TECHNICAL REPORT

ISO/IEC
TR 14471

First edition
1999-06-01

Information technology — Software engineering — Guidelines for the adoption of CASE tools

Technologies de l'information — Ingénierie du logiciel — Lignes directrices pour l'adoption d'outils CASE

Contents

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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 main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/IEC TR 14471, which is a Technical Report of type 2, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software engineering*.

Annexes A and B of this Technical Report are for information only.

Introduction

Historically, there have been problems experienced by organizations in adopting CASE tools. Because organizations have not gained the expected benefits of CASE technology, it is hoped that the use of a well-founded CASE adoption process will help achieve successful adoption of CASE tools.

A survey conducted by ISO/IEC JTC 1/SC 7/WG 4 offers some hope that these problems may be improving. This survey suggests that CASE tools are performing new capabilities and getting easier to use, that users' expectations are getting more sophisticated, and that CASE tools are more likely to meet their goals. However, according to the survey, there remain a number of continuing problems. There has not been sufficient attention given to pilot trials of CASE technology before using it on actual projects, and users report a need for additional top management support, a total process for CASE adoption, and a preparation of the organization for the introduction of the technology. This Technical Report addresses the continued needs reported by users.

The purpose of this Technical Report is to provide a recommended practice for CASE adoption. It provides guidance in establishing processes and activities that are to be applied for the successful adoption of CASE technology. The use of this Technical Report will help to maximize the return and minimize the risk of investing in CASE technology. However, this Technical Report does not establish compliance criteria.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Information technology — Software engineering — Guidelines for the adoption of CASE tools

1 Scope

Since CASE adoption is a subject of the broader technology transition problem, this Technical Report addresses the adoption practices appropriate for a wide range of computing organizations. Also, this Technical Report neither dictates nor advocates particular development standards, software processes, design methods, methodologies, techniques, programming languages, or life-cycle paradigms.

This Technical Report will:

— identify critical success factors,

— propose a set of adoption processes,

— guide successful adoption in consideration of organizational and cultural environment.

The following groups are targeted as potential audiences:

— CASE users

— information systems managers

— chief information officers (CIO)

— CASE suppliers

— software engineering consultants

— those involved in the acquisition of CASE tools and technology

This Technical Report addresses aspects of product evaluation, selection, and adoption which are specific to CASE tools. It is complementary to related ISO/IEC documents which deal with the general aspects of these topics.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 9126:1991, *Information technology — Software product evaluation — Quality characteristics and guidelines for their use.*

ISO/IEC 12207:1995, *Information technology — Software life cycle processes.*

ISO/IEC 14102:1995, *Information technology — Guideline for the evaluation and selection of CASE tools.*

3 Terms and definitions

For the purposes of this Technical Report, the following definitions apply.

3.1
Successful adoption
the extent to which the use of CASE tools can measurably meet an organization's uniquely defined adoption goals

3.2
Adoption process
the set of activities by which an organization brings CASE tools into widespread use

3.3
CASE needs
the organizational requirements which are met by CASE tool characteristics

NOTE   These characteristics are detailed in Clause 9 of ISO/IEC 14102:1995. They include: management process, development process, maintenance, documentation, configuration management, quality assurance, verification, validation, environment needs, CASE tool integrability, quality characteristics, acquisition needs, implementation needs, support indicators, and certification requirements.

4 Symbols and abbreviated terms

CASE   Computer aided software engineering

CIO   Chief information officer

CSF   Critical success factor

MIS   Management information system

5 Critical success factors for adoption

One of the primary goals of this Technical Report is to identify major factors which are critical to success in CASE adoption. A comprehensive set of technical, managerial, organizational, and cultural factors should be considered in order to successfully introduce CASE technology into an organization. These factors should be monitored through the adoption processes when applicable. A cross reference table for the processes and the factors is provided in Annex B.

The critical success factors include:

Goal setting: The definition of a clear, measurable set of goals and expectations for CASE adoption, including both business and technical goals.

NOTE 1   Examples of measurable set of goals for CASE adoption might be "twenty percent increase of productivity in unit test activity", "sixteen percent improvement of quality in requirements specification activity", "fifty percent gain of reusability in object oriented design activity", "sixty percent of projects should use CASE tools", etc.

Management support: The extent to which high level management actively encourages CASE adoption, including but not limited to the willingness to allocate the necessary resources.

Tool use strategy: The definition of a clear strategy for the scope of tool use.

NOTE 2   Examples of strategy might include tool use on a specific set of application types, use by a specific business component or corporate-wide use.

Total adoption process plan: A plan and design for the total process of bringing the tool into the organizational component.

2

Engagement: The extent to which the people involved in the adoption effort become active, motivated participants.

