**i Competency Dictionary**

**Handbook**

June 6, 2016

Information-technology Promotion Agency, Japan (Independent Administrative Agency)

Center for Human Resources Development Initiative, IT Human Resources Development Headquarters

Introduction

Information Technology (IT) in business has been gradually recognized as basic literacy or “Information Literacy” rather than tools for differentiation strategy. In this environment, what would you think about “IT human resource” development?

First of all, the stereotyped model that IT experts only provide IT services to any customers or clients on business doesn’t make sense any more. These experts do not catch up with rapid changes around the world unless they are flexible to business needs across their technical and engineering areas. In other words, “Human Resource for Innovative IT Integration” are being required, who has general IT knowledge and are familiar with the most-advanced business image. But in fact, it is obvious that any company has not even defined or identified those resources yet.

On the other hand, highly specialized IT engineers are needed as usual. All of them, however, have noticed that it is not efficient or effective any longer to learn technical skills with the typical and traditional career models beginning from programmer or to be trained by experienced engineers and experts because the environment surrounding them has been changed drastically. It is easy to understand them as human resource development methods. Developed human resources with them, however, are too late to meet the actual business requirements which have been already changed.

In order to develop human resources on two sides, who are corresponding to both necessary diversity and flexibility, we need to convert our consideration for human resource development from “Human resources are defined to be utilized on business after appropriate training with the definition” to “They should be developed while identifying business processes, improving them as appropriate and achieving missions”.

As a new skill standard in accordance with this, the “i Competency Dictionary (iCD)” (trial version) was released by Information-technology Promotion Agency (IPA) in July, 2014. A number of people in IT vendors, IT departments of their clients, or any IT related employees, have made a great use of iCD and we have received their evaluations. Based on their comments, ideas or opinions, by adding and modifying items, the “i Competency Dictionary (iCD)” was officially released with the “iCD Utilization System”.

This “i Competency Dictionary (iCD) Handbook” explains the characteristic structure and intends to give instructions on how to use and apply the iCD to a lot of people so that they can make an efficient use of it much earlier than you expect. Traditional skill standards including IT Skill Standard (ITSS) were limited for those who were quite familiar with them because of its complexity. The “i Competency Dictionary (iCD)” has such a simple structure with two dictionaries, “Task Dictionary” and “Skill Dictionary” that it is quite flexible for any companies or a company division to use a necessary part of these dictionaries, independent from the company size. These dictionaries are also available for company management requesting the whole improvement from the point of view of business process, managers or directors who can’t assign a dedicated person for HR development, these supervisors who need to ensure their subordinates’ IT potentials in the business field, and anyone who considers the restructure of IT related operation in your company and its division as well as the employee development. In addition, this “i Competency Dictionary (iCD)” is also available for companies using any former skill standards such as ITSS to brush up them. Therefore we would be grateful to your reading through this handbook for a good use of “i Competency Dictionary (iCD)”.

Finally I really would like to thank to all of the companies, using “Common Career Skill Framework (Version 1 and supplement) “ before the “i Competency Dictionary (iCD)“ as well as the “i Competency Dictionary (iCD)” (Trial version) , and the organizations supporting those companies, because without their assistance, we could not have released this “i Competency Dictionary”.

June 30, 2015

Osamu Endo

Promotion Manager - i Competency Dictionary

HRD Initiative Center,

IT Human Resource Development Headquarters

Information-technology Promotion Agency, Japan

**Table of Contents**

[1. Objectives of the i Competency Dictionary 4](#_Toc469043434)

[2. Basic Structure and Features of the i Competency Dictionary 5](#_Toc469043435)

[2.1 Concept of the i Competency Dictionary 5](#_Toc469043436)

[2.2 Task Dictionary 8](#_Toc469043437)

[2.3 Skill Dictionary 13](#_Toc469043438)

[2.3.1 Structure of the Skill Dictionary 13](#_Toc469043439)

[2.3.2 Job List 19](#_Toc469043440)

[3. Forms of Use and Application of the i Competency Dictionary 20](#_Toc469043441)

[3.1 Use and Application example of the i Competency Dictionary by Companies/Organizations 21](#_Toc469043442)

[3.1.1 Requirement Analysis 22](#_Toc469043443)

[3.1.2 Task Analysis 24](#_Toc469043444)

[3.1.3 Definition of Internal Tasks and Roles 27](#_Toc469043445)

[3.1.4 Formulation of Assessment Items and Criteria 28](#_Toc469043446)

[3.1.5 Trial and Determination 33](#_Toc469043447)

[3.2 Use and Application of the i Competency Dictionary by Individuals 35](#_Toc469043448)

[3.3 Use and Application of the i Competency Dictionary by Educational Institutions, e.g. Schools 36](#_Toc469043449)

[4. Future Objectives 39](#_Toc469043450)

Appendix 1 Use and Application methods of the i Competency Dictionary by CCSF (Supplement) users

Appendix 1.1 Items changes in CCSF (Supplement)

Appendix 1.2 Use and Application methods

# Objectives of the i Competency Dictionary

The "Common Career/Skill Framework (Ver. 1/Supplement)" (hereinafter CCSF (Supplement)) released in March 2012 is organized and systematized around tasks, human resources, and skills in a way that makes it possible for companies involved in the training of IT professionals to flexibly combine and apply the Skill Standards for IT Professionals (ITSS), Users' Information Systems Skill Standards (UISS), and Embedded Technology Skill Standards (ETSS) (hereinafter, all three are referred to generally as Skill Standards) to match the needs and goals of their organizations. This allows companies to browse the tasks and skills necessary for them to implement "development of human resources who will contribute to the achievement of business targets" without regard for the differences in structure between the Skill Standards.

Not only this body of definitions, but also application tools and an application guide were released in combination to facilitate its widespread use.

In recent years, dramatic changes have continued to affect IT-related enterprises. For example, the business shift from "contract development" to "IT service provision" is accelerating, linked to the spread of cloud computing. This changing environment demands fresh perspectives in essential IT personnel, and defining the human resources who will take on the future of IT-related industries has become a crucial issue.

In the face of these circumstances, the "i Competency Dictionary" was formulated to provide a wide range of contents for human resource development with an eye on the future, and enable the companies that use and apply it to easily build a structure for identifying their ideal states and achieving human resource development.

It also defines specific skills and the relationships between skills and tasks to allow individual IT engineers (including students; hereinafter, IT engineers) to clarify their goals with regard to skill enhancement. In addition, its structure is designed to help various educational and training service providers offer training based on　skills defined by the i Competency Dictionary. These approaches tangibly link educational content with skill enhancement.

The i Competency Dictionary is composed of two main elements: the "Task Dictionary" and the "Skill Dictionary." These serve as references for major process structures and bodies of knowledge, and are also structured in a way that allows them to be applied flexibly to newly emergent IT functions and technologies.

In the future, we will continue to make revisions that anticipate trends in business and technology by responding flexibly to the rapidly changing environment. Through this effort, we hope to reinvigorate the IT human resource development initiatives of companies and organizations whose human resource development activities may have stagnated due to insufficient personnel or information, and to encourage the emergence of human resources who can play a vital role in enhancing Japan's industrial competitiveness.

# Basic Structure and Features of the i Competency Dictionary

## 2.1 Concept of the i Competency Dictionary

The i Competency Dictionary is expected to be provided as a tool for companies, organizations, and IT engineers to efficiently draft, implement, and achieve results with measures related to human resource development and skill enhancement.

The i Competency Dictionary is composed of the "Task Dictionary" and the "Skill Dictionary." It offers　structural representations of tasks and skills, and by selecting among them as needed, companies and organizations can efficiently implement evidence-based policies for human resource development and the achievement of their ideal state.

Figure 2.1-1 shows the function of each dictionary with regard to task execution and the relationships between them.

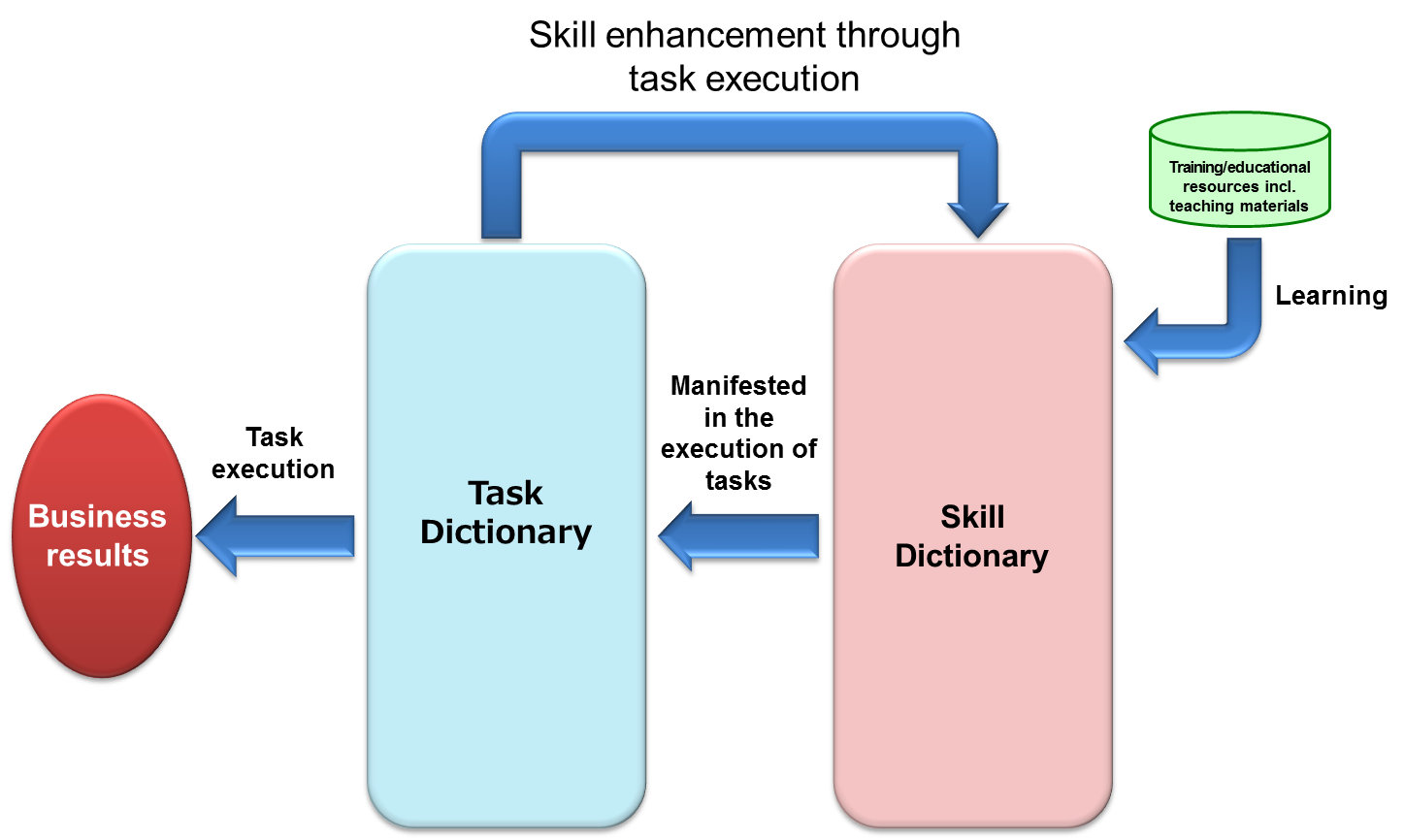


Fig. 2.1-1 Relationship Between Task Execution and Dictionaries function

(1) Concept of the Task Dictionary

Defining the ideal tasks for a company or an organization based on its business strategy and business plan is no small endeavor. Nonetheless, if it’s ideal state cannot be defined, then not only is it impossible to define what skills its human resources must possess and to what degree they are necessary, but the gap between this ideal state and the status quo will be unclear and it will be difficult to draft and implement effective human resource development policies.

We consider, in the i Competency Dictionary, the "Task Dictionary" plays an important role in the promotion of human resource development. It provides a wide-scale, comprehensive grouping of tasks that allows it to be used and applied by any kind of company or organization.

Companies and organizations can establish their own required tasks (hereinafter, internal tasks) by browsing the Task Dictionary and selecting among tasks based on the company’s or organization's business model, business strategy, business plan, or current operations.

Defining internal tasks in line with the business strategy or business plan with the use of the i Competency Dictionary also allows for applications beyond the scope of human resource development, including organizational optimization and optimal assignment of personnel.

The contents of the Task Dictionary are based on the "Task Model" found in the CCSF (Supplement). In order to be more broadly used and applied, they have been organized and synthesized with the following systems of processes as references.

* Japan Common Frame 2013 (SLCP 2013)

A standard model for software lifecycle processes was formulated by the International Organization for Standardization (ISO). The "Japan Common Frame 2007" was used as a reference in the creation of the Task Model in the CCSF (Supplement), which corresponds to "Phases and Fields of IT Investment" in the ITSS. In the i Competency Dictionary, the newest version, the "Japan Common Frame 2013," was used as a reference in the creation of the Task Dictionary.

