

SFIA vs iCD Mapping Research Project

Phase1: Compare the Underlying Principles and
Generics

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1 Skills Framework for the Information Age, SFIA - Introduction

1.1 Overall

1.1.1 Background to SFIA

The Skills Framework for the Information Age (SFIA) originated out of the collaboration of skills and competency initiatives within UK companies in the 1980s and 90s. This collaboration resulted in the SFIA Framework being published and adopted within the UK and made available through the SFIA Foundation from the year 2000. For many years the SFIA Framework has been the single global common language for describing skills and competencies required in the digital world.

Adoption of SFIA increased steadily in the early years, firstly within the UK, and subsequently, globally. SFIA has a world-wide user base of thousands of organizations and individuals in around 180 countries: there are currently (2018) some 20,000 registered users, where one user may be using SFIA across a workforce of thousands. The SFIA Framework has become the de facto global digital and IT skills framework, a global common language, and a standard for skills and competencies. SFIA is available in 6 languages; English, Spanish, German, Japanese, Chinese, and Arabic.

The SFIA Foundation found that there is more to a framework than the framework itself and, as a result, established the ecosystem necessary to support the Framework.

1.1.2 The SFIA Foundation

The SFIA Foundation (Fig 1-1) is a global not-for-profit organization that develops, maintains and makes available the SFIA Framework for use. It is funded through a modest licensing model for use of the SFIA intellectual property – with the vast majority of users able to use SFIA under a free-of-charge user license.

The SFIA Foundation is led by the SFIA Board which focuses on governance and oversees the work of the Foundation while a modest operations and business administration activity carries out the day-to-day running of the Foundation. The SFIA Council, comprising representatives from the global user base, discusses the direction of the Foundation and provides a pool of expertise. Finally, there is the global SFIA community of users, and it is this community that creates the SFIA Framework and associated products

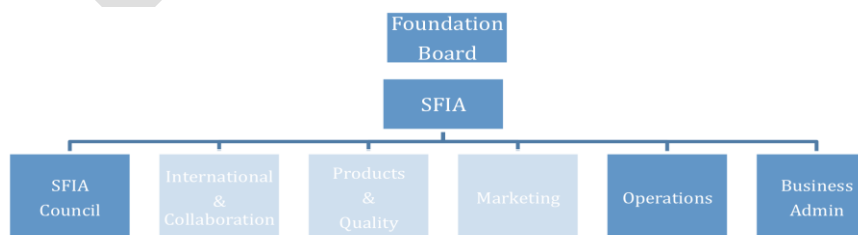


Fig 1-1 SFIA Foundation

What is unique about SFIA is the way it has focused on mobilizing the global user base to balance the needs of all stakeholders rather than to be overly driven by any one and this is a major component of the success that is SFIA – it is 'pulled' by industry and business because they want to use it rather than 'pushed' by commercial or other interests.

For more information about the SFIA Foundation, the SFIA Framework or how the framework can be used visit the SFIA Foundation website at www.sfia-online.org or contact the SFIA Foundation General Manager, Ian Seward, at ops@sfia-online.org

1.1.3 The Success of SFIA

SFIA has become a global phenomenon and the de facto global Digital and IT skills framework – it has done this without any push from the Foundation, any organization or any Government. To have achieved this without any well-resourced central drive or promotion is remarkable and is as a result of a number of key attributes.

1. The Framework must be right – companies and individuals want to use it.
Users want to use SFIA because they find it to be useful in helping them to manage the skills and competencies of their staff – they are not forced to use it.
2. It reflects reality and is relevant to industry and business.
It is built by industry and business for use by industry and business. It focuses on the needs of the end user rather than other interested stakeholders alone.
3. It is simple, generic, extensive and independent of method or technology.
It is universally applicable.
4. It requires experience of a skill to be demonstrated.
An individual has the skill at a particular level because they have performed that skill at that level in real-world situations.
5. It is readily available.
It can be obtained free of charge and is available in 6 languages.
6. An ecosystem has established and this is now supported for all.

While there are many other attributes that have contributed to the success that is SFIA these are perhaps the key elements and while it is impossible to identify the single most important factor, points 2 and 3 above must be out in front.

1.1.4 The SFIA Update Process

The SFIA Framework is updated by a process of open consultation involving the whole user-base. Anyone can raise a request for change and these are reviewed against the SFIA design principles and progressed accordingly by the Design Authority. At this stage new content is drafted by the volunteer user community and reviewed. Then the draft of the whole framework is assembled and reviewed again for consistency across skills and against design principles, translated and published.

1.2 The SFIA Framework

1.2.1 Context

The context for SFIA is to describe skills and address the needs of the IT and digital world, to enable a single global common language. As the commercial workplace has become increasingly global this need has become increasingly important. The Framework enables organizations to characterize their roles, identify their skill needs and to help develop the skills of their workforce. The SFIA Framework can be used by individuals to develop their own skills; by organizations to develop the skills of their workforce and enhance their organizational capability; and by Governments to secure a world-class national workforce. It can be used both internally and externally to support the purchaser-supplier interaction.

While the SFIA Framework is an important enabler and tool, it can be used in a great many different ways and underpins the capability development activities of industry and business.

1.2.2 Design Principles

The SFIA design principles were established in 2000 and remain relevant because they can be challenged and refined in updated versions of the Framework. It is the design principles that have enabled SFIA to resist following fashion and to focus on transferrable skills, allowing experience to be valued and individuals to maintain relevance in the work place.

One design principle, for instance, is method and technology independence, indicating the driver is a skill, rather than a particular method or technology: for example, Java or C++ is the technology and while the language, in this case, may be relevant to a particular job, the skill is nevertheless programming. This is an important point as while the industry moves rapidly and new methods or technologies appear frequently, many skills persist throughout and SFIA recognizes this.

1.2.3 Structure

The SFIA Framework is simple and generic and has a structure that is consistent throughout. This allows information to be readily found, considered and consistently applied. (Figs 1-2 & 1-3).

Essentially the SFIA Framework is a 7 level framework with 4 generic responsibilities and 97 professional skills aligned to the 7 levels; the generic responsibilities and professional skills are used together.

SFIA can be considered a 3 dimensional model: with the 7 levels of competence as one dimension, the 97 Professional Skills as the second dimension and the Generic Responsibilities (which could be considered personal attributes) as the third dimension.

The structure is as follows:

- 7 Levels
 - 4 Generic Responsibilities
 - 97 Professional Skills
 - 6 Categories (containing a number of sub-categories)
 - Skill Title
 - Skill Descriptor
 - Level Descriptors (up to 7)

Fig 1-2 SFIA Structure

The table is a matrix titled 'Skills Framework for the Information Age version 6'. The columns represent levels from 1 to 7. The rows are grouped into six categories:
 1. **Strategy and Planning** (red): Includes 'Strategic strategy', 'Business strategy and planning', and 'Operational strategy and planning'.
 2. **People and Performance** (purple): Includes 'Recruitment', 'Performance management', and 'Employee development'.
 3. **Information and Data** (yellow): Includes 'Information management', 'Data management', and 'Information security'.
 4. **Business and Operations** (brown): Includes 'Business development', 'Operational management', and 'Business operations'.
 5. **Finance and Risk** (blue): Includes 'Financial management', 'Risk management', and 'Quality and compliance'.
 6. **Legal and Governance** (green): Includes 'Legal and governance', 'Ethical and sustainability', and 'Governance and compliance'.
 Each cell in the matrix contains specific skill titles and their corresponding level descriptors.

Fig 1-3 SFIA Framework

SFIA Framework ER Diagram (Fig 1-4) identifies the Skills entity, Levels Description entity, Levels of Responsibility entity and Levels Guiding Word entity. Skills entity is connected to Levels Description entity in 1: N by Skill code since a skill entry has multiple level descriptions. Levels Description entity is connected to Levels of Responsibility entity and Levels Guiding Word in 1: N (include0). For example, Skill name: IT governance, Skill code GOVN has Level 5, 6 and 7. So, GOVN corresponds to only these three Levels of Levels of Responsibility and Levels Guiding Word “Ensure, advise” , “Initiate, influence” , “Set strategy, inspire, mobilise”).

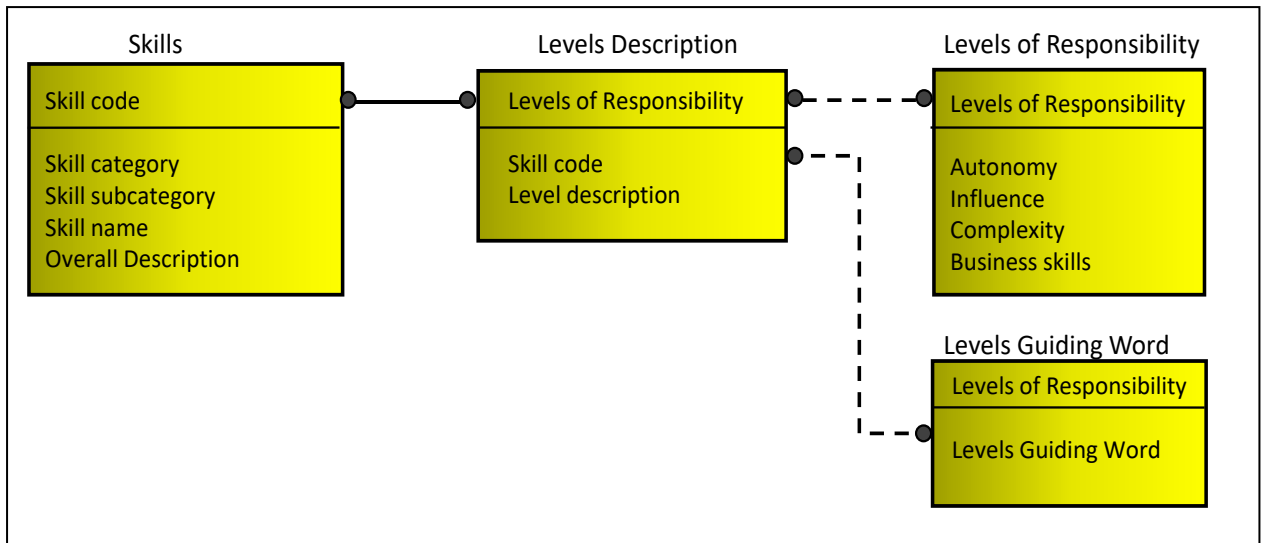


Fig 1-4 SFIA Framework ER Diagram

1.3 How SFIA Works – The SFIA Levels

The SFIA Levels describe experience and competency. The definitions describe the behaviors, values, knowledge and characteristics that an individual should have in order to be identified as competent at that level. Each level has a guiding word or phrase that acts as a brief indicator: FOLLOW • ASSIST • APPLY • ENABLE • ENSURE, ADVISE • INITIATE, INFLUENCE • SET STRATEGY, INSPIRE, MOBILISE. (Fig 1-5)

The SFIA Levels provide consistency for both the Generic Levels of Responsibility and the Professional Skills which should be used together.

