

10

Introduction
to Management
Cybernetics

Integrated IT workflow applications



Learning Objectives

Session X

In this section...

- You will understand why the IT applications supporting the processes should be fully integrated
- You will take away the necessary requirements for an integrated “IT landscape”
- You will learn how to succeed in integrating your IT applications

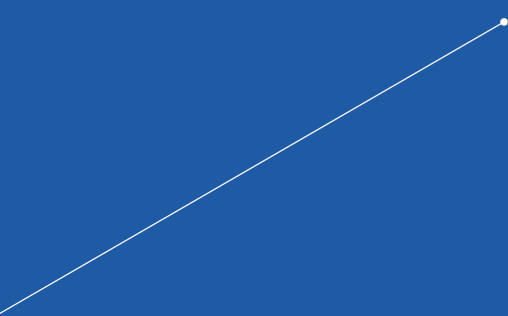
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The IT applications should best support the coordinated processes and reflect the process quality.

- ➔ The software applications should best support the defined processes.
- ➔ The IT should best link the single processes and entities of the company or the value network with each other, supporting the collaboration in distributed teams.
- ➔ By means of the IT-supported workflow, feedback mechanisms (sign-offs, traffic light signals) should be provided to users during process interfaces.
- ➔ IT should provide users with an integrated view of the whole process, showing the interdependencies and possible effects of measures.
- ➔ Operative efficiency, transparency, real-time and “single truth” (Oracle claim) are key.
- ➔ Process-oriented, well channeled reporting (task-related information push service) is required.
- ➔ To optimize the whole business activity, especially co-ordination tasks around manifold interfaces like a “360° view on project management including settlement and billing” and “stock optimization” should be supported by IT applications.
- ➔ Try to capture and monitor the system’s cost by IT.

The quality and fit of company-specific IT solutions significantly contribute to the corporate success.

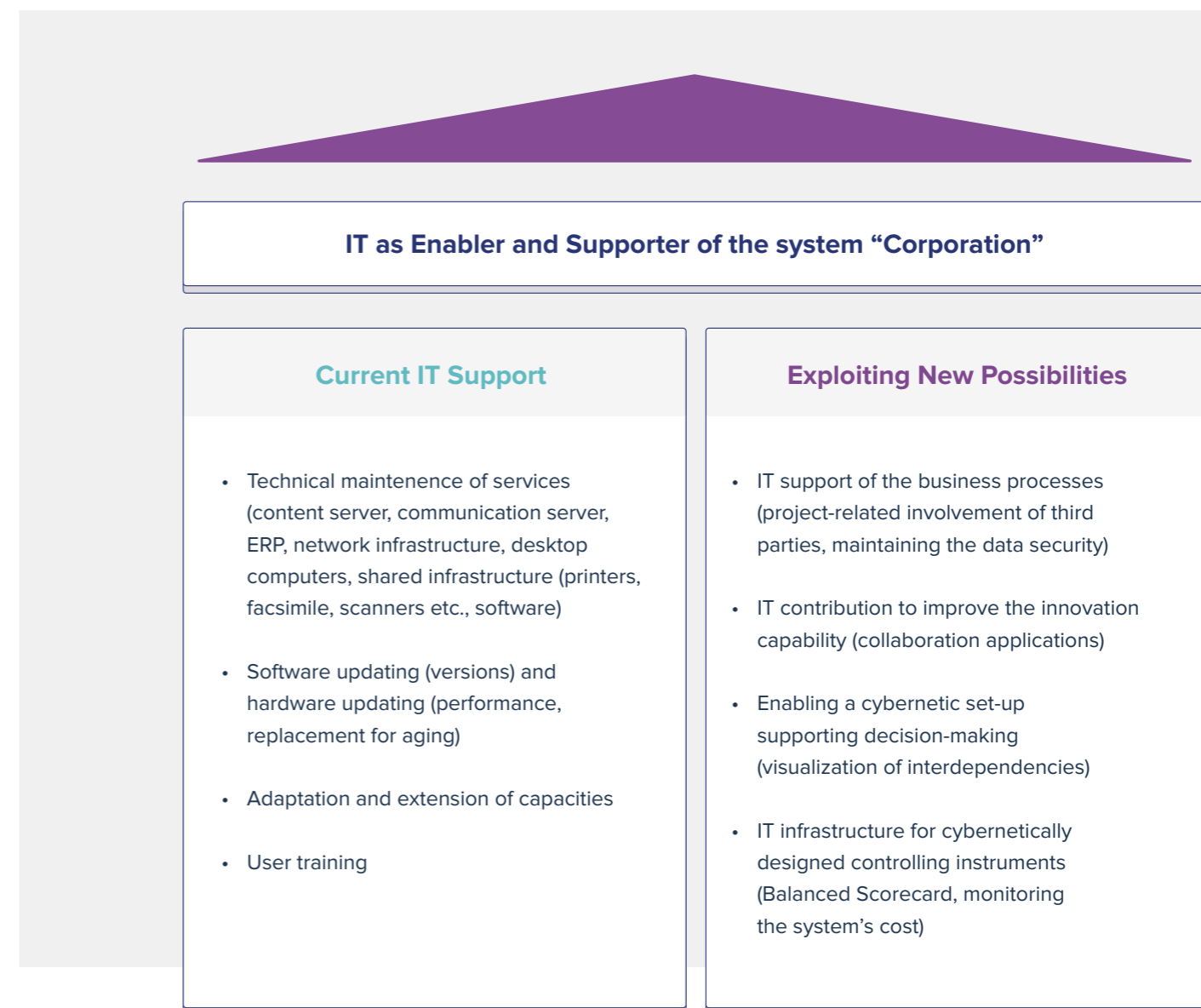
- ➔ IT applications should be flexible to adapt to changing processes. Even though ERP vendors have usually implemented a lot of industry experience in their applications, processes should never be slaves of the ERP, but should rather define the kind of support to be provided by IT-based ERP.
- ➔ Consider the opportunity of improving your corporate flexibility by means of IT.
- ➔ Keep your IT capable of easy release updates without any need for interface adaptations
- ➔ Consider cloud-based access to ERP applications: Service on demand may offer flexibility and scalability to your organization. Your IT should be able to breathe with the situational corporate challenges.
- ➔ The information system which supports the management decision-making process should guide the management’s attention to the most relevant business parameters for each respective situation by means of a dynamically fed information cockpit.

