Knowledge Science Approach for Health Service Innovation: Service Knowledge Sharing and Education

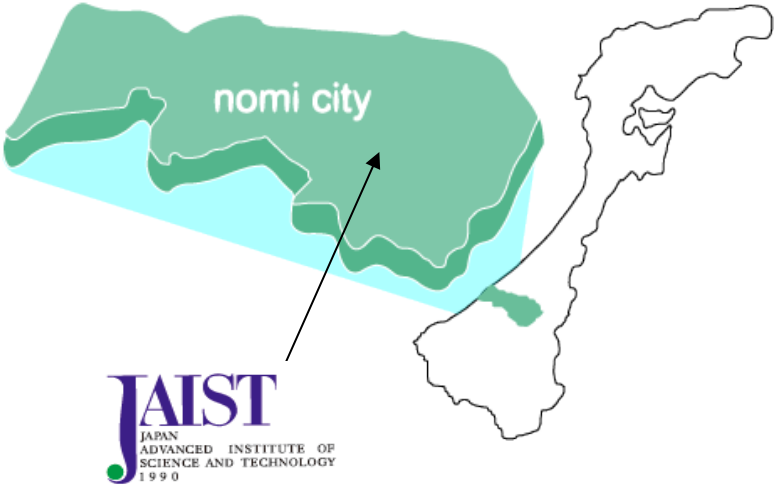
Mitsuru Ikeda

Director of Service Science Center, Japan Advanced Institute of

Science and Technology, Japan

I come from…

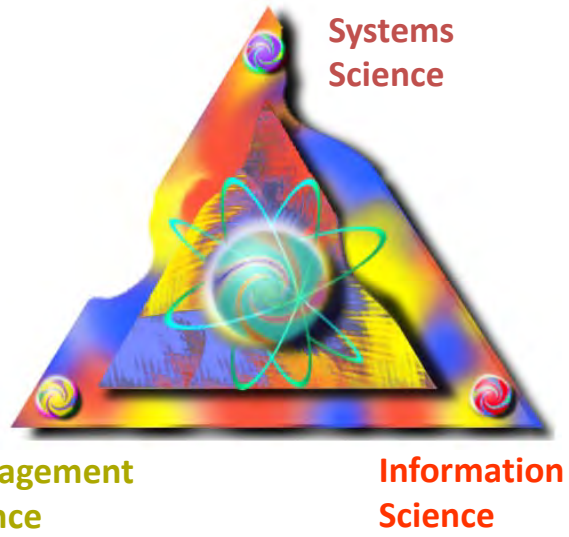

Toyama
Kanazawa Station
Kanazawa Nishi I.C.
Nishi Kanazawa Station
Nomachi Station
Shin Nishi Kanazawa Station
Matto Station
Hakusan City
JAIST
TOKYO
NAGOYA
OSAKA
Mikawa I.C.
Route8
Route157
Mikawa Station
Tsurugi Station
Terai Station
Nomi City
Komatsu City
JAIST
Komatsu I.C.
Komatsu Station
Komatsu Airport


nomi city
JAIST
JAPAN
ADVANCED INSTITUTE OF
SCIENCE AND TECHNOLOGY
1990


能美郡
川北町
能美市

School of knowledge science, JAIST

- The first school in the world on this new science, with knoweldge as objective and toward a knoweldge society.
- Based on the integration of management science, systems science and information science.



Goal of Knowledge Science
Integration of Wisdom/Knowledge

- To integrate the wisdom of **humanities** and **sciences** (For mutual complementary uses)
- To integrate the **scientific/objective** wisdom, and **human's/subjective**

- **To offer a place where latest science and technological wisdom blend up with practical wisdom**

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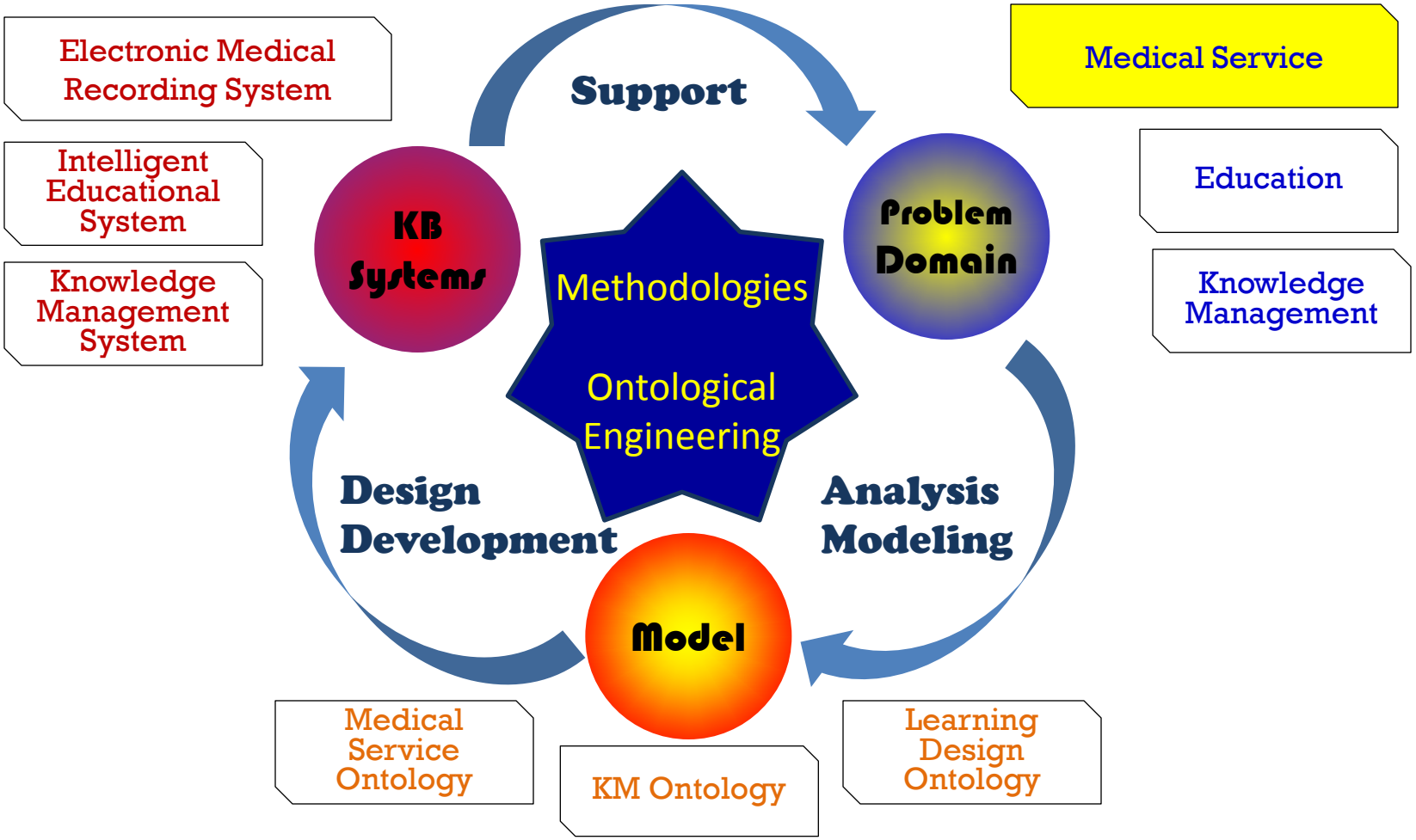
1990

My Research Interests

Ontological Engineering, Educational Engineering, Service Engineering

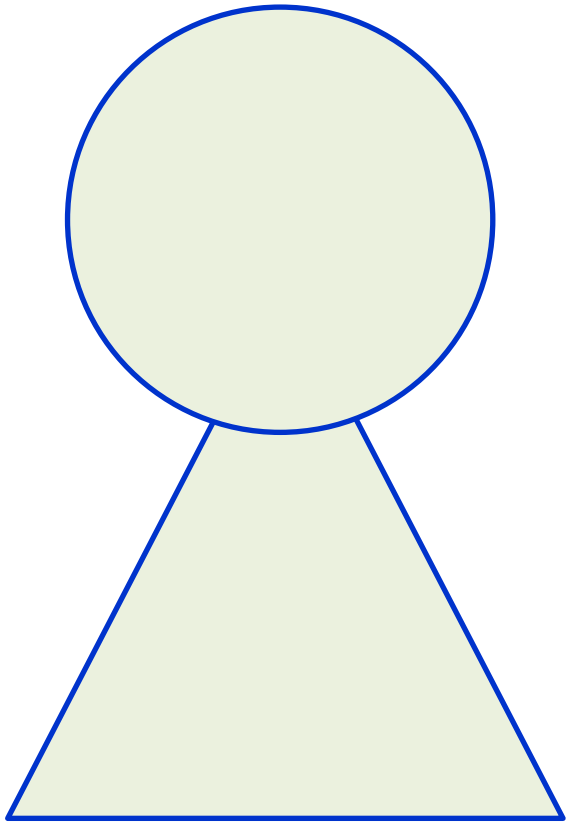
Goal: **To Establish Knowledge-based System Design Methodologies to Facilitate Knowledge Sharing and Creation.**



