TECHNICAL REPORT

ISO/IEC TR 22446

First edition
2017-11

Information technology — Continual performance improvement of IT enabled services

Technologies de l'information — Amélioration continue des performances des services informatisés

Reference number
ISO/IEC TR 22446:2017(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by ISO/IEC JTC 1, *Information technology*, Subcommittee SC 40, *IT Service Management and IT Governance*.

Introduction

A key success criterion of the continual performance improvement process is to add value by reducing performance-based economic risks.

The service management processes described in the ISO/IEC 20000 series and the relationships between the processes can be implemented in different ways by different organizations. This is because the nature of the relationship between each organization and their customers, users and interested parties can influence how the service management processes are implemented.

Service and service component measurement and improvement are important aspects of a service management system (SMS) as described in the ISO/IEC 20000 series.

Service performance improvement is a key to successful deployment of new or changed services. Reasons why service performance improvement is of critical importance include:

a) IT enabled services can have multiple interdependencies;

b) service components can be built, controlled, operated or maintained by external parties;

c) service component reliability improvement can be a challenging and a key aspect of service performance.

Also, from a service performance viewpoint, understanding and predicting successful implementations of new or changed services can be very challenging.

a) Many organizations offer their services to unknown, heterogeneous and inter-networked consumers and external organizations (for instance, supply chain of a telecom operator).

b) Ensuring the service performance of each component to the service delivery requirements by all component providers is essential and should be considered when engaging in improvement activities. In service performance improvement, all of the components should be considered together.

c) Intelligent service component reliability improvement can be considered difficult due to the lack of a generic model. And it is not always linked to wear-out failures. As human and mechanical system controls are being superseded by intelligent service components, reliability improvement of these components can become more important to the trustworthiness and dependability of services.

Problem management findings illustrated here in these statements form the genesis of the approach.

a) Root causes of service incidents can be often linked to lack of a consistent implementation of intelligent service components.

b) The degree of consistent implementations of intelligent service components can be common to all departments within a given organization.

c) Performance risks can strongly impact service value for any organization. Thus, directly or indirectly, they are always a subset of economic risks.

d) The resolution of service performance problems is strongly connected to intelligent service component reliability and service capacity.

e) In an open or cloud environment, due to the complexity of these environments, the analysis of intelligent service component reliability issues can be a heuristic process.

f) Independent of capacity problems, it is possible to predict service performance from reliability evaluation of intelligent service components.

Previous statements, cited above, reveal a number of benefits to an organization implementing the lifecycle reliability improvement (LCRI) approach as a method supporting the continual performance improvement process. To achieve these benefits:

a) LCRI scores should be viewed as performance-based economic risks;

b) LCRI should be viewed as a way to address intelligent service component reliability challenges;

c) LCRI method and the continual performance improvement repository (CPIR) content are continually updated, but LCRI principles will not change.

This document is intended to support the ISO/IEC 20000 series by providing guidance that enables continual performance improvements of IT enabled services in terms of:

a) introducing a set of service performance criteria, based on recurring operational known errors and costly major incidents (the economic losses can be linked, for instance, with user productivity or with business sales);

b) applying a quantitative method of evaluating intelligent service components by relating their reliability and service performance. This provides predictable service "health checks" before and after deployment and supporting problem resolution processes by verifying service performance criteria and prioritizing actions mitigating performance-based economic risks;

c) introducing a continual performance improvement repository which can be included in the configuration management system. The repository can store known errors, "health check" results and service performance criteria. Thus, it enables the management of this information as configuration items in the SMS to simplify the exchange of information with existing processes;

d) introducing a "step by step refinement" process which provides the means to improve performance without wasting time, investments or quality:

   1) by defining recurrent "health checks" of the services to verify service performance criteria;

   2) by defining simple intermediary steps in order to solve performance problems;

   3) by demonstrating how the previous systematic method, the previous repository and the root-cause analysis (RCA) risk evaluation technique can be combined to provide a heuristically proven strategy for optimizing deployment success of new or changed services with a low economic risk.