Ideally, the IT applications are fully integrated.

- ➔ **Avoid IT “point solutions” and silo cultures;** the handling of interface problems which might arise can become challenging and expensive.
- ➔ **Rather select one suitable integrated ERP system.** By working with an integrated system you can minimize data checks and preparation tasks for analyses – saving time, cost and effort.
- ➔ **Integrated IT systems support process stability.**
- ➔ **Strive for data integration from machine data logging to data assessment and reporting.**
- ➔ For an integration platform architecture, **appropriate layers** are, according to the IEEE, “**business**”, “**user interface**”, “**integration**”, “**services**”, and “**data**” (acc. to the International Conference on Information Technology Systems and Innovation (ICITSI), 2018).
- ➔ **Avoid disruptions between different systems,** e.g. a production planning and an ERP system.
- ➔ **A unique database helps prevent departments from working side-by-side without coordinated information. Centrally managed data** avoids data incongruity and mismatch.

Appropriate applications are commercially available. The challenge is to find IT specialists with cybernetic understanding..

IT Applications for Networked Thinking



Questions for Reflection

- 1 How positively do your employees assess the IT support of the processes?
- 2 Does IT initiate strategic and/or operative need for action?
- 3 Are system costs in your organization recorded and evaluated by IT systems?
- 4 How well can your IT adapt to changes in your organization or business environment?
- 5 Is your IT really integrated? Where might there be any IT “island solutions”?

Summary of Section

- The IT applications should **best support the coordinated processes** and reflect the process quality.
- The IT applications should be **flexible to adapt to changing processes**.
- Ideally, the IT applications are **fully integrated**.
- IT should **dynamically provide the most relevant management information for each individual situation**.

Relevant Sources for Further Reading

- **Hetzler, Sebastian:** Real-Time-Control. Für das Meistern von Komplexität, Campus Verlag, Frankfurt am Main 2010, 978-3-593-39205-9.
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Measuring cybernetic excellence



Learning Objectives

Session XI

In this section...