* ITIL 2011 Edition

Reference information for tasks related to IT service management, system operations management, etc.

* COBIT 5

Reference information for tasks related to IT governance (internal control, compliance, etc.).

* [Revised Edition] Embedded System Development Process Reference (ESPR Ver. 2.0)

Reference information for tasks related to embedded software development.

* CRISP-DM

Reference information for tasks related to data science (utilization of internal company data such as aggregation/analysis, data mining, etc.).

The contents of the Task Dictionary are described in "2.2 Task Dictionary."

(2) Concept of the Skill Dictionary

A "Skill Dictionary" was newly created in the i Competency Dictionary.

Individual IT engineers are expected to use the Skill Dictionary, by selecting among skill items in the Skill Dictionary, to grasp their status quo and define targets for skill enhancement. In addition, they can use information linked with the Task Dictionary to judge which skills are effective in the execution of particular tasks. Educational institutions are considered to combine their educational programs implementing skill data with the Skill Dictionary, etc.

The contents of the Skill Dictionary reflect a wide range of skills and knowledge essential to the execution of IT-related tasks. A variety of Bodies of Knowledge (BOK) were referred to in the collection of these skills, including Skill Standards and the CCSF (Supplement). These Bodies of Knowledge are listed in Table 2.1-1.

Table 2.1-1 Main Bodies of Knowledge Referenced

|  |  |
| --- | --- |
| **Title** | **Published by (Organization)** |
| Information Technology Engineers Examination Morning Examination Scope of Questions (Body of Knowledge) | Information-technology Promotion Agency (IPA) |
| Common Career/Skill Framework (Ver. 1/Supplement) (CCSF) Body of Knowledge | Information-technology Promotion Agency (IPA) |
| Skill Standards for IT Professionals (ITSS) V3 2011 | Information-technology Promotion Agency (IPA) |
| IT Specialist Training Handbook, 2008 Revised Edition | Information-technology Promotion Agency (IPA) |
| Users' Information Systems Skill Standards (UISS) Ver. 2.2 | Information-technology Promotion Agency (IPA) |
| Embedded Technology Skill Standards (ETSS) 2008 | Information-technology Promotion Agency (IPA) |
| Computing Curriculum Standard J07 | Information Processing Society of Japan |
| Guide to the Business Analysis Body of Knowledge (BABOK) Ver. 3.0 | International Institute of Business Analysis (IIBA) |
| Requirements Engineering Body of Knowledge (REBOK) Ver. 1 | Japan Information Technology Services Industry Association (JISA) |
| Strategy and Analysis Body Of Knowledge (SABOK) ver.1.4 | Japan IT Strategist Association |
| Software Engineering Body of Knowledge (SWEBOK) V3.0 | IEEE/ACM |
| Guide to the Project Management Body of Knowledge (PMBOK Guide) Ver. 5, PMBOK Guide Ver. 5, Software Extended Version | Project Management Institute (PMI) |
| ITIL (Information Technology Infrastructure Library) 2011 Edition | itSMF Japan |
| Guide to the Software Quality Body of Knowledge (SQuBOK) Ver. 2.0 | Union of Japanese Scientists and Engineers |
| DAMA Guide to the Data Management Body of Knowledge (DMBOK) Ver.1 | DAMA International |
| Official (ISC)2 Guide to the CISSP CBK | (ISC)2 Japan |
| Information Security Body of Knowledge (SecBok) | Japan Network Security Association (JNSA) |
| (CAIS)BOK Ver2.2 | Japan Information Security Audit Association (JASA) |

(Listed in no particular order)

The contents of the Skill Dictionary are described in "2.3 Skill Dictionary."

## 2.2 Task Dictionary

The "Task Dictionary" is intended to be used and applied by companies and organizations in order to determine internal tasks in line with their business strategy or business plan. The structure of the dictionary assumes a wide range of corporate activities so that companies with any kind of business model can use and apply it.

It includes "Task Dictionary Chart" and "Task Profiles" and is expected to be used for reference when internal tasks are formulated.

Figure 2.2-1 shows the relationships between the various contents that compose the Task Dictionary.

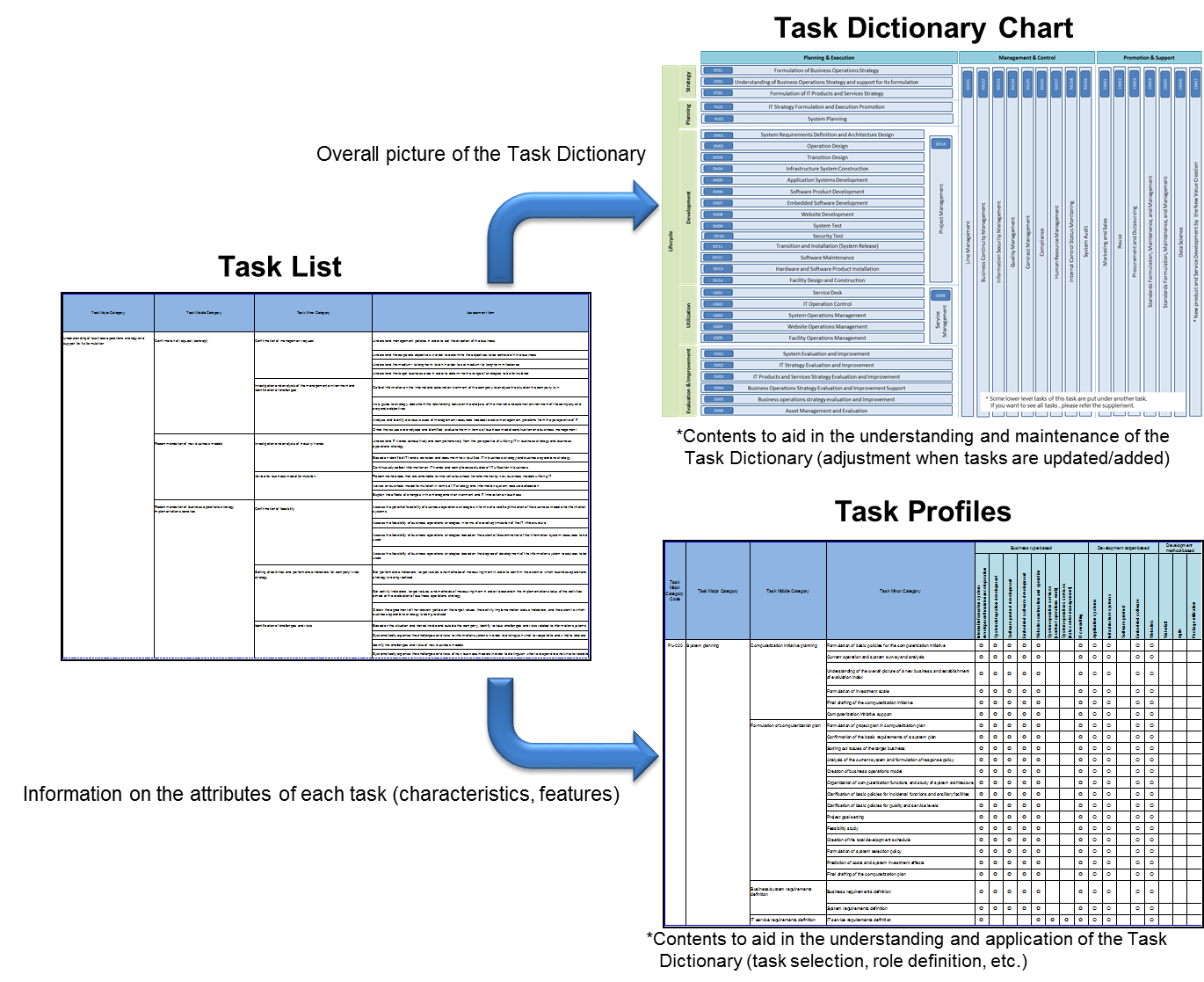


Fig. 2.2-1 Structure of the Task Dictionary

(1) Task List

When companies and organizations discuss IT human resource development, based on their corporate strategy or business plan, it is expected to be used to formulate internal tasks for the definition of the personnel roles by selecting essential tasks necessary for organizational functions from the Task List.

The tasks are made up of assessment items and three layers of stratification (Major, Middle, and Minor Categories), and consist of the following task groupings.

* Group of tasks responsible for "planning/execution" of a business lifecycle applying IT (strategy, planning, development, use and application, evaluation/improvement)
* Group of tasks that "manage/control" to efficiently and effectively execute tasks
* Group of tasks that "promote/support" the implementation of other tasks

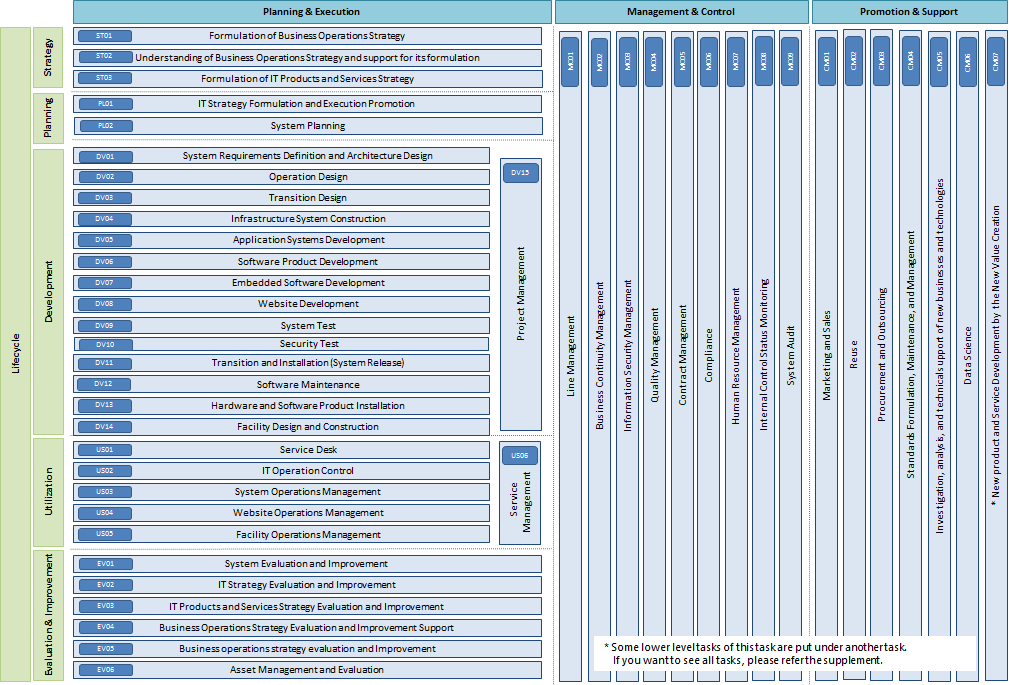
Tasks can be uniquely identified by their task codes. "Assessment Items" that exemplify specific instances of implementation are also assigned for each Minor Category. These can be used as references when determining whether or not to execute a task.

Table 2.2-1 Task List (Excerpt)



(2) Task Dictionary Chart

The Task Dictionary Chart represents a task structure composed of the business lifecycle (strategy, planning, development, use and application, evaluation/improvement) and the four task groups: "Planning/Execution," "Management/Control," "Promotion/Support", and “Other tasks”. By obtaining a bird's-eye view of the entire Task Dictionary on the Major Category level, users are expected to apply it for the formulation of their internal tasks.



**Fig. 2.2-2 Task Dictionary Chart**

(3) Task Profiles

"Task Profiles" can be used as a reference to aid understanding of tasks when selecting from the Task List to formulate internal tasks. Two types of documents are provided: the "List of Task Profiles" (describing each task profile) and the "Task Profile × Task Correspondence Table."

The profiles are classified based on task features and characteristics such as their corresponding business/function or development target, as described below.

* Business Type-Based

Examples of task sets that may be necessary depending on the organization's position (user, vendor) or business category, such as internal information system development/maintenance/operations, software product development, and system operation services, etc.

* Development Target-Based

Examples of task sets **that may be necessary depending on the type of target for development, construction, maintenance, or operation, such as application systems, infrastructure systems, embedded software, etc.**

* Development Method-Based

Examples of task sets that may be necessary depending on the type of development methods or means such as Waterfall, Agile, etc.

* New Business-Based

Examples of task sets that are essential to the personnel who will take on new businesses and functions such as cloud business, data science, information security, etc.

* Role-Based

Examples of task sets that can be used as reference information by companies and organizations when determining their own roles. Companies and organizations can use the Role-Based Task Profiles as a reference in selecting essential tasks based on their own business or functions.

The Task Profiles have nonetheless been assigned based on case studies obtained through various training activities for IT professionals, and do not take into account the individual circumstances and characteristics of companies and organizations. When using and applying the Task Profiles, organizations should not simply determine essential tasks based on this information alone, but also select them after sufficient consideration to their own business types and processes.