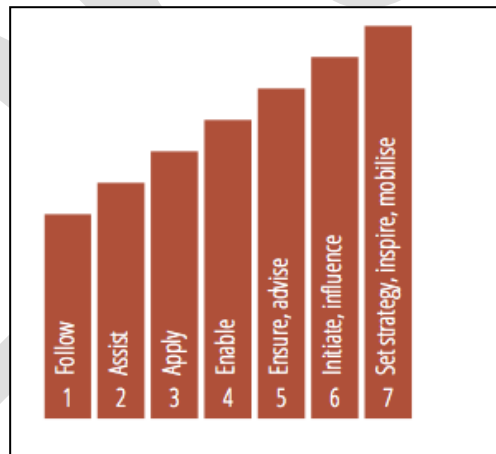


Fig 1-5 Levels of responsibility

1.4 Generic Levels of Responsibility

The generic levels of responsibility describe 4 attributes for each of the 7 levels and reflect the experience and competency levels within SFIA. An example is provided below (Fig 1.6)

The generic responsibilities are:

- Autonomy

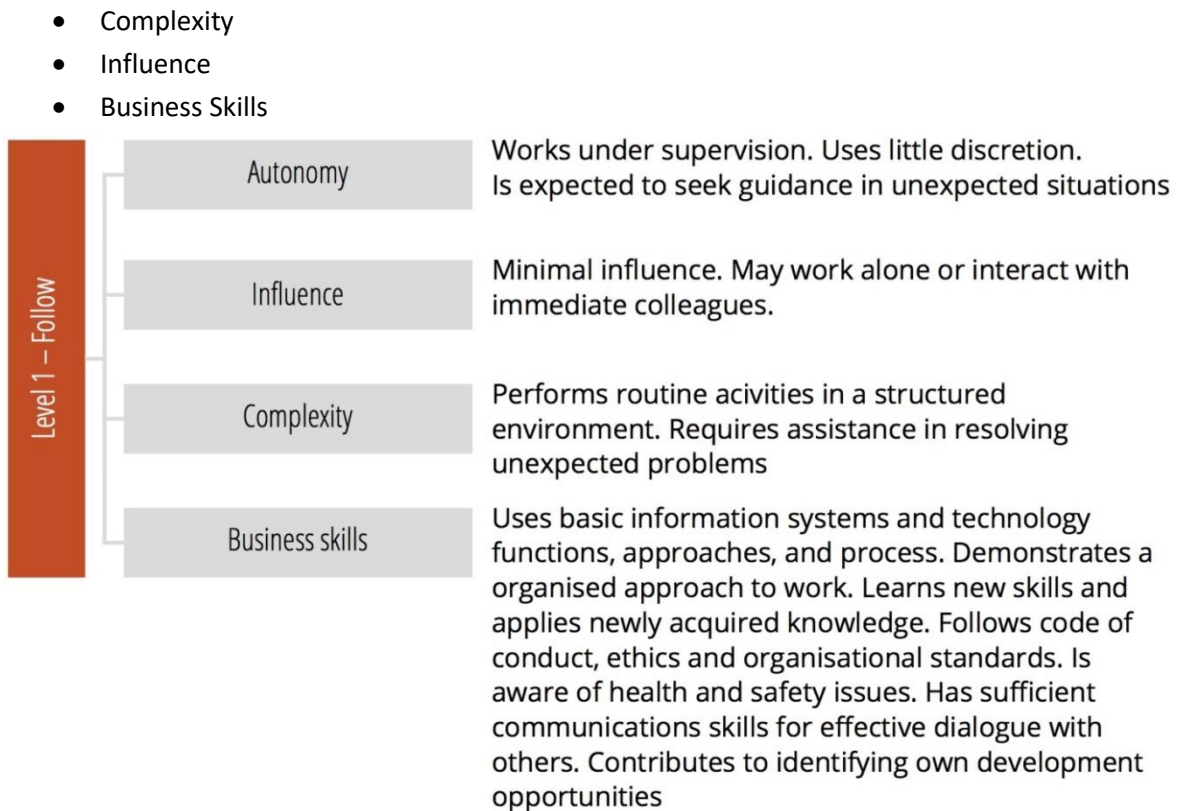


Fig 1-6 Example Generic Levels of Responsibility for a SFIA Level

1.5 Professional Skills

The SFIA Framework identifies 97 professional skills. Each skill entry comprises an overall definition and descriptions of each of up to seven levels at which the skill might be exercised. These descriptions provide a reference of how the skill and level combined produce a more detailed definition of what level of competency each skill is practiced at.

The Professional Skills are organized into 6 categories and a number of sub-categories. The categories and sub-categories do not equate to jobs, roles or organizational teams – they are there to for ease of use and aid navigation through the Framework.

The 6 categories are:

- Strategy and Architecture
- Change and Transformation
- Development and Implementation
- Delivery and Operation
- Skills and Quality
- Relationships and Engagement

As an example, a sub-category might be Business Change and Implementation that sits within Change and Transformation.

1.5.1 Consistent Layout of a Skill

The SFIA Professional Skills are described in a consistent manner:

- Skill Name
- Skill Code
- Skill Description
- Level Descriptors

A sample skills entry is shown below:

Skill name Digital forensics

Skill code DGFS

Overall description The collection, processing, preserving, analysing, and presenting of computer-related evidence in support of security vulnerability mitigation and/or criminal, fraud, counterintelligence, or law enforcement investigations.

Level descriptions Level 6: Sets policies and standards and guidelines for how the organisation conducts digital forensic investigations. Leads and manages complex investigations managing specialists if required. Authorises the release of formal forensics reports.

Level 5: Conducts investigations to correctly gather, analyse and present digital evidence to both business and legal audiences. Collates conclusions and recommendations and presents forensics findings to stakeholders. Contributes to the development of policies, standards and guidelines.

Level 4: Contributes to digital forensic investigations. Processes and analyses computer evidence in line with policy, standards and guideline and supports production of forensics findings and reports.

1.6 SFIA Documentation

The SFIA Framework is readily available online from the SFIA Foundation website and in two downloadable documents in six languages, with more translations planned:

- The Complete Reference Guide
This provides the detailed description of the Generic Responsibilities and Professional Skills, along with an introduction to the SFIA Framework, further explanation and a chapter on the wider use of the SFIA Framework.
- Summary Chart
This provides a summary view of the SFIA Generic Responsibilities and Professional Skills.

Current available documents relate to SFIA6 but will be replaced mid-2018 with updated SFIA version7 documentation.

2 i Competency Dictionary (iCD)

2.1 Overall

2.1.1 Background to i Competency Dictionary (iCD)

The i Competency Dictionary (iCD) is a structured dictionary, composed of the Task Dictionary and the Skill Dictionary, developed and maintained by the IPA (Information Technology Promotion Agency)*¹ an organization governed by the Ministry of Economy, Trade and Industry of Japan.

The IPA developed the Common Carrier Skill Framework (CCSF) in 2008 by integrating three skill standards: ITSS (Information Technology Skill Standard)*² 2002, UISS (User Information Skill Standard)*³ 2006, and ETSS (Embedded Technology Skill Standard)*⁴ 2005. The CCSF has been used as the skill standard for all business category organizations to adapt to rapidly changing business environment, also meeting the needs of IT human resources development.

Subsequently, the IPA reorganized and enhanced the CCSF, rebranded as the iCD trial version in July 2014, finally releasing version 1 of the iCD2015 in June 2015.

*1: For more information about IPA, visit IPA website at <https://www.ipa.go.jp/index-e.html>

*2: Skill standard for the vendors in IT service industry to develop IT human resource.

*3: Skill standard for IT user organization IS human resource development.

*4: Skill standard for human resource development engaged with embedded software development.

2.1.2 Update Process

Since its 2005 release, the iCD has been updated annually, ensuring its ongoing relevance. The annual update process is planned to continue, taking into consideration:

- The voices / opinions of users or stakeholders
- Global IT trends captured through various collaborations
- The need for consistency between IT Engineer Examination (ITEE) updates and the iCD
- Updates of other global standards and BOKs available in Japanese

2.1.3 iCD Contents

The iCD consists of the task dictionary and the skill dictionary (Figure 2-1). The task dictionary specifically details task requirements in IT business, and the skill dictionary details the IT skills required to perform those tasks. In the iCD, a task identifies a function of the IT organization and is equivalent to a specific job, while a skill means the ability to handle knowledge. The iCD contains the essential elements from the three previous skill standards in Japan.

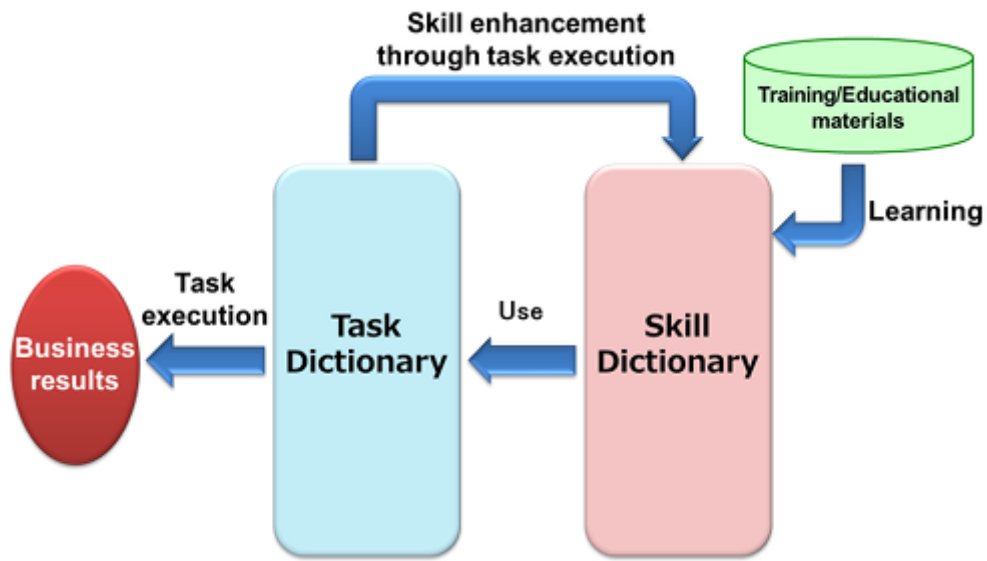


Figure2-1 Relationship between Task execution and Dictionaries

Table 2-1 shows the list of iCD main contents.