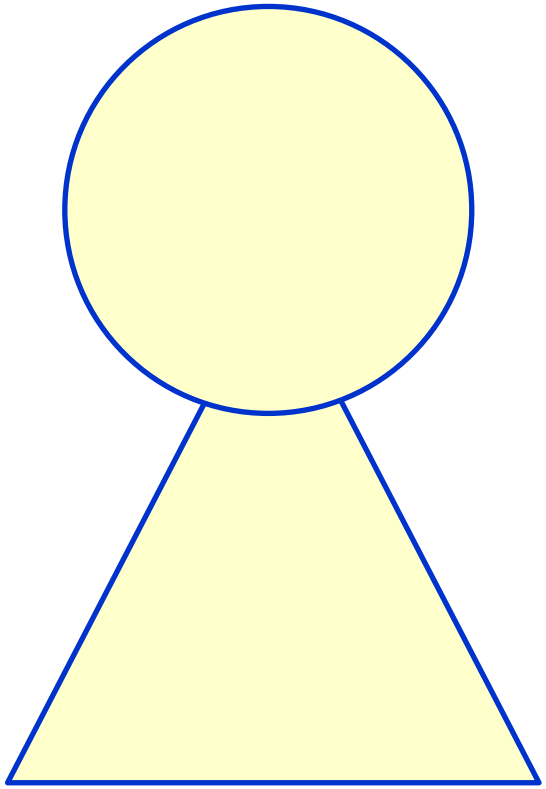
A Model of Service

Based on H. Yoshikawa, 2007

Service PROVIDER



Service Recipient



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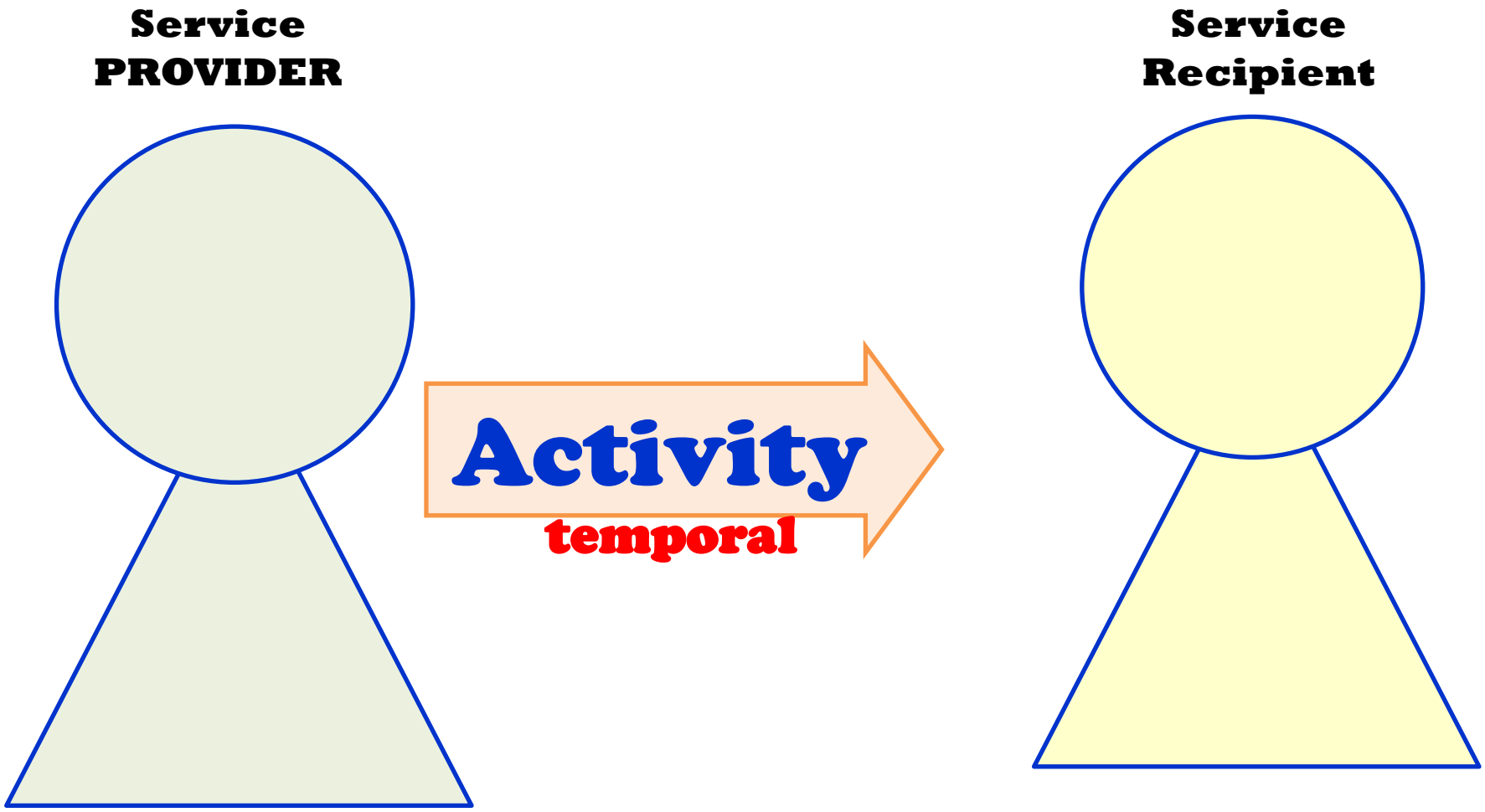

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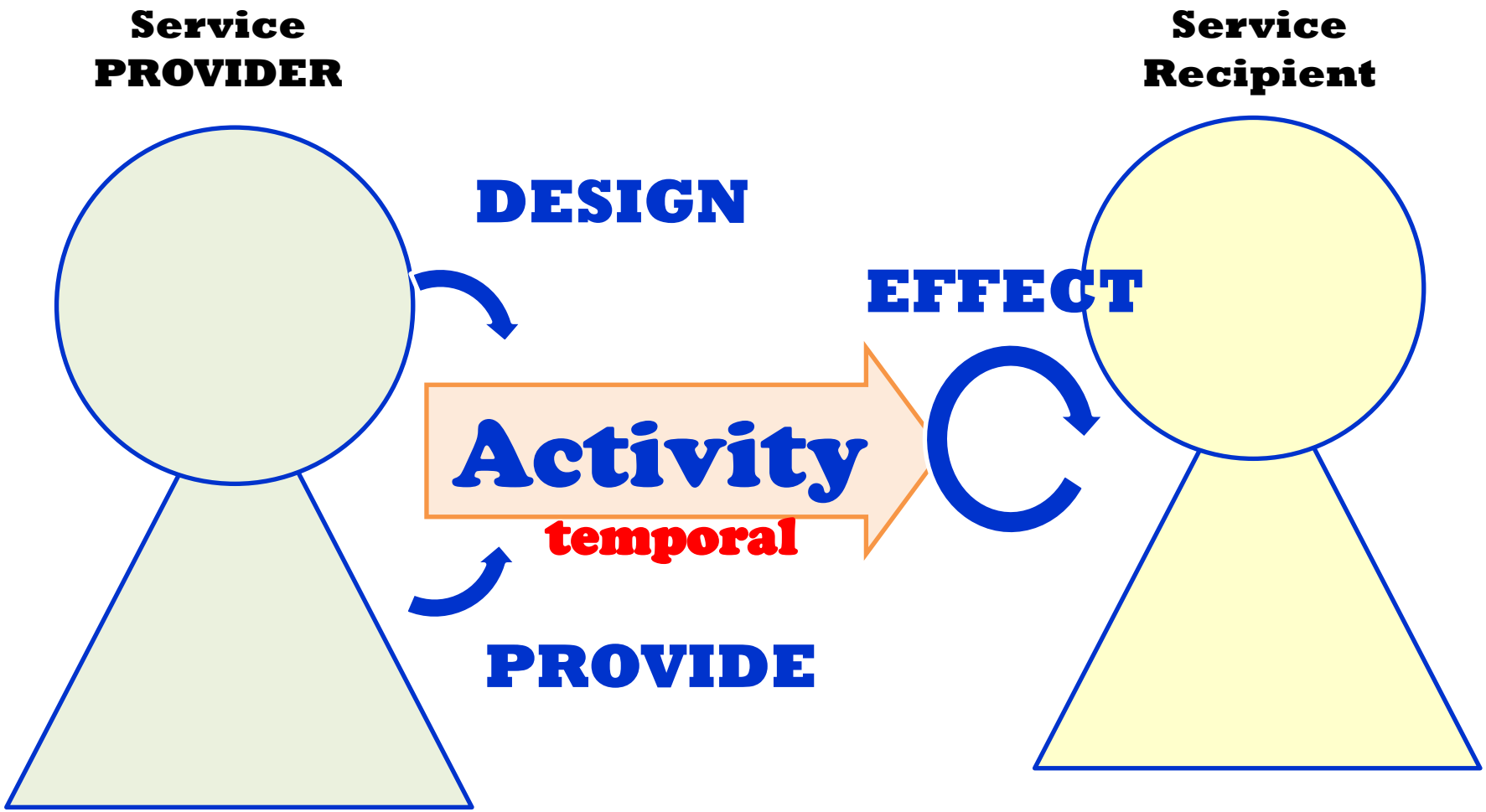

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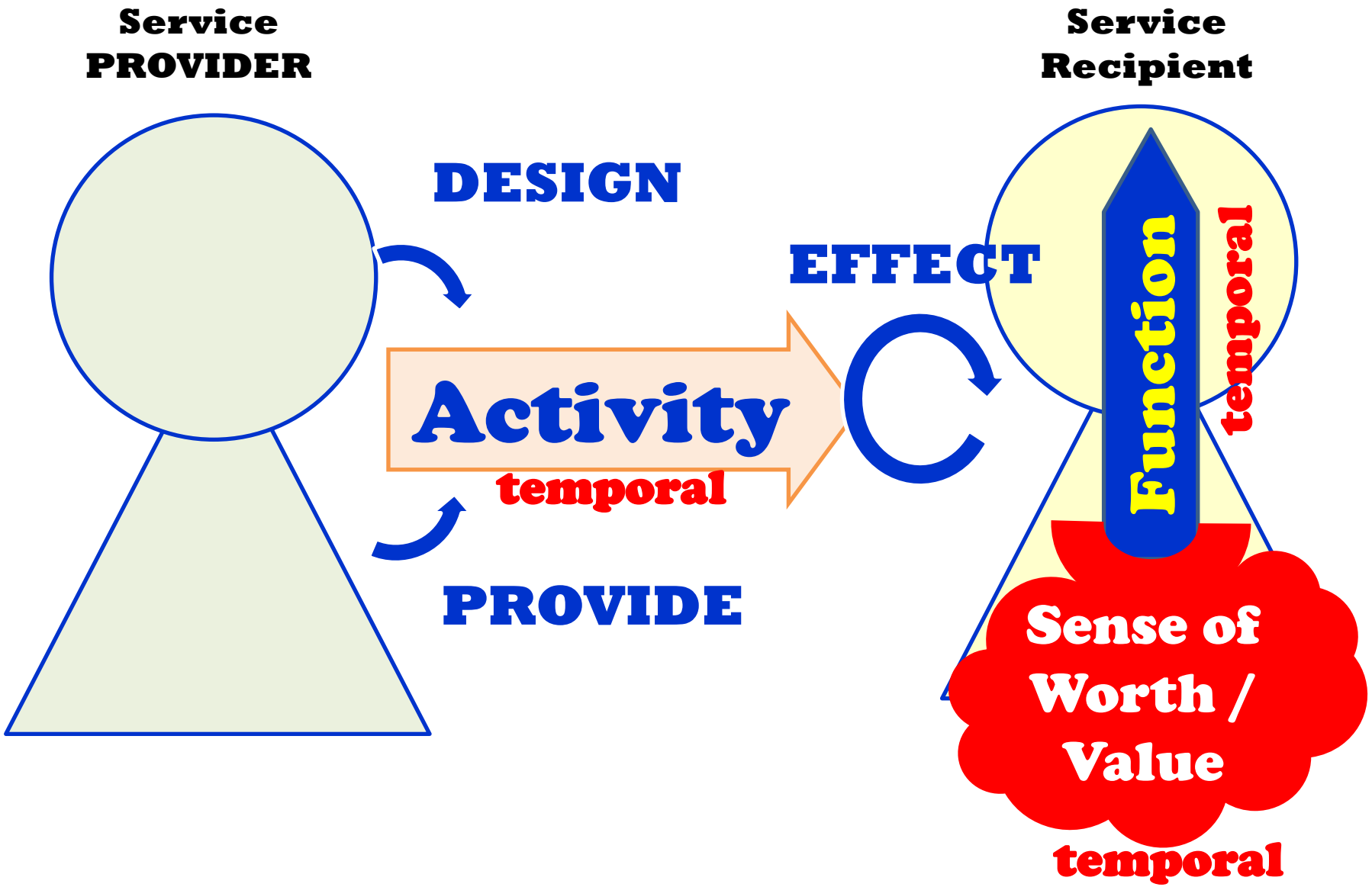