- You will learn which informative value you can expect from traditional KPI systems
- You will be introduced to an overview of risks and opportunities
- You will be introduced to the nature of cybernetics-oriented reporting systems
- You will gain practice-proven means for an effective risk management

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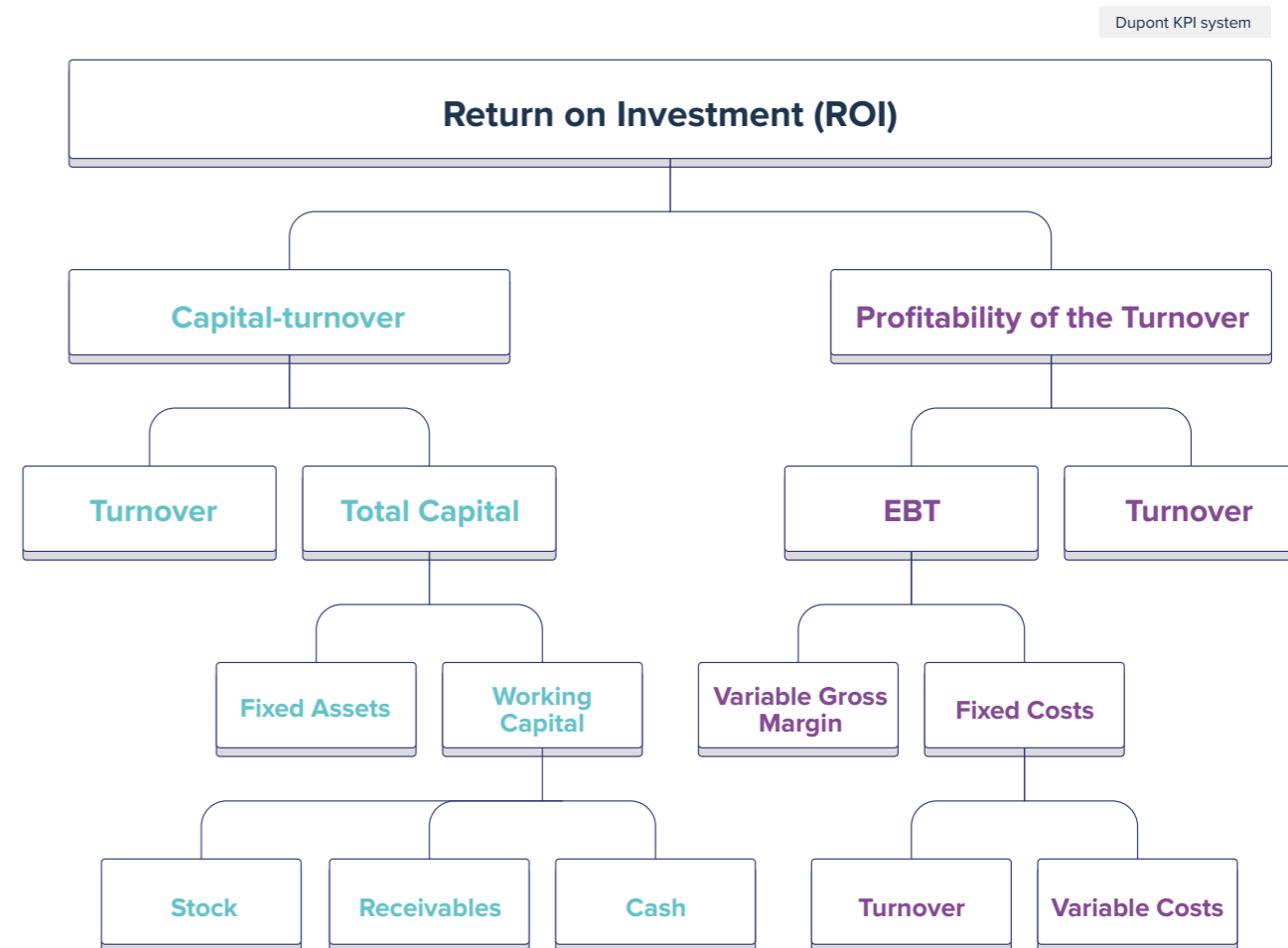
Performance KPIs are pure indicators and are often optimized without considering their mutual relationships.

Classic Key Performance Indicators (KPIs)



KPI systems aggregate performance indicators without optimizing the interactions between the performance-creating areas