Fig. 2.2-3 shows an example of specifying a particular task profile to identify the corresponding tasks.

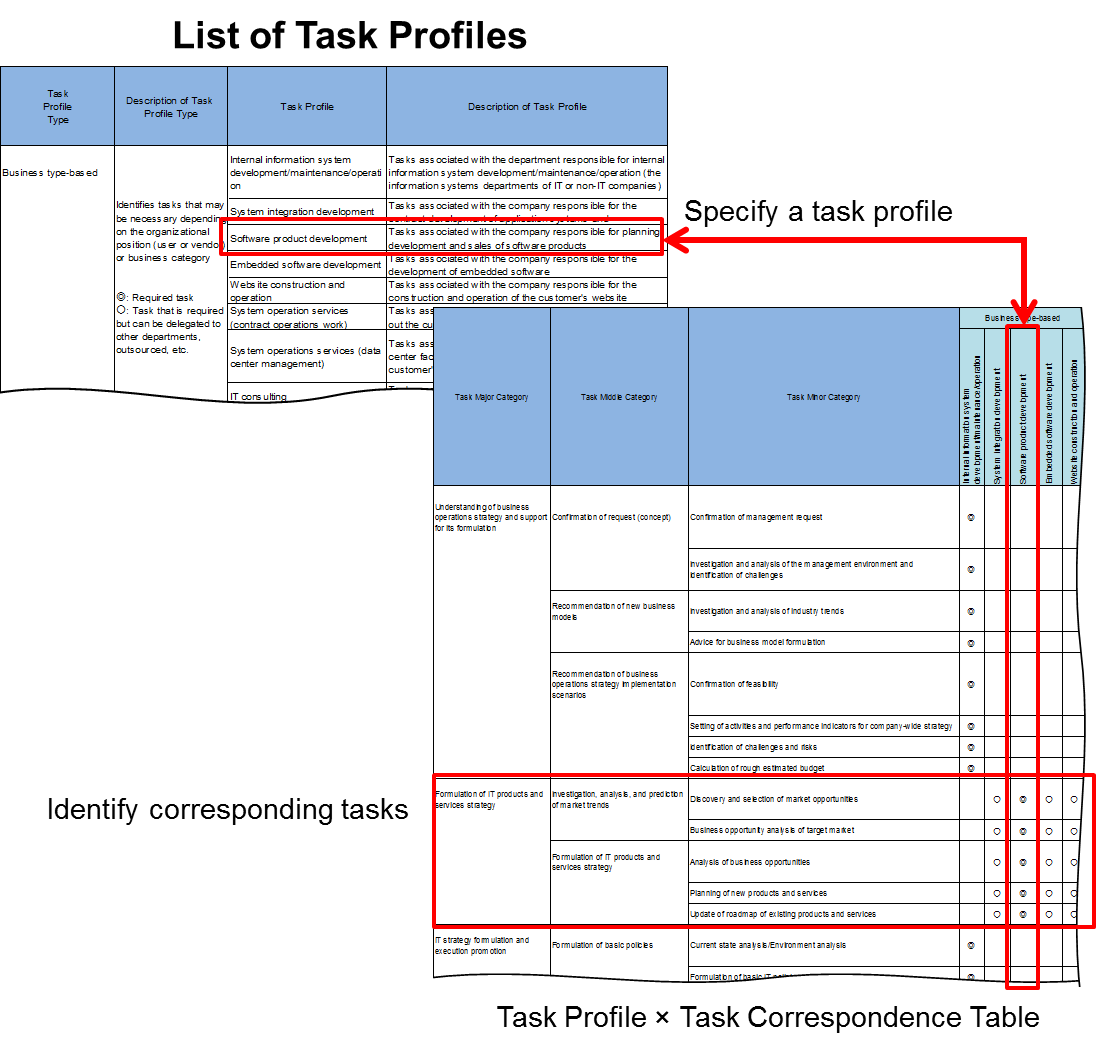


Fig. 2.2-3 Use and Application of the Task Profiles

## 

## 2.3 Skill Dictionary

The "Skill Dictionary" is structured so that it can be used and applied independently to focus on skills and boost training activities. It is expected to be used in the combination with various other qualifications and certification examinations including Information Technology Engineers Examination, and school-related or educational providers' curricula.

Using the examples of knowledge items and main Bodies of Knowledge in the Skill Standards and Information Technology Engineers Examination as a reference base, the Skill Dictionary summarizes and catalogs skills and knowledge items essential to the execution of IT-related tasks.

### 2.3.1 Structure of the Skill Dictionary

The Skill Dictionary is divided into four categories based on skill characteristics: "Methodology", "Technology”, "Related Knowledge”, and "IT Human Skills”.

Methodology, Technology, and Related Knowledge summarize knowledge items with the Skill Standards, CCSF (Supplement), and other major Bodies of Knowledges as a reference base.

IT Human Skills serves as a reference model for companies and organizations assigning human skills essential to the execution of IT-related tasks based on their business type, organizational climate or environment, etc. The following documents were consulted in its compilation.

* Guide to Building Practical Courses ~ To Promote the Independent Development of Industry-Academia Collaboration in Education (Part 3: Evaluation Criteria) (IPA 2013)
* Fundamental Competencies for Working Persons (Japan Ministry of Economy, Trade and Industry 2006)

(1) Methodology

Methodology category includes methods, processes, etc. exercised in various aspects of IT business activities and is a set of skills with a wide scope of manifestation and high versatility and applicability.

Table 2.3-1 Methodology (Excerpt)



(2) Technology

Technology category includes IT-related techniques, etc. exercised in various aspects of IT business activities and is a set of skills most of which have a specific scope.

Table 2.3-2 Technology (Excerpt)



(3) Related Knowledge  
Related knowledge category includes a set of business knowledge related to fields other than methodology and technology that is applied to various aspects of IT business activities.

Table 2.3-3 Related Knowledge (Excerpt)



(4) IT Human Skill

IT Human skill is a category of fundamental skills frequently exercised in various aspects of IT business activities. These are made up of three categories and twelve skill items and defined as categories of skills manifested in the execution of tasks, just like "Methodology," "Technology," and "Related Knowledge." (Fig. 2.3-1)

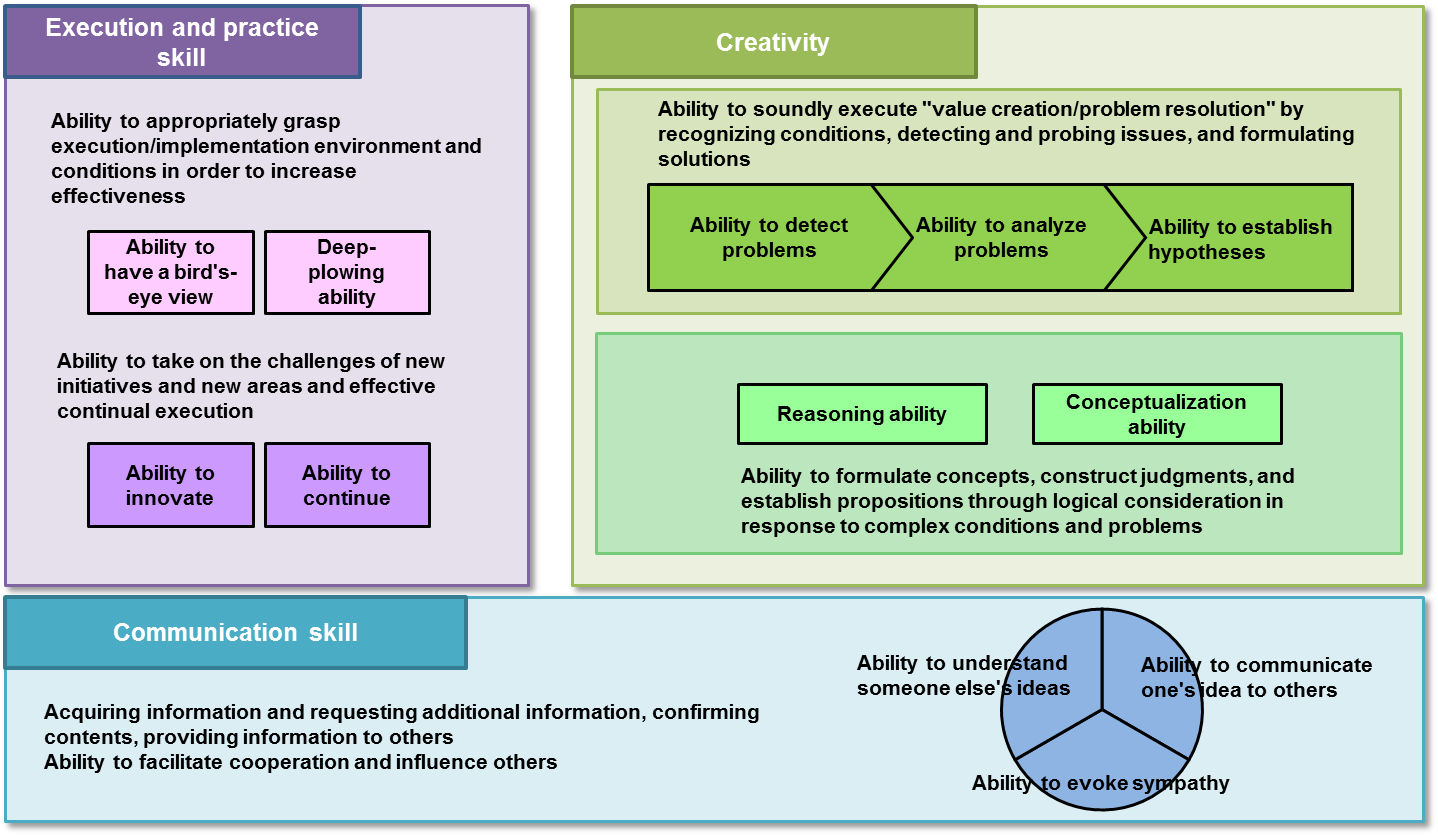


Fig. 2.3-1 Conceptual Diagram of IT Human Skills

Fig. 2.3-2 shows these four skill categories and skill classifications along the axes of IT Orientation (High-Low) and Application Area (Wide-Narrow).

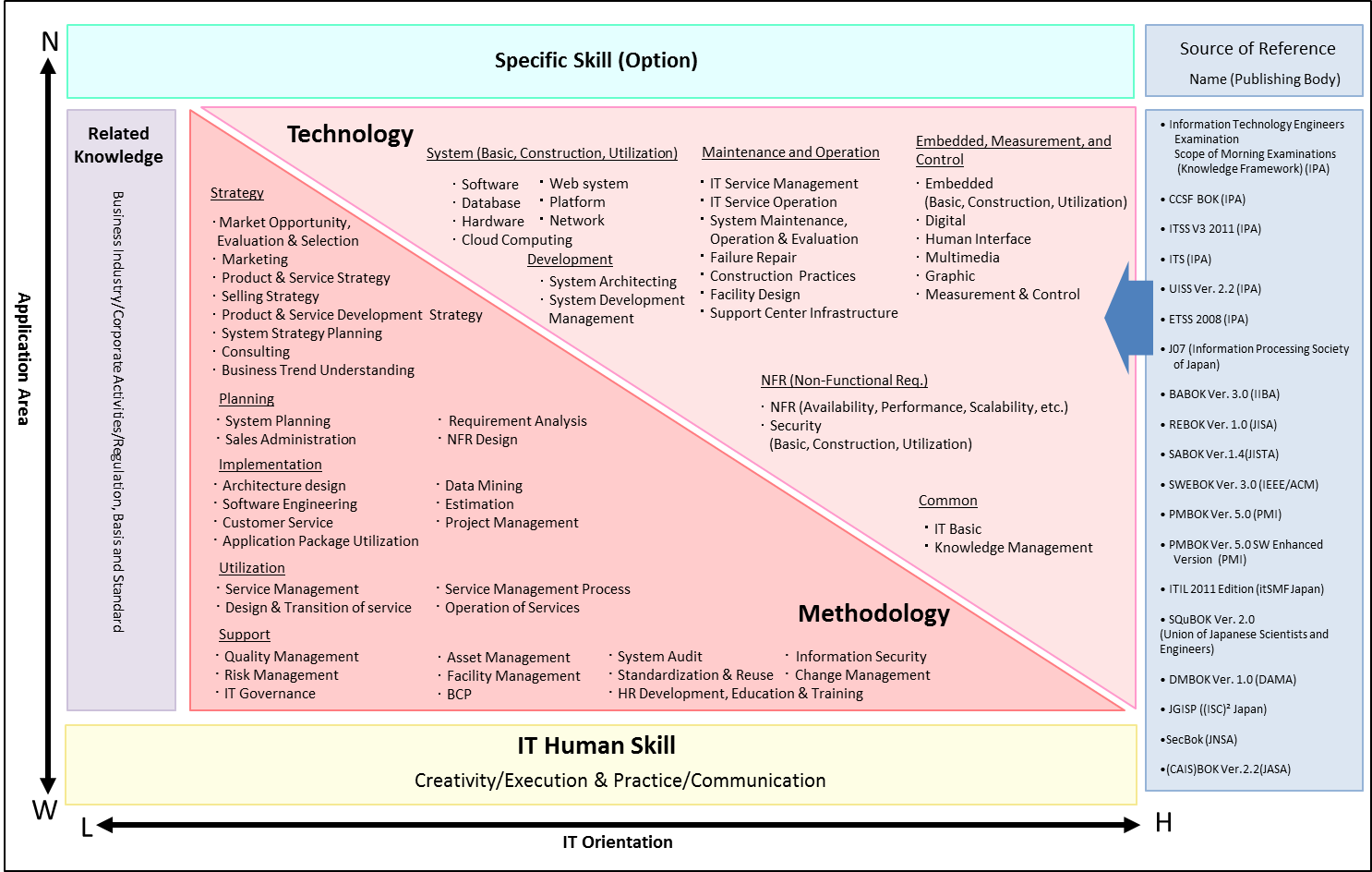


Fig. 2.3-2 Diagram of the Structure of the Skill Dictionary

### 2.3.2 Job List

The Job List combines the jobs/specialized fields, human resource profiles, and human resource models defined in the former Skill Standards and CCSF (Supplement) with the skills in the Skill Dictionary and defines and lists them as jobs. It is expected to be used as a reference resource to help IT engineers set their own targets and identify necessary skills for the targets.