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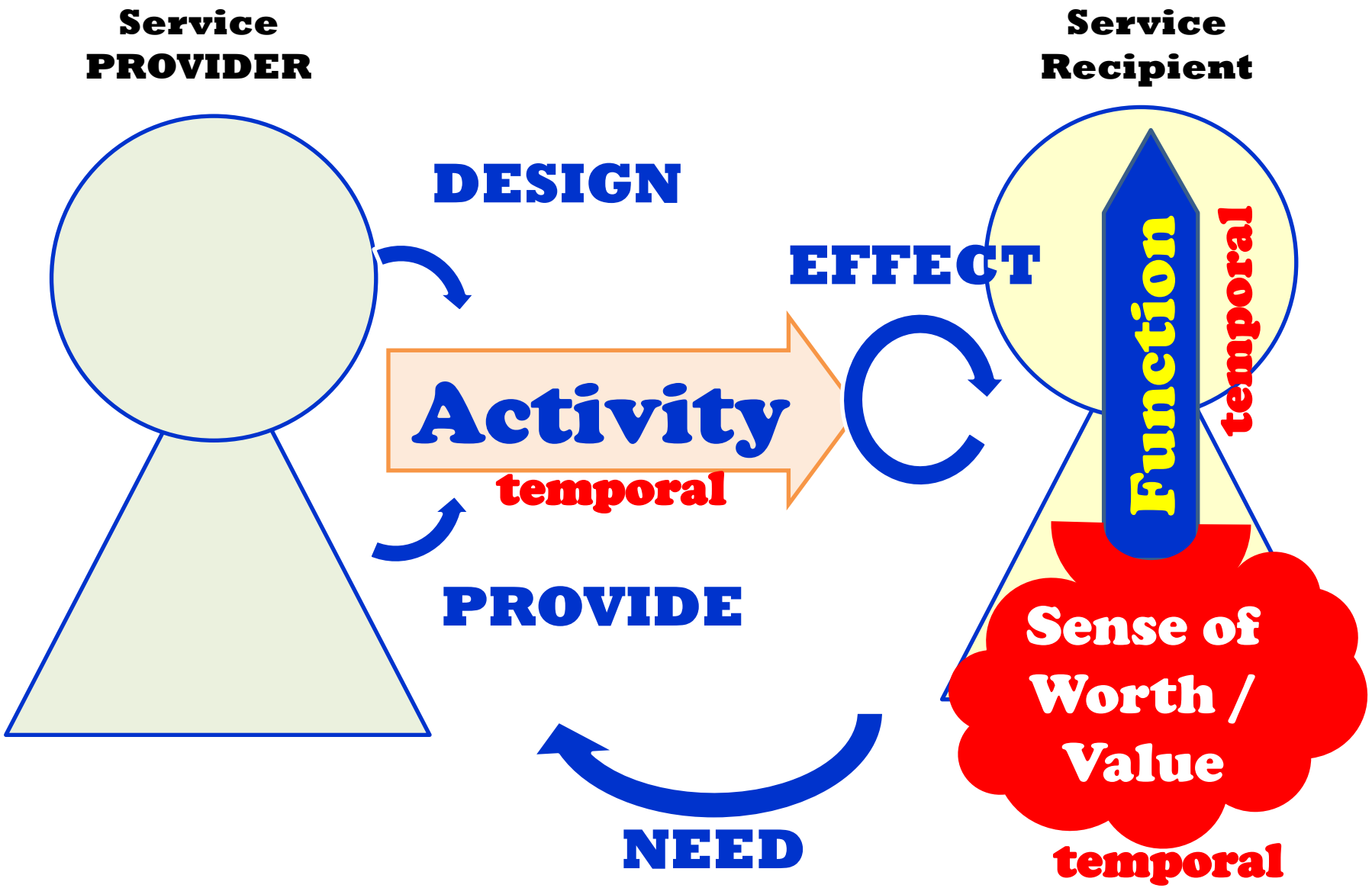
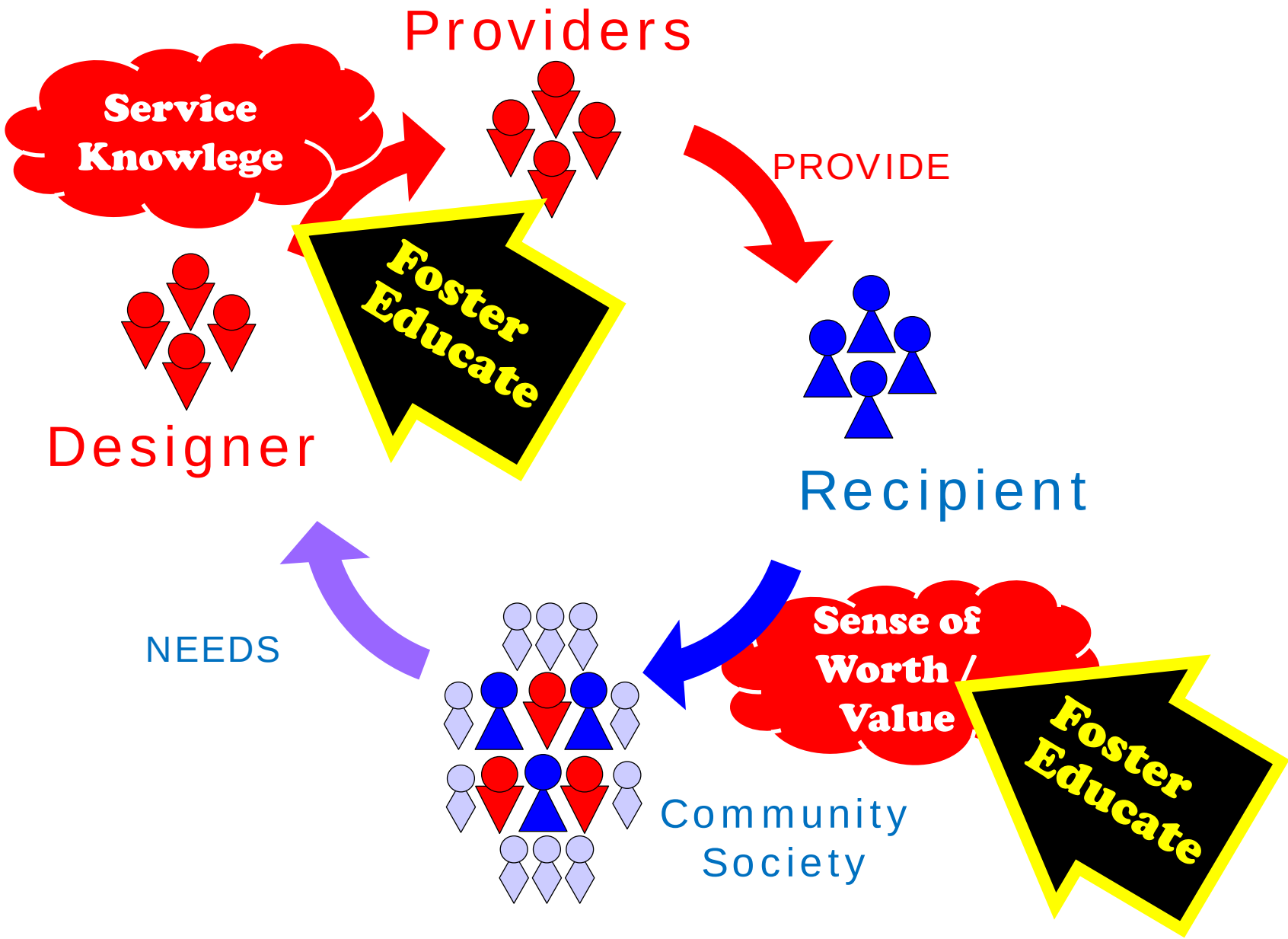


Life Cycle of Service



Medical Knowledge Science

- Medical Service Knowledge Circulation by Medical Record System.
- Education Program for Medical Knowledge Co-creation Skill
- Patients Centered Quality Indicator Ontology
- Learning/Knowledge Sharing Support of Medical Incident Analysis
- SNS to Foster Diabetes Patients Community