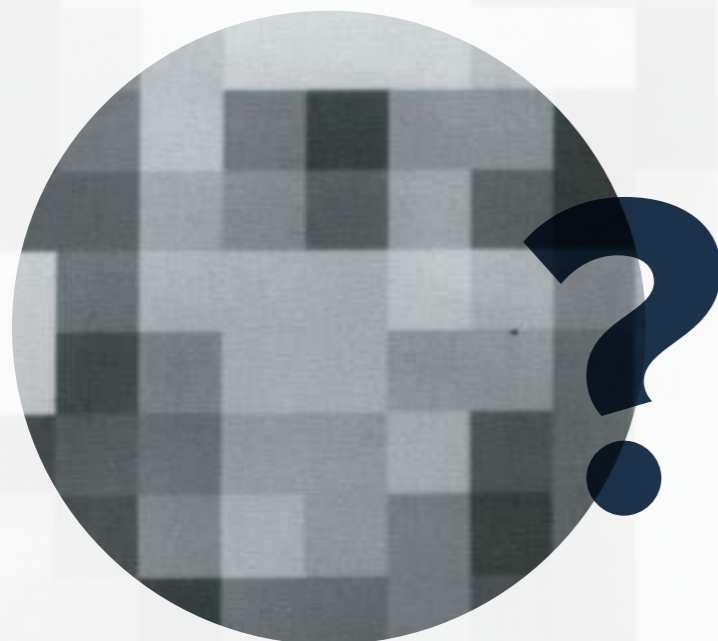
Aggregation in a KPI System



- ➔ A KPI system does not coordinate and thus does not optimize the activities
- ➔ It does not optimize the total result, but only “shows” it
- ➔ It leaves unsolved interest conflicts

The more we focus on details the less we understand the big picture.

ANALYSIS VERSUS HOLISTIC APPROACH AND INTEGRATION



Abraham Lincoln

- Often, the meaning is only recognized from a certain distance.
- Success does not depend on the analysis of each detail, but rather on the comprehension of the big picture.
- Companies are characterized by their "surface behaviour", not by their partial functions.

➔ Integrative Approach, as opposed to the analytic approach

➔ Recognition of patterns from holistic view, even though it might be "out of focus"

Analyze complex systems by observing the system's behaviour and influence it by aligning the key variables.

Understanding Complex Systems

To understand the behaviour of complex systems, any approach that is limited to partial areas is not suitable.



- Address your analysis towards the whole system
- Observe variables that can easily be captured
- Try to recognize changes, fluctuation, trends, leaps, thresholds and reversions of trends
- Try to understand the relationships between the observed changes and the constellation of the variables
- Carefully adjust and bundle these variables

The behaviour of complex systems can only be understood with a holistic view.

...Versus Integration

Example: Intention of a cat

A cat's intention to jump cannot be derived from the analysis of its single cells.

Only the observation of the cat as whole, combined with personal experience, allows the conclusion that the cat is intending to jump.



Under VUCA conditions, special controlling methods and instruments are useful to lead companies.

Integrated Leadership Concept

Concept	Instruments	Effect
Corporate foresight	Scenario technique, Analysis of strategic risks	➔ Strategic flexibility and adaptability
Innovation management process	Creativity techniques, Initiative portfolio	➔ Capability of developing and adapting
Holistic approach to business processes	Business process modeling, Capturing and molding effect networks, operational risk self-assessment (ORSA) process	➔ Process stability while improving the efficiency, accepted and enforceable solutions
Complexity management	Internalization of risks, balanced scorecard concept, beyond budgeting approach	➔ Cybernetically meaningful decision-making, follow-up of measures, multi-dimensional view regarding results
Corporate policies	Corporate mission statement, leadership statement	➔ Orientation, providing meaning
Cybernetic leadership approach	Self-organization, cybernetic discourse, recursively designed structures, trust as the basis of business, triggering of intrinsic motivation factors	➔ Making use of the personal potential of employees and development of the organizational self-regulation capabilities and dynamics

In quality management, cost is recorded as the total of the cost of failure and the cost of preventative measures.