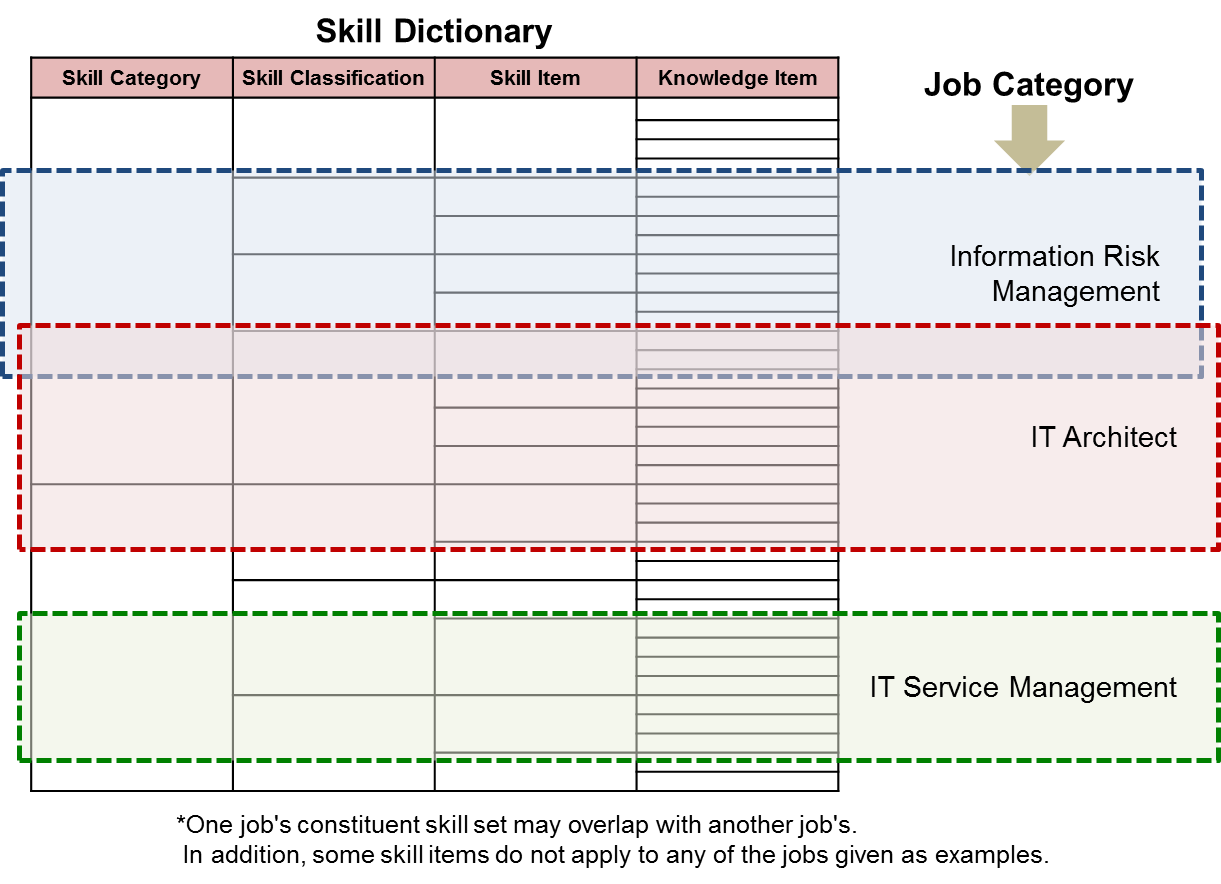


Fig. 2.3-3 Example of Skill Sets Constituting Jobs

# Forms of Use and Application of the i Competency Dictionary

The i Competency Dictionary postulates the following three forms of application for each of them who should use and apply it.

* Use and application by companies/organizations
* Use and application by individuals
* Use and application by educational institutions, e.g. schools

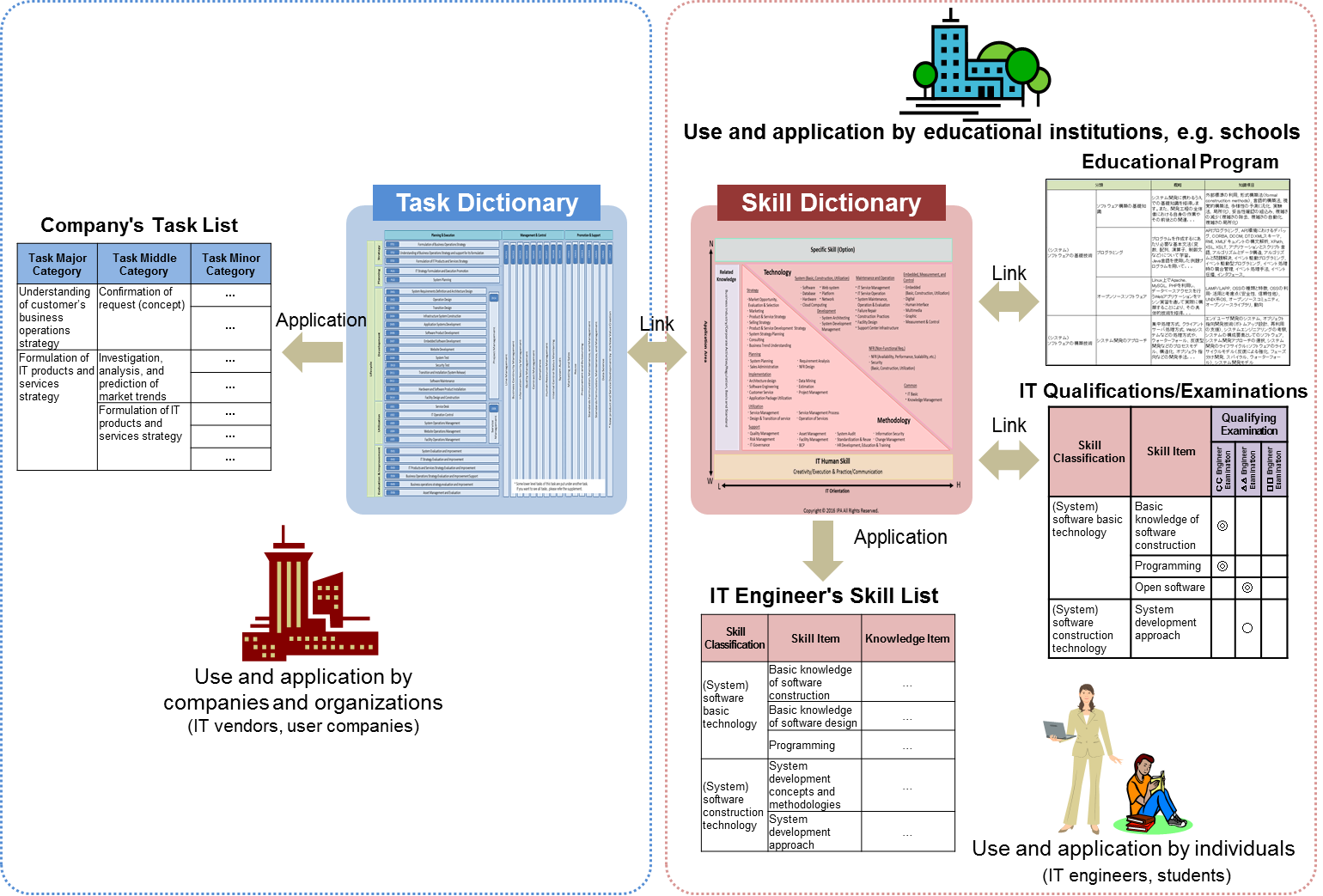


Fig. 3-1 Forms of Use and Application of the i Competency Dictionary

## 3.1 Use and Application example of the i Competency Dictionary by Companies/Organizations

Companies and organizations must develop training plans and personnel plans based on the discrepancy with the status quo, and go through a PDCA cycle after defining their desired activities and the practical abilities that those require based on their business strategy or business plan and with an eye to the future.

The objective examples of use and application by companies and organizations are listed below.

* Use and application to enhance organizational strength
* Designing the organization and visualizing the functions and roles required of it
* Defining division of roles and optimal allocation
* Ascertaining business functions and examining human resource development policies targeting enhancement of productivity and the quality of work and so on
* Implementation of effective investment aimed at realizing the corporate or organizational strategy
* Defining priorities and ascertaining the efficacy of investment and so on
* Streamlining assignment of personnel to projects
* Drafting human resource development plans matched to corporate/organizational objectives and the status quo
* Ascertaining the status quo of IT human resources and points that must be reinforced
* Examining training plans
* Selecting appropriate educational programs and so on
* Defining career paths
* Clarifying skill development necessary to achieve a target career
* Use as a reference model when considering a career change and so on

To achieve these objectives, the application method which entails defining internal tasks based on the company or organization's business strategy or business plan and constructing those as roles is effective

This section will describe the process of applying the i Competency Dictionary to construct a system by which companies and organizations can implement PDCA for IT human resource development. The use and application process shown in Fig. 3.1-1 compiles it based on the results achieved by many companies and organizations that attempted this kind of method.

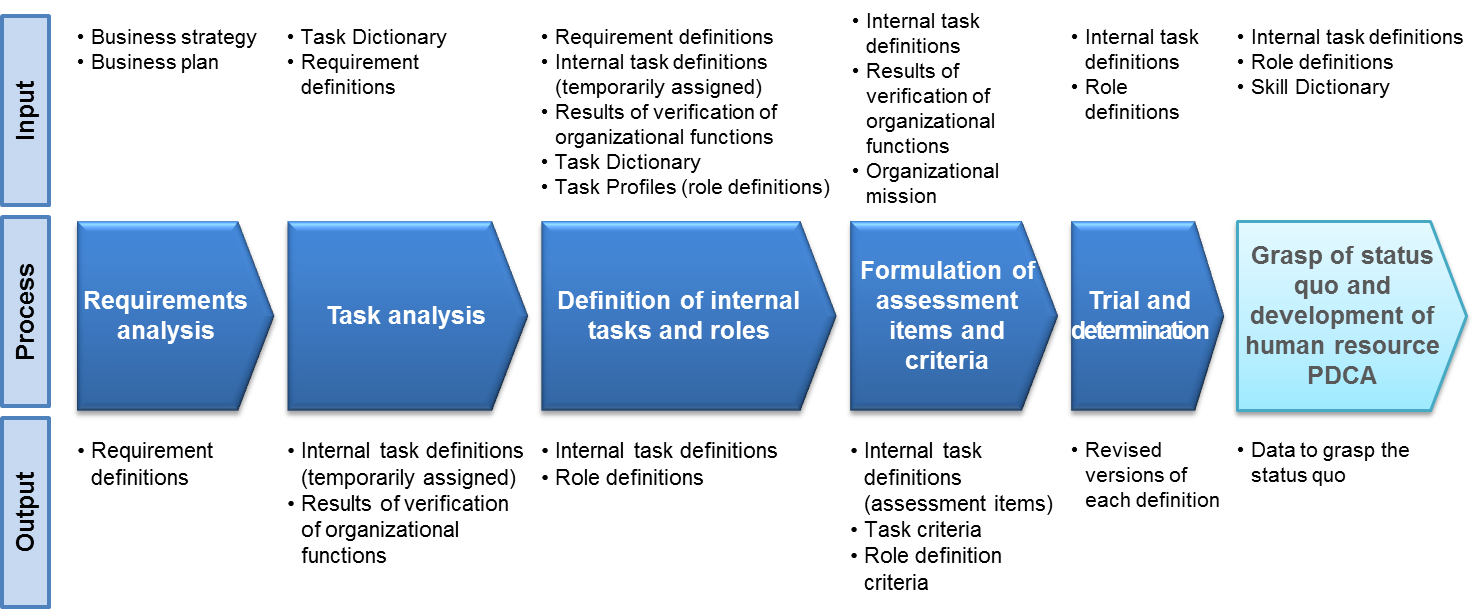


Fig. 3.1-1 Use and Application Process for an IT Human Resource Development System

### 3.1.1 Requirement Analysis

In Requirement Analysis process, a company or organization compiles requirements concerning the organization and human resources necessary to achieve its business targets, based on its business strategy, business plan, etc.