Table2-1 iCD main contents list

	name	Description
1	Task List	The list of tasks. The Task Dictionary is comprised of 4 layers divided into three task layers plus the Assessment Items layer (approx. 2,200 items).
2	Task Dictionary Chart	Task Dictionary overall view
3	Task Profile	A list of profiles and explanations by business types, development targets, development methods and roles.
4	Task Profile X Task Corresponding table	The corresponding table between an entry of the task profiles and tasks in the task list
5	Skill List	The list of skills. The Skill Dictionary is also comprised of 4 layers divided into three skill layers plus BOK layer (approx. 10,000 items).
6	Skill Dictionary Chart	Skill Dictionary overall view
7	Job List	The list of job professions and explanations
8	Job X Skill Corresponding table	The corresponding table between each job in the job list and skills

9	ITEE X Skill Corresponding table	The corresponding table between each ITEE and required skills with required level
10	Task X Skill corresponding table (Second layer)	The corresponding table between tasks and skills (2 nd layer basis)
11	Task X Skill corresponding table (Third layer)	The corresponding table between tasks and skills (3 rd layer basis)

The Entity Relationship Diagram of the iCD is illustrated in Figure2-2

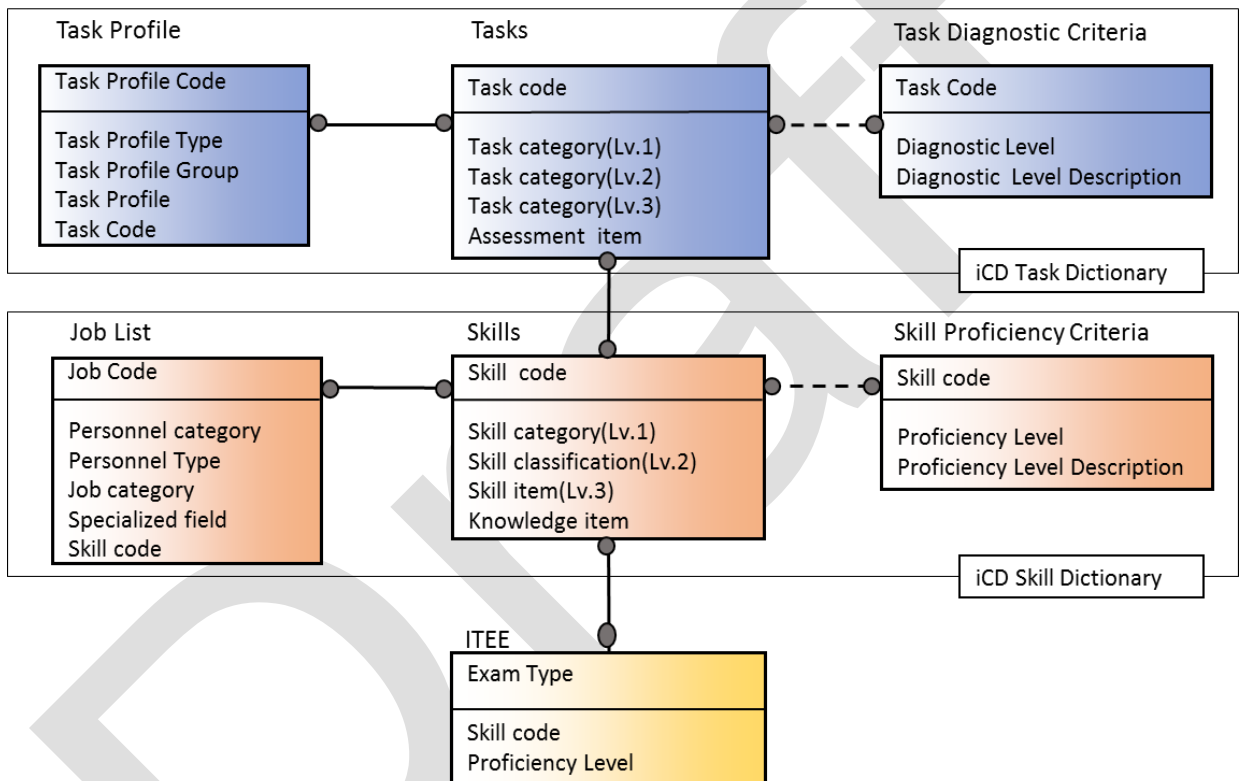


Figure2-2 i Competency Dictionary (iCD) ER Diagram

In Figure 2-2, the ITEE refers to the IT Engineer Examination, a large national examination in Japan with approximately 600,000 applicants annually. Conducted by the IPA since 1969, the ITEE consists of 13 examination categories aligned with 4 levels. The ITEE is well respected and supported by the industry and academia, and many IT companies recommend their employees obtain the qualification in their HR development system.

2.1.4 iCD Implementation Status

By September 2017 about 1000 organizations had the iCD user company certification. HITACHI Ltd is the largest, using iCD tasks to perform level checks for 20,000 employees.

Companies and organizations use the Task Dictionary to determine internal tasks in line with their business strategy or business plan and it is, therefore, predominantly used in Industry. However, iCD implementation is also making progress within academia, such as university IT departments

and IT engineer education schools; within these organizations, the Skill Dictionary is mainly used to establish a syllabus or curriculum for IT engineering. The IPA welcomes this particular trend, which demonstrates the iCD's wider acceptance.

The iCD has seen an increase in interest and take-up around the world since the English version was released in 2015 (Europe, Middle East, Asia, and North/South America) and to-date, 24 countries have adopted the iCD.

2.1.5 iCD Supplement

The iCD Task Dictionary comprises the Main contents and Supplementary contents. Only the Main contents have been translated into English for overseas use as the Supplementary contents relate specifically to urgent or special task requests from Japanese companies. The Supplementary contents are not linked to skills and currently support consideration of the following tasks:

- Marketing
- General affairs/Personnel affairs/Accounting
- Education
- Call centers
- IoT system service lifecycle

2.2 Task Dictionary and Structure

The Task Dictionary is a four-layer structure (Figure 2-3) where tasks are broken down in detail from major to minor through the layers. Organization members typically evaluate task performance based on allocated third layer (minor) tasks, with the fourth layer (Assessment Items) offering further explanation. Organization members may also choose to evaluate task performance in the second layer, rather than in the third, thereby avoiding too much detail.

2.2.1 Task Dictionary Overview

The iCD Task Dictionary (Figure 2- 3) provides a comprehensive grouping of tasks which can be used by, and applied to, a wide range of companies and organizations due to the referencing of the following task models:

- Japan Common Frame 2013 (SLCP 2013), which is defined by analyzing and integrating software life cycle standards such as ISO/IEC 12207, 15288 and 29148
- ITIL V3: Reference information for tasks related to IT service management, system operations management, etc.
- COBIT 5: Reference information for tasks related to IT governance
- Embedded System Development Process Reference (ESPR Ver. 2.0)
- CRISP-DM: Reference information for tasks related to data science

The iCD, therefore, provides the standard reference to understand the relationships between various BOKs, skill standards, and the ISO software life cycle process standards.

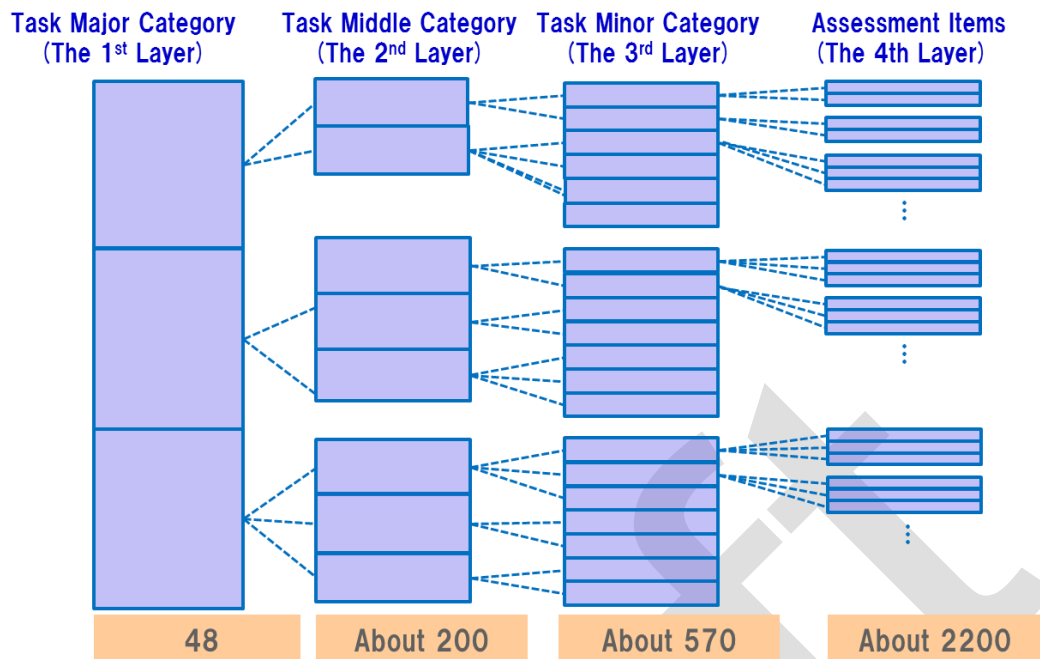


Figure 2-3 ICD Task Dictionary Structure

2.2.2 Task Dictionary Structure

The Task Dictionary structure represents the Organizational Structure and Function of IT in Business and has a four-layer structure:

- Major Task category (1st layer) represents Organizational Structure.
- Middle Task category (2nd layer) represents Organizational work list.
- Minor Task category (3rd layer) represents greater details of the Middle Task category.
- Assessment Items (4th layer) provides deeper explanation of the Minor Task category.

2.2.3 Task Categories

Tasks are detailed on the horizontal axis and the vertical axis (Figure 2-4). The vertical axis shows the lifecycle of the IT business, and the horizontal axis details the lifecycle support tasks:

- The vertical axis indicates the five categories of the IT business lifecycle process, namely:

Strategy: Formulates the business strategy for IT business operations, products, and services.

Planning: Based on Strategy, formulating operations or business implementation plans to utilize IT.

Development: Based on Planning, developing various products or services.

Utilization: Using various products or services.

