Ministry of Economy, Trade and Industry [METI], Japan

Process Metrics WG Activities in 2010

Software Metrics Advancement Project

November. 2010

MITSUBISHI RESEARCH INSTITUTE, INC.

Research Center For Information Technology

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1. Outline of the Process Metrics WG Activities

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METI Software Metrics Advancement Project

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Background and Objectives

- Background
  - Quantitative management is recognized as an effective way for evaluation and improvement of various project parameters such as productivity, quality, etc. And many benchmarks are actually used in Japan.
  - Although these benchmarks appear to use the same metrics, in most cases the metrics have their individual definitions and sometimes there is no consistency in their relationship or contents.
  - The situation makes it impossible for stakeholders to objectively analyze or evaluate IT project performance in common ways, and difficult for quantitative management to progress.

- Objectives (WG Scope)
  - To develop/improve the environment in which the system and software project can be analyzed and evaluated in an objective manner and with the same way.
  - To improve the interoperability of data among organizations.
  - To enable IT project stakeholders to share the contents and states of achievements of IT projects' QCD (Quality, Cost, Delivery) requirements in the future.
  - To enable IT industries to response to the diversifying needs of IT project associated with changes in the social environment such as rapid globalization eventually.

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Activity Objective and Activity Plan

Activity Objective in 2010

To develop the following environment step by step.

- The acquirer and supplier choose the benchmark suitable for the goal of the organizations and can compare it with their own data adequately .
- The acquirer and supplier analyze IT project performance to evaluate IT project in the same manner.

Activity Plan

1st year（FY2009）

Preparation of **"Guide to the Major Benchmarks and Usages of them in Japan"**

- To arrange plural benchmarks.
- To guide on their usage with the basis of quantitative management and provide points to note.

2nd year（FY2010）

Preparation of **"Guidelines for IT Project Performance Benchmark Suppliers -Supplying in one organization and cross organization- "**

- Guidelines are being prepared for benchmark suppliers, including the following items:
  - Activities that should be implemented when preparing and supplying benchmarks, and examples
  - Guidelines for the ways to define data items (prescribed items in data item are defined)
  - Examples of typical data definition through using guidelines.

3rd year（FY2011）

Promote widespread use by standardizing the guidelines

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Working Group

Industry-Academia-Government Collaboration

The working group consists of the main benchmark suppliers, industry associations as data supplier, and academic experts

Organization	Role of Participation
Information-Technology Promotion Agency, Japan Software Engineering Center (IPA/SEC)	Benchmark supplier (provider) [Benchmark Report] IPA/SEC White Papers on Software Development Projects in Japan
Japan Users Association of Information Systems (JUAS)	Benchmark supplier Benchmarking user [Benchmark]　Software Metrics Reports
Economic Research Association (ERA)	Benchmark supplier [Benchmark] Report of software development for supplier -Part II
Japan Information Technology Services Industry Association (JISA)	Data supplier Benchmarking user
Academics	Quantitative management experts
Ministry of Economy, Trade and Industry (METI)	Secretariat
Mitsubishi Research Institute (MRI)	Secretariat

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Outline of Benchmarks in Japan

Organization Deliverables	JUAS 2009 Software Metrics Reports (user companies)	IPA/SEC 2009 White Paper on Software Development Projects in Japan	ERA Report of Software Development for Supplier – Part II
Number of collected data (Latest Version)	435 Project (Development/management/ maintenance) Data	2,327 Project Data	173 Company Data
Outline	■ Analytical result of profile of questionnaire data ■ Analytical result of development survey (man-hour, construction period, total cost, system size, quality evaluation, productivity, etc.) ■ Analytical result of maintenance survey (maintenance organization, staff, quality, construction period, estimate, satisfaction) ■ Analytical result of operation survey (management level, organization, use of ITIL, personnel development, outsourcing, content of various kinds of management) ■ Summary of survey results of development, maintenance and operation	■ Collected data, analysis ■ Profile of collected data ■ Statistics of major elements of a project (FP scale, SLOC scale, construction period, man-hour, number of staff) ■ Analysis of relations of man-hour, construction period and scale (man-hour and construction period, scale and man-hour, productivity) ■ Analysis of reliability (FP scale and No. of failures (density), SLOC scale and No. of failures (density)) ■ Analysis per process (construction period per process, man-hour, No. of cases where reviews are pointed out, No. of test cases, etc.) ■ Analysis of budget and actual cost, productivity cross-analysis (analysis of plan and performance, analysis of productivity)	■ Relation between man-hour and construction period, analysis per process (new development, renovation development) ■ Analysis of relation between scale and man-hour ■ Analysis of relation between scale and productivity (FP scale and FP productivity, FP scale per industry and FP productivity, etc.) ■ Analysis of reliability (FP scale and No. of bugs, density of bugs, etc.) ■ Analysis of estimate and performance (size/man-hour/construction period) ■ Analysis of effect by contract form (estimates/actual values of FP/man-hour/construction period and contract forms)