Methodology adjustability: The willingness and technical feasibility of adjusting, as necessary, existing organizational methods and typical methods of using the CASE tool so as to arrive at a single consistent set of methods.

NOTE 3   For example, existing process-oriented methods and candidate object-oriented programming tools might not be adjusted as a single consistent set of methods.

Training: Provision of the training and information necessary and appropriate at each step for each person involved in the adoption process.

Expert support: Provision of enthusiastic, expert tool use support during the pilot project and continuing as the tool moves into routine use throughout the organizational component.

NOTE 4   The experts (or champions) assigned to the pilot project, as a group, should have a combination of skills, including capability of being proponents for the new technology, experience in the tool use, experience in the process and procedures of the organization, and influence within the organization.

Pilot project: The performance of a controlled pilot project prior to the final adoption decision.

Tool capability: The technical capability of the tool, in its hardware and software environment, to satisfy the defined goals in the context of the intended scope.

Smooth changeover: Due consideration paid to ensuring the ability of the organization to simultaneously operate in both the old and new methods until the entire organizational component has fully changed over to the new methods.

6 Overview of CASE adoption

This Technical Report will describe a set of adoption processes that can be used in a broad range of environments, where the definition of success can be tailored to the organization. Successful CASE adoption requires more than casual adoption activities. This section shows the major processes for adoption and the overview of the processes as shown in Figure 1. Adoption of CASE tools includes four major processes:

a)   Preparation process

b)   Evaluation and selection process

c)   Pilot project process

d)   Transition process

6.1 Preparation process

The purpose of the preparation process is to establish the general objectives and goals of the CASE adoption effort, to establish the high level direction, and to define the management aspects of the effort (e.g., schedule, resources, cost).

The preparation process is composed of four activities:

a)   **Setting goals**: identifies CASE adoption goals where CASE can help meet business objectives.

b)   **Verifying feasibility and measurability**: develops and verifies technically and economically feasible and measurable subgoals for a CASE adoption project.

c)   **Setting policy**: provides the rationale and general policy for adoption of CASE tools incorporating the critical success factors.

d)   **Developing a plan**: produces a plan for the entire adoption project.
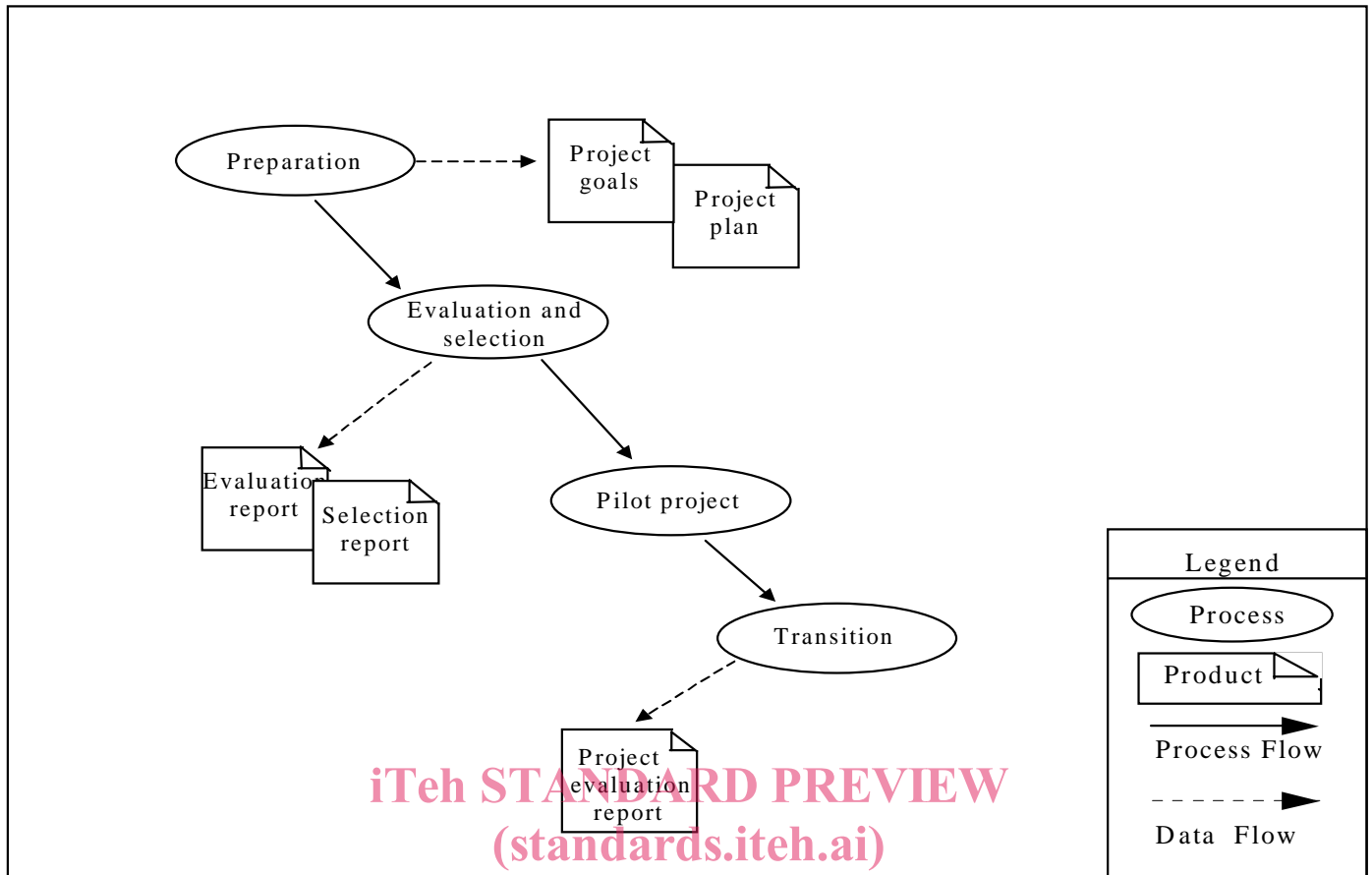
Figure 1 — Overview of CASE adoption process

