking out weak signals to anticipate change;

— overcoming barriers that limit value creation;

— implementing a structured approach to problem solving.

0.2 Principles

Strategic intelligence within the context of innovation management should conform to the following innovation management principles that are the foundation of an innovation management system:

a) Realisation of value

Strategic intelligence impacts on the vision, mission and innovation activities of an organization. As such, it should support the creation of value for all relevant stakeholders. This includes long-term and short-term value; explicit and implicit value; financial and non-financial value (e.g. competence growth, technological and/or competitive advantage, societal benefit, sustainability improvement).

b) Future-focused leaders

When managing innovation initiatives, leaders across the organization should foster strategic intelligence as an enabling factor for long-term value creation.

c)   Strategic direction

The organization should align the overall strategic direction for the management of strategic intelligence with its business and innovation strategies.

d)   Culture

Strategic intelligence management should be aligned and fostered within the shared values, beliefs and behaviours across the organization (and relevant community) and should be part of its identity.

NOTE 1   The concept of "culture" (supporting innovation activities) is defined in ISO 56000:2020, 3.2.10 and specifically addressed in ISO 56000:2020 4.3.4 and ISO 56002:2019, 4.4.2 respectively.

NOTE 2   The concept of "identity of an organization" is specified and addressed in ISO 9004:2018, Clause 6.

e)   Exploiting insights

Pursuing innovation opportunities in order to drive innovation and create value, clearly relies on the capacity of generating insight, defined in ISO 56000:2020, 3.4.3 as profound and unique knowledge about an entity.

In this perspective, strategic intelligence management should ensure access to a diverse range of internal and external data, information and knowledge sources to systematically build expertise in support of strategic decision-making.

f)   Managing uncertainty

The organization should foster strategic intelligence management in support of identifying, assessing and managing innovation uncertainties and related opportunities and risks.

g)   Adaptability

The organization should align the need of strategic intelligence with its vision and mission, addressing and even anticipating changes at different time scales in the external and internal context.

h)   Systems approach

The organization should manage strategic intelligence based on a systems approach (instead of an *ad-hoc* basis) with a view to reducing organizational risks and enhancing value creation potential for the organization.

These principles can be considered as an open set to be integrated and adapted within the organization.

Innovation management — Tools and methods for strategic intelligence management — Guidance

1 Scope

This document provides guidelines for supporting strategic intelligence within innovation management. It aims at addressing the following areas concerning strategic intelligence at strategic and operational levels:

— creating a strategic intelligence management strategy to support innovation in an organization;

— establishing strategic intelligence management in support of the innovation activities and initiatives within the innovation management system and the related innovation processes;

— applying strategic intelligence tools and methods in support of the innovation activities and initiatives within the innovation management system and the related innovation processes.

Strategic intelligence is transversal and cross-sectorial by nature. It is not limited to innovation activities and can apply to all areas where knowledge is required for strategic decision-making and consequent actions.

This document is not applicable to:

— certification;

— data protection.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 56000, *Innovation management — Fundamentals and vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 56000 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
intelligence
result of gathering, analysing and interpreting data, information and knowledge

Note 1 to entry: Intelligence can be of different kinds, e.g. (but not limited to) market, technology, competition, intellectual property or business.

3.2
strategic intelligence
intelligence directed to top management with recommendations to make decisions impacting the vision, strategy, policy and objectives as well as innovation activities of the organization

4 Fundamentals of strategic intelligence

4.1 Purpose of strategic intelligence

Intelligence is required at every stage of the innovation processes, including but not limited to idea generation, engineering conception, and business model determination.

Knowledge is the key resource in generating innovative concepts, e.g. knowledge of technology progress, markets, business trends, geopolitics.

Strategic intelligence promotes decision-making based on knowledge, assists in managing uncertainty by addressing opportunities and risks and is integral to the innovation management system activities and processes.

