

Human Factors, Management and Risk (an overview)

Addressing human factors is at the core of risk management!

Diskussion on LinkedIn group ISO 31000 Risk Management Standard started by Peter Blokland about half a year ago with in the end 102 comments.

My intrinsic feeling: to say »addressing the human factor is at the core of risk management« is like saying »the human factor is at the core of business or at the core of life«

What can be gained: [Never ever forget the human factor!](#)

Without people you are going nowhere!

Topics of this overview

- 1) **What does ISO 31000:2009 (E) say about human factors?**
- 2) **Addressing human factors is at the core of Mangement and Risk!**
- 3) **Complex systems require complex Human Factors Management!**
- 4) **Risk Mangement and Human Factors Management need to be tailored and a simple systemic approach is a humble but good start!**

Risk Management

ISO 31000:2009(E) ➤

- 2.1** → **risk** = effect of uncertainty on objectives (reference to potential events and consequences or a combination of these)
- 2.2** → **risk management** = coordinated activities to direct and control an organization with regard to risk [**but: compare introduction (page vi):** ... refers to the architecture (principles, framework and process) for managing risks effectively]

Process Guidelines:

5.1 General: The risk management process should be

- an integral part of management,
- embedded in the culture and practices, and
- tailored to the business processes of the organization

Human Factors and ISO 31000

Principles (ISO 31000:2009(E) Section 3):

... (a – g)

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

... (i – k)

indirect references:

risk owner (2.7, 4.3.3), **stakeholder** (notes to 2.10 & 2.11, 2.13, 3(i), 4.3.1, 4.3.7 ...), **people** (note to 2.11, 3(h), 4.3.1, 4.3.3, 4.3.5), **measured or determined ... subjectively** (note to 2.19), **management** (3(b), 4.2), **decision makers & experts** (3(c) & (f)), ...
use of **verbs** (»Tu-Wort« = »doing word«) → somebody (a human) is doing something

»uncertain future events«: »something happening« → naturally or man-made (80 % and more of all events connected to risk are said to be man-made!)

ISO 31000:2009(E) the process as seen by Auxilium Management Service:

5.2 - 5.6 items of the process: – communication and consultation (5.2), establishing the context (5.3)



➤ in sections 5.4, 5.5, 5.6 & 5.6 a guideline of the core process outlines handling of risk; in this context

Human Factors can be either:

- a) risk related, or
- b) process related

Process related human factors

ISO 31000:2009(E) sections

5.2 (Communication and consultation): **Perceptions (of risk) can vary due to differences in values, needs, assumptions, concepts and concerns of stakeholders.**

5.3 (Establishing the context): **... objectives and concerns of external stakeholders are considered ... based on ... stakeholder perceptions ... (5.3.2); capabilities ... relationships ... culture ... (5.3.3); responsibilities ... assessment ... decisions ... (5.3.4)**

Core process: (sections 5.4 – 5.7) **risk assessment, treatment, monitoring & review and recording**

5.4.2: **People with appropriate knowledge should be involved in identifying risks.**

→ **The focus is on process related human factors, reference to risk related human factors is made in the subsections on establishing the external and internal context but not within the core process!**

ISO 31010:2009-11

ISO 31010:2009-11 is a norm supporting ISO 31000 dealing with risk assessment techniques and refers to section 5 of ISO 31000 as its core element.

- ⇒ **human factors are mentioned in its section 5.2 dealing with risk identification putting emphasis on the fact that regardless of which technique is applied within risk identification it is of paramount importance to pay sufficient attention to human factors of influence**

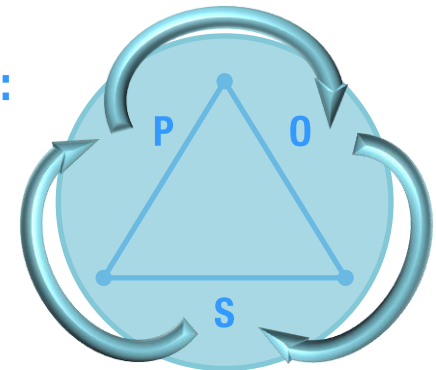
- ⇒ **in annex B (which is only informative) describing risk assessment techniques a section on human reliability assessment is included**
the purpose of human reliability assessment is described to be evaluating the consequences of human error for a technical system ← its origin obviously is the **analysis of accidents!**

Risk and Management

- ISO 31000:2009(E) ➤ the purpose ... is to integrate the process for [managing] risk into the organization's overall governance, strategy and planning, management, reporting processes, policies, values and culture [Introduction pg (v)].
- Risk [management] is an integral part of all organizational processes ... [including] the responsibilities of management ... decision making ... [3 (b) & (c)].