Documents related to the business strategy or business plan usually do not clearly describe the requirements for organizations and human resources. However, an ideal state matched to the company or organization cannot be defined unless the requirements sought from essential organizational functions and human resources are first clarified.

Companies and organizations must therefore read between the lines of these strategies or plans and look to the future to compile requirements for necessary organizational functions and human resources from a business perspective.

For example, a sales strategy of acquiring new projects one after another will entail different organizational functions, necessary skills, etc. than one of focusing on existing customers and generating new projects through improvement proposals.

The output of this requirement analysis will be the "Company's/Organization's Requirement Definitions" (hereinafter, Requirement Definitions), which define the requirements for the ideal state of the company or organization's internal tasks and human resources.

This ideal state will serve as a compass throughout the entire use and application process. Problems cannot be resolved without an idea of how things should be.

Requirements do not always have to be defined at the very beginning, but they must be defined at an early stage in the installation process.

The specific operations are as follows.

a) Identifying Organizational and Personnel Requirements

Extract keywords from the business strategy, business plan, and interviews with management to identify requirements for organizational functions and essential human resources.

b) Stratification of Requirements

Using the identified requirements, combine a top-down technique breaking objectives down into measures and a bottom-up technique extracting objectives from measures to create a Requirement Definition logic tree made up of objectives and measures. (Fig. 3.1-2)

Discuss the formulated Requirement Definitions in terms of the following points while confirming the corporate/organizational objectives and internal tasks.

* Is each element easy to understand and is the granularity uniform?
* Are elements in the proper order? Does anything seem to be missing?
* Are the written contents easy to keep in mind?

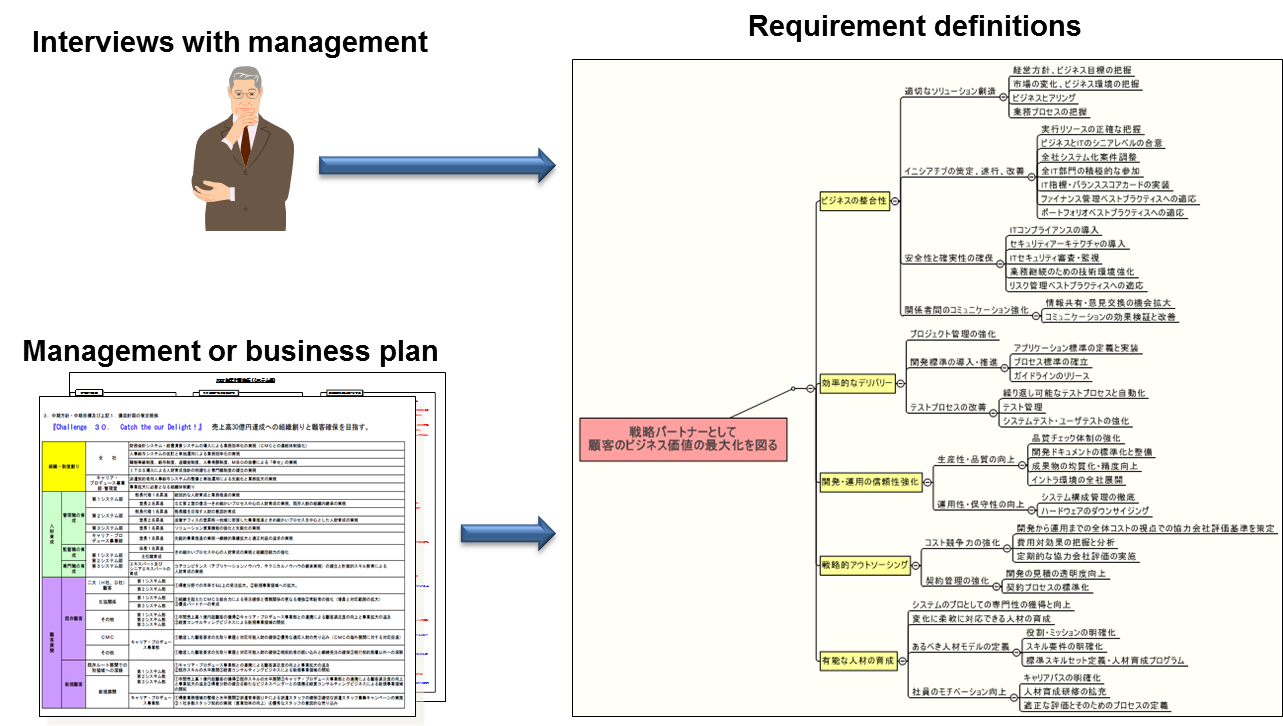


Fig. 3.1-2 Requirement Definitions

The Requirement Definitions established in this manner serve as an expression of a company or organization's ideal state in order to meet its corporate strategy or business plan, and the necessity of that state.

### 3.1.2 Task Analysis

In Task Analysis process, it gives further shape to the organizational functions required for the company or organization to achieve its business targets. At this point, instead of ignoring the current business processes, etc., an ideal state should be sought that is an extension of the present.

Achieve this by selecting tasks from the Task List to temporarily assign internal tasks that will be required in the future.

It is a challenge to define essential tasks from zero, but the Task List of the i Competency Dictionary can be used to make this proceed more efficiently.

The specific operations are as follows.

a) Understanding the Task Dictionary

Use the Task Dictionary Chart and Task Profiles to grasp the contents of each task and the scope of tasks indicated in the Task List (see 2.2.(1)).

b) Verification of Organizational Functions

The point of this operation is to define the company or organization's future-oriented business and functions based on the Task List.

Verify not just currently implemented tasks (As Is tasks), but also future-oriented tasks (To Be tasks) for each level of the organization (divisions, departments, sections, etc.) in line with the Requirement Definitions identified in "3.1.1 Requirement Analysis." (Fig. 3.1-3)

During verification, it is also important to add any items not found in the Task Summary even though they are essential tasks.

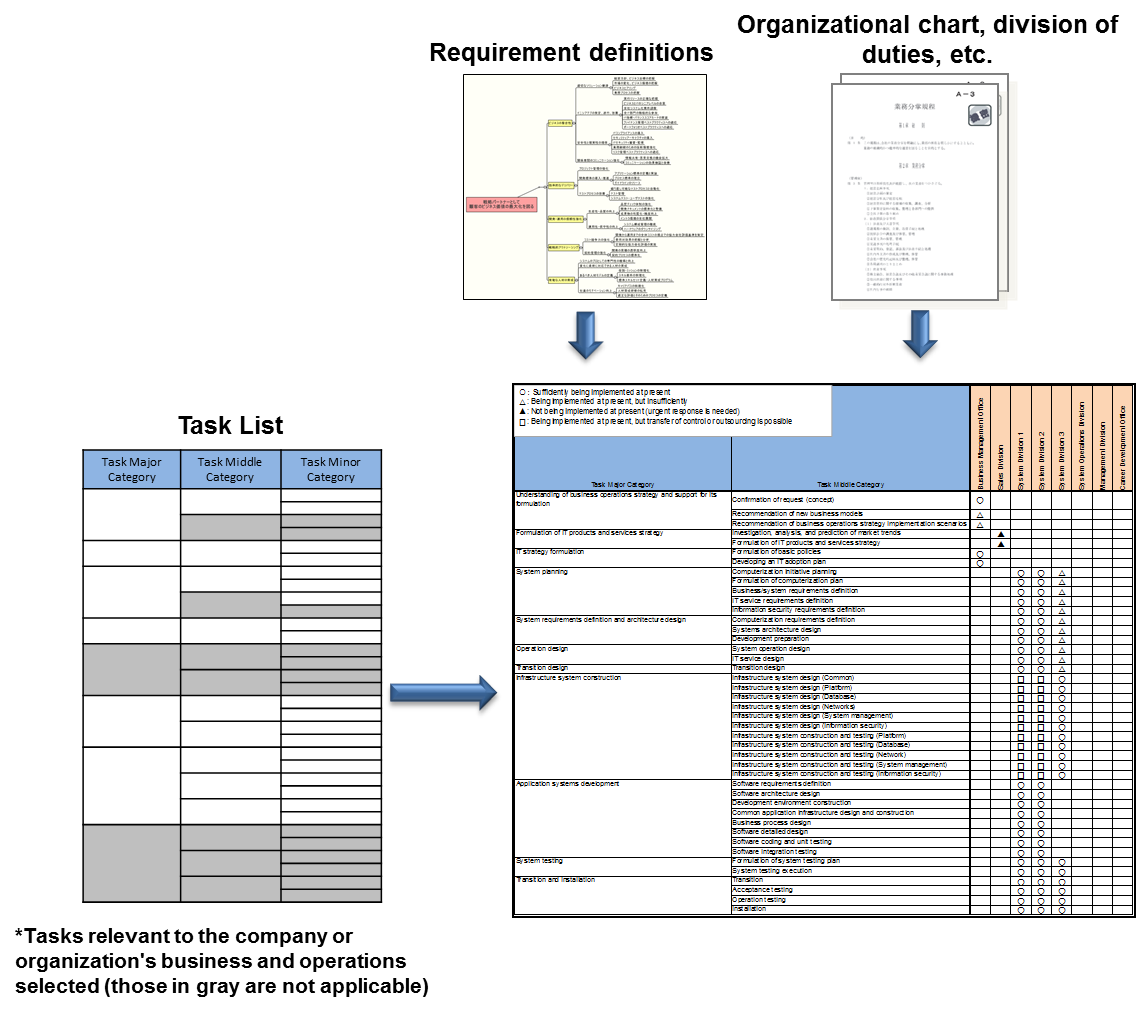


Fig. 3.1-3 Verification of Organizational Functions

c) Temporary Assignment of Internal Tasks

In b) Verification of Organizational Functions, tasks necessary both at present and in the future were identified and their implementation status was ascertained for each level of the organization (divisions, departments, sections, etc.).

Next, temporarily assign internal tasks by carefully examining those results and eliminating tasks that are unnecessary to the company or organization as a whole, adding to tasks that are lacking, and discussing solutions (who will implement and when, etc.) for tasks that are not being implemented, based on the Requirement Definitions. (Fig. 3.1-4)

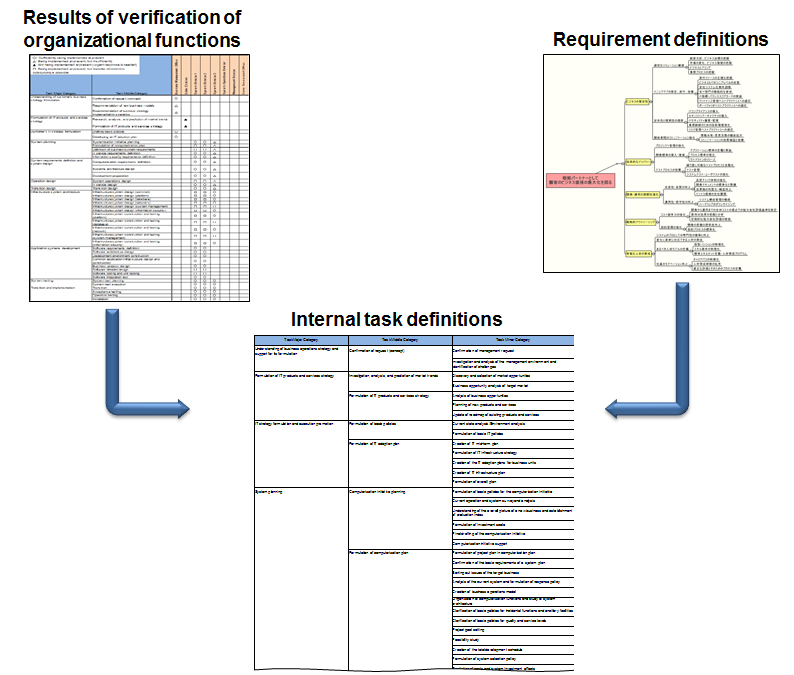


Fig. 3.1-4 Temporary Assignment of Internal Tasks

### 3.1.3 Definition of Internal Tasks and Roles

In Definition of Internal Tasks and Role process, further refine the internal tasks temporarily assigned in "3.1.2 Task Analysis."

For example, if the focus is on a 3-year business plan, start with the tasks necessary to achieve targets 3 years into the future and further define internal tasks by investigating and defining whether anything is missing or left out.