Quality Cost Record

Qualitätskostenentwicklung in Unternehmen xyz	Stand 2008		Stand 2009		Ziel 2010	
	[EUR]	[%]	[EUR]	[%]	[EUR]	[%]
A Interner Ausschuss	1.528.667	66,1	1.449.167	61,4	1.223.333	51,0
Materialwert des Ausschusses	500.000	21,6	425.000	18,0	400.000	16,7
Transformationskosten des Ausschusses	400.000	17,3	340.000	14,4	320.000	13,3
Kapitalkosten für zusätzl. Lagerhaltung durch Ausschuß	6.667	0,3	5.667	0,2	5.333	0,2
Abfallwirtschaft	10.000	0,4	8.500	0,4	8.000	0,3
Doppeltarbeit, Nacharbeit	20.000	0,9	20.000	0,8	20.000	0,8
falsche oder ineffiziente Planung	136.000	5,9	180.000	7,6	150.000	6,3
Blindleistung	80.000	3,5	40.000	1,7	40.000	1,7
Trouble shooting	76.000	3,3	80.000	3,4	80.000	3,3
mangelhafte Informationskanalisierung	300.000	13,0	350.000	14,8	200.000	8,3
B Kundenreklamationen	163.000	7,0	210.000	8,9	305.000	12,7
Gutschriften an Kunden	90.000	3,9	160.000	6,8	150.000	6,3
Verwaltungsaufwand, Personal	40.000	1,7	40.000	1,7	40.000	1,7
Kundenbesuche	3.000	0,1	10.000	0,4	15.000	0,6
Materialsanierung	30.000	1,3	0	0,0	100.000	4,2
Anwalt-/Gerichtsverfahrenskosten	0	0,0	0	0,0	0	0,0
entgangener Gewinn	0	0,0	0	0,0	0	0,0
Imageverlust	0	0,0	0	0,0	0	0,0
Vertrauensverlust, Auftragsverlust, Kundenverlust	0	0,0	0	0,0	0	0,0
C Toleranzüberschreitung	212.000	9,2	255.000	10,8	185.000	7,7
Beschichtungsdicke	0	0,0	0	0,0	0	0,0
Materialstärke	0	0,0	0	0,0	0	0,0
Überlappungsmaß	0	0,0	0	0,0	0	0,0
Sicherheitsüberproduktion	5.000	0,2	5.000	0,2	5.000	0,2
überhöhte Materialqualität	0	0,0	70.000	3,0	50.000	2,1
überhöhte Verarbeitungsqualität	0	0,0	0	0,0	0	0,0
Überqualifikation von Personal	45.000	1,9	0	0,0	0	0,0
Überqualifikation von Maschinen	162.000	7,0	150.000	6,4	130.000	5,4
Personalüberschuss	0	0,0	30.000	1,3	0	0,0
D Qualitätssicherung und Vorbeugung	410.200	17,7	445.000	18,9	685.000	29,6
Personal in Q-Sicherung	275.000	11,9	250.000	10,6	280.000	11,7
Kontroll- und Meßgeräte der Q-Kontrolle	0	0,0	60.000	2,5	60.000	2,5
Kontroll- und Regelgeräte in Produktion	0	0,0	30.000	1,3	0	0,0
Personalschulung, Q-Zirkel, Methoden	5.000	0,2	5.000	0,2	30.000	1,3
EDV-Einsatz zur Datenerfassung und -auswertung	0	0,0	0	0,0	160.000	6,7
Arbeitsabläufe und Arbeitsanweisungen	130.200	5,6	100.000	4,2	25.000	1,0
Standardisierung	0	0,0	0	0,0	0	0,0
Teamarbeit	0	0,0	0	0,0	10.000	0,4
externe Beratung	0	0,0	0	0,0	70.000	2,9
rechtzeitige Information und flüssige Kommunikation	0	0,0	0	0,0	40.000	1,7
Lieferantenaudits	0	0,0	0	0,0	10.000	0,4
Summe der Qualitätskosten [EUR]	2.313.867	100,0	2.359.167	100,0	2.398.333	100,0
Umsatz [EUR]	12.060.000		10.700.000		12.000.000	
Qualitätskosten bezogen auf den Umsatz [%]	19		22		20	

Internal errors and reworking are only a part of the system cost. The objective is the optimization of the total system cost.

Internal Errors and Reworking

System Cost						
	Last Year		Objective Present Year		Plan Next Year	
	[kEUR]	[%]	[kEUR]	[%]	[kEUR]	[%]
A Internal blunder and rework because of systemic deficiency	0	0	0	0	0	0
Material cost of waste, due to systemic deficiency						
Transformation cost of waste, due to systemic deficiency						
Capital cost of avoidable stock-keeping, due to missing alignment						
Cost of parallelly carried out work, due to missing alignment						
Cost of rework, caused by systemic deficiency						
Cost of "blind performance, due to not sufficiently defined processes and objectives						
Cost of the implementation of illusive solutions (symptom treatment)						
Troubleshooting cost related to systemic deficiencies						
Cost of missed out operative performance, due to a motivation deficit						
Cost of individual capabilities and ideas						
Cost of too little variety (incapability of homeostasis)						
Cost of missing networking (incapability of emergence)						
Subsequential cost of an inappropriate reduction of the complexity						
Cost of organizational incapability to spontaneously recognize patterns						
Cost of missing feedback mechanisms						
Cost of missing orientation in potential effects						
Cost of inside-out planning (missing orientation in scenarios)						
Subsequential cost of missing hedging measurements						
Cost of not having recognized the systems (markets, organizations) behaviour						
Cost of avoidable internal meetings						
Cost of re-scheduling orders (additional setup times, delays) that is usually not reflected in the post-calc.						