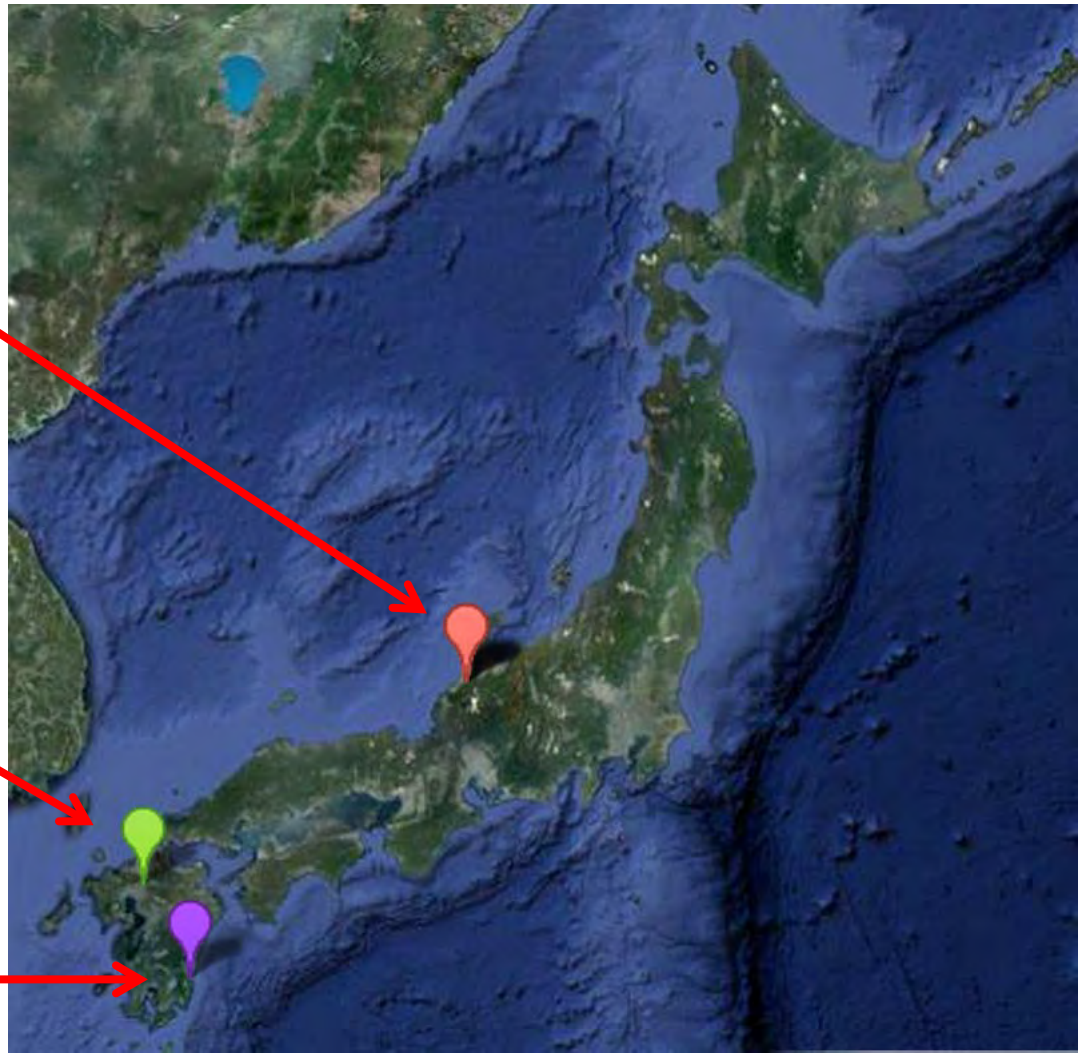
Medical Service Innovation HRD Project

Human resource development for service innovation in cooperation with the regional medical front

Collaboration of 3 universities

- The Faculty of Medicine of the University of Miyazaki
- The Kurume University School of Medicine
- The Japan Advanced Institute of Science and Technology

Location of the universities



Outline

University education reform model to meet society's new needs for learning through regional and functional cooperation

Deepening cooperation between regions and universities

Presenting contemporary problems in regional medicine

Evaluating the quality of education

Stakeholders in the Kyushu region

Regional cooperation

University of Miyazaki

Medical Informatics

Practical fieldwork
Hospital management, regional cooperation, medical safety, drug discovery
Cultivating professionals with problem-solving capabilities through fieldwork

Kurume University

Medical Statistics

Functional cooperation

Service Science

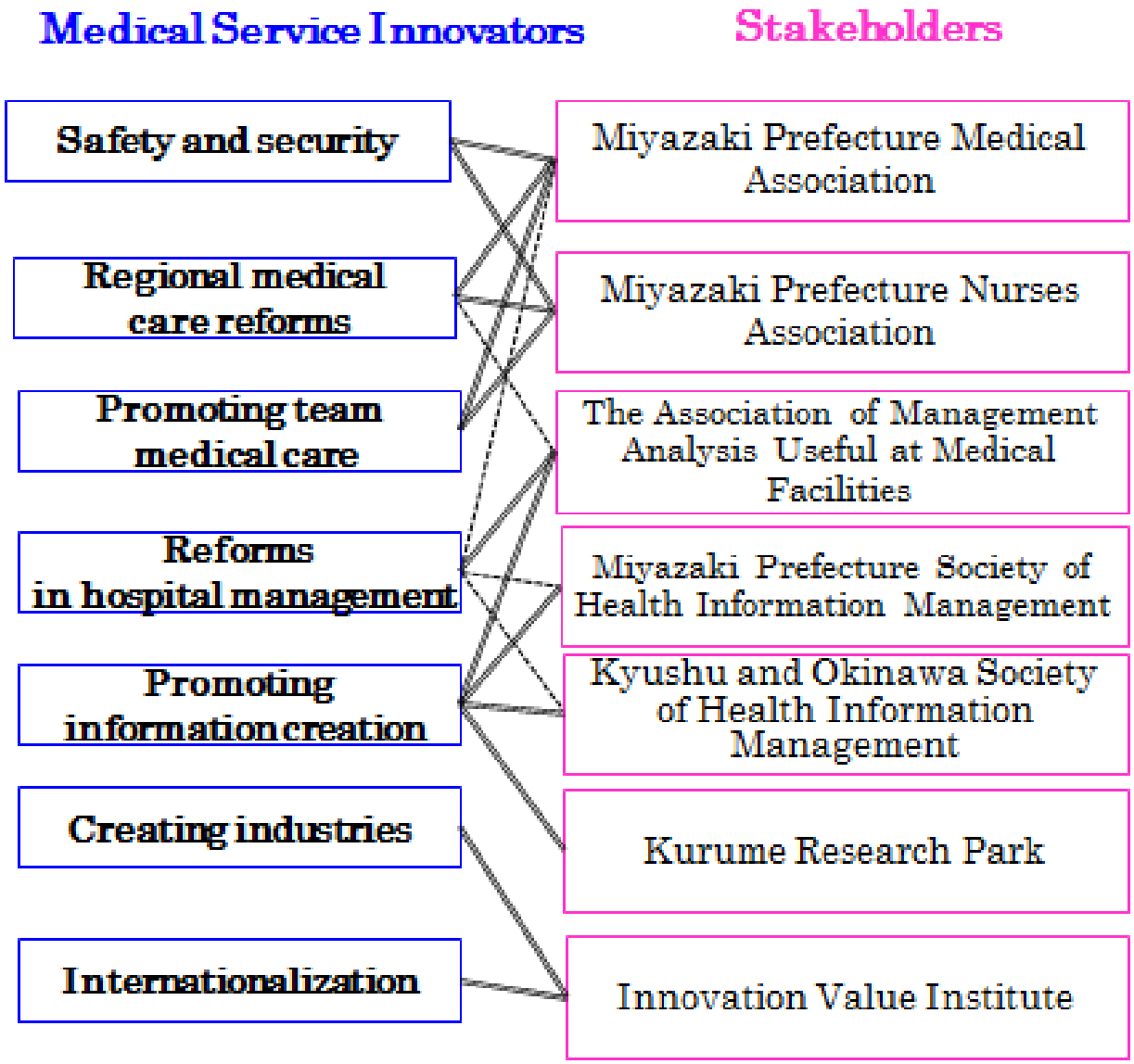
New learning needs arising from changes in the industrial structure

Japan Advanced Institute of Science and Technology

Active Learning Knowledge Creation Theory

Cultivating human resources who engage in lifelong learning and are able to think independently

Stakeholders



Goal of the human resources to develop

Japan Advanced Institute of Science and Technology

③ Knowledge science for the cultivation of Π-shaped medical service innovators

Service Innovation | **Knowledge Science** | **Service Knowledge Creation**

Medical Statistics

Medical Services Management

Medical Informatics

Medical Services Statistics Practice

Medical Services Statistics Theory

Medical Services Knowledge Creation Theory

Medical Services Statistics Practice

Medical Services Knowledge Creation Practice

Medical Services Innovation Practice I

Medical Services Innovation Practice II

Regional Cooperation

Hospital Management

Drug Discovery

Medical Safety

On-site practical abilities

University of Miyazaki, Kurume University

①Expertise relating to medical informatics, medical services management

University of Miyazaki Japan Advanced Institute of Science and Technology Kurume University

②Knowledge of and ability to solve real problems at the medical front

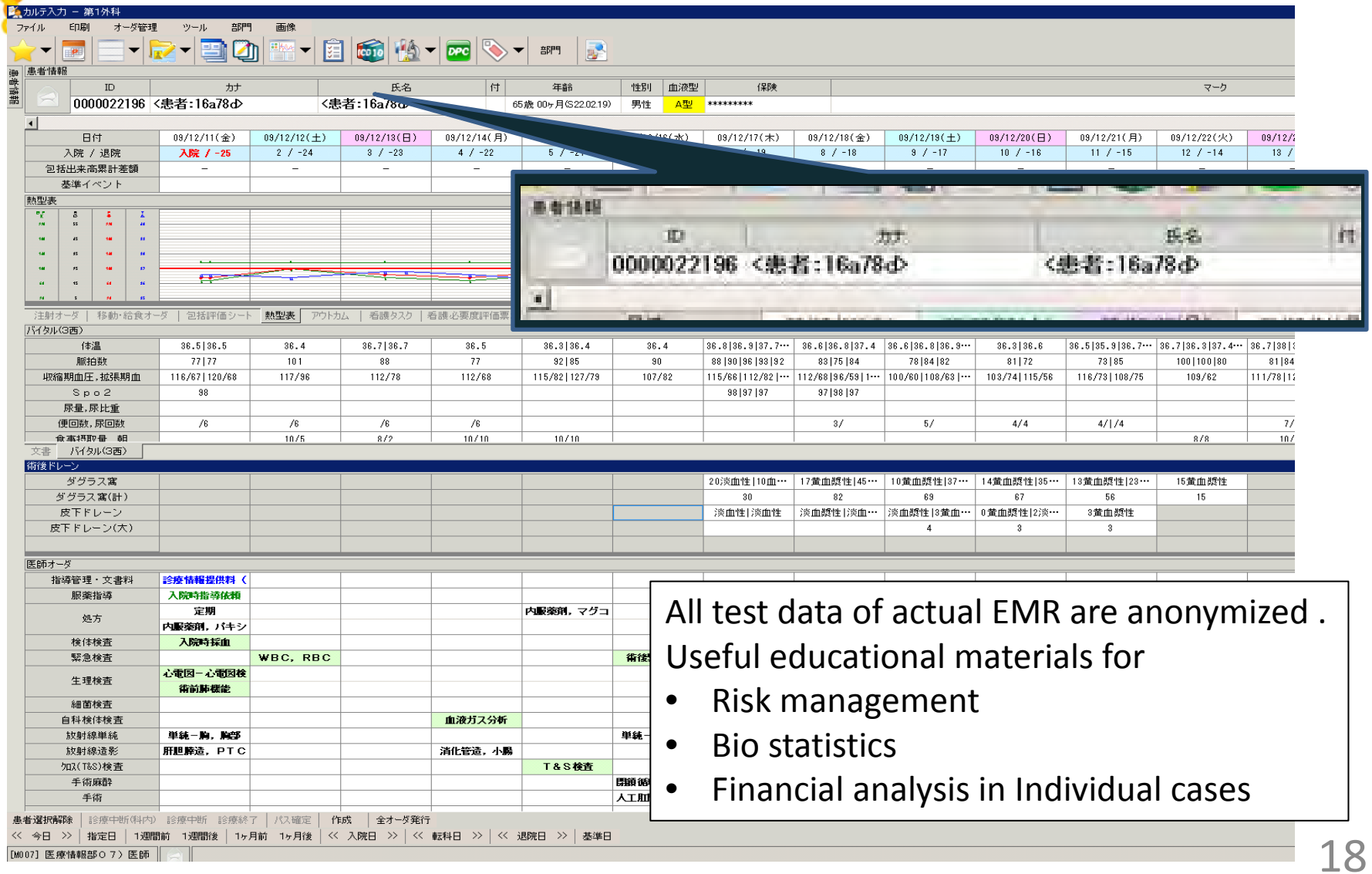
Professionals who are able to carry out the hypothesis-verification cycle when on-site Medical Services Innovation Theory