Evaluation/Improvement: Based on Utilization results to evaluate Strategy, Planning, and extracting improvement items (task sets) for the next fiscal year.

- The horizontal axis shows the three areas of the IT business lifecycle process, namely:

Planning and Execution: Tasks to plan and achieve IT business (PDCA cycle).

Management and Control: Tasks to manage and control the Planning and Execution tasks across the whole IT business lifecycle process.

Promotion and Support :Tasks to promote or support Planning and Execution tasks.

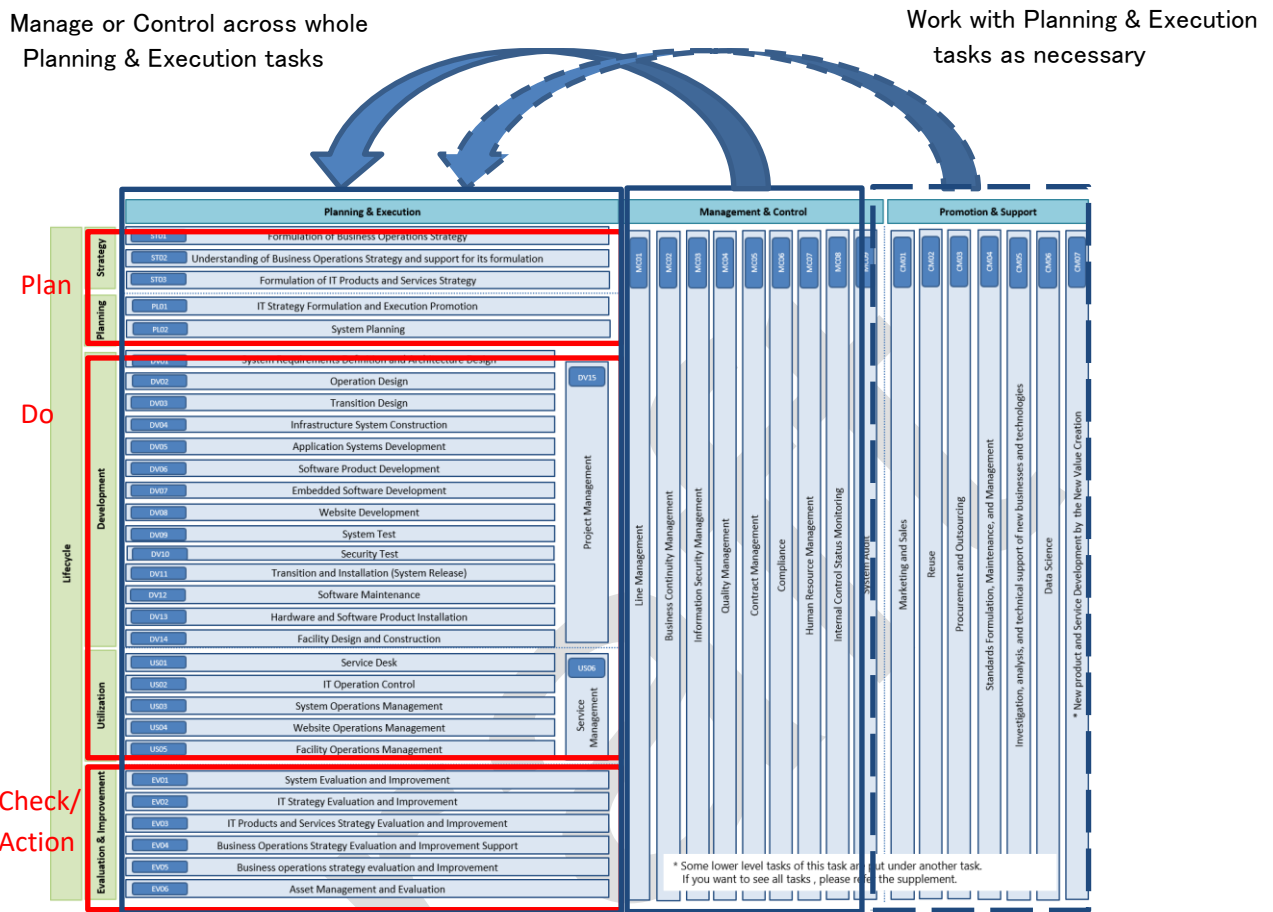


Figure 2-4 Task Dictionary Categories

2.2.4 Major Task Category

The Major Task Category (1st layer) defines generic organizational structure. These tasks are the functions most commonly undertaken by any organization and, therefore, specific viewpoints such as business type or position are not included. In addition, tasks undertaken in relation to the user's requirements, such as business models, business types, or development methods, are defined in the remaining layers, 2 through to 4.

2.2.5 Middle Task Category

The Middle Task category (2nd layer) defines tasks in respect of departmental role. The definitions for the Middle Task layer are:

- Tasks that differ according to business type/position become 'different' tasks.
- Tasks that are the same despite differing business types/position become 'same' tasks.

Table 2-2 summarizes these policies.

Table 2-2 Summary of Task 2nd layer definition policies

Business Type/position		
------------------------	--	--

Action \	Same	Different
Same	Same Task	Same Task
Different	Different Task	Different Task

2.2.6 Minor Task Category & Assessment Items

- The Minor Task category (3rd layer) represents the Middle Task category in greater detail.
- The Assessment Items (4th layer) represent a deeper explanation of the Minor Task category, and the practical application of 3rd layer tasks are also described in this layer to aid understanding.

2.3 Task Profiles

The Task Profiles provides additional task information to enable organizations, businesses, and companies to formulate their own task sets. The documentation includes: the descriptive List of Task Profiles, 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:

- **Business Type**
Examples of task sets that may be necessary depending on the organization's type (user, vendor) or business category, such as internal information systems development, maintenance, operations, software product development, system operation services, etc.
- **Development Target**
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**
Examples of task sets that may be necessary depending on the type of development methods such as Waterfall, Agile, etc.
- **New Business**
Examples of task sets that are essential to the personnel who will take on new business and functions such as cloud business, data science, information security, etc.
- **Role**
Examples of task sets used by companies or 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.

2.4 Task Assessment Level

The Diagnostic Criteria can be applied to the Task Assessment items or the appropriate task layer to evaluate an individual's task performance level from L0 to L4 (Table 2-3). This Diagnostic Criteria can initially be applied to the individual task assessments, then the task performance for each department or an organization can be obtained by aggregating all results. Table 2-3 shows an example of the Task Assessment Diagnostic Level and Diagnostic Criteria.

Table 2-3 Examples of Task Assessment Diagnostic Level and Diagnostic Criteria

Diagnostic 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

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2.5 Skill Dictionary and Structure

Skills are the capabilities required to handle the necessary knowledge items in order to carry out a task. The Skill Dictionary comprises four layers divided into three skill layers plus a fourth layer of approximately 10,000 Associated Knowledge Items (Figure 2-5). The Skill Dictionary references and sorts items from the major Body of Knowledge, processes and skill standards in the world.

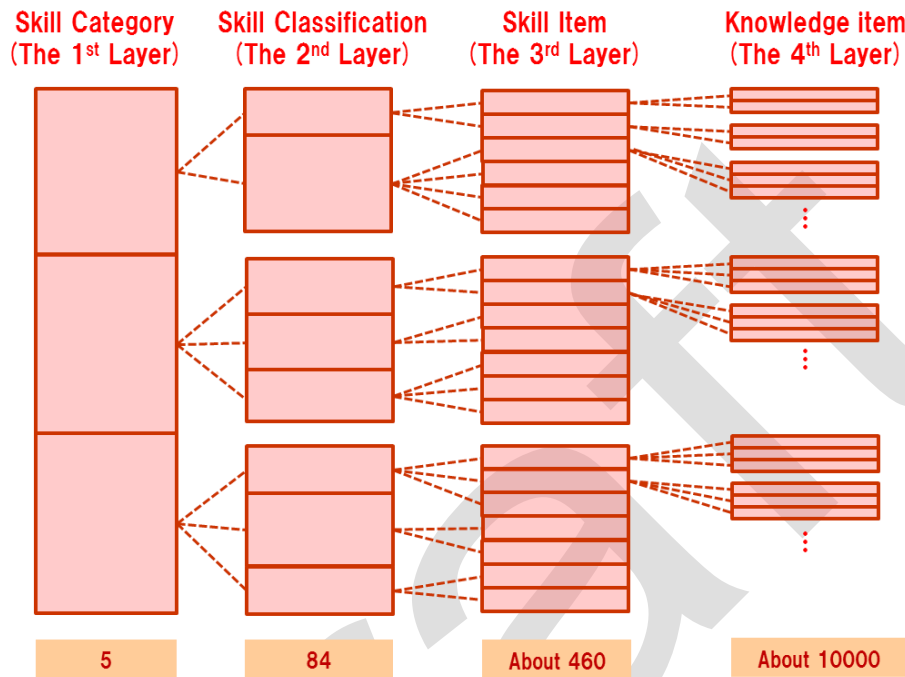


Figure 2-5 The iCD Skill Dictionary Structure

2.5.1 Skill Dictionary Overview

The iCD Skill Dictionary has been compiled by analyzing various tasks, skills and knowledge items as defined in the following list of BOKs and skill standards (ITSS, ETSS, UISS). J07 is a collection of six BOKs developed by the IPSJ (Information Processing Society of Japan) for college-level computing education. The iCD Skill Dictionary also contains IT soft skills such as creativity, execution & practice, and communications.

- BABOK (Business Analysis)
- CBK (Information Systems Security)
- CCSF (Common Career/Skill Framework)
- DMBOK (Data Management)
- JITEE (Japan IT Engineer Examination)
- ITIL
- ITS (IT Specialist Training Handbook)
- Computing Curriculum Standard J07
- PMBOK (Project Management)
- REBOK (Requirement Engineering)
- SABOK (Strategy and Analysis)
- SQuBOK (Software Quality)
- SWEBOK (Software Engineering)
- ITSS (IT Skill Standard)
- ETSS (Embedded Technology Skill Standard)
- UISS (User's Information Systems Skill Standard)
- SecBoK (JNSA)
- (CAIS)BOK (JASA)

2.5.2 Skill Dictionary Structure

The Skill Dictionary is a four-layer structure (Figure 2-5) that has been built from the expansive fourth layer upwards. The iCD refers to the fourth layer as the body of knowledge (BOK) that has been collected and collated from a variety of national and international BOK sources. These BOKs integrate into the third level (Skill Item), then into the larger second level (Skill Classification), and, finally, into the first level (Skill Category).