6.2 Evaluation and selection process

The purpose of the evaluation and selection process is to identify the most suitable CASE tool(s) among the candidate tools, and to ensure that the recommended tool(s) meets the original goals.

The evaluation and selection process is fully defined in ISO/IEC 14102:1995, and is composed of:

a) **Initiation**: defines the objectives and requirements of the intended evaluation and selection of CASE tools.

b) **Structuring**: elaborates a set of structured requirements based upon the CASE tool characteristics of Clause 9 in ISO/IEC 14102:1995.

c) **Evaluation**: produces technical evaluation reports that will be the major input for the selection sub process.

d) **Selection**: identifies the most suitable CASE tool(s) among the candidate tools.

6.3 Pilot project process

The purpose of the Pilot project process is to aid in validating the work performed in the earlier processes of CASE adoption process and to determine if the actual capability of the tool meets the organizational needs.

The Pilot project process is composed of four activities:

a) **Pilot initiation**: defines plans, procedures, resources, and training to perform a pilot project.

b) **Pilot performance**: executes a controlled project in which the newly acquired CASE tools can be tried out.

c) **Pilot evaluation**: provides the evaluation results of the performance of the pilot project.

d) **Decision for a next step**: decides whether to go ahead with the adoption process, abandon the tool or perform a second pilot project, and identify organizational learning experience for the transition process.

6.4 Transition process

The purpose of the transition process is to minimize disruptions during the changeover from the current processes to new technology based on the maximum use of the pilot project experiences.

The transition process is composed of five activities:

a) **Initiation for transition**: defines plans, procedures, and resources to perform transition and outlines, use of the tool.

b) **Training**: trains new CASE tool users.

c) **Institutionalization**: progressively applies the tool to larger segments of the target environment until its use becomes part of normal organizational practice.

d) **Monitoring and continuous support**: identifies whether the adoption is in fact working, and ensures on-going training and other resources as needed during the transition period.

e) **Evaluation of adoption project and completion**: measures the success of CASE adoption, and provides organizational learning experience for future adoption projects.

7 Preparation process

The first process in a CASE adoption effort is the preparation of CASE adoption goals and the project plan. Four major activities in the preparation process are:

a) Setting goals,

b) Verifying feasibility and measurability,

c) Setting policy,

d) Developing a plan.

Starting with the review of business objectives, CASE adoption goals will be defined and validated. A business objective is a higher level objective (e.g., improve competitive position of the organization, increase productivity), which is not tied to any specific software engineering life-cycle objective. However, business objectives should be used to derive core (possibly alternate) sets of CASE adoption goals (e.g., improve process, improve design quality). These goals are related to software engineering life-cycle processes to ensure the effectiveness of the organizational functions and performances.

The activity of verifying feasibility and measurability examines the conformance of the business and CASE adoption objectives and it assesses technical and economic validity.

The activity of setting policy develops the direction for the remainder of the adoption process. In this activity, the critical success factors defined in Clause 5 should be tailored for a specific CASE adoption effort. Finally, the last activity in the preparation process is to organize a plan for the total process of bringing the tool into the organizational component. The overview of the preparation process is shown in Figure 2.