4.2 Strategic intelligence needs

To accomplish this purpose, the strategic intelligence team should:

— acquire data, information and knowledge from internal and external sources;

— collaborate and cooperate with relevant interested parties;

— gain additional perspectives, e.g. present and future trends, internal and external factors, demand and supply for intended products/services, needs of providers and users related to new or changed products, services, processes, models, methods, competitors and collaborators, regulatory changes, intellectual property management, consumer safety, security and ethics, and sustainable development considerations;

— develop influencing activities and initiatives to increase acceptance of innovation, e.g. evolution of regulatory requirements, standards, and innovation ecosystems;

— identify external interested parties: customers, suppliers, internal and external auditors and assessors (e.g. compliance with standards, regulations), governments at all levels (e.g. compliance with regulations, statutes, laws), consumer groups (e.g. concerns regarding fairness, ethics, safety), regulatory bodies, industry and trade associations;

— identify internal interested parties: employees, union representatives (if applicable), management (e.g. performance, costs), shareholders/owners (e.g. earnings);

— anticipate and analyse external trends (e.g. megatrends, policies, regulations, economy, society, technology, environment, legal), drivers and signals;

— identify internal tendencies (e.g. resources, competencies, assets, business models);

— understand interested parties' issues that are relevant to its purpose and that affect its ability to achieve the intended outcome(s).

4.3 Core of the strategic intelligence process

The primary strategic intelligence cycle is referred to as the DIKI model:

$$Data \rightarrow Information \rightarrow Knowledge \rightarrow Intelligence$$

NOTE   The DIKI model is an adaptation of the DIKW (data, information, knowledge, wisdom) pyramid. In this sense, while "wisdom" is an ideal/asymptotic concept, "intelligence" can be achieved by implementing an appropriate intelligence management process, such as the one specified in this document.

The implementation of the strategic intelligence process requires use of various tools and methods, e.g. data mining, analytics, artificial intelligence, machine learning, prediction techniques, environmental scanning, technology watching, ethnographic research, to support the DIKI model.

4.4 Strategic intelligence timing

Ideally the strategic intelligence cycle should be a continuous cycle. However, due to practical reasons, it may not be feasible. Gathering of data, extraction of knowledge and intelligence can be either calendar driven or triggered by an external and/or internal event that requires leadership attention and/or decision(s).

4.5 Expected strategic intelligence outcomes

The following outcomes are expected:

— a set of recommendations to the leadership for use in strategic planning and decision-making;

— a set of recommendations to the strategic intelligence team on new or alternative directions and any additional data requirements for confirmations. This includes appropriate levels of confidentiality, protection, disclosure and maintenance of the proprietary nature of intelligence, also considering intellectual property-related aspects.

4.6 Strategic intelligence essentials

The strategic intelligence cycle should require:

a) Support in terms of infrastructure and access to:

   1) specialized databases such as intellectual property, business, marketing and other commercial databases, with appropriate licences and permits;

   2) specific techniques and tools for generation, search, retrieval, analysis and treatment of data and information, e.g. text mining, big data, machine learning, social network analysis, voice and other methods and

   3) workspace infrastructure, and associated facilities, utilities and equipment, e.g. facilities, IT hardware/software.

b) Recommended competencies, e.g. a team of multidisciplinary expertise:

   1) team/project management;

   2) subject matter expertise, e.g. technology scenario analysis, business environment and market analysis, innovation management, sustainability, prospective, intellectual property, human resources & social sciences;

   3) ethnography, behavioural science, design research, user insights;

   4) industry sector expertise, e.g. chemical, energy and power, oil and gas, automotive, aerospace and defence, manufacturing, healthcare, government and public administration;

   5) data analytics, e.g. statistics, big data analytics, AI/Machine Learning, forecasting.

NOTE 1   These are minimum options for a multidisciplinary expertise. Depending on the size of the organization, the number of people involved, the type of information or other reasons, the same person can fulfil one or more roles, when there is a need to add the relevant skills.

NOTE 2   The strategic intelligence team can foster knowledge exchange and have sufficiently developed interpersonal and personal skills (e.g. communication skills, emotional intelligence, problem solving, flexibility, analytical capacity and intuition).