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2. Preparation of Guidelines for Benchmark Suppliers

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Overview

- Points to note regarding benchmarks
  - Selecting benchmarks suitable for one's own organization
  - Comparison and evaluation of benchmarks with individual organization's data appropriately
- Requirements for appropriate benchmarking
  - The benchmarking user must understand and select the appropriate benchmark when preparing information of the benchmark (background, process, data collection source, data definition, and measurement methods) .
  - The benchmark suppliers must prepare appropriate benchmarks, and disclose the prepared information (information source, analysis method, and conditions and restrictions of use) .

- Details of activities
  - Support benchmarking users to enable to select benchmarks which meet their purposes.
  - Provide the following items
    - The work items to develop a benchmark
    - The work items to supply a benchmark (report, tool, etc)
    - The information that should be disclosed
      - Notation form, preparation information of benchmark,etc
  - Publication of the guidelines

"Guidelines for IT Project Performance Benchmark Suppliers -Supplying in one organization and cross organization- “

[Information] WG activities in 2009

- Survey on the existing public benchmarks
- Promotion of knowledge necessary to use benchmarks
- Publication of **" The Guide for Usage of Published Benchmark Data for Quantitative Management”**

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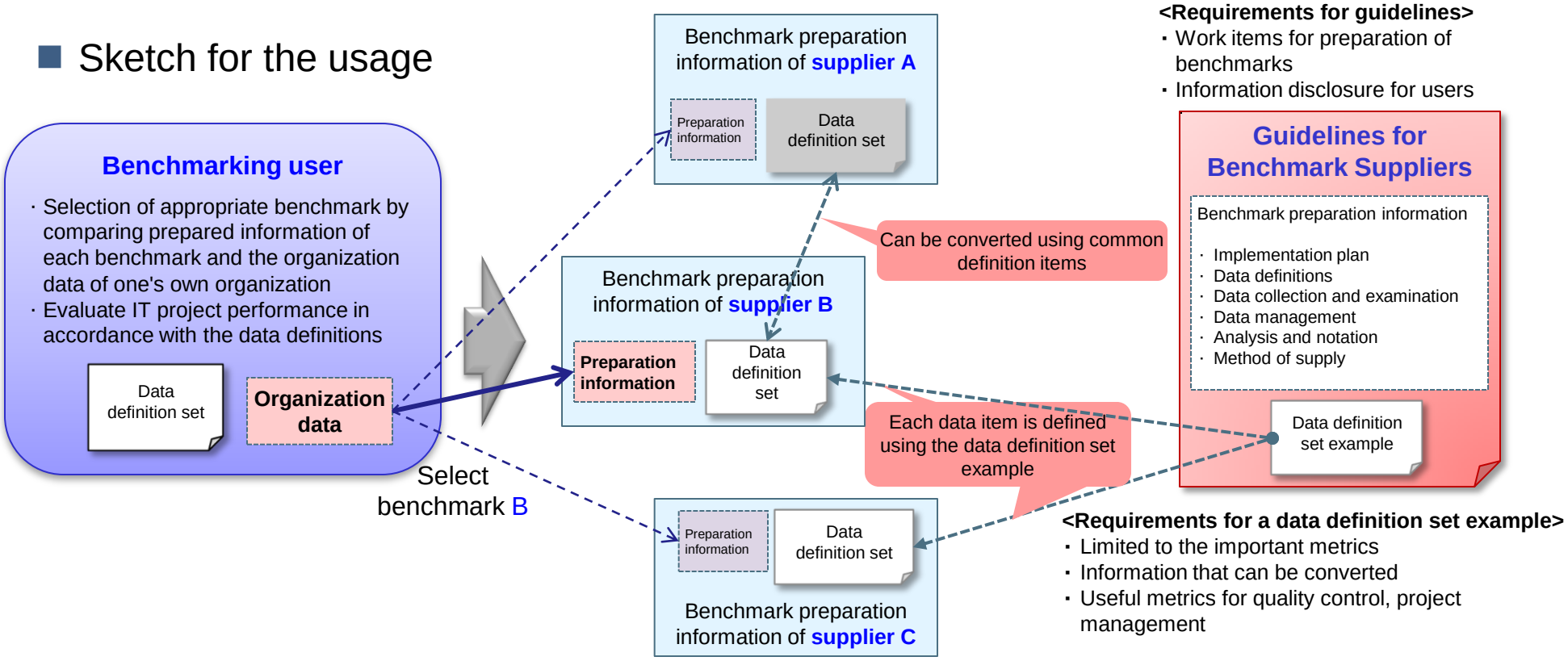
Preparation policy