Core process: risk assessment, treatment, monitoring & review and recording

The most significant assignment for management is guidance of employees:



Management tool

ISO 31000:2009(E)

Risk [management] recognizes [integrates?] the capabilities, perceptions and intentions of external and internal people that can facilitate or hinder achievement of the organization's objectives [section 3 (h)] ← ... takes human ... factors into account.

..., decision makers should inform themselves of, and should take into account, any limitations ... [section 3 (f)] ← ... based on the best available information.

→ Risk [management] empowers the management of an organization to make informed choices, prioritize actions and distinguish among alternative courses of action [section 3 (c)].

→ Risk [management] is a tool that assists management to • plan, • organize and • supervise!
[compare introduction to ISO 31000:2009(E)]

→ Risk [management] is (just) a management tool! ← »(framework) and process manager«

→ Management by objectives – not by uncertainties or risk!

Management takes human factors into account

LinkedIn Group discussion: »... the management world at large isn't quite ready ...« → »The instrumentalist approach (...) is a good start for most organizations.« (midway through the discussion
»Addressing the human factor is at the core of risk management«)

There followed a shift of the discussion to perception bias, psychology bias and to HFACS (human factors analysis and classification system) awareness; next steps:

- »HRA« (human reliability analysis) and
- »ETTO« (efficiency-thoroughness trade-off)

▶ **The most significant assignment for management is the guidance of employees** ◀

- **Leadership**
- Teambuilding for successful efficiency in team
 - Identifying conflicts and resolving them before they escalate
 - Communicating actively and passively – avoiding conflict escalation
 - Being and staying self-assured even in conflict and confrontation

(Colin Guthrie, Berlin)

Management success depends on human factors

Corporate success depends widely on satisfaction. With regard to satisfaction there are numerous stakeholders besides the shareholder and the management. The most important are:

- the customer and
- **the employee!!**

A good approach to raise customer satisfaction is to raise employee satisfaction ← a dissatisfied employee will normally not do a good job and work quality will not be aligned with the organization's standards!

Employee satisfaction has more than monetary aspects – the most important are:

- employees are taken seriously and are valued
- employees are working reasonably self-determined

As general rule, an employee who seems to be a problem is someone who has a problem!

Also as a general rule, self assuredness will raise satisfaction and the ability to resolve problems amicably will raise self assuredness – and this requires training (giving assistance and showing that the employee is valued)!

Addressing human factors is at the core of management

The examples from the previous two slides from leadership training (Colin Guthrie, Berlin) and customer as well as internal service training (Auxilium Management Service) show that

- ☛ addressing human factors is at the core of management and
- ☛ addressing human factors is common practice for management

All these examples are risk related :

- ← any missing leadership competency is a risk
- ← badly treated employees are a risk for the organization
- ← employees perceiving themselves to be badly treated are a risk







Addressing human factors is at the core of risk!

Analysis of human factors is vital for risk assesment

To address human factors correctly there should be analysis and classification  **HFACS**

The Human Factors Analysis and Classification System (»HFACS«) identifies the human causes of [an accident] and provides tools to assist the investigation process and to target training and prevention efforts.

HFACS is based on the »Swiss Cheese« model of human error with four levels of active errors and latent failures:

-  **unsafe acts (errors (skill based, decision and perpetual) & violations)**
-  **preconditions for unsafe acts (environmental, operators', personnel)**
-  **unsafe supervision**
-  **organizational influences (resource, climate, process)**

HFACS

HFACS was developed in response to the fact that the primary factor in 80% of the flight accidents of the US Navy and Marine was human error!

It is now said that between 90 % to 95 % of aviation accidents and incidents are caused by human factors.

- **The FAA issued order 9550.8 (human factors policy) stating that human factors shall be systematically integrated into ... all FAA elements and activities associated with ... system operations.**

Why is Auxilium Management Service stressing human factors

Assessments of systems or projects or of an organization and its processes usually consider only the tangibles such as hardware, software and equipment. Mostly they neglect the complex socio-technical nature of modern systems and the end user – both crucial: consideration must be given to different aptitudes and abilities.

→ A system can work perfectly in a test environment and not perform as well as soon as the human factor becomes relevant.

What is considered a human factor?

- ← human capabilities, limitations and cultural biases!
- ← this includes perception bias and psychological bias

Human error has been cited as a cause or contributing factor in disasters and accidents in industries as diverse as nuclear power plants, aviation, space exploration and medicine.

Actions called human error are part of the ordinary spectrum of human behavior (e.g. absent-mindedness)!

Critical Industries such as the ones just mentioned need a »**Human Factors Management**« (HFM)!

Human Factors Management (HFM)

Applying HFACS is a vital part of Human Factors Management in complex industries. Human performance can be affected by many factors such as age, state of mind, physical health, attitude, emotions, and cognitive biases etc.