Lectures and practice using anonymous digitized records

Professionals who are able to carry out the hypothesis-verification cycle when on-site

Anonymized electronic medical records -Innovative educational materials-

Owl
God of knowledge



All test data of actual EMR are anonymized .
Useful educational materials for

- Risk management
- Bio statistics
- Financial analysis in Individual cases

EMR –IZANAMI –

electronic medical record

Moving IT from Cost to Value Centre

History of Development

Year	Month	Events
2003		The development of our EMR(IZANZMI) have been initiated. Hospitals played a central role in the development.
2006	May	**IZANAMI has worked in Miyazaki university hospital.**
2011	May	Mobile EMR(WATATUMI) has worked.
2013	Jan	**IZANAMI has worked in Kurume university hospital.**

System Features

- Standardization, quality control and efficiency of medical care

  →**Clinical path system**

- Ubiquitous

  →**Mobile EMR –WATATUMI-**

- Financial cost analysis system for medical care

  →**Mercury**

Owl
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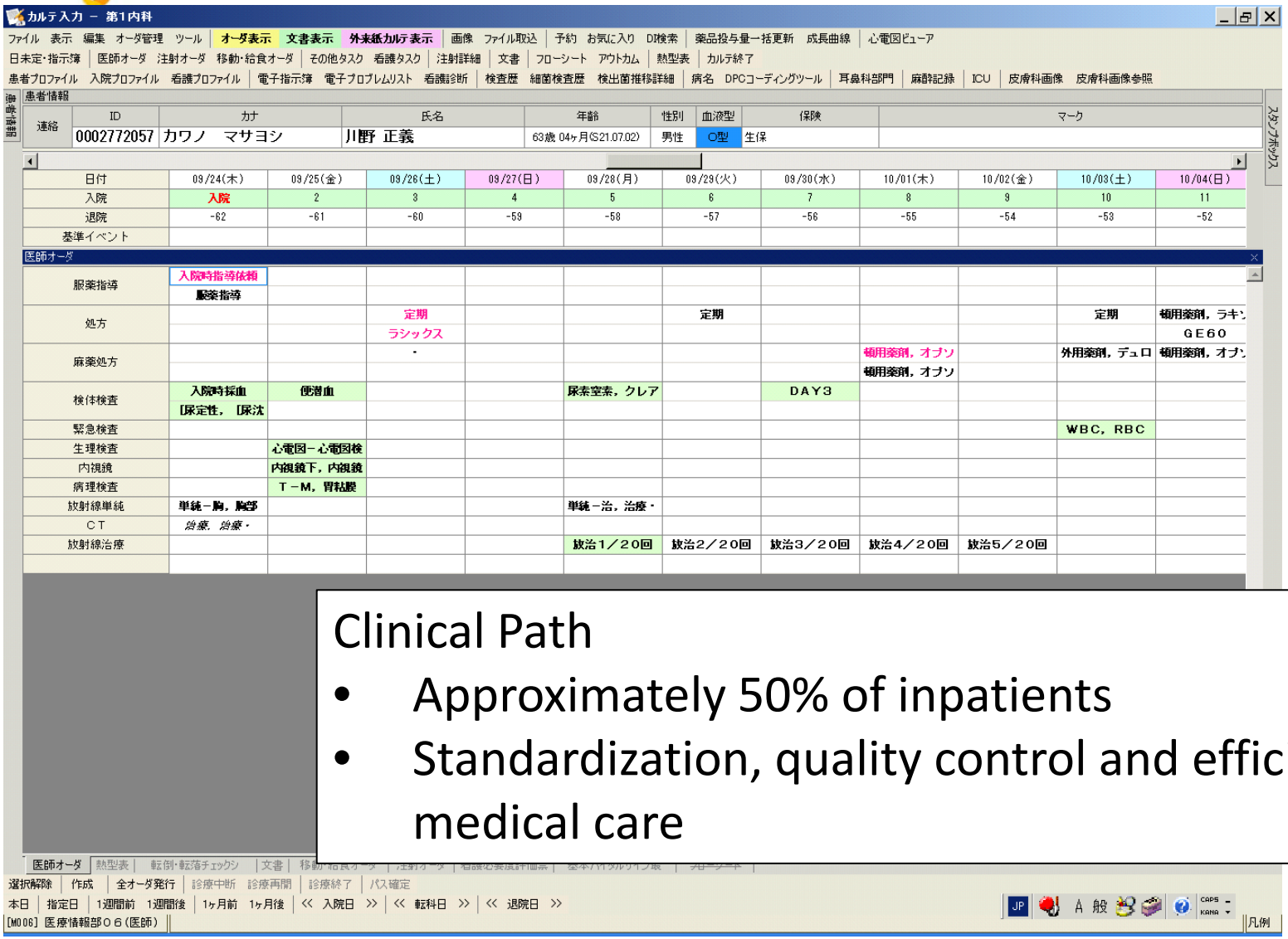
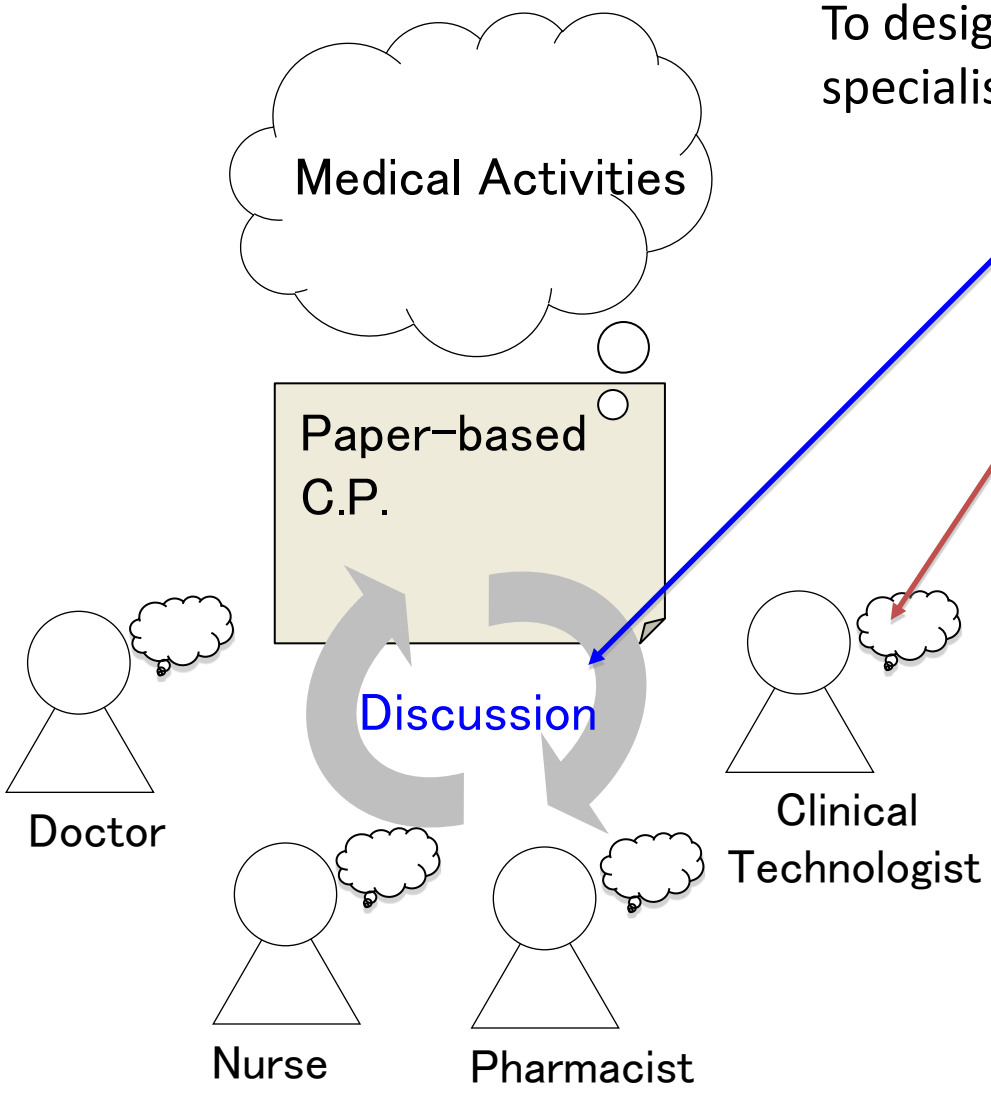
Clinical path system



Clinical Path

- Approximately 50% of inpatients
- Standardization, quality control and efficiency of medical care