- Preparation policy for guidelines
  - Indicate the work items for the appropriate preparation and supply of benchmarks by benchmark suppliers.
  - Provide a typical example of data definition set
  - Indicate the information that should be disclosed by benchmark suppliers in order that benchmarking users can correctly understand the benchmark attributes.

- Sketch for the usage



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Contents of the Guidelines

- The contents are studied with reference to various international standards including ISO/IEC 29155-1, and Japanese Industrial Standard.

- Table of Contents (*: important study items)

Chapter 1 Objectives
- *Objectives of establishing the guidelines*

Chapter 2 Scope of Application
- *Outline and usage of the guidelines, and limitations on their use*

Chapter 3 Terminology and Definitions
- *Definitions of the main terminology*

Chapter 4 Overview of benchmark preparation/supply process
- *Overview of benchmark preparation process*
- *Overview of benchmark supply process*

Chapter 5 Benchmark Preparation Process (*)
- ***Details of work items that should be implemented when preparing benchmarks***
- *Format with reference to ISO/IEC 29155 series*

Chapter 6 Benchmark Supply Process (*)
- ***Details of work items that should be implemented when supplying benchmarks***
- *Information disclosure that is necessary when benchmarking*

Chapter 7 Appendix
- *Example of data definition set according to "Section 5.2 Data definition"*

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Chapter 5 The Benchmark Preparation Process

- Outline
  - Define the work items that should be implemented when a benchmark supplier prepares benchmarks
  - In this way, benchmarking user can obtain benchmarks that have been prepared by passing through a safe and reliable process.

- Main reference information
  - Details of the actual activities and work items of the major benchmark suppliers in Japan
  - ISO/IEC 29155-1

- Structure of Chapter 5
  (*: important study items)
  - 5.1 Implementation Plan
  - 5.2 Data Definitions (*)
  - 5.3 Data Collection and Cleansing (*)
  - 5.4 Data Management (*)
  - 5.5 Analysis and Preparation of Benchmarks