2.5.3 Skill Category

Skill category is the highest layer of skills: Technology, Methodology, Related Knowledge, IT Human Skill, Specific Skill. Table 2-4 shows the meanings of each category.

Table 2-4. Skill categories (1st layer) description

Skill Category (1 st layer)	Description
Technology	Technical skills to accomplish tasks. These generic skills apply to all users.
Methodology	Methods, methodology, solution methodology skills to accomplish tasks. These skills work differently depending on users.
Related Knowledge	Skills related to fields other than methodology and technology that is applied to various aspects of IT business activities.
IT Human Skill	Human skills to accomplish tasks. The ability shown in various situations of IT business activities.
Specific Skill (Option)	Each organization can define skills originally. IPA provides conceptual area only (therefore, initial status is blank)

2.5.4 Skill Classification

The 3rd layer, Skill Classification details 84 skills, and the use of these can broadly define an individual's skill set.

2.5.5 Skill Item / BOK

The 84 Skill Classifications are explained in greater detail in Skill Item, for example, the classification (Implementation) Architecture design method consists of five Skill Items as expressed in table 2-5. This particular skill level would apply to students or elementary learners.

Table 2-5. Skill Dictionary 2nd layer and 3rd layer example

Skill Classification	Skill item
(Implementation) Architecture design method	Architecture design method
	Application Architecture design method

	Industry package design/development method
	Infrastructure architecture design method
	Data architecture design method

Knowledge items (4th layer) can be used to more deeply understand the meanings of a practical skill item, for example, Table 2-6 shows the skill item 'Infrastructure architecture design method', which details 17 knowledge items, from K001 to K017, to assist in the understanding.

Table 2-6 Skill dictionary 3rd layer and 4th layer example

Skill item	Code	Knowledge item
Infrastructure architecture design method	K001	System management / operation
	K002	System management / operation design
	K003	Evaluation of system infrastructure test strategies and plan
	K004	Evaluation of system infrastructure transition strategies and plan
	K005	Evaluation of system infrastructure design tools
	K006	Evaluation of system infrastructure design techniques
	K007	Security
	K008	Security design
	K009	Network
	K010	Network design
	K011	Performance design
	K012	Platform
	K013	Platform design (OS, middleware etc.)
	K014	Availability design
	K015	Performance and capacity
	K016	Knowledge of target domain
	K017	Physical data structure design, etc.

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 of the 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 annual reports
Category	Technology	Methodology	Related Knowledge

Figure 2-7. Skill Proficiency Levels

2.8 Task x Skill Correspondence Table

Figure 2-8 indicates with a dot in applicable cells those skills that are associated with particular tasks. Displayed below is an example extract of the complete table. This table is used to identify the skills corresponding to each task and vice versa.

Task Middle Category Code	Task Major Category	Task Middle Category	Skill Classification Code															
			S110 010	S110 020	S110 030	S110 040	S110 050	S110 060	S110 070	S110 080	S120 010	S120 020	S120 030	S120 040	S130 010	S130 020	S130 050	S130 060
Linkage information between Task middle category in Task dictionary and Skill Classification in Skill dictionary. (IT Basic and IT human skill are excluded)			Skill Category															
◎ : Strong relationship			Methodology															
Skill Classification			(Strategy) Market opportunity evaluation and selection	(Strategy) Marketing	(Strategy) Product and service strategy	(Strategy) Selling strategy	(Strategy) Product and service development strategy	(Strategy) System strategy planning methods	(Strategy) Consulting methods	(Strategy) Business trend understanding methods	(Planning) System planning methods	(Planning) Sales administration methods	(Planning) Requirement analysis methods	(Planning) Non-functional requirements design methods	(Implementation) Architecture design methods	(Implementation) Software engineering methods	(Implementation) Customer service methods	(Implementation) Application package utilization methods
ST01.1	Business operations strategy formulation	Analysis of business operations strategy	◎						◎									
ST01.2		Formulation of business operations strategy	◎															
ST01.3		Establishment of business operations strategy	◎															
ST02.1	Understanding of business operations strategy and support for its formulation	Confirmation of requirement (concept)	◎															
ST02.2		Recommendation of new business models	◎					◎		◎								
ST02.3		Recommendation of business operations strategy implementation scenarios	◎					◎										
ST03.1	Formulation of IT products and services strategy	Investigation, analysis, and prediction of market trends			◎	◎	◎											
ST03.2		Formulation of IT products and services strategy			◎		◎											
PL01.1	IT strategy formulation and execution promotion	Formulation of basic policies							◎	◎								
PL01.2		Formulation of IT adoption plan							◎									
PL01.3		IT strategy execution management							◎									
PL02.1	System planning	Computerization initiative planning						◎			◎							
PL02.2		Formulation of computerization plan						◎			◎							
PL02.3		Business/system requirements definition						◎			◎							
PL02.4		IT service requirements definition						◎			◎							
PL02.5		Information security requirements definition						◎			◎							

Figure 2-8. Task X Skill Table (extract)

2.9 The iCD Application System

The IPA provides the Application Service Provider (ASP) system to promote iCD utilization. It is free for use but available only in Japanese. More information can be found at this website:

https://www.ipa.go.jp/jinzai/hrd/i_competency_dictionary/system.html

2.10 iCD Documentation

To request the full iCD, visit the IPA web site (<https://www.ipa.go.jp/english/humandev/icd.html>) and once the application form has been completed, the full iCD will be sent as e-mail attachment. The material and content of the full iCD are shown in the table 2-7.

Table 2-7 iCD Documents

Material	Content
Task Dictionary Chart	Task Dictionary overall view
Task Dictionary	Task list and associated materials
Skill Dictionary Chart	Skill Dictionary overall view
Skill Dictionary	Skill list and associated materials
Task x Skill corresponding table	Task vs Skill relationship matrix
Handbook	iCD usage explanation guide

Draft

3 SFIA & iCD Comparison of Underlying Principles

3.1 SFIA & iCD Overall Comparison

A comparison between SFIA and the iCD in areas including organization, structure, design principles etc., appears in Table 3-1.

Table 3-1. Overall Comparison between SFIA and the iCD

	SFIA	iCD
Background	<p>SFIA originated out of the collaboration of skills and competency initiatives within UK companies in the 1980s and 90s. This collaboration resulted in the single skills framework (SFIA) being published and adopted within the UK, and made available through the SFIA Foundation from the year 2000. Since 2003 the SFIA Framework has been the single global common language for describing skills and competencies required in the digital world. Adoption of SFIA increased steadily in the early years, firstly in the within the UK, and subsequently, globally.</p>	<p>The IPA has used three skill standards ITSS (Information Technology Skill Standard) from 2002, UISS (User Information Skill Standard) from 2006 and ETSS (Embedded Technology Skill Standard) from 2005 and integrated these into the Common Carrier Skill Framework (CCSF) in 2008. The IPA enhanced the CCSF and reorganized it into the iCD trial version in July 2014, then released iCD2015 in June 2015 as the first version. Adoption of the iCD in Japan has increased rapidly. The iCD English version was released one year after the Japanese version: -English iCD Trial version Jun/30/2015 -English iCD V1 Jul/15/2016 -English iCD V2 Apr/12/2017</p>

<p>Organization</p>	<p>The SFIA Foundation (Fig 1-1) is a global not-for-profit organization that develops, maintains and makes available the SFIA Framework for use. It is funded through a modest licensing model for use of the SFIA Intellectual Property – with the vast majority of users able to use SFIA under a free-of-charge user license.</p> <p>The work of the Foundation is overseen by the SFIA Board which focuses on governance and oversees the work of the Foundation, while a modest operations and business administration activity carries out the day-to-day running of the Foundation. The SFIA Council, comprising representatives from the global user base, discusses the Foundation's direction, providing a pool of expertise. Finally, the global SFIA community of users is able to suggest input into updated versions of the SFIA Framework and associated products, which are then agreed and published by the SFIA Foundation Design Authority.</p> <p>What is perhaps unique about SFIA is the way it has focused on mobilizing the global user base to balance the needs of all stakeholders rather than to be overly driven by any one and this is a major component of its success – it is 'pulled' by industry and business because they want it rather than 'pushed' by any commercial or other interests.</p> <p>For more information about the SFIA Foundation, the SFIA Framework or how the framework can be used visit the SFIA Foundation website at www.sfia-online.org or contact the SFIA Foundation General Manager, Ian Seward, at ops@sfia-online.org</p>	<p>The iCD is developed and maintained by the IPA. The IPA has promoted activities related to IT policy since its establishment in 2004 as a policy implementation agency under the jurisdiction of the Ministry of Economy, Trade and Industry (METI).</p> <p>The IPA looks at the bigger picture of IT in society, endeavoring to meet the challenges of creating a safe and convenient use of IT in society, today and in the future. The way society interacts with IT has changed significantly in recent years due to the progress of the IoT, which will connect everything to the Internet, also the rapid improvement of big data technologies, and the rise of artificial intelligence. The IPA's contribution aims to solve problems, making IT in society reliable by through IT Security, IT Human Resources Development, and the Development and Promotion of Reliable Systems.</p> <p>There are plans to establish the iCD Association (iCDA), a not-for-profit organization, in 2018. Its mission will be:</p> <ol style="list-style-type: none"> 1. Support iCD implemented companies 2. Certificate iCD implemented companies/organizations to promote iCD 3. Promote iCD System Utilization 4. Construct the iCD Education System using iCD <p>The IPA will be responsible for maintaining the iCD and iCDA will be in charge of iCD marketing.</p>
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Structure	<p>The SFIA Framework is simple and generic and, like all frameworks, has a structure that is consistently applied throughout the Framework: this allows information to be readily found and considered consistently (Fig 1-3).</p> <p>Essentially, the SFIA Framework is a 7 level framework with 4 generic responsibilities, and 97 professional skills aligned to the 7 levels; the generic responsibilities and professional skills are used together</p> <p>The SFIA Framework consists of Skills, Levels Description, Levels of Responsibility, and Levels Guidance from ER Diagram (Fig 1-4). The Skills entity is connected to the Levels Description entity in 1: N by Skill code since a skill entry has multiple level descriptions. Levels Description entity is connected to Levels of Responsibility entity and Levels Guiding Word in 1: N (include0). For example, Skill name : IT governance, Skill code GOVN has Level 5, 6 and 7. So, GOVN corresponds to only these three Levels of Levels of Responsibility and Levels Guidance (“Ensure, advise”, “initiate, influence”, “Set strategy, inspire, mobilise”).</p>	<p>The iCD consists of the Task Dictionary and the Skill Dictionary (Fig 2-1).</p> <p>The Task Dictionary is a four-layer structure (Fig 2-3). A task increases in detail from the first layer to the second layer and to the third layer. Organization members evaluate the task performance typically based on allocated third layer tasks. The fourth layer (Assessment items) explains the meaning of third layer tasks. The Skill Dictionary is a list of capabilities required to handle associated knowledge items to carry out tasks. The Skill Dictionary is a four-layer structure (Fig 2-5) divided into three skill layers plus Associated Knowledge Items (approx 10,000). The Skill Dictionary references and sorts the items from the major global Body of Knowledge (BoKs).</p> <p>The Task Dictionary has Main and Supplementary contents. Only the Main contents has been translated to English because the Supplementary contents comprise only urgent or special task requests from Japanese companies and are not linked to skills. The current supplementary contents include:</p> <ul style="list-style-type: none"> • Marketing • General affairs/Personnel affairs/Accounting • Education • Call center • IoT system service lifecycle
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Design Principles	<p>The SFIA design principles were established in 2000 and are regularly revised to ensure they remain relevant. These design principles have enabled SFIA to resist following latest trends, and to focus on transferrable skills, allowing experience to be valued and individuals to maintain relevance in the work place.</p> <p>One design principle, for instance, Method and Technology Independence, means that a particular method or technology is not the driver, rather the skill is the driver; and programming, for example, is the skill, Java or C++ is the technology, and while the language in this case may be relevant to a particular job, the skill is, nevertheless, programming. This is an important point as while the industry moves rapidly and new methods or technologies appear frequently, many skills persist throughout and SFIA recognizes this.</p>	<p>The Task Dictionary is intended to be used and applied by companies and organizations in order to determine tasks in line with business strategies or business plans, and therefore, the Task Dictionary is used widely in Industry. The Skill Dictionary, however, is used by academic organizations such as IT departments in universities and IT engineer education schools to setup their syllabuses or curriculums. Tasks and skills are connected so skills to enhance tasks can be identified in industry, and students can identify tasks using acquired skills. The IPA is responsible for the IT Engineer Examination (ITEE) and the iCD provides the link between each ITEE examination and required skills and levels.</p>
Update Process	<p>The SFIA Framework is updated by a process of open consultation involving the whole user-base: anyone can raise a request for change and these are reviewed against the SFIA design principles and progressed accordingly by the Design Authority. New or updated content is drafted by the volunteer user community and reviewed. Then the draft of the whole framework is assembled and reviewed again for consistency across skills and against design principles, translated and published by the Design Authority.</p>	<p>Since the first version was released in 2015, the iCD update has been reviewed annually. This annual update process is planned to continue. Update consideration points include:</p> <ul style="list-style-type: none"> • The voices/opinions of users or stakeholders • Global IT trends captured through various collaborations • The consistency between the ITEE updates and the iCD • Updates to recognized global standards and BOKs
Update Frequency	<p>Updates occur every 2-3 years leading to the publication of new version (SFIA version 7 publication due mid-2018)</p>	<p>The Japanese version is updated annually; the English version is updated annually and published one year later than the original Japanese.</p>
Translation	<p>Available in 6 languages (English, Spanish, German, Japanese, Chinese, and Arabic) with more planned.</p>	<p>Available in 2 languages (Japanese and English) with no plan for other translations.</p>