Difficulties in C.P. Design

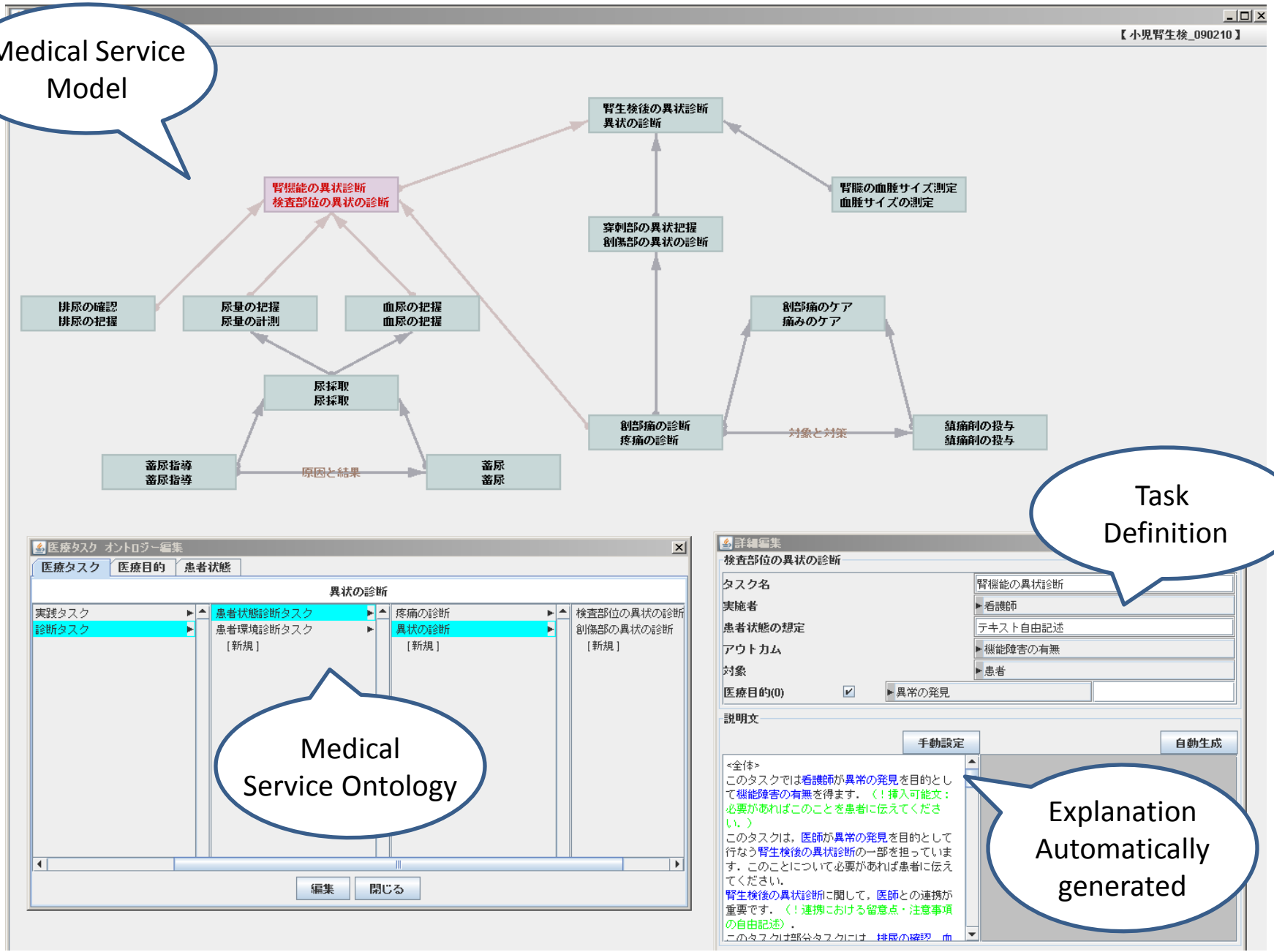


To design clinical pathway, medical specialists in the hospital have meetings.

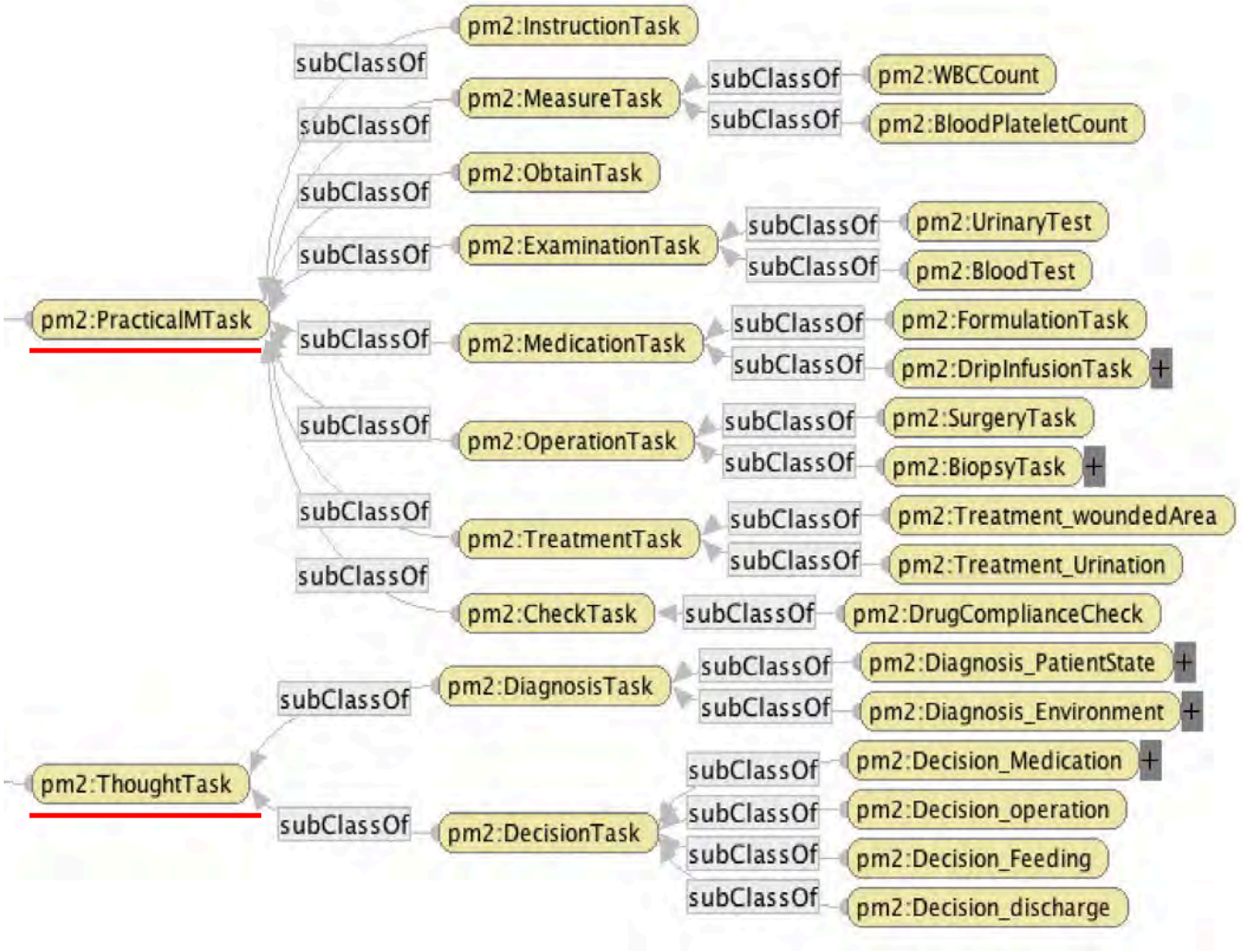
Difficulties:

1. Each specialist's vocabulary has different meaning.
2. Ideas about medical activities are based on their specialties and sense of worth. (We call their specialties and senses of worth their **viewpoints**) The viewpoints are sometime unclear and the misunderstanding of them causes confusions in discussion.
3. The discussions are done on paper-based media. And the process of discussions and the intention of the decisions are lost.

Medical Service Modeling Tool



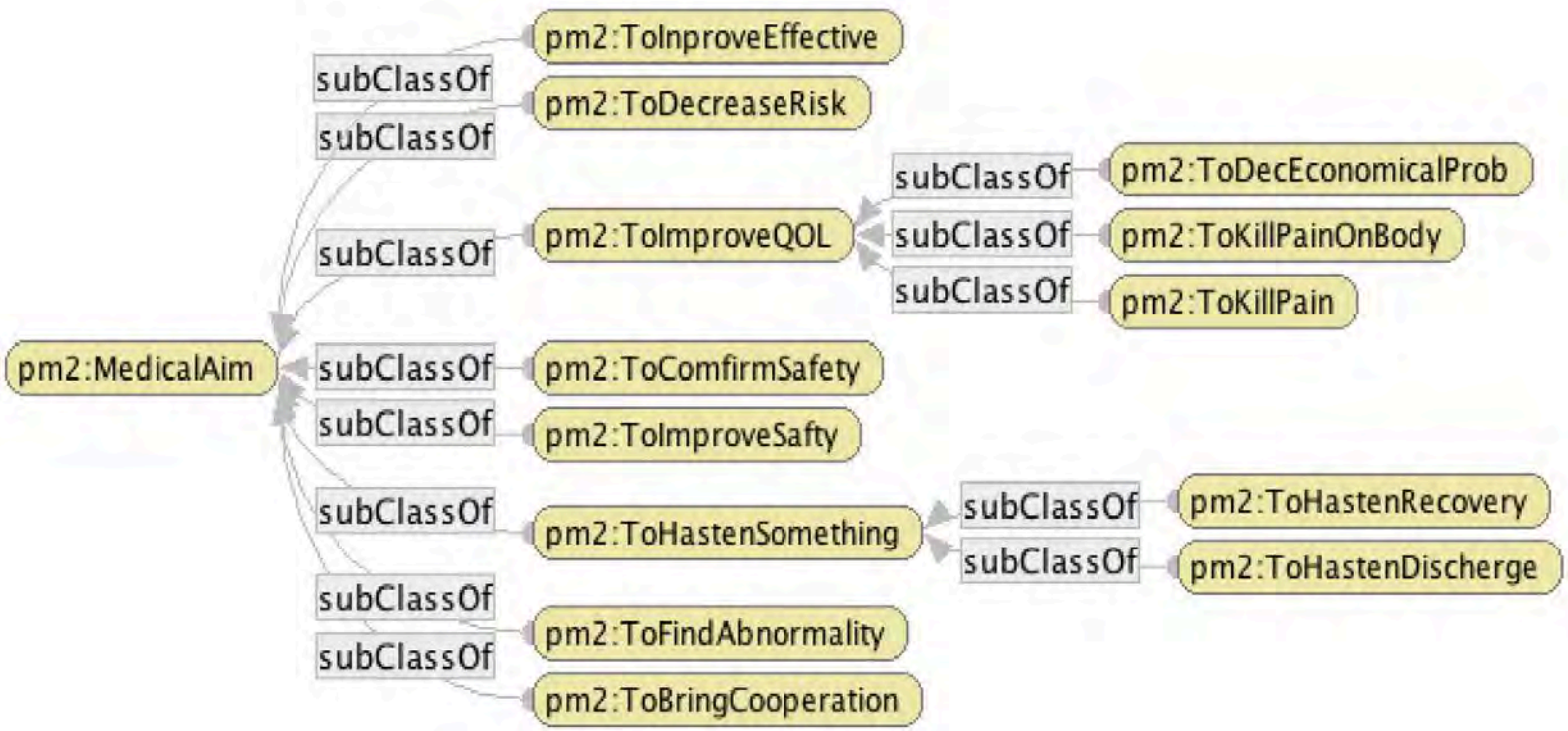
Medical service ontology



Medical Task

Environment: “Semantic Editor” developed by AIST

Medical service ontology



Medical Aim

Interview Massages Generated from the Model

Ex) The task of " Pain diagnosis" after biopsy of kidney

(1) Nurse do this task to decide to use pain-killer, and get the Degree of pain.