- ← Human reliability is crucial when the human is a crucial part of a large socio-technical system
- ← Human Reliability Analysis (»HRA«) is desirable for all complex systems. Two approaches for HRA:
 - 1) Probability risk assessment (»PRA« a functional decomposition – task analysis – will show a level of detail for which failure or error probabilities can be assigned)
 - 2) Cognitive control-based techniques (human performance modeled as a set of control modes and how transitions between them occur based on a number of factors such as estimate of outcome, time for the accomplishment and number of simultaneous goals)

Probability risk assessment methods:

- ← Technique for human error rate prediction (»THERP«)
- ← Accident Sequence Evaluation Program (»ASEP«)
- ← Simplified Human Error Analysis Code (»SHEAN«)

Resilience Engineering is Human Factors Management

Newer approaches such as resilience engineering highlight not only human error but also the positive roles that humans can play in complex systems. Success (things that go right) and failures (things that go wrong) are seen as having human performance variability as common basis.

One simple but powerful principle that might be used to understand both positive and negative outcomes of human performance is meant to be the Efficiency-Thoroughness Trade-Off-Principle – in brief:

ETTO

- ← People naturally adjust what they do to match the conditions – usually by sacrificing thoroughness for efficiency (due to lack of time, lack of resources, work and company pressures, lack of information etc.) .
- ← The ability of people mutually to adjust their performances is often found to be the reason why things go right (and sometimes their disability to do so the reason why things go wrong).

Concept: Safety (absence of risk) cannot be achieved by eliminating risks and failures alone!

ETTO (cf. Hollnagel, Eric; The ETTO Principle)

- In (complex) socio-technical systems the environment cannot be specified completely. Humans function as buffers and for various reasons generally will (have to) etto (trade-off thoroughness for efficiency).
- There will be more cases of success than of failures (even if the probability of failure is 10^{-4} there are 9.999 cases of success per failure)!
- Universal explanations like Murphy's law (if there is more than one way to do a job, and one of those ways will result in disaster, then somebody will do it that way) are tempting but wrong.
- Always remember that the efficiency of HAFCS, HRA or PRA, even risk assessment itself usually comes from simplification (a form of ETTO). ← A quick (simple but incomplete) explanation is better than none: ... something familiar ... comforts and satisfies ... giving us a feeling of power ... [while] the unknown ... danger, discomfort ... [Nietzsche (quoted from Hollnagel pg.10)].

ETTO benefit and appliance

- ☛ When risk becomes reality (an accident) we should try to understand what should have happened, what normally should have taken place and we should look for the trade-offs and the reasons why things usually go right!
- ☛ **The ETTO principle enables us to better understand what other people do or may do!**

Risk assessment → The question to ask (keep in mind) is:

How will the process owner etto?

ETTO Rules [examples, not exhaustive, (Hollnagel, Eric; The ETTO Principle, pg.35, 36)]

- It looks fine. → so there is no need to do anything and an action can be skipped!
- It is not really important. → there is really no need to do anything!
- **It is normally OK.** → there is no need to check, it always works out even if it looks suspicious in the beginning!
- It is good enough for now. → passing minimal requirements!
- **It will be checked later by someone else.** → the test/procedure can be skipped!
- **It has been checked earlier by someone else.** → the test/procedure can be skipped!
- There is no time (or resources) to do it now. → so postpone it and do it later (if not forgotten by then)!
- I cannot remember how to do it. (and I cannot be bothered to look it up)!
- **It looks like a Y so it probably is a Y.**
- **We always do it in this way here.** → so there is no reason to worry that the procedures say something else!
- If you don't say anything, I won't either. ← typically a rule has been bent!
- **I'm not an expert on this, so I will let you decide.** → deferring to the knowledge and experience of another person
← very popular in decisions taken by groups (board of directors)!

Risk [management] (principles, framework and process) is tailored

ISO 31000:2009 (E): »Risk management is aligned with the organization's external and internal context ...«. → Design of the framework demands an understanding of the organization and its context (section 4.3.1)

- ➡ Does the complexity of your organization's social and cultural, political, legal, regulatory financial, techno-logical, economic, natural and competitive environment require a complex HFM?
- ➡ Does the complexity of your organization's governance, structure roles accountabilities, policies, objectives, strategies, capabilities and processes require a complex HFM?

Apply the »KISS« rule

Etto ➔ simplify your life, apply the »KISS« rule: **Keep it simple, stupid!**

Start with the basics! Remember the quote mentioned before from the fb discussion:

»The instrumentalist approach (...) is a good start for most organizations.« (Julian Talbot)

- ➔ Start implementing the core process (recorded assessment, treatment, monitoring and review of risk)
- ➔ implement a **risk inventory** (and if appropriate add an »Internal Controls Maturity Self-Assessment Tool«)!

and : align internal audit with them!