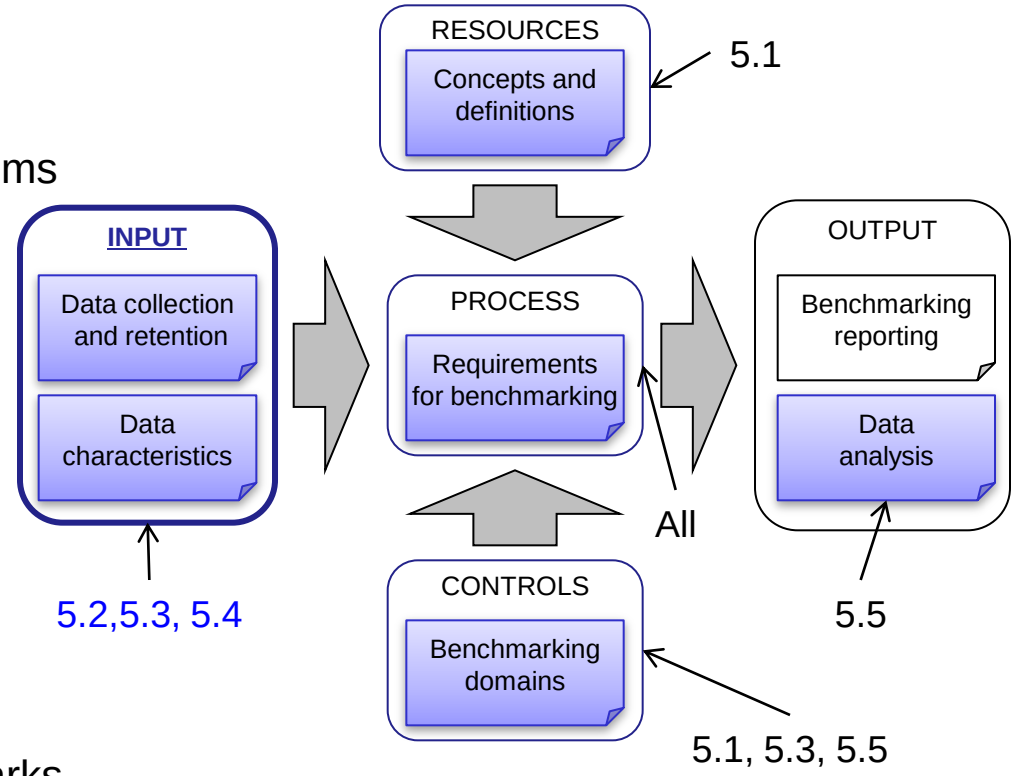

Fig. IT project performance benchmarking standards overview and relationship with Chapter 5

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5.2 Data Definitions

- Issues relating to data definition
  - The details (name, method of measurement, description, display units, etc.) of the definition of metrics differ among organizations (including benchmark suppliers).
  - There is no common understanding regarding software metrics definitions.

- Important matters for investigation
  - Setting common data definition items
    - Enable correspondence among organizations.
    - Enable the definition of benchmarks to be interpreted without error to enable comparison.
  - Supply of a typical data definition set
    - Can be freely used by anyone.
    - Does not restrict the data definition itself of any organization.
    - Results in forming a common consensus of data (metrics) definition.

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5.2 Data Definition

- Preparation of **data definition items**
  - Reference information: Definition items in ISO/IEC 9126 series, ISO/IEC 25021 Draft, ISO/IEC 15939
  - Data definition items are set by WG referring to the already used definition items that are easy to understand by user and practical definition items.

- Preparation of **a typical data definition set**
  - Extract the typical metrics (basic measurement quantities and derived measurement quantities) from among the metrics used by the major benchmark suppliers in Japan.
  - Extract a group of metrics and define them based on the data definition items.
  - The data definition groups for both basic measures and derived measures are shown in Chapter 7 (Appendix) as an example of typical data definition set.

Table. Candidate metrics group provided in the example of data definition set.

Basic measures	Derived measures
・Scale (number of lines in source code, number of FPs, number of screens, number of files) ・Number of manhours ・Work period ・Quality (number of Defects)	・Productivity ・Defect density ・Review density