(2) This task is a part of Pain care task done by Nurse for the purpose to increase comfort.

Q1. How to judge the Degree of pain for the aim to increase comfort?

(3) This task is a part of Abnormity diagnosis task done by Doctor for the purpose to ensure patient safety.

So this task needs cooperation with Nurse and Doctor.

Q2. How to judge the Degree of pain for the aim to ensure patient safety?

Q3. What is key points and some consideration in the cooperation?

(4) The input (target) "Patient explanation about pain" may trigger patient's anxiety.

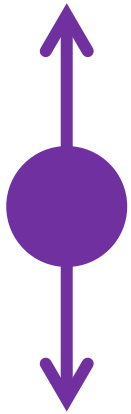
Please care the patient's mind, and give suitable explanation in executing it.

Q4. How to care the patient's mind?

Value of Pain

From **Doctors** Viewpoints : **Sign** of Disease

From **Nurses** Viewpoints :



From **Patients** Viewpoints : **Harm** caused by Disease

But it highly depends on Context

Answers to the interview messages

Q1. How to judge the Degree of pain for the aim to increase comfort?

A1. If the patient expresses pain, it should be respected. Give the pain-killer as soon as possible.

Q2. How to judge the Degree of pain for the aim to ensure patient safety?

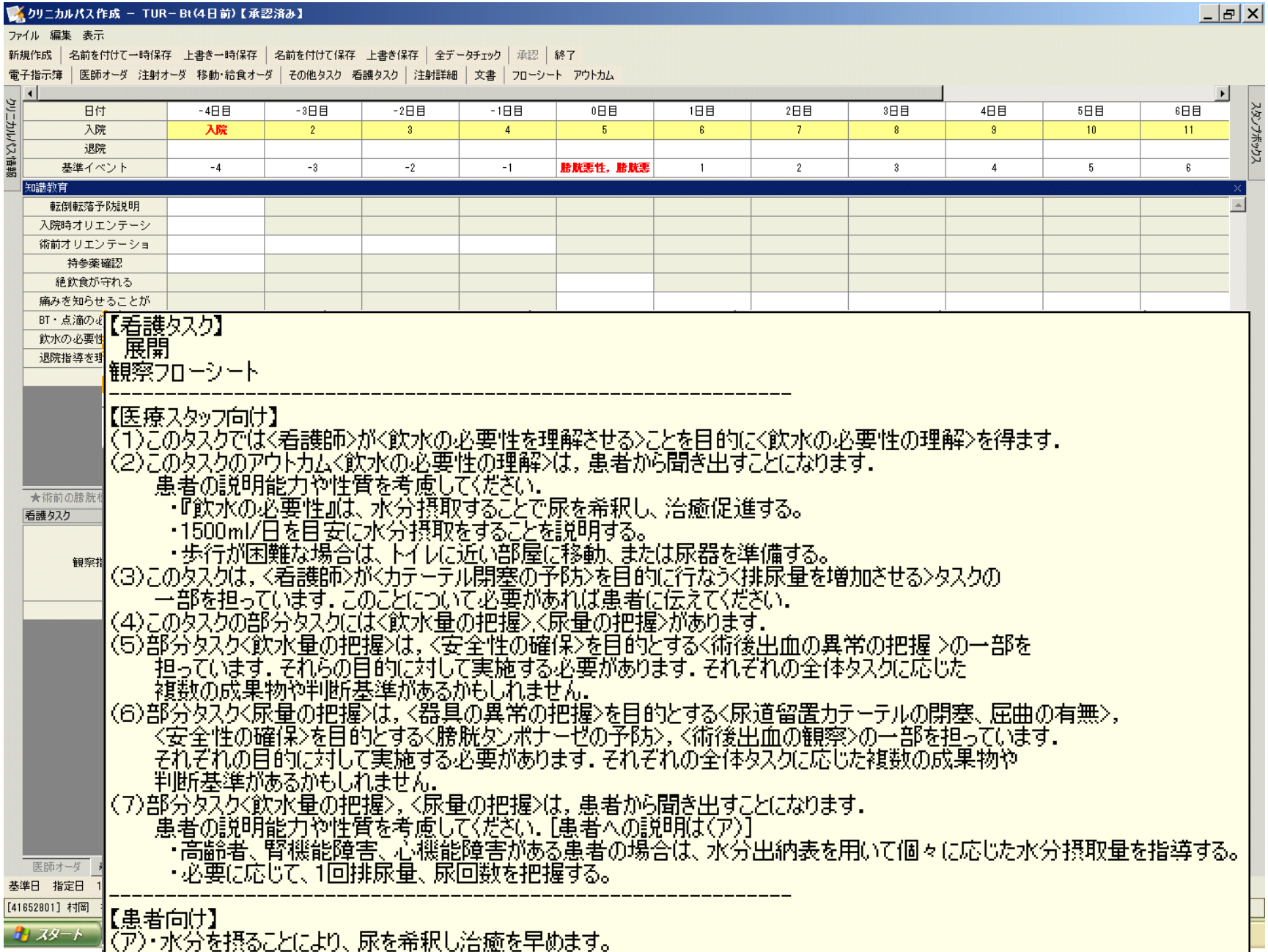
A2. The pain caused by the puncture site and the pain cause by some abnormality in the kidney or other organs. Distinguish the causes of the pain.

Q3. What is important consideration in team medicine?

A3. If you find or feel any sign of abnormality, inform doctors immediately.

Q4. How to care the patient's mind?

A4. Let patient know that "The pain-killer is already arranged. It is no needed to endure the pain." and "The pain is a important sign, and medical staff want to know it."


クリニカルパス作成 － TUR－Bt(4日前)【承認済み】
ファイル 編集 表示
新規作成 名前を付けて一時保存 上書き一時保存 名前を付けて保存 上書き保存 全データチェック 承認 終了
電子指示簿 医師オーダ 注射オーダ 移動・給食オーダ その他タスク 看護タスク 注射詳細 文書 フローシート アウトカム
日付 -4日目 -3日目 -2日目 -1日目 0日目 1日目 2日目 3日目 4日目 5日目 6日目
入院 入院 2 3 4 5 6 7 8 9 10 11
退院
基準イベント -4 -3 -2 -1 膀胱悪性，膀胱悪 1 2 3 4 5 6
知識教育
転倒転落予防説明
入院時オリエンテーシ
術前オリエンテーショ
持参薬確認
絶飲食が守れる
痛みを知らせることが
【看護タスク】
展開
観察フローシート
【医療スタッフ向け】
(1)このタスクでは<看護師>が<飲水の必要性を理解させる>ことを目的に<飲水の必要性の理解>を得ます．
(2)このタスクのアウトカム<飲水の必要性の理解>は，患者から聞き出すことになります．
患者の説明能力や性質を考慮してください．
・『飲水の必要性』は、水分摂取することで尿を希釈し、治癒促進する。
・1500ml/日を目安に水分摂取をすることを説明する。
・歩行が困難な場合は、トイレに近い部屋に移動、または尿器を準備する。
(3)このタスクは，<看護師>が<カテーテル閉塞の予防>を目的に行なう<排尿量を増加させる>タスクの
一部を担っています．このことについて必要があれば患者に伝えてください．
(4)このタスクの部分タスクには<飲水量の把握>,<尿量の把握>があります．
(5)部分タスク<飲水量の把握>は，<安全性の確保>を目的とする<術後出血の異常の把握 >の一部を
担っています．それらの目的に対して実施する必要があります．それぞれの全体タスクに応じた
複数の成果物や判断基準があるかもしれません．
(6)部分タスク<尿量の把握>は，<器具の異常の把握>を目的とする<尿道留置カテーテルの閉塞、屈曲の有無>，
<安全性の確保>を目的とする<膀胱タンポナーゼの予防>，<術後出血の観察>の一部を担っています．
それぞれの目的に対して実施する必要があります．それぞれの全体タスクに応じた複数の成果物や
判断基準があるかもしれません．
(7)部分タスク<飲水量の把握>，<尿量の把握>は，患者から聞き出すことになります．
患者の説明能力や性質を考慮してください．[患者への説明は(ア)]
・高齢者、腎機能障害、心機能障害がある患者の場合は、水分出納表を用いて個々に応じた水分摂取量を指導する。
・必要に応じて、1回排尿量、尿回数を把握する。
【患者向け】
(ア)・水分を摂ることにより、尿を希釈し治癒を早めます。
・1日1500mlを目標に摂取しましょう。
・飲水について疑問のあるかたは，スタッフに尋ねてください．尿道留置カテーテルを抜いたあとは、
1日の尿を全てためてください。

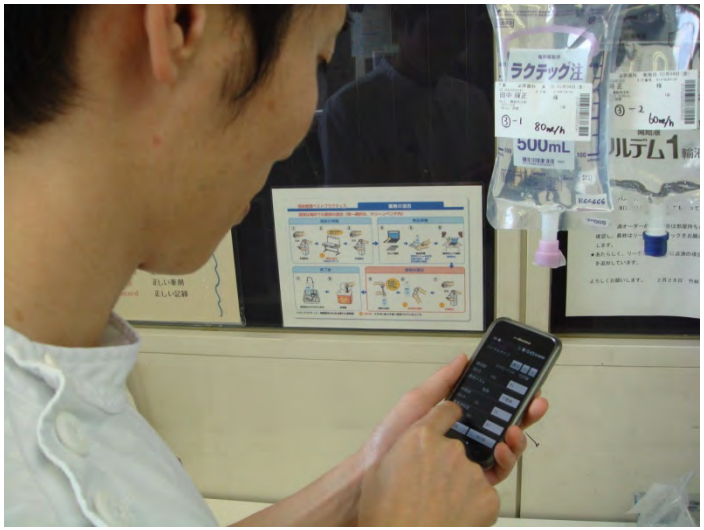
Preliminary Summary of Questionnaires/Interview

- Most of the nurses(87%) appreciate the explanation and follow the suggestion.
- Most of the nurses(95%) agreed that the explanations are useful for them to share the nursing practical knowledge.