Some of the reasons for poor intelligence generation can include:

— inadequate collection of data, information and knowledge;

— missing requirements, deadlines or costs;

— wrong or poor communication of intelligence;

— wrong or poor execution of the strategic intelligence cycle (e.g. lack or wrong execution of one or more steps).

5 Strategic intelligence cycle

5.1 Operational planning and control

The strategic intelligence needs of an organization regarding innovation depend on the identification of the relevant data, information and knowledge in the context of the organization (e.g. market, competitors, technical, stakeholders). It should be aware that the business environment is dynamic and continually changing. The strategic intelligence team should consider the following external and internal aspects as a minimum:

— business areas of the identified innovation projects, activities and initiatives;

— relevant interested parties, e.g. competitors, investors, partners, academia and research infrastructures and ecosystems;

— market trends including unstated customer needs and expectations;

— technology trends;

— standards, industry codes and best practices;

— legal and regulatory relevant frameworks and trends;

— intellectual property and intellectual property rights;

— aspects related to environmental, social and economic sustainability.

Verification is performed in order to reduce uncertainty, minimize risks and avoid incurring unnecessary costs. Verification is applied to outcomes at each step throughout the strategic intelligence cycle, evaluating them against a set of requirements. The strategic intelligence team may select one of the many existing models for this purpose.

5.2 Strategic intelligence cycle
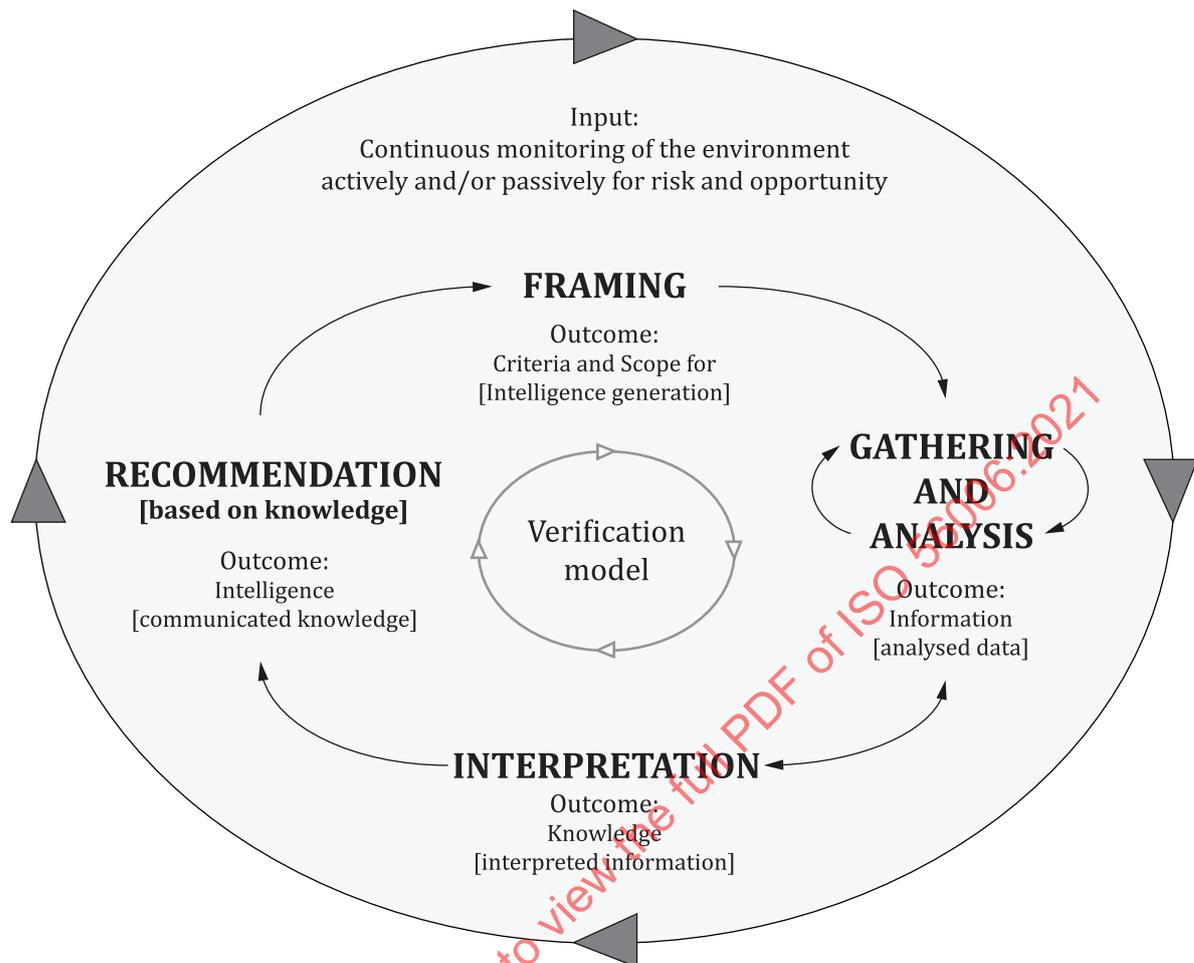
The strategic intelligence cycle is shown in Figure 1.