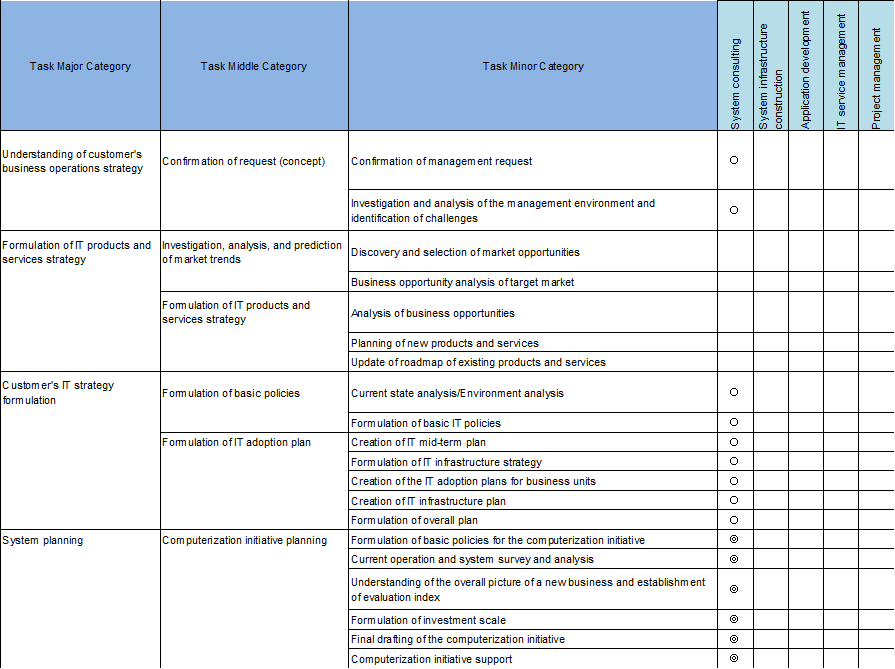
At the same time, define roles based on the internal tasks. Review the internal tasks through examining roles and enhance their precision. Then, define both the internal tasks and roles.

The specific operations are as follows.

a) Creating a Role Assignment Matrix

Determine multiple roles necessary in the execution of a task and create an assignment matrix that defines the allotment for each task. (Fig. 3.1-5)

The examples for Role-Based Task Profiles (see 2.2 (3)) can be used as a reference at this time. However, care must be taken that sufficient attention is given to the differences between the internal tasks and the example tasks given in the Task Profiles.



\*Reexamine excesses and deficiencies in the tasks as well as defining the division of roles for internal tasks.

Fig. 3.1-5 Assignment of Internal Tasks and Roles

b) Improving the Precision of Internal Task and Role Definitions

Identify excesses or deficiencies in the internal tasks and improve them by evaluating and verifying the assignment matrix.

While examining excesses and deficiencies, pay attention to the granularity of the tasks and try to improve their precision.

After compensating for excesses and supplementing deficiencies in the tasks, reevaluate the validity of each role. Repeat these operations to successfully formulate highly precise internal tasks and roles.

### 3.1.4 Formulation of Assessment Items and Criteria

Assign assessment items and corresponding criteria to gauge the ability to execute each task defined as an internal task.

The specific operations are as follows.

(1) Assignment of Assessment Items and Diagnostic Criteria

a) Assignment of Assessment Items

The Task List contains examples of assessment items to ascertain the execution status of each Minor Category of tasks. Assign assessment items for the company or organization by adjusting these examples based on work contents and regulations, etc. and adding original items. (Fig. 3.1-6)

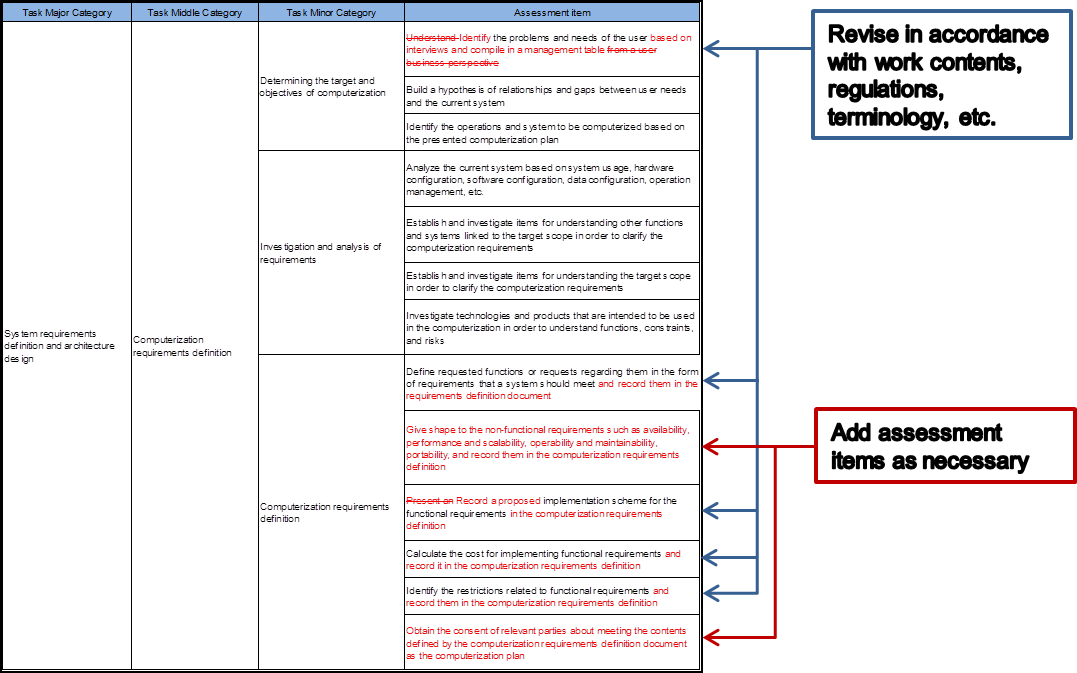


Fig. 3.1-6 Assignment of Assessment Items

b) Assignment of Diagnostic Criteria

After assessment items have been assigned, determine criteria to diagnose tasks. Table 3.1-1 shows examples of diagnostic criteria. Each organization may assign them as appropriate.

Table 3.1-1 Examples of Diagnostic Criteria for Task Evaluation

|  |  |
| --- | --- |
| **Diagnosis Level** | **Diagnostic Criteria** |
| L0 | No knowledge or experience |
| L1 | Has knowledge based on training |
| L2 | Can carry out with support or has such experience |
| L3 | Can carry out independently or has such experience |
| L4 | Can instruct others or has such experience |

(2) Assignment of Task-Based Level Assessment Criteria

In this section, criteria to assess Task-Based levels must be assigned. Aggregate the level diagnostic results of the task minor category and organize the level assessment of each layer tasks for understanding individual IT engineers’ task performance capability and the total task performance capability aggregated for each department.

1. Level Assessment Criteria assignment for Task Minor Category

The level diagnosis for task minor category is a diagnosis referring each assessment items and consulting the assessment criteria in the “Table 3.1-1 Examples of Diagnostic Criteria for Task Evaluation”.

Or diagnose the levels for each evaluation items then assess the levels using the aggregated result and “the Level assessment criteria” defined by own company/organization.

Fig. 3.1-7 shows an example of averaging level diagnostic result of evaluation items set by task minor category (L0 – L4) and assessing base on the assigned level assessment criteria for the task minor category set.

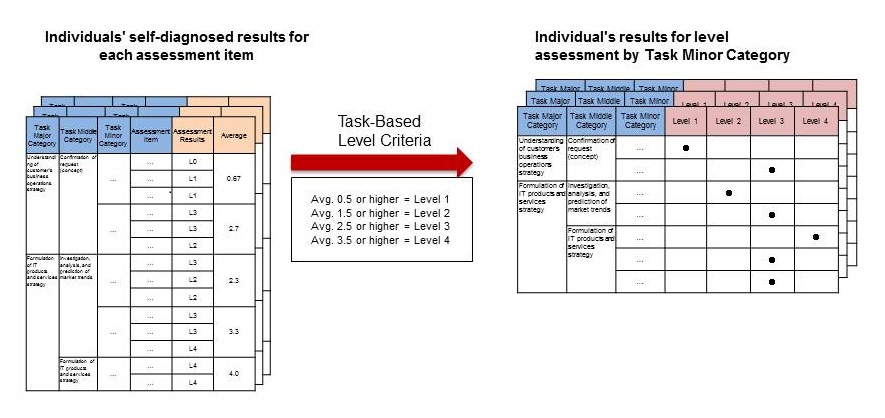


Fig. 3.1-7 Example of Task-Based Level Assessment (Task minor category)

1. Level Assessment Criteria assignment for Task Major/Middle Category

Assign the level assessment criteria for task major/middle category according to the level diagnostic result of task minor category.

Aggregating the task minor category assessment result by task major/middle category enables to visualize the organization task performance capability.

Fig. 3.1-8 shows an example of task major/middle category level based on assessment result for task minor category level and the assigned level assessment criteria.

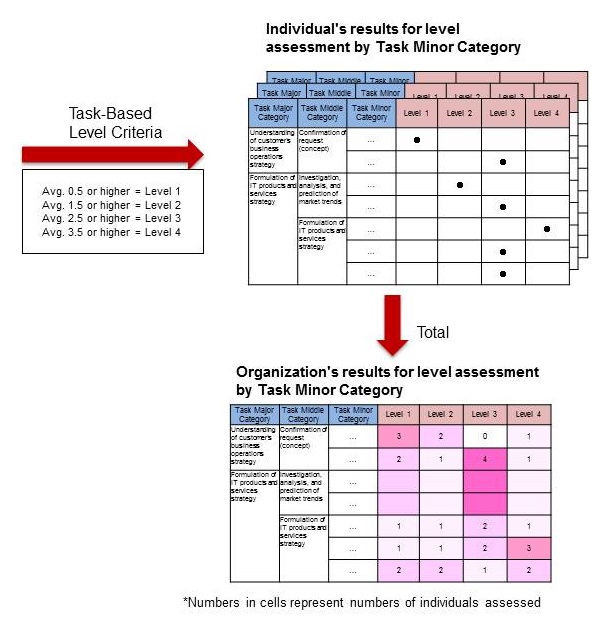
****

Fig.3.1-8 Example of Task-Based Level Assessment (Task major / middle category)

(3) Level Criteria Assignment by Roles

a) Assignment of Levels to Roles

Assign the level of roles that will serve as an index for human resource development and growth. Define the actions, business initiatives, results, leadership/training of subordinates, etc. expected of each level and use these as the criteria for assessing levels.

Fig. 3.1-9 shows an example of level assignment in which a company or organization's roles are graded on six levels.

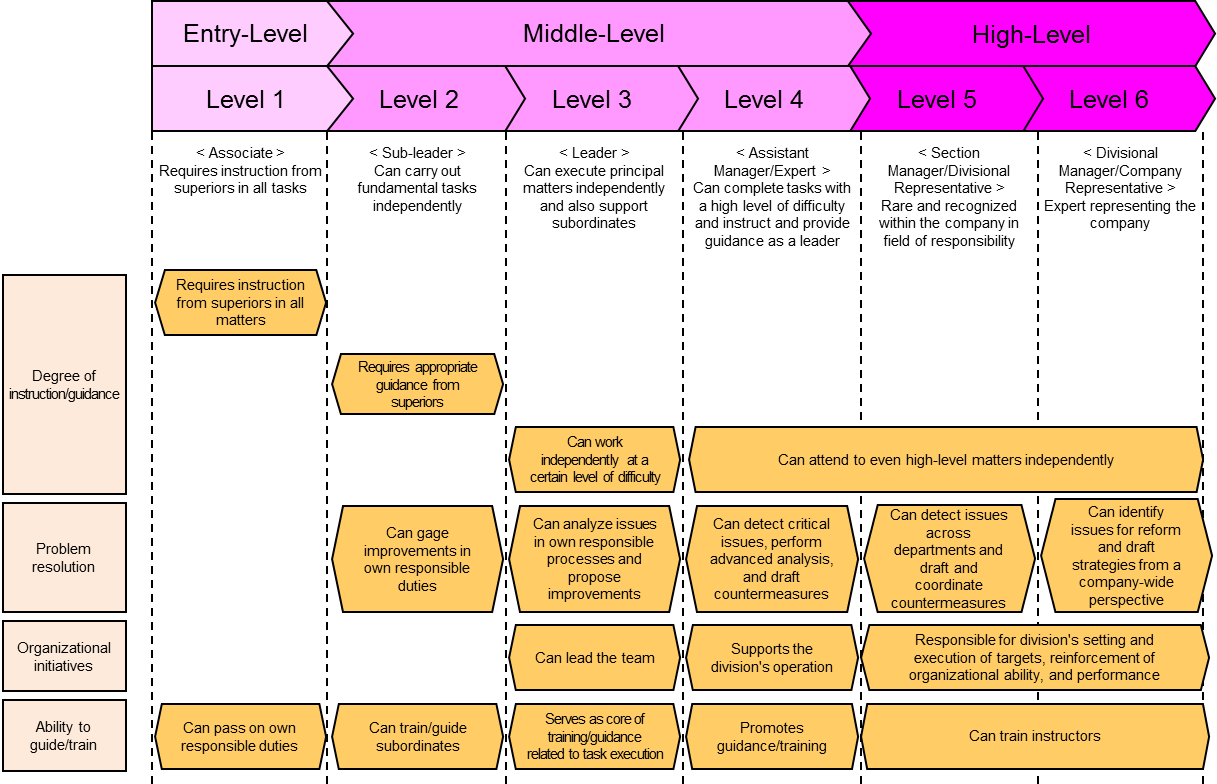


Fig. 3.1-9 Example of a Company's/Organization's Level Assessment for Roles

b) Level Criteria Assignment by Roles

Just like in "(2) Assignment of Task-Based Level Criteria," assign the criteria to be used in aggregating the diagnostic results for assessment items and carrying out role-based level assessment, based on the levels assigned in a).