Usage	<p>SFIA has a world-wide user-base of thousands of organizations and individuals in around 160 countries. As of 2017, there are some 20,000 users: a single user may be using SFIA across a workforce of thousands. The SFIA Framework has become the de facto global IT skills framework, a global common language, and a standard for skills and competencies.</p>	<p>About 1000 organizations in Japan have achieved corporate iCD user certification (Sept 2017). HITACHI Ltd is the biggest iCD user, using iCD tasks to perform level checks of 20,000 employees.</p> <p>Since the 2015 release of the English version use of the iCD has grown around the world: Europe, Middle East, Asia, and North/South America and has been adopted by 26 countries (2017).</p>
Price	<p>Free to use but charges apply according to type of usage, commercial, for instance.</p>	<p>The iCD system and contents are free to Japanese users.</p>
Global Status	<p>Due to the global reach and influence of SFIA, many organizations have approached the Foundation for international collaborations. SFIA is a global phenomenon and the de facto global IT skills framework – it has done this without any push from the Foundation, any organization, or any Government. To have achieved this without any well-resourced central drive or promotion is remarkable and is as a result of a number of key attributes:</p> <ol style="list-style-type: none"> 1. The Framework must be right: it is used because companies and individuals want to effectively manage the skills and competencies of self/staff and find it helpful and relevant. 2. It reflects reality and is relevant to industry and business. It is built by industry and business for use by industry and business and focuses on the needs of the end user rather than other interested stakeholders alone. 3. It is simple, generic, independent of method or technology, extensive and universally applicable. 4. It requires experience of a skill to be demonstrated. An individual has the skill at a particular level because they have performed that skill, at that level, in real-world situations. 5. It is readily available. It can be obtained free of charge and is available in 6 languages. 6. An ecosystem has been established and this now provides support for all users. <p>While there are many other attributes that have contributed to the success that is SFIA these are perhaps the key elements.</p>	<p>The iCD collaborates with several global organizations:</p> <p>[IEEE-CS]</p> <ul style="list-style-type: none"> • Contracted MoU in June 2016 in Global Alliance Membership of IEEE-CS. • IEEE-CS EITBOK (April 2017) refers the iCD to show the relationship between EITBOK activities and the iCD tasks and skills on EITBOK wiki. <p>[ACM]</p> <ul style="list-style-type: none"> • The IPA is a member of the Task Group of the CC (Computer Curriculum) 2020 project • Thesis submitted about iCD jointly [ATD (Association of Talent Development)] • Submitted iCD lecture to ATD Asia Conference 2015 in Taipei together with presentation of the iCD. <p>[SFIA]</p> <ul style="list-style-type: none"> • Contracted MoU (Sept 2017) for SFIA and the iCD Comparison Research Project. • In this project, the structures of SFIA and the iCD are being compared, to be followed by the mapping of SFIA skills and iCD tasks. This project's duration will be two-and-a-half years. <p>[IVI]</p> <ul style="list-style-type: none"> • Contracted iCD Licensing in Feb 2017. • IVI uses IT-CMF to diagnose IT capability maturity of companies then uses the iCD to improve the competency of employees. <p>[Others]</p> <ul style="list-style-type: none"> • The IPA is a member of ITPE (IT Professionalism Europe), which is an initiative of CEPIS (Council of European Professional Informatics Societies).

Public Activities	Not at present although future activities are under consideration.	<ul style="list-style-type: none"> • Workshops at various venues within Japan • Monthly iCD Explanation Sessions at the IPA • The annual iCD Conference in Tokyo
Documents	<p>The SFIA Framework is readily available online from the SFIA Foundation website in two downloadable documents:</p> <ul style="list-style-type: none"> • The Complete Reference Guide (SFIA6) This provides the detailed description of the Generic Responsibilities and Professional Skills, along with an introduction to the SFIA Framework, further explanation and a chapter on the wider use of the SFIA Framework. • Summary Chart (SFIA6) This provides a summary view of the SFIA Generic Responsibilities and Professional Skills. The SFIA materials are currently available in 6 languages with other translations planned. <p>The updated SFIA (version 7) will be published mid-2018.</p>	<p>The full iCD is downloadable from the IPA website: (www.ipa.go.jp/english/humandev/icd.html). Following completion of the online application form, the full iCD contents are sent by e-mail. As shown in table 2-1, the iCD provides the following contents:</p> <ul style="list-style-type: none"> • Task List • Task Dictionary Chart • Task Profile • Task Profile xTask Corresponding Table • Skill List • Skill Dictionary Chart • Job List • Job x Skill Corresponding Table • ITEE x Skill Corresponding Table • Task x Skill Corresponding Table <p>In addition:</p> <ul style="list-style-type: none"> • i Competency Dictionary Handbook • iCD Pocket Handbook
System	None	<p>The IPA provides the Application Service Provider (ASP) system to promote the iCD utilization. It is free to use but only available in Japanese. More information: www.ipa.go.jp/jinzai/hrd/i_competency_dictionary/system.html"</p>

3.2 SFIA & iCD Detailed Comparison

3.2.1 SFIA and iCD Relationship

The Complete Reference Guide (currently SFIA6) provides detailed descriptions of Generic Responsibilities and Professional Skills, along with an introduction to the SFIA Framework, further explanation, and a chapter on the wider use of the SFIA Framework.

- SFIA is a practical resource for individuals who manage or work in IT. It provides a common reference model in a two-dimensional framework consisting of **skills** on one axis and seven levels of responsibility on the other. **It describes professional skills at various levels of competence, also generic levels of responsibility** in terms of Autonomy, Influence, Complexity and Business Skills. (P 8/85, SFIA6 Complete Reference Guide).
- SFIA is used extensively in the assessment of existing capability, at individual and organizational levels. **The framework itself does not provide instructions for improvement or the specific mix of skills that an individual or organization should have.** Context is important in the use of any framework, and it is crucial to understand an organization's needs rather than simply use the skills in an isolated way to form a single job description or role profile. The specific mix will be different from one organization to the next. (P 13/85, SFIA6 Complete Reference Guide).
- **SFIA does not attempt to cover all individual requirements and does not describe any specific product, technology, skills or knowledge, industry experience or qualifications.** For example, a service desk manager could be considered to require knowledge of a particular process framework (such as ITIL or COBIT), together with specific service desk tools used in that particular organization, also specific industry experience, security clearance and defined qualifications. (P 13/85, SFIA6 Complete Reference Guide).

The iCD comprises the Task Dictionary and the Skill Dictionary. A task specifically means a function of an organization. In other words, a task is a work the organization should do, but a task has no concept of order a work has. Although the Task Dictionary shows tasks in a sequence, these are listed purely for convenience of arrangement and in no particular order. A task is simply a function to accomplish without any prerequisite skills implication.

The Skill Dictionary indicates the skills required in order to accomplish tasks. Skills for a task are mapped in the task × skill matrix, and the prerequisite skills for the task are identified by this matrix. In the Skill Dictionary, skills required for any task are comprehensively defined. 'Skill' is the ability to handle or make use of knowledge items (skill dictionary 4th layer) and these abilities are listed in the 3rd layer. They are suitably grouped into the 2nd layer and 1st layer. A skill can be mapped to multiple tasks to be able to be required by multiple tasks.

SFIA is a simple, generic, and universally applicable skills and competency framework. It recognizes the importance of technology, knowledge and qualifications but deliberately does not specify these as they rapidly change, sometimes by trend alone. This is similar to the task definition in the iCD which is just the function definition independent of skill (Fig 3-1. SFIA Skill and iCD Task Dictionary Relation).