The aim of performance continual improvement process is to deal with the following recurrent issues:

a) performance expectations, either implicit or expressed too late, that should be taken into account before the deployment of new or changed service;

b) wasted workload and delay by testing multiple non-deployable releases;

c) inefficient technical disagreements between subject matter experts (SME) of the organization and interested parties;

d) right or wrong decisions, based on opinions, rather than economic risks;

e) lack of common performance-based culture between the organization and interested parties. For example, "agile" methodologies are harder to adopt;

f) lack of predictive evaluation controls that contribute to the services' performance improvement.

This document can also contribute to:

a) capturing relevant information, enabling the ability to qualify the value of incidents and action plans connected to resolution of performance problems;

b) prioritizing service performance improvement opportunities;

c) determining opportunities to improve the governance of all the parties (and in doing so, the documented information and the communication between the parties);

d) simplifying the decision-making, as part of the change and/or incident management processes;

e) improving the service management plan and particularly the service performance policy;

f) defining service performance criteria during design and service transition of new and changed services, and during maintenance of an existing service;

g) improving and complementing the delivery of services;

h) improving the service monitoring and measurement, based on risk-driven performance information;

i) improving the content of service reports to include evidence of service "good health."

The systematic approach described in this document is not dependent upon the intended goals or the functional architecture of the service components. The automated analysis does not require, as inputs, any non-performance criteria, or any technique, resource, method or organization needed to obtain those criteria.

Information technology — Continual performance improvement of IT enabled services

1 Scope

This document establishes a continual performance improvement (CPI) process that supports service management system (SMS) as defined in the ISO/IEC 20000 series.

This process ensures successful deployment and service performance criteria fulfilment.

This process is based on a predictive performance evaluation method and a related repository.

This document is not intended to be used as a means of certification and does not add any requirements to those specified in ISO/IEC 20000-1.

This document does not provide specific criteria for identifying the need for risk analysis, nor does it specify the types of risk analysis techniques that are used to support a particular technology.

This document does not offer techniques for implementing the continual performance improvement process.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
continual performance improvement repository
CPIR
repository that contains *service performance criteria* (3.12), *LCRI* (3.6) scores, known performance errors, at a given time, having a performance economic risk for the organization, and known related recommendations to mitigate the risk

Note 1 to entry: It is part of the configuration information system.

3.2
fix
last release that solves, with an acceptable level of performance-based economic risk, a known error

Note 1 to entry: This release modifies at least one service component of a new or changed service.

Note 2 to entry: Depending on the nature of the problem, one or a series of linked requests for change would be associated with a known error to ensure the fix deployment and the decision-making are consistent. The decision to deploy the change in several releases depends on the release policy, on the context (e.g. crisis driven by incident management) and on the request for change content.

3.3
health check
evaluation of the performance of an IT-enabled service or of the *reliability* (3.10) of an *intelligent service component* (3.5)

Note 1 to entry: This evaluation is compared to previous evaluations or to a set of *service performance criteria* (3.12).

3.4
heuristic method
any exploratory method of solving problems in which an evaluation is made of the progress towards an acceptable final result using a series of approximate results, for example by a process of guided trial and error

[SOURCE: ISO/IEC 2382:2015, 2124041]

3.5
intelligent service component
service component comprised of an execution subcomponent and of a controlling subcomponent

Note 1 to entry: It is capable of making decisions (based on inputs and execution conditions) to achieve its mission and to adapt its behaviour.

Note 2 to entry: Behaviour adaptations are linked to internal organization (goals are driven by organization's changes) or external environment (constraints are driven by technology changes, like the Cloud Computing).

EXAMPLE Water towers, for instance, are now managed by an intelligent service component (via radio and mobile phone protocols).

3.6
lifecycle reliability improvement
LCRI
risk-oriented method translating *intelligent service component* (3.5) reliability into service performance, and service performance into intelligent service component reliability

Note 1 to entry: LCRI method checks a subset of *service performance criteria* (3.12).

3.7
mistake
human action or inaction that can produce an unintended result

[SOURCE: ISO/IEC 2382:2015, 2123030]

3.8
performance incident
incident whose symptom(s) is(are) related to performance

Note 1 to entry: For instance, trouble ticket associated with resetting a password does not involve performance incident.