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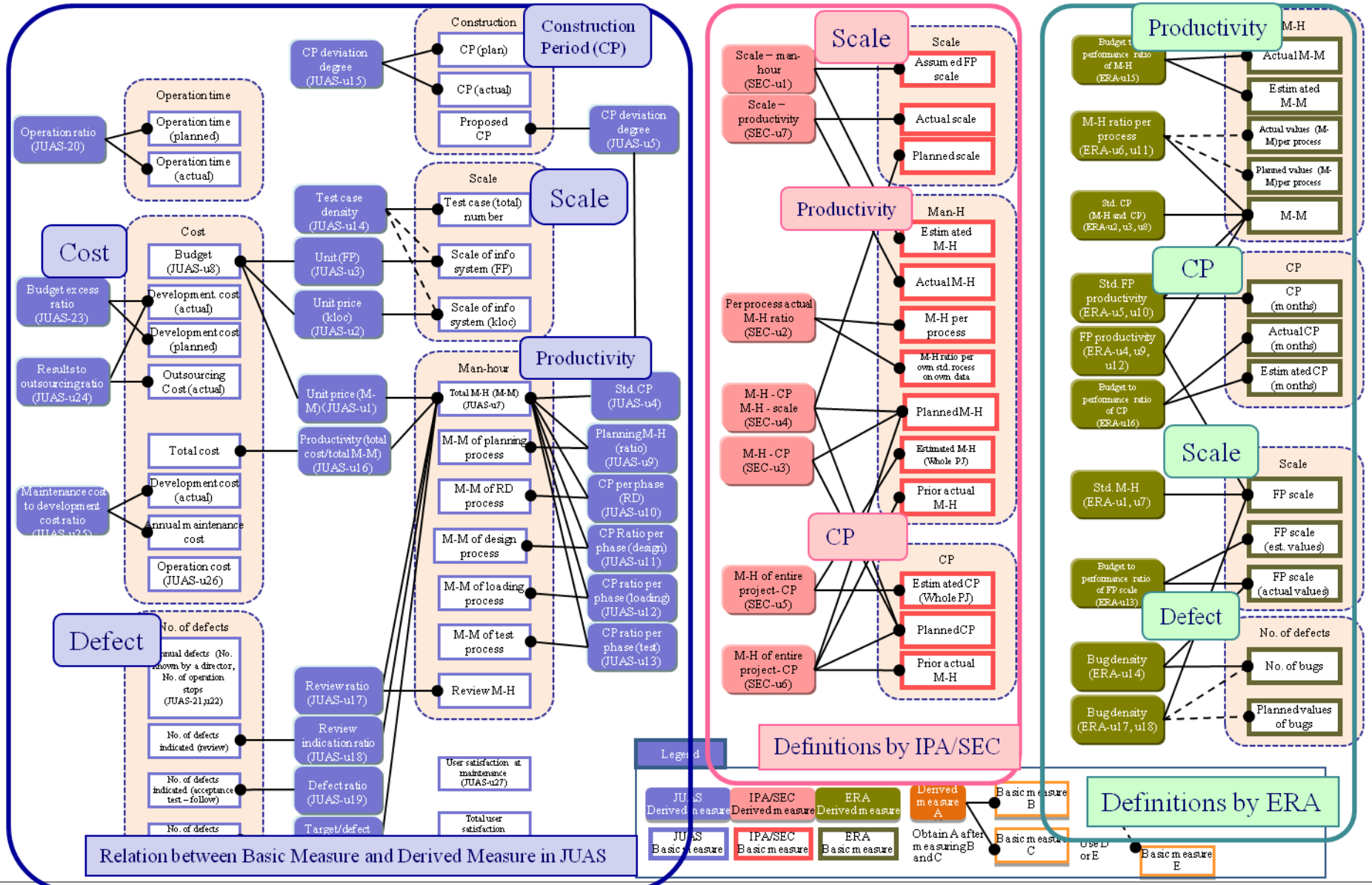
[Information] Measure Relationship Diagram (For Acquirer)



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5.3 Data Collection and Cleansing (Major Benchmark supplier Cases)