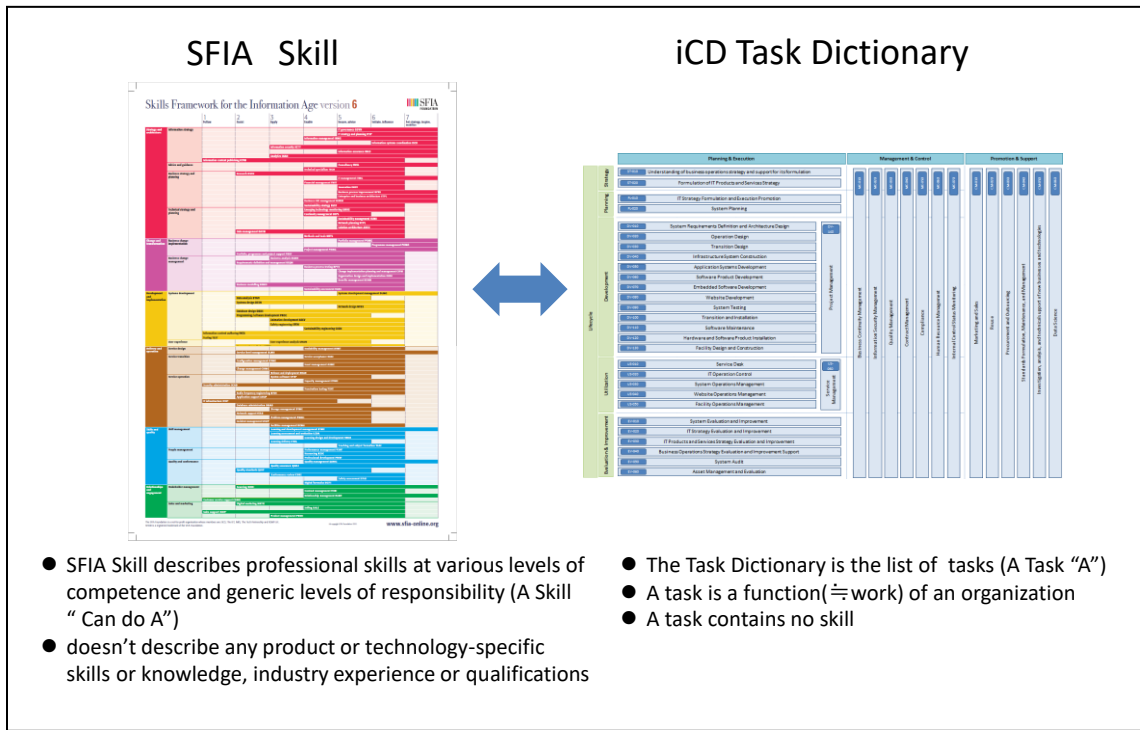


Figure 3-1. SFIA Skills and iCD Task Dictionary Comparison

A direct comparison between SFIA and the i-CD can be considered at a point where SFIA Skills corresponds to the iCD Task Dictionary.

1. Skills Definition in SFIA

In SFIA, Overall Skills is described as: 'A broad definition of the skill, without any reference to the levels at which it might be practiced, (p 13/85, SFIA6 Complete Reference Guide).

And, the overall description of Systems Design (DESN) is as follows:

The specification and design of information systems to meet defined business needs in any public or private context, including commercial, industrial, scientific, gaming and entertainment. The identification of concepts and their translation into implementable design. The design or selection of components. The retention of compatibility with enterprise and solution architectures, and the adherence to corporate standards within constraints of cost, security and sustainability.

Figure 3-2. SFIA SKILLS: An Overall description of System design (DESN)

2. Task Definition in the iCD

The corresponding definition in the iCD Task Dictionary is looked at in detail: as an example, an extract of Layer 1 System Requirements Definition and Architecture Design (Major Task Category) is expanded to Layer 2 (Middle Task Category), Layer 3 (Minor Task Category) and Layer 4 (Assessment Item):

1. System Requirements Definition and Architecture Design
 2. System requirements definition
 3. Target and objectives determination of the system
 4. Understand the problems and needs of the user from a user business perspective
 4. Build a hypothesis of relationships and gaps between user needs and the current system
 4. Identify the operations and system to be computerized based on the presented computerization plan
 3. Investigation and analysis of requirement
 4. Analyze current system based on system usage/usability/hardware configuration/software configuration/data configuration/operation management, etc.
 4. Establish and investigate items for understanding other functions and systems linked to the target scope in order to clarify the computerization requirements
 4. Establish and investigate items for understanding the target scope in order to clarify the computerization requirements
 4. Investigate technologies and products that are intended to be used in the computerization in order to understand functions, constraints, and risks
 3. Functional requirements definition
 4. Define requested functions or requests regarding them in the form of requirements that a system should meet
 4. Actualize usability requirements based on the current system issues and user needs
 4. Present an implementation scheme for the functional requirements
 4. Calculate the cost for implementing functional requirements
 4. Identify the restrictions related to functional requirements
 3. Non-functional requirement definition
 4. Define requests regarding availability, performance and scalability, operability and maintainability, portability, security, and system environment and ecology in the form of non-functional requirements that a system should meet
 4. Present an implementation scheme for the non-functional requirements
 4. Calculate the cost for implementing non-functional requirements
 4. Identify the restrictions related to non-functional requirements
 3. Documentation and review of system requirement
 4. Consolidate computerization targets, objectives, requirements (functional and non-functional) and constraints in a computerization requirements definition document and explain them to the relevant parties
 4. Evaluate the review results from the relevant parties, and revise the computerization requirements definition document
 4. Obtain the consent of relevant parties about the computerization requirements definition document meeting the contents defined by the computerization plan



Note : 1= Task Major Category , 2= Task Middle Category, 3= Task Minor Category, 4=Assessment item

Figure 3-3. iCD Task Dictionary: The extract of “System Requirements Definition and Architecture Design” (Task Major Category)

In conclusion, SFIA Skills corresponds to the iCD Task Dictionary in that the iCD defines task 'A' and SFIA Skills defines 'Can do A' where both A are completely independent of any specific technologies or methodologies, respectively. SFIA uses 'Skills' to express competency and the iCD uses 'Task' to express work independently of any product or technology-specific skills or knowledge, industry experience or qualification.

SFIA Skills corresponds to the iCD Task List but does not correspond with any other iCD contents. Therefore, only the iCD Task List will be discussed here in comparison with SFIA Skills.

3.2.2 SFIA Skills and the iCD Task Dictionary Comparison

A comparison between SFIA Skills and the iCD Task list in the Task Dictionary follows:

Table 3-2. SFIA Skills vs iCD Task Dictionary Comparison

SFIA Skills		iCD Task List in Task Dictionary	
Component	Description	Component	Description
3 layers	1 st Layer: 6 Categories 2 nd Layer: 17 Subcategories 3 rd Layer : 97 skills	Task Categories + 4 layers +	X and Y Axes: 3 Task Categories 1 st Layer: 48 Major Task Category 2 nd Layer :Middle Task Category(≐200) 3 rd Layer : Minor Task Category(≐570) 4 th Layer : Assessment item(≐2200)
Category (6)	The skills in SFIA are grouped into categories and subcategories for the convenience of users. The grouping is intended to assist people who are incorporating SFIA skills in role profiles or job descriptions, or who are building an organization’s IT competency framework	Task Category (3)	Has horizontal axis and vertical axis. The vertical axis shows lifecycle of IT business, horizontal axis shows the tasks supporting the vertical axis tasks.
Subcategory (17)		Major Task category (48)	Structure of the organization function
Skill name(97)	The name used for normal reference purpose	Middle Task category(≐200)	Organizational work list

Skill code	A unique code used for short reference	<ul style="list-style-type: none"> • Major Task Category Code • Middle Task Category Code • Minor Task Category Code • Assessment Item Code 	A unique code used for short reference
NA	NA	Minor Task Category(≠570)	The breakdown of work list of the middle task category
Overall description	A broad definition of the skill, without any reference to the levels at which it might be practiced	Assessment item(≠2200)	The explanatory examples for the minor task category
Level description	Definitions of the skill for each of the levels at which it is practiced. The phrasing facilitates their use as professional competencies.	NA	NA
Level of Responsibility	Provide generic levels of responsibility, with descriptions at each of the seven levels for the following attributes: -AUTONOMY -INFLUENCE, -COMPLEXITY, -BUSINESS SKILLS.	Task Assessment Diag. Level	Applied to the appropriate task layer to evaluate one's task performance task level from L0 to L4 (Table 2-3).
Level Guiding Word	Reflect experience and competency levels within SFIA. Each level has a guiding word: FOLLOW/ ASSIST/APPLY/ENABLE, ADVISE/INITIATIVE, INFLUENCE/SET STRATEGY, INSPIRE, MOBILISE	NA	NA

4 SFIA & iCD Comparison of Generics

4.1 SFIA Generics vs Task Evaluation Level

4.1.1 SFIA Level of Responsibility

Each skill entry comprises an overall definition with descriptions of each of up to the seven levels at which that skill could be practiced. These descriptions provide a reference of how the skill and level combined produce a more detailed definition of what level of competency each skill is practiced at.

The seven levels of SFIA are used in two key ways: to provide generic levels of responsibility, with descriptions at each of the seven levels for the attributes of AUTONOMY, INFLUENCE, COMPLEXITY, and BUSINESS SKILLS in order to reflect experience and competency levels within SFIA. The definitions describe the behaviors, values, knowledge and characteristics that an individual should have in order to be identified as competent at that level (Fig.4-1). Each level has a guiding word or phrase that acts as a brief indicator: FOLLOW (Level 1), ASSIST (Level 2), APPLY (Level 3), ENABLE (Level 4), ENSURE/ADVISE (Level 5), INITIATE/INFLUENCE (Level 6), SET STRATEGY/INSPIRE/MOBILISE (Level 7).

Each skill has a pre-defined qualification level, for example, IT governance (GOVN) defined at level 5-7, reflects the levels at which the skill is actually demonstrated by performance. Unlike the iCD, SFIA has no level to evaluate skill performance after skill execution.

Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1
<p>Autonomy At the highest organisational level, has authority over all aspects of a significant area of work, including policy formation and application. Is fully accountable for actions taken and decisions made, both by self and others to whom responsibilities have been assigned.</p> <p>Influence Makes decisions critical to organisational success. Inspires the organisation, and influences developments within the industry at the highest levels. Advances the knowledge and/or exploitation of technology within one or more organisations. Develops long-term strategic relationships with customers, partners, industry leaders and government.</p> <p>Complexity Leads on the formulation and implementation of strategy. Applies the highest level of leadership skills. Has a deep understanding of the industry and the implications of emerging technologies for the wider business environment.</p> <p>Business skills Has a full range of strategic management and leadership skills. Understands, explains and presents complex ideas to audiences at all levels in a persuasive and convincing manner. Has a broad and deep business knowledge, including the activities and practices of other organisations. Communicates the potential impact of emerging practices and technologies on organisations and individuals and assesses the risks of using or not using such practices and technologies. Assesses the impact of legislation, and actively promotes compliance. Ensures that the organisation develops and mobilises the full range of required digital skills and capabilities.</p>	<p>Autonomy Has defined authority and accountability for actions and decisions within a significant area of work, including technical, financial and quality aspects. Establishes organisational objectives and assigns responsibilities.</p> <p>Influence Influences policy and strategy formation. Initiates influential relationships with internal and external customers, suppliers and partners at senior management level, including industry leaders. Makes decisions which impact the work of employing organisations, achievement of organisational objectives and influence over the allocation of resources.</p> <p>Complexity Has a broad business understanding and deep understanding of own specialism(s). Performs highly complex work activities covering technical, financial and quality aspects. Contributes to the implementation of policy and strategy. Creatively applies a wide range of technical and/or management principles.</p> <p>Business skills Absorbs complex information and communicates effectively at all levels to both technical and non-technical audiences. Manages and mitigates risk. Understands the implications of new technologies. Demonstrates clear leadership. Understands and communicates industry developments, and the role and impact of technology in the employing organisation. Promotes compliance with relevant legislation. Takes the initiative to keep both own and colleagues' skills up to date.</p>	<p>Autonomy Works under broad direction. Work is often self-initiated. Is fully responsible for meeting allocated technical and/or project/supervisory objectives. Establishes relationships and has a significant role in the assignment of tasks and/or responsibilities.</p> <p>Influence Influences organisation, customers, suppliers, partners and peers on the contribution of own specialism. Builds appropriate and effective business relationships. Makes decisions which impact the success of assigned work, i.e. results, deadlines and budget. Has significant influence over the allocation and management of resources appropriate to given assignments.</p> <p>Complexity Performs an extensive range and variety of complex technical and/or professional work activities. Undertakes work which requires the application of fundamental principles in a wide and often unpredictable range of contexts. Understands the relationship between own specialism and wider customer/organisational requirements.</p> <p>Business skills Advises on the available standards, methods, tools and applications relevant to own specialism and can make appropriate choices from alternatives. Analyses, designs, plans, executes and evaluates work to time, cost and quality targets. Assesses and evaluates risk. Communicates effectively, both formally and informally. Demonstrates leadership. Facilitates collaboration between stakeholders who have diverse objectives. Takes all requirements into account when making proposals. Takes initiative to keep skills up to date. Mentors colleagues. Maintains an awareness of developments in the industry. Analyses requirements and advises on scope and options for continuous operational improvement. Demonstrates creativity, innovation and ethical thinking in applying solutions for the benefit of the customer/stakeholder.</p>	<p>Autonomy Works under general direction within a clear framework of accountability. Exercises substantial personal responsibility and autonomy. Plans own work to meet given objectives and processes.</p> <p>Influence Influences customers, suppliers and partners at account level. May have some responsibility for the work of others and for the allocation of resources. Participates in external activities related to own specialism. Makes decisions which influence the success of projects and team objectives.</p> <p>Complexity Work includes a broad range of complex technical or professional activities, in a variety of contexts. Investigates, defines and resolves complex issues.</p> <p>Business skills Selects appropriately from applicable standards, methods, tools and applications. Communicates fluently, orally and in writing, and can present complex information to both technical and non-technical audiences. Facilitates collaboration between stakeholders who share common objectives. Plans, schedules and monitors work to meet time and quality targets. Rapidly absorbs new information and applies it effectively. Maintains an awareness of developing technologies and their application and takes some responsibility for driving own development.</p>	<p>Autonomy Works under general direction. Uses discretion in identifying and responding to complex issues. Usually receives specific instructions and has work reviewed at frequent milestones. Determines when issues should be escalated to a higher level.</p> <p>Influence Interacts with and influences colleagues. Has working level contact with customers, suppliers and partners. May supervise others or make decisions which impact the work assigned to individuals or phases of projects.</p> <p>Complexity Performs a range of work, sometimes complex and non routine, in a variety of environments. Applies methodical approach to issue definition and resolution.</p> <p>Business skills Demonstrates an analytical and systematic approach to issue resolution. Takes the initiative in identifying and negotiating appropriate personal development opportunities. Demonstrates effective communication skills. Contributes fully to the work of teams. Plans, schedules and monitors own work (and that of others where applicable) competently within limited deadlines and according to relevant legislation, standards and procedures. Appreciates the wider business context, and how own role relates to other roles and to the business of the employer or client.</p>	<p>Autonomy Works under routine direction. Uses limited discretion in resolving issues or enquiries. Works without frequent reference to others.</p> <p>Influence Interacts with and may influence immediate colleagues. May have some external contact with customers, suppliers and partners. May have more influence in own domain.</p> <p>Complexity Performs a range of work activities in varied environments. May contribute to routine issue resolution.</p> <p>Business skills Demonstrates a rational and organised approach to work. Identifies and negotiates own development opportunities. Has sufficient communication skills for effective dialogue with customers, suppliers and partners. Is able to plan, schedule and monitor own work within short time horizons. Absorbs new information when it is presented systematically and applies it effectively.</p>	<p>Autonomy Works under supervision. Uses little discretion. Is expected to seek guidance in unanticipated situations.</p> <p>Influence Minimal influence. May work alone, or interact with immediate colleagues.</p> <p>Complexity Performs routine activities in a structured environment. Requires assistance in resolving unanticipated problems.</p> <p>Business skills Uses basic information systems and technology functions, applications, and processes. Demonstrates code of conduct, ethics and organisational standards. Is aware of health and safety issues. Has sufficient communication skills for effective dialogue with others. Contributes to identifying own development opportunities.</p>

SFIA6
Skills Framework
for the Information Age

Figure 4-1 SFIA Levels of Responsibility

4.1.2 iCD Task Performance level

The iCD's Task Performance level (Table 4-2) evaluates the task performance of each employee from Level 0 to Level 4, (as shown in Table 3); this assigned task performance level is evaluated quarterly, half yearly, or at the end of a fiscal year. Organization members evaluate their task performance typically at the third level (Minor Task Category) of an assigned task. This evaluation directly impacts an individual's evaluation of the current fiscal year; salaries and promotions may also be linked to the evaluation result.

The task evaluation typically occurs on a fiscal year basis. This means for a specific task, even though the performance evaluation is very high in some year, it might be very low in the next year. This is possible, for example, due to a project member change, or some serious communication problem occurring in the next year, or an unexpected system problem causing a lack of project members. Similarly, the same task performance of the same organization member might fluctuate over years.

The SFIA Levels of Responsibility address all 7 levels; the SFIA Skill levels only address those at which the skill can be practiced. iCD has no prerequisite task level and anyone can conduct any task. However, some tasks are more difficult to conduct than others, for example, 'Business operations strategy formulation' is apparently difficult for a freshman to conduct, but the iCD assumes this task might be assigned to this freshman whatever the performance level might be.

Table 4-2. Task Evaluation Level

Level	Evaluation Criteria
Level 0	No knowledge or experience
Level 1	Has knowledge based on training
Level 2	Can carry out with support or has such experience
Level 3	Can carry out independently or has such experience
Level 4	Can instruct others or has such experience

4.2 iCD Criteria for levels of Skill Mastery

Skill Mastery consists of seven levels from 1 to 7 (Table 4-3). Definitions for levels 1 to 4 differs for Technology, Methodology, and Related Knowledge in the skill category in order to clarify the differences in skill characteristics.

The definition for levels 5 to 7 is identical across the skills categories because the skill maturity level above level 5 represents a high-level contribution to society as a professional within any skill category. This means the skill maturity level goes up over level 5 to level 7 for an individual's career by continuous skill development. As a practical skill level in order to perform corresponding tasks, maturity level 4 is sufficient. However, the skill maturity level evaluates an individual's professional commitment and contribution. The skill maturity level does not cover IT soft skills. An IT human skill is enough to judge if a member has a skill or not rather than leveling.

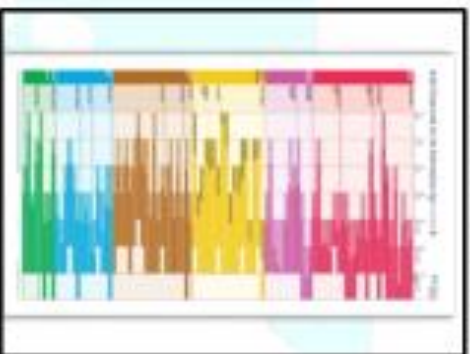
SFIA has no corresponding level to the iCD Criteria for levels of Skill Mastery.

Table 4-3 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

Draft

SFIA V6
(Skills Framework for the Information Age)



iCD V2
(i Competency Dictionary)



- SFIA Foundation develops, maintains and makes available SFIA.
- The collaboration within UK companies in the 1980s and 90s resulted in SFIA Framework being published/adopted from the year 2000.
- SFIA has 20000 users worldwide in around 180 countries.
- Available in 6 languages (English, Spanish, Japanese, etc.)
- Updated every 2-3 years
- SFIA Framework consists from Skills/Levels Description/Levels of Responsibility/Levels Guiding Word entities.
- SFIA Framework is a 7 level framework with 4 generic responsibilities and 97 professional skills aligned to the 7 levels.
- The generic responsibilities and professional skills are used together.
- A reference guide provides the detailed description of Skills and Responsibilities
- The i-CD is the property of the IPA (Information-technology Promotion Agency, Japan)
- In Japan, the IPA announced iCD trial version in Jul/2014; iCD2015 in Jul/2015. English version iCD available one year after.
- Used by 1000 companies in Japan, 27 countries globally
- Translated into English
- Updated annually
- The iCD consists of Task Dictionary and Skill Dictionary
- Task Dictionary corresponds to SFIA V2
- Task Dictionary is a four-layer structure (48, 200, 570, 2200)
- Skill Dictionary is a four-layer structure (5, 84, 460, 10000)
- A Task x Skill matrix links the two dictionaries
- Both dictionaries have additional supporting tables.

5 Summary of SFIA & iCD Comparison