Figure 1 — Strategic intelligence cycle

5.3   Framing

5.3.1   General

The framing step aims to define the external and internal issues relevant to the scope of the strategic intelligence. It ensures alignment with the organization's mission, vision strategy, policy and objectives regarding innovation to define the boundaries for data gathering and analysis (see 5.4), information interpretation (see 5.5) and knowledge communication and formulation of related recommendations (see 5.6) to top management.

5.3.2   Outcome of framing — Criteria and scope for intelligence generation

Framing is the initial problem statement step in which the definition of the intelligence scope takes place.

EXAMPLES   Understanding the global development status of a certain technology, the regional dynamics of a certain market, the position of a certain player in a certain sector of a certain geographic area.

The identification of the types and sources of data takes place in this phase, as well as the definition of the analytical tools to be utilised (hence the know-how to be included in the project team), of the key aspects of the context, and of the final recommendation mode.

5.4 Data gathering and analysis

5.4.1 General

Gathering and analysis step builds on the framing phase to implement the actions required to generate information. It can be divided in two processes:

— data gathering and verification;

— data analysis to extract information.

Feedback and iterations between these processes can happen depending on the specific case, e.g. to add or modify a dataset, apply different analytics tools, iterate data verification.

5.4.2 Data gathering and verification

This is the process of finding and mining data and information, checking and maintaining quality and integrity and identifying patterns ready for interpretation. The aim is the generation of a verified set of data and information, ready for analysis.

5.4.3 Outcome of data gathering — Data and information (analysed data)

Sources of data, information and resources should be identified based on the criteria of quality, objectivity, reliability, and classification, e.g.:

— classified information, which has a quantified level of sensitivity according to a scale pre-established by the organization;

— inside information that concerns a company or market, with a high potential value but which is not publicly available or yet unknown to the public;

— sensitive information, of which the disclosure, loss or unavailability is likely to have negative consequences for the organization, regardless of the medium (oral, written, electronic);

— critical information, which is likely to alter an organization's strategy.

This data and information may be obtained from:

a) internal sources, e.g.:

— the organization's own document system and knowledge base, if available;

— people with knowledge or experience related to the organization's strategic intelligence needs and expectations;

— results of available forward-looking analyses, e.g. forecasting, foresight exercises, drafting of scenarios, road maps.

b) external sources, e.g.:

— customers, suppliers, competitor activities;

— documentation sources that the organization can access: hard and/or electronic copies, e.g. magazines, catalogues;

— supports, e.g. databases, or information resources on the Internet, e.g. specialized portals, news, blogs and social networks. This includes technical documentation, e.g. regulations, specifications, databases of patents and others intellectual property rights, and standards;

— publicly available research papers or unpublished research;

— congresses, seminars, fairs or exhibitions;

— market analysis reports;

— surveys, interviews, focus groups;

— partnerships and networking.