- The average quality of explanation to the patients seems improved.
- The explanation is hard to understand.
- It maybe more useful if we can use mobile devices to read it at the patients' bed side.
- The explanation is too long for busy nurse to read.
- It is very useful to knowledge transfer from expert to novice.

Mobile EMR –WATATUMI-

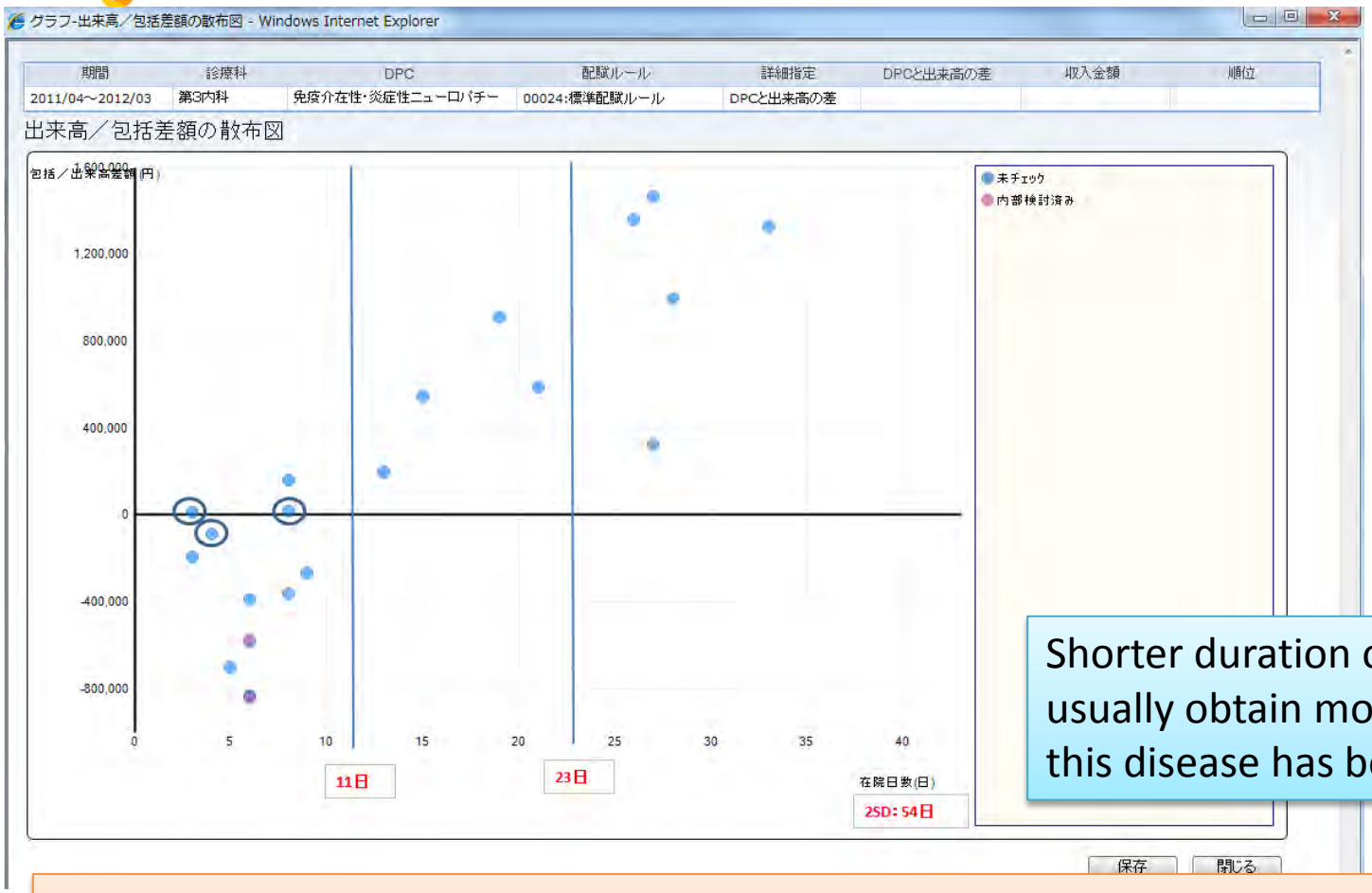
- Android smartphone
- About 600 devises



Mercury

Financial cost analysis system for medical care

Owl
God of knowledge



Shorter duration of hospital stay usually obtain more profit, However, this disease has become reversed.

Sample view of Mercury
Disease; Immune-mediated inflammatory neuropathy
Vertical; **Profits** Horizontal; **admitted days** Each dot represents one inpatient

Moving IT from Cost to Value Centre

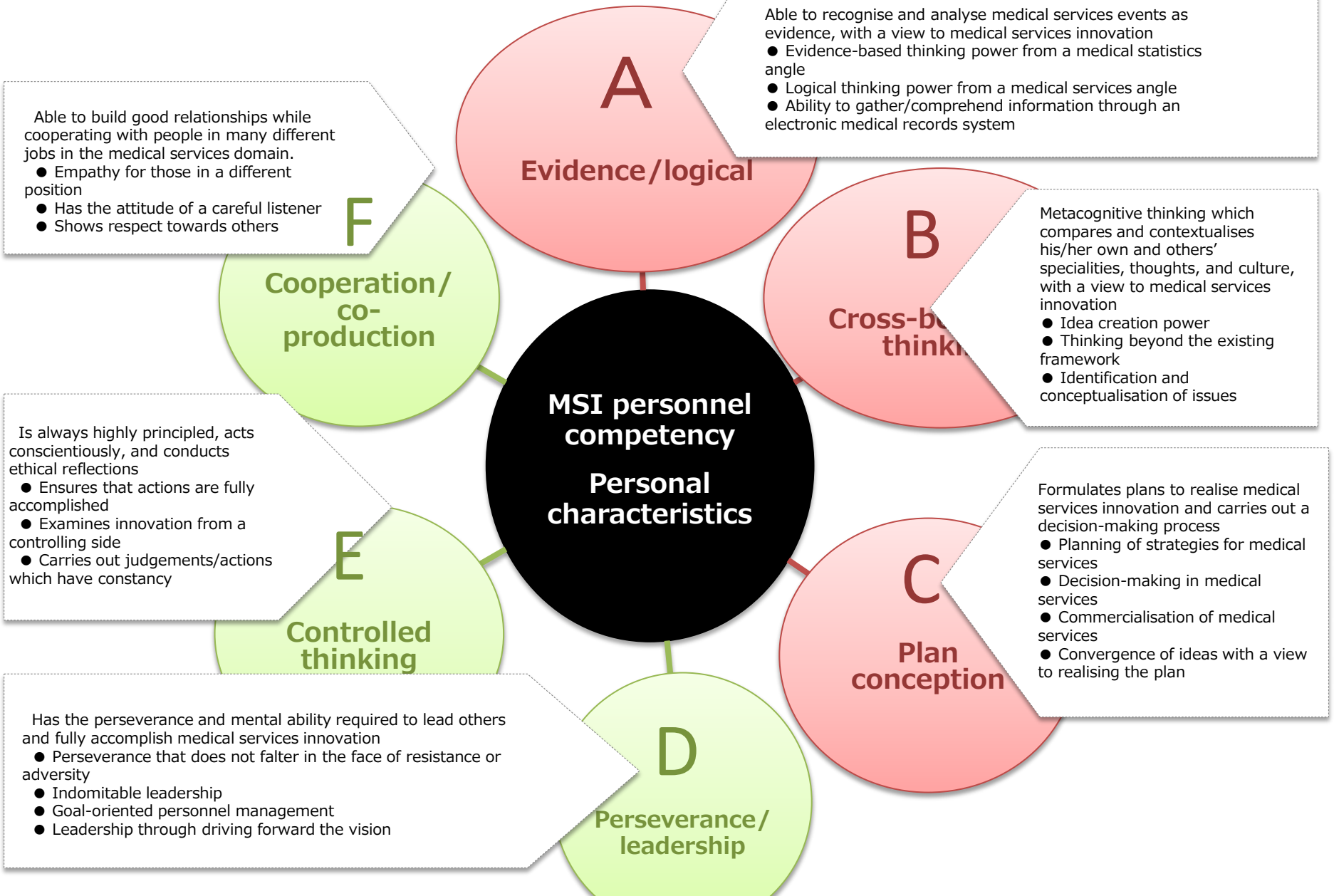
The first goal	actual system =cost	Result →Value
Standardization, quality control and efficiency of medical care	Clinical path system	1. Hospital stay was shorten. 2. Financial balance has been improved.
Ubiquitous	Mobile EMR WATATUMI	1. Overtime for nurses has been reduced. 2. The contact time is increased between nurse and patient.
Financial cost analysis system for medical care	Mercury	1. Doctors are now interested in the cost.

Moving IT from Cost to Value Centre

MSI Personnel Competency

(Medical Service Innovation)

MSI Personnel Competency



Knowledge/Skill Set (1)

Knowledge and skills related to Competency (A)

▼Competency	▼Knowledge	▼Skills	▼Explanation
【A】 **Evidence/Logical** ● Keywords: Evidence, analytical ability, logical thinking, comprehension of situation, information gathering	Knowledge which relates to medical statistical definitions with medical services events, both organically and logically, and thereby comprehends them integrally	Comprehends medical services and task-based events as evidence	Identifies medical services and task-based events as evidence
		Interprets medical services and task-based events as evidence	Using a hypothesis, interprets the evidence obtained from medical services and task-based events
		Derives medical services innovation from such interpretation	Interprets medical services and task-based events on the basis of hypothetical standards and then uncovers medical services innovation
		Describes medical services innovation from evidence	Explains medical services innovation statistically on the basis of the evidence
	Knowledge that comprehends electronic medical records system through its integration into medical services events	Enters medical records in the electronic records system having understood medical services events logically	Enters medical records in the electronic records system having understood the subject logically
		Enters medical records in the electronic records system having contextualised medical services events	Enters medical records in the electronic records system having contextualised the subject
		