Fig. 3.1-10 shows an example of assessment from Level 1 to Level 6 for each role. In this example, the Minor Category assessment results required by each role are aggregated and the level is assessed based on the assigned level criteria.

Just like in the task-based level assessment, individual assessment results can be aggregated to visualize the whole organization's ability to execute tasks.

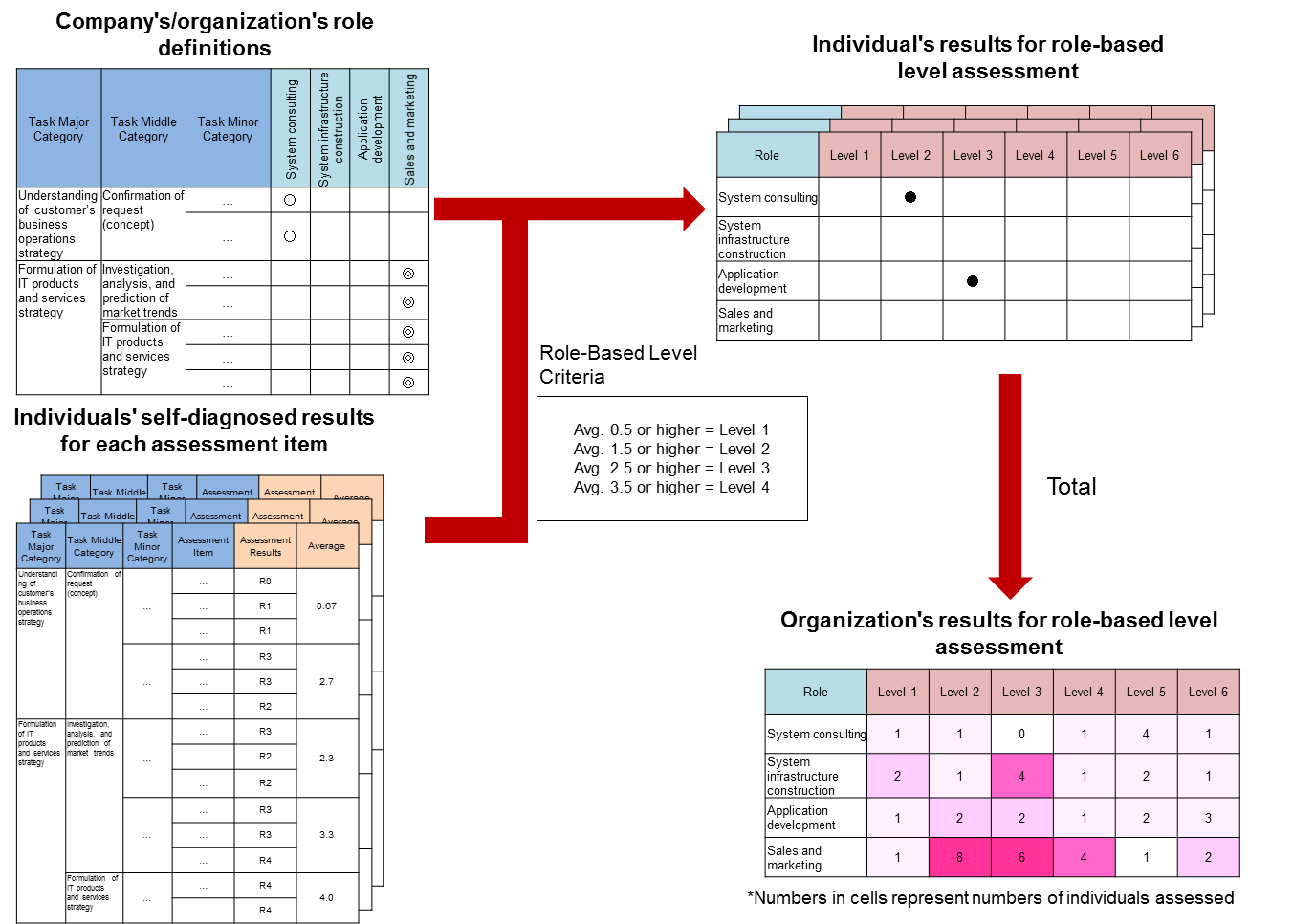


Fig. 3.1-10 Example of Role-Based Level Assessment

### 3.1.5 Trial and Determination

In Trial and Determination process, examine the assigned internal tasks and assessment items, roles, diagnostic criteria for assessment items, and level criteria.

The specific operations are as follows.

a) Implementing Task Diagnosis

Implement task diagnosis by the target IT engineers.

Aggregate the results and use the predetermined level criteria to assess task-based and role-based levels.

b) Improving Internal Tasks and Roles

Analyze the results of level assessment in a) to detect internal tasks that are lacking, role definitions that do not align, etc. and review as necessary.

Table 3.1-2 gives examples of detection of misalignment in the results and subsequent review for task-based and role-based level assessment.

Table 3.1-2 Examples of Problem Detection and Analysis / Review Based on Results of Level Assessment

|  |  |  |
| --- | --- | --- |
|  | Problem Detection | Analysis and Review |
| Example 1 | A division that mainly builds infrastructure showed poor overall results in level assessment for the role of "Infrastructure Architecture."  Examination of each IT engineer's results for task-based level assessment showed that assessment results for a particular task tended to be poor. | Based on that division's work contents, it was determined that the particular task was not one for which the division was responsible and its inclusion in the role of "Infrastructure Architecture" was inappropriate. The task was therefore excluded from the role. |
| Example 2 | For the organization as a whole, assessment levels for a certain task stuck out as low, and diagnostic results for a specific assessment item within that task were poor. | Checking with several of the IT engineers who had taken part in the evaluation revealed that they had taken a divergent interpretation of the assessment item and answered accordingly. The assessment item was compared with company regulations and terminology and the wording was revised so that it would be understood correctly. |

## 3.2 Use and Application example of the I Competency Dictionary by Individuals

The objective examples of individuals (IT engineers including students, etc.) using and applying the i Competency Dictionary are listed below.

* Gaining a grasp of IT-related skills
* Ascertaining the skills (skill areas) they personally possess and their degree of mastery
* Understanding the situations in which each skill is applied and gaining a grasp of the skills needed in their desired profession
* Defining their target skills, means of mastering those skills, and means of confirming skill attainment (qualifications, examinations, etc.) and so on.

By expanding the scope of the CCSF (Supplement) and newly adding the Skill Dictionary, the range of use and application by individuals has been broadened to help achieve these objectives.

The Skill Dictionary can be used together with the Task Dictionary, but it is designed so that it can be used and applied independently to aid in skill-focused IT human resource development and self-improvement.

The Skill Dictionary and the Task Dictionary can also be applied in conjunction and used as a material to "relate currently possessed skills and skills whose enhancement is sought to the kinds of tasks whose execution they improve."

Figure 3.2-1 demonstrates an individual use and application process.

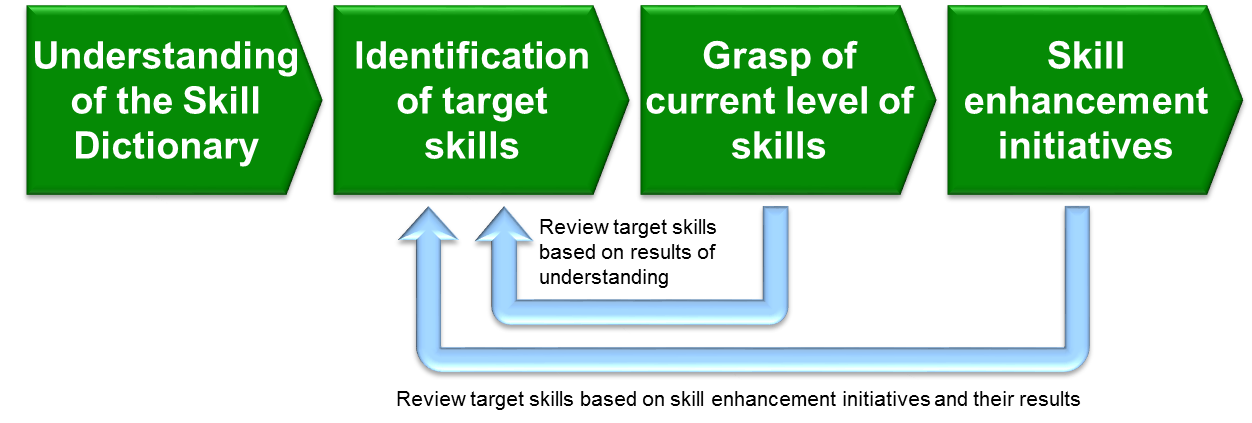


Fig. 3.2-1 Individual Use and Application Process

The specific procedure for use and application is as follows.

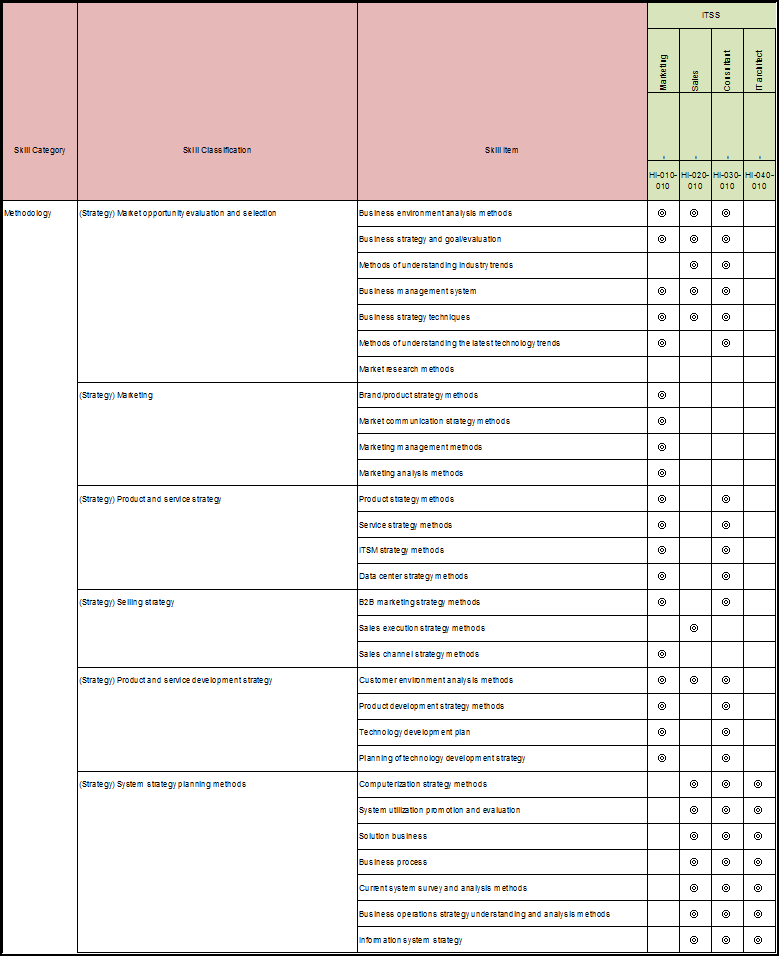
a) Understanding the Skill Dictionary

Grasp the overall picture of the Skill Dictionary (see 2.3.1).

The Job List is provided to facilitate the use and application of the Skill Dictionary.

This list shows examples of skill sets that establish each job/specialized field, etc. defined in the Skill Standards and CCSF (Supplement) as a combination of the skill items in the Skill Dictionary. A clear grasp of the contents of the Skill Dictionary can be gained through these jobs. (Table 3.2-1)

Table 3.2-1 Job List (Job x Skill) (Excerpt)



b) Identify Target Skills

Identify knowledge items of interest from the Skill Dictionary, such as skills to be improved, skills for which a clear picture of the current level of attainment is sought, etc.

The following are examples of skill identification.