First, internal errors and resulting rework, tolerance exceedance and commercial loss should be registered.

Tolerance Exceedance, Commercial Loss

B Tolerance exceedance (avoidable reserve), due to systemic deficits
Cost of arbitrary relations (unnecessary complexity)
Cost of avoidable diversity (e. g.: assortment, options), missing modularization
Cost of overdrawn reporting routines
Cost of complicated decision structures
Cost of unnecessarily complex information systems
Cost of avoidable material reserve, due to missing specs or process reliability
Cost of avoidable over-production, due to missing process reliability or professionalism
Cost of avoidable material quality, due to missing experience or professionalism
Cost of avoidable over-qualification of personnel
Cost of avoidable overspecification of machines or equipment
Cost of avoidable personnel, due to exaggerated flexibility or amendable planning
C Commercial loss with customers and with suppliers due to systemic deficiency
Price reductions, due to justified claims/complaints
Credit vouchers to customers, due to justified claims/complaints
Cost of customer visits needed due to claims/complaints
Cost of lawyers and court proceedings, caused by disputable performance
Missed out margin, due to lost orders
Cost of consequences, due to missing end-to-end contracts
Cost of insufficient involvement of suppliers in the definition of contracts with customers

Then, well-coordinated preventative measures should be defined and implemented to reduce the cost of failure and to optimize the total system cost.

Preventative Measures, Total System Cost

D Effort for preventative measurements for systemic meaningful proceeding
Cost of functional qualification measurements
Cost of training in cybernetics principles
Cost of system analysis
Cost of designing and implementing end-to-end processes
Cost of designing and implementing stabilizing feedback mechanisms
Cost of adequate process-oriented re-allocation of personnel resources
Cost of adequate process-oriented machinery and equipment
Cost of integrating of information systems
Cost of end-to-end contracts with customers/suppliers
Cost of deriving and communicating clear objectives
Cost of developing and implementing value-oriented incentives

Total system cost	0	0	0	0	0	0
Organizational turnover						
System cost, referred to the turnover [%]						

By means of strategic and operational risk self-assessment, all risk becomes evident and an effective risk management will be possible.

Operational Risk Self-Assessment

The probability of the risks and the associated costs should be quantified by everyone.



- Address your analysis towards the whole system
- Observe variables that can easily be captured
- Try to recognize changes, fluctuation, trends, leaps, thresholds and trend-reversions
- Try to understand the relationships between the observed changes and the constellation of the variables
- Carefully adjust and bundle these variables

The self-assessment can be structured (standard report)

➔ **...according to the involved entities (e.g. sales, engineering, production planning, finance and others)**

➔ **...or according to process phases (e.g. acquisition, order confirmation, order execution, settlement)**

The single inputs should be aggregated for top management.
The risk reporting should be updated in monthly cycles, involving all functions.

Questions for Reflection

- ➊ How are performance and success measured in your organization?
- ➋ Is enough attention paid to the 'big picture' or is the focus on details?
- ➌ How is the quality of interface communication evaluated?
- ➍ How are system costs determined? What measures are derived from the evaluations?
- ➎ How are strategic and operative risks registered in your organization? How are they dealt with?

Summary of Section

- **Performance KPIs are pure indicators** and are often optimized without considering their mutual relationships.
- **KPI systems only aggregate** performance indicators without optimizing the interactions between the performance-creating areas.
- The more we focus on details, the less we **understand the big picture**.
- Therefore, analyze complex systems by **observing the system's behaviour** and influence it by coordinating the key variables. The behaviour of complex systems can only be understood with a holistic view.
- Under VUCA conditions, **selected controlling methods and instruments** are useful to lead companies.
- With regards to the recording and optimizing of quality cost, **the system cost can be managed**. The objective is the optimization of the total system cost.
 - First, **internal errors and the resulting reworking, tolerance exceedance and commercial loss** caused by a lack of cybernetic quality should be registered.
 - Then, **well-coordinated preventative measures** should be defined and implemented to reduce the cost of failure and to optimize the total system cost. This bundle usually consists of process optimization, training and leadership.
- By means of **a strategic and an operational risk self-assessment**, all risk becomes evident and an effective risk management will be possible.

Relevant Sources for Further Reading

- **Auer, Ludwig von:** Ökonometrie – Eine Einführung, Springer Gabler Fachmedien, Wiesbaden 2016, 978-3-366-247868-4.
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