Table. Data Collection of Major Benchmark supplier

Organization Deliverables	JUAS 2009 Software Metrics Reports (user companies)	IPA/SEC 2009 White Paper on Software Development Projects in Japan	ERA Report of Software Development for Supplier – Part II
Data collection organization	Data collection, development, maintenance, and operation are basically JUAS members	Supplying organizations and companies	Mainly companies registered with the Japan Function Point User's Group (JFPUG)
Project conditions applicable to data collection	■ Development completed in the past two years ■ New development or upgrading ■ Development cost > JPY 5 million ■ No special conditions for maintenance and operation projects.	■ Completed within the past three years ■ Covers basic through to overall testing (projects that were sub-divided throughout due to orders being issued in stages, etc., were processed to give one overall duration without breaks in between.)	■ Contract in the past two-three years ■ New development projects (including system reconstruction or downsizing) and modification projects ※Use of package software or system migration were not included ■ Covers the six development stages (basic design through to overall testing (vendor checking)) ■ Service contract or commission contract
Data collection method	■ Questionnaire using survey form ■ Interview	■ Automatic collection using a tool Data was examined to a certain extent at the data receipt stage using the tool's examination function.	■ Questionnaire using survey form
Collection period	Autumn – year end	August to October	November to February of the following year
Collection frequency	Once/year	Once/year	Once/year

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5.3 Data Collection and Cleansing (Major Benchmark supplier Cases)

Table. Data Cleansing of Major Benchmark supplier

Organization Deliverables	JUAS 2009 Software Metrics Reports (user companies)	IPA/SEC 2009 White Paper on Software Development Projects in Japan	ERA Report of Software Development for Supplier – Part II
Data Cleansing and analysis	■ Data protection ■ Review Review of analysis results by statistical analysis specialists, and other involved persons	■ Review Disclosure after examination by experts to determine that there were no errors in the analysis method or contents, and no mistaken interpretation, etc. ■ Processed for anonymity Proper names changed into generic names ■ Examination in terms of statistical processing Adopted if there were 10 or more available for data analysis If the sample for analysis is three organizations or more and the percentage from one organization is 70% or less	■ Processed for anonymity Separation of information that could identify the company ■ Examination in terms of statistical processing Checking outlying values Prevention of bias in the data

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Chapter 6 Benchmark Supply Process

- Outline
  - Define the work items that should be implemented when a benchmark supplier supply benchmarks.
  - Indication of information that should be disclosed by benchmark suppliers in order that users can correctly understand the benchmark attributes.
  - In this way, benchmarking user can select and use benchmarks that suit the objectives of the benchmarking users.
- Main reference information
  - Details of the actual activities and work items of the main benchmark suppliers in Japan
  - Opinions of benchmark users
- Structure of Chapter 6
  (*:important study items)
  - 6.1 Implementation Plan
  - 6.2 Supply of Benchmark(*)
    - *Identification of the information (benchmark, preparation information, etc)*
    - *Supply method, etc.*
  - 6.3 Supply of Repository
    - *Contents to supply*
    - *Supply method, etc.*