* Examples of identifying skills currently being learned at school or other educational institution

The "Computing Curriculum Standard" and other resources applied by many educational institutions in the formulation of their curricula were referred to in the creation of the Skill Dictionary. (See Table 2.1-1)

These curricula can be compared with skill items and related knowledge items to identify relevant skills.

* Examples of identifying skills necessary to targeted IT engineering career

Select items relevant to the targeted IT engineering career from the Job List and identify necessary skills based on the applicable definitions for jobs and specialized fields.

* Examples of identifying skills relevant to work (tasks)

Select specific tasks such as functions associated with their desired profession, etc. from the Task List (see 2.2 (1)) and identify connected skills.

* Examples of identifying skills based on qualifications to be aimed for

Identify skills targeted by each category of the Information Technology Engineers Examination.

c) Identifying the skills acquisition degree

Regarding each skill identified in b), measure the skills acquisition degree using 7 levels skill mastery criteria indicated in table 3.2-2.

Level 1 to 4 criteria differs according to contents of technology/methodology/related knowledge. Skill mastery level 4 is the highest acquisition level of the skill for the task accomplishment.

Level 5 to 7 criteria is defined across the categories. Levels higher than or equal to 5 are defined not evaluated by the skill possession level but evaluated by social contribution degree as a professional.

In addition, IT Human Skills are difficult to diagnose directly because they are closely linked to tasks and the degree to which they are exercised varies with the conditions of task execution, so these should be excluded from the diagnosis.

The currently possessed level of skills essential to targeted jobs can be ascertained by consulting the results of current skill level assessment for particular jobs.

Table 3.2-2 Criteria for Levels of Skill Mastery

|  |  |  |  |
| --- | --- | --- | --- |
| Level 7 | Skills at the level of an industry leader who has influence on the market | | |
| Level 6 | Skills at the level of a recognized contributor to the industry | | |
| Level 5 | Skills at the level of a recognized contributor within affiliated associations and organizations | | |
| Level 4 | Level at which one is able to produce optimal solutions that take into account non-functional requirements, step outside of established tactics, and pass the advanced information technology examinations | Has mastered and can select the most suitable methods, and can freely apply the methods according to the situation | Is able to discuss what needs to be done with senior management within the industry or business they are involved in |
| Level 3 | Is able to create functional requirements and to work independently under limited circumstances | Is able to apply the proper method according to the problem, and has utilized the methods on-site and drawn conclusions | Has proposed solutions to the IT-related problem points in the industry and businesses they are involved in |
| Level 2 | Has implementation experience, and is able to use and apply the technology if instructions are available | Is able to perform analysis using the method, or is able to use the methodology under guidance | Understands the IT-related problem points in the industry and businesses they are involved in |
| Level 1 | Has knowledge, and understands lectures and presentations about　technical content | Understands lectures and presentations about the method, understands and can explain what it is, and understands textbooks about　 it | Understands and can explain what kind of industry and business they are involved in, and understands public information such as securities reports |
| Skill Category | Technology | Methodology | Related Knowledge |

d) Skill Enhancement Initiatives

Select skill items to be improved based on the results of diagnosis for the target skills, then draft and implement plans for specific initiatives. Information relating educational programs and various certifying examinations/qualifications to the skills in the Skill Dictionary is to be provided by vendors of IT education and the associations responsible for various certifying examinations in the future. Apply this kind of information to set goals and work toward concrete plans for passing examinations, acquiring relevant qualifications, and using educational curricula to enhance skills.

Ideally, users should revisit "b) Identify Target Skills" and follow a skill enhancement PDCA cycle based on the results of these initiatives.

## 3.3 Use and Application example of the i Competency Dictionary by Educational Institutions, e.g. Schools

Companies and organizations define internal tasks and then work toward reinforcing task-related skills as a means of enhancing their ability to execute those tasks, while individuals work toward skill enhancement in accordance with their goals.

Educational institutions are expected to provide opportunities for skill enhancement to both companies/organizations and individuals by offering educational programs and qualifications/examinations with the use of the Skill Dictionary.

(1) Planning and Offering an Educational Program Based on the Skill Dictionary

Educational institutions such as schools can provide effective means for companies/organizations and individuals to improve their skills with the connections between each skill in the Skill Dictionary and the educational programs offered by each institution.

From the perspective of companies/organizations and individuals, linking the Skill Dictionary and educational programs increases the means by which they can select more suitable programs.

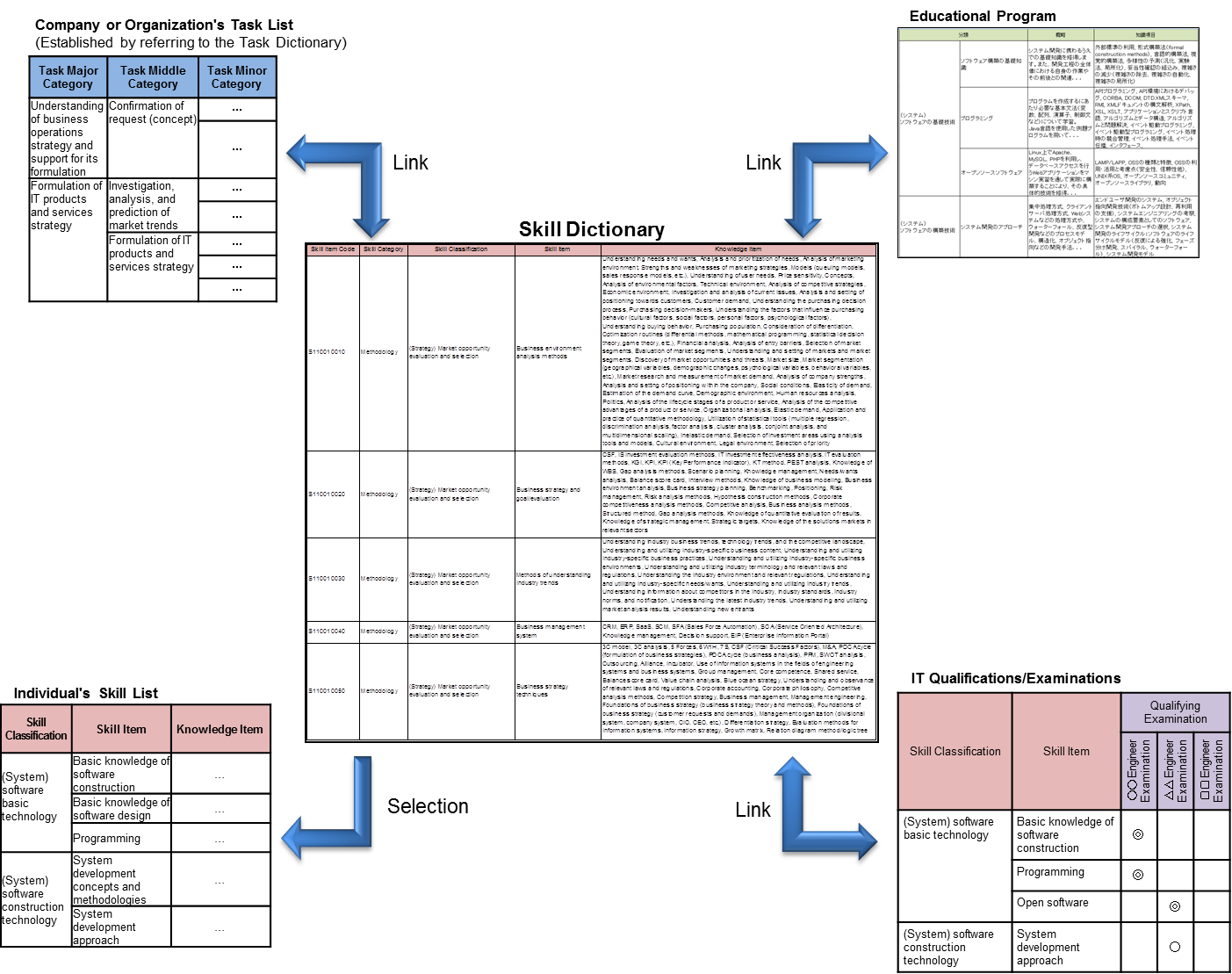


Fig. 3.3-1 Relationships Between Companies/Organizations, Individuals, and Educational Programs Mediated by the Skill Dictionary

(2) Evaluation of Educational Programs

Each educational institution can measure the skill level of IT engineers before and after participation in an educational program in order to evaluate and improve the program.

Furthermore, program participants can be provided with information on their estimated level of each skill item in the Skill Dictionary based on completion of a program, passing a certifying examination, etc., which will aid them in their own skill enhancement initiatives.

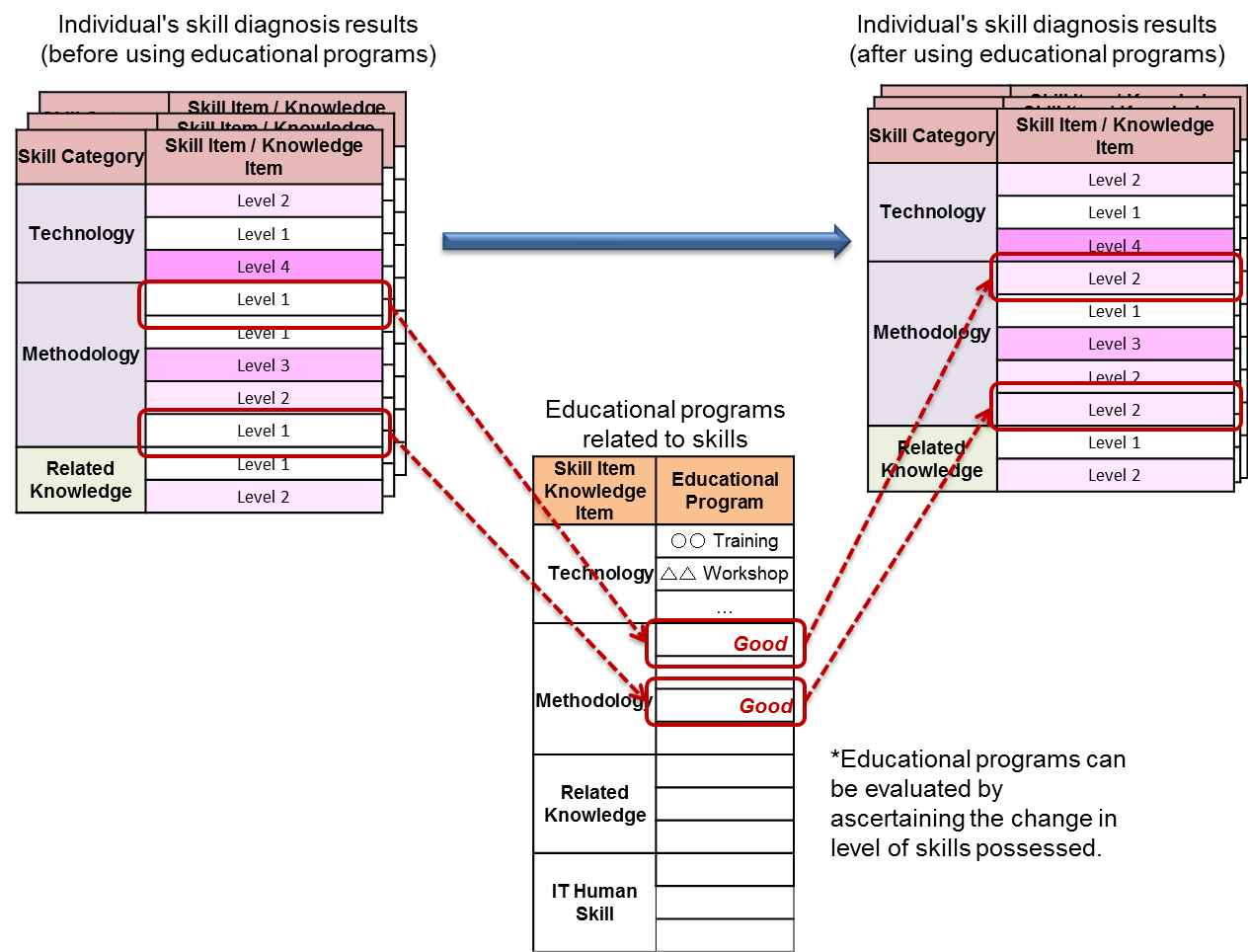


Fig. 3.3-2 Educational Program Evaluation

# Future Objectives

In order to strategically promote IT human resource development policies with an eye to the changing times, we will seek to continuously improve the i Competency Dictionary through the following initiatives.

* Further enrich the contents of the Task Dictionary and Skill Dictionary

We will work to expand the areas defined by the Task Dictionary and further enrich its contents to reflect IT trends and changes in the business environment.

We will also work to further enrich the contents of the Skill Dictionary by responding to revisions to the Bodies of Knowledge, etc. that serve as its reference base and the publication of new Bodies of Knowledge, and by cooperating with various other IT-related organizations.

* Share examples of application

We will collect examples of application and work to enrich contents supporting use and application by demonstrating examples, offering public templates, etc.