Keep it simple

Implement a uniform risk inventory applicable for the whole organization to record all activities (risk identification, risk analysis, risk evaluation and risk treatment)!

Classify risk according to likelihood, impact and effort needed for treatment as simple as possible:

- Likelihood:**
- high probability, likelihood more than 50 % (once every two years)
 - medium probability, likelihood less than 50 % but more than 5 % (once every 20 years)
 - low probability, likelihood less than 5 %
- Impact:**
- small, less than 5 % of the average profit of the last 3 years
 - explicit, more than 5 % but less than 50 % of the average profit of the last 3 years
 - critical, more than 50 % of the av. profit of the last 3 years but losses below 50 % of equity
- Treatment:**
- easy to handle
 - possible when conducted properly
 - challenging and difficult

Internal Controls Maturity Self-Assessment Tool

The maturity of internal controls is an indicator for the reliability of internal controls and thus an indicator for the quality of controls and thereby part of risk management!

The requirement for internal controls to be qualified as reasonable is the achievement of the level »standardized«.

Capability Maturity Continuum; attributes:

- **Not Performed**
- **Initial (Chaotic)** (ad-hoc and inconsistent processes, unstable environment, success depends on people)
- **Repeatable (Intuitive)** (process established, reliance on people reduced, documentation missing)
- **Standardized (Defined)** (policies, process and standards implemented but not consistently enforced)
- **Managed (Monitored)** (process and output quantitatively controlled but might be insufficient for objectives)
- **Optimizing (Continuous feedback)** (improvement objectives are established and continually revised)

Human Factors

How will the process owner etto? → processes should be defined and documented (best in an organizational manual)

Standardize interfaces (human-machine and human-human) → if vital include steps for confirmation and follow up

Keep cultural differences in mind → confer for example »culture of honor« experiments at the University of Michigan and cultural dimensions described by Hofstede (power distance index - PDI)

Pause and reflect and do not succumb to the pressure just to continue – this rule applies for management as well:

- Which ETTO rule does management apply and what risk stems there from?
- Which ETTO rule is applied in risk assessment and which risk stems there from?
- Be suspicious of universal explanations and keep open for questions!

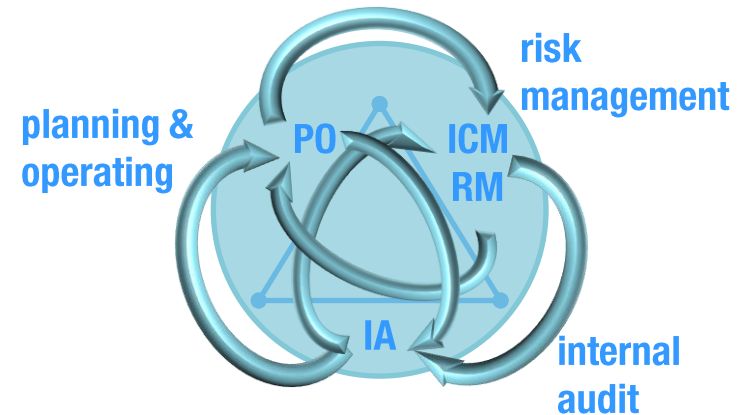


Use checklists wherever suitable and (last but not least) train yourself and your people!

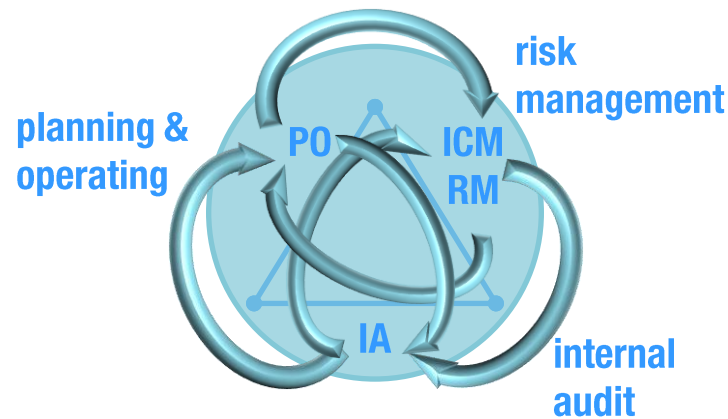
Alignment of / with Internal Audit

Continuous and periodic updating of risk inventory and Internal Controls Maturity Self-Assessment (which are management tools and an integral part of all organizational processes) are

- subject to Internal Audit monitoring
- and
- a basis for the annual planning of Internal Audit
- ← Internal Audit will be operating on a higher level of maturity based on a qualified approach instead of a mere quantitative approach!



Internal Audit and Risk Management



A mere systemic approach of checks and balances taking human factors into account is a humble contribution to Human Factors Management and a good start with Risk Management!

Thank you for your attention!

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