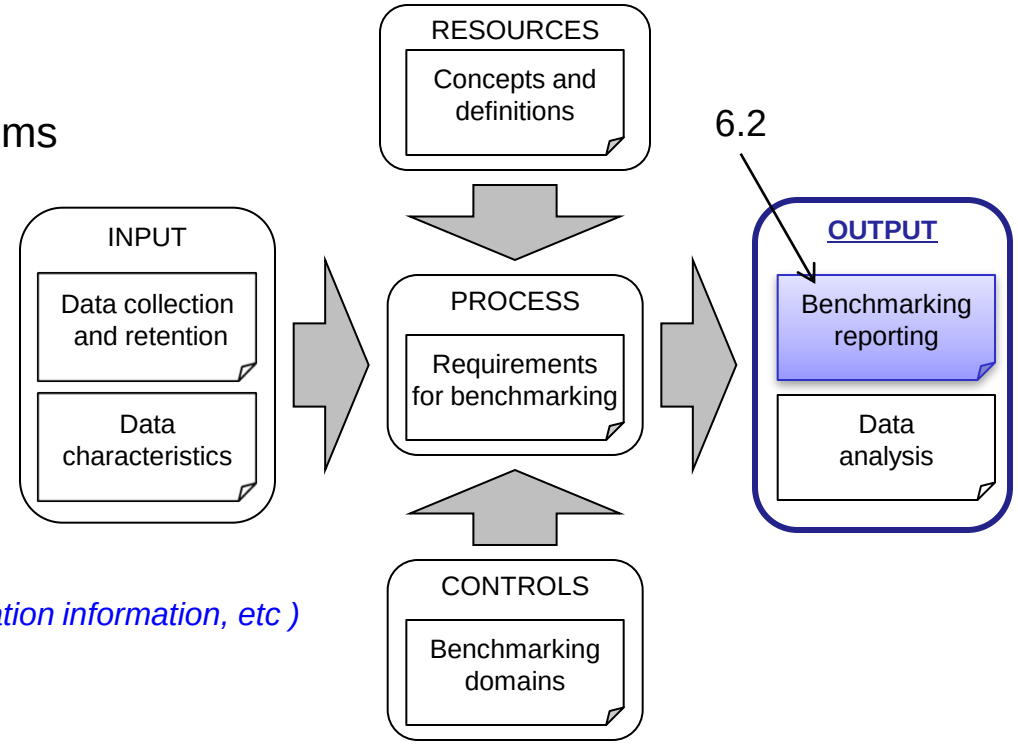

Fig. IT project performance benchmarking standards overview and relationship to Chapter 6

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6.2 Supply of Benchmark (Identification of the information)

Table: Information that must be disclosed when supplying benchmarks

Process		Items for which information disclosure is desirable (draft)	Information necessary when selecting a benchmark	Information necessary when using a benchmark
Report on benchmark result		Results stratification, classification criteria (for work type and process)	✓	✓
		Guide for documentation, graphical description	✓	✓
Report on the benchmark preparation process	(5.1) Implementation plan	Objective of benchmark preparation	✓	
		Policy on benchmark preparation	✓	
	(5.2) Data definition	Data definition items		✓
		Definition of data terminology		✓
	(5.3) Data collection and examination	Object of data collection	✓	✓
		Data collection method	✓	✓
		Data collection period, frequency	✓	
		Data examination method		✓
	(5.4) Data management	Details of data management	✓	
		Details of repository management	✓	
		Details of data quality management	✓	
	(5.5) Analysis and benchmark preparation	Analysis method		✓
		Details of statistical processing		✓
		Method of examining the analysis results		✓
Other reference information		Relationship to other activities and standards	✓	

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3. Future Schedule

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3. Future Schedule

- WG Scope
  - To develop/improve the environment in which the system and software project can be analyzed and evaluated in an objective manner and with the same way.

- Future activities
  - Implement the following to prepare **"Guidelines for IT Project Performance Benchmark Suppliers -Supplying in one organization and cross organization- " .**
    - Investigate the work items that should be carried out by benchmark suppliers

      Particular Section

      <5.2 Data Definition>, **<5.3 Data Collection and Cleansing>, <6.2 Supply of Benchmark>**
    - Prepare examples of data definition sets agreed upon with the WG related organizations including the main benchmark supplier in Japan.

  - 3rd year (FY2011)

    Promote widespread use by standardizing the guidelines
    - Carry out standardization activities to realize the development of the environment and its widespread use.

- The summarized results are planned to be submitted to ISO/IEC 29155 series as the Japan's proposal.

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[INFORMATION] Process Metrics WG Activities in 2009

2009 Activity Overview (in English)

Software Metrics Advanced Project

http://www.meti.go.jp/policy/it_policy/softseibi/index.html#metrics

- Activities for the first year (2009)
  - To summarize benchmark reports that you can currently use in Japan, and assume the role of a guide for their usage methods together with the basis for the quantitative management and points to note.
- Intention
  - Aiming to develop/improve the environment in which you can analyze and evaluate the system and software projects from the viewpoints commonly available.
- Summary
  - To explain the expectation effect of the quantitative management and the usage of published data for the quantitative management.
  - To introduce the published benchmark reports which you can use in Japan at present.
  - To explain the usage methods of these as well as points to note

Content	
Chapter 1	Basis of Quantitative Management
Chapter 2	Outline of Published Data
Chapter 3	Usage Methods of Published Benchmark Data
Appendix	Metrics Relationship Diagram of Published Benchmark Data Outline of Activities of Organizations in Japan

…Thank you

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