EXAMPLE Service complaints, unfulfilled *service performance criteria* (3.12).

3.9
performance problem
root cause of *performance incident* (3.8) or of unfulfilled *service performance criteria* (3.12)

Note 1 to entry: A root cause of a performance incident is not necessarily a performance problem. For instance, eligibility criteria to Digital Subscriber Line (xDSL) offers are not performance problems, but they may cause performance incidents. If the marketing direction of a telecommunication organization promotes offers to non-eligible customers then, if they want to subscribe, they would encounter a problem. It would be a performance incident linked to a non-performance problem.

Note 2 to entry: A problem related to the *reliability* (3.10) of a service component will be named "reliability problem".

Note 3 to entry: The root cause of a service performance problem can be related to the integration of its service components in addition to the reliability of at least one of those service components.

3.10
reliability
degree to which a system, product or component performs specified functions under specified conditions for a specified period of time

Note 1 to entry: Adapted from ISO/IEC/IEEE 24765.

Note 2 to entry: Wear does not occur in software. Limitations in reliability are due to faults in requirements, design and implementation, or due to contextual changes.

Note 3 to entry: Dependability characteristics include availability and its inherent or external influencing factors, such as availability, reliability (including fault tolerance and recoverability), security (including confidentiality and integrity), maintainability, durability, and maintenance support.

[SOURCE: ISO/IEC 25010:2011, 4.2.5]

3.11
root-cause analysis
root cause analysis
RCA
determination of a potential problem's (a risk factor's) underlying cause or causes

[SOURCE: ISO/IEC/IEEE 24765:2010, 3.2612]

3.12
service performance criterion

acceptable level of a configuration item

Note 1 to entry: Service performance criteria are based on incidents type and not on incidents.

4 Continual performance improvement of IT enabled services

4.1 Inputs and outputs

4.1.1 Inputs

4.1.1.1 Incidents and problems

— Service complaints analysis;

— Data needed to qualify service complaints (kinematics of a service, screenshots);

— Available monitoring data and intelligent service components log files (process errors or mistakes);

— Recurrence of the incidents and problems (in time and in space).

4.1.1.2 Classification of incidents

— Analysis of the root causes, of the business impacts and the frequency of production incidents;

— Validation of the "black-box" known errors (and their fixes) by communities' leaders (to avoid blame game between experts).

4.1.1.3 Execution inputs related to LCRI

— Automatic detection of the service processing errors;

— Dynamical discovery and performance inputs (processing times, response times, throughputs) of the functions performed by intelligent service components;

— Dynamical discovery of intelligent service component calls to other service components (including their response times and the load associated);

— Dynamical discovery of calls to other service components correlated to service requests (including an evaluation of their criticality);

— Detailed monitoring of memory and CPU utilizations, and of connection pools.

4.1.1.4 Parameters inputs related to LCRI

Exhaustive parameters of a predefined set of intelligent service components configuration items, as required by the "tuning reliability problem", are listed in Table 1.

NOTE Table 1 connects inputs and activities described in this document.

Table 1 — Inputs

Activities	Inputs			
	Incidents and problems	Classification of incidents	LCRI execution inputs	LCRI parameters inputs
Root-cause analysis	x	x		
LCRI/tuning		x		x
LCRI/caching of static content			x	x
LCRI/usage model			x	
LCRI/response time degradation			x	
LCRI/multiplication of synchronous interfaces				x
LCRI/error handling			x	
LCRI/resource utilization			x	
LCRI/freeze of a service component			x	
LCRI/ "top ten" of DBMS transactions			x	
LCRI/timeouts			x	x

4.1.2 Outputs

4.1.2.1 Quantitative outputs ("health check" related to service performance criteria)

Unlike the correlation between gathered information, the following quantitative outputs are not used to solve specific performance problems, but to assess service performance as part of economic risks. Even when related to the same inputs, these outputs are based on service performance criteria coming from the CPIR. Correlation is not used to compute them.

They can be based on known errors, service catalogue management process, and incidents' frequency.

NOTE 1 Known errors are used to classify incidents.

New or change service should use known errors to avoid associated performance problems.

NOTE 2 Service catalogue management process is used to allocate incident and problem priorities.