Data and information quality can be assessed by considering the following:

— reliability and accuracy, e.g. the origins of data and information and the credibility of sources;

— suitability and adequacy, e.g. identifying gaps in key information and implementing solutions that include, if needed, further information.

A table of functions / activities / information can be established to map data and information flows. For the main activities, relevance of incoming data and information should be evaluated by reviewing with the person in charge of framing.

Data can be verified through test runs on data, e.g. data consistency, relevance and reliability, unused data, sensitivity analysis, outliers' identification and treatment.

5.4.4 Data analysis to extract information

This is the process of application of analytical tools determined during the framing yielding composite information (e.g. correlations, trends, maps) starting from homogeneous or heterogeneous datasets (e.g. patents, papers, market data). This stage turns a set of strategic intelligence management data into information, i.e. composite data bearing non-trivial meaning.

5.4.5 Outcome of analysis — Information (analysed data)

Before processing data and information, the organization should define the vocabulary specific to their area of business activity in order to share a common vision and language. The organization should use different analysis techniques as appropriate, e.g. human-based, automated or a combination.

Some common automated tools that can deal with large amounts of data and information, structured or not, can be used to reveal patterns and trends, and/or to provide a visual representation, e.g.:

a) statistical tools or software;

b) data mining;

c) mapping and visualization tools;

d) classification;

e) taxonomy;

f) lexical or semantic analysis.

Some common human-based tools that can be used to analyse information include, e.g.:

— SWOT (with respect to strengths, weaknesses, opportunities and threats);

— PESTEL (with respect to political, economic, social, technological, environmental and legal factors);

— Five Forces (with respect to competitive forces and actors, new entrants, competitors, customers, suppliers).

Information can be verified through sensitivity analysis using tools for data analytics.

5.5 Interpretation

5.5.1 General

This is the step where knowledge is generated by interpreting information in accordance with the context of the organization. Information generated under various contexts, i.e. market, government, social, may be brought in to know the "how and why behind changes".

5.5.2 Outcome of interpretation — Knowledge (interpreted information)

This is the actual knowledge valuable for the strategic decision maker, i.e. information that is useful to make a strategic decision. Examples can include: mapping of competitors' activities and highlight of weak signals; identification of priorities for technical development and roadmap towards implementation.

The interpretation involves a range of different competencies. This can include aspects, e.g.:

— integration of data from different sources in order to achieve synergies, in which the combination of information from different sources constitutes a whole with a greater relevance and scope than the individual pieces of information;

— interpretation of the information, with the objective of determining what is valid and what is relevant for decision-making including, e.g. the understanding of the analysed information or a forecast of its consequences and foreseeable evolution;

— verification of the meaning of the information which has been analysed, e.g. concerning the technical content and the market/commercial relevance, and of their likely consequences for the organization;

Feedback and iterations between interpretation and data gathering/analysis can happen depending on the specific case, e.g. to add or modify a dataset, apply different analytics tools, and to avoid any possible misinterpretation.

NOTE   Some common outputs can be in the form of a "what if" type of analysis presenting choices (case analysis) for, e.g. direction, cause and effect relations, intellectual simulations, management, scenario modelling.

Knowledge can be verified through, e.g. reverse framing of scenario, cause-effect analysis.

5.6 Recommendation

5.6.1 General

This final step communicates intelligence to top management with recommendations relevant to the scope of strategic intelligence application, to support and inform decision-making.

5.6.2 Outcome of recommendation — Intelligence (communicated knowledge)

Communication tools are used to transfer intelligence to the management functions responsible for strategic decision-making, e.g. top management, senior managers, general managers, heads of strategy/innovation functions, research and development directors.

They should be open to the recommendations and available to implement bidirectional communication on subsequent actions. Some examples can be:

— prospective planning: proposals for actions in response to changes, or expectations of changes in the analysed environment;

— making improvements: proposals for actions needed to address limitations, inefficiencies or to minimize weaknesses identified;

— pursuing opportunities: proposals for actions to exploit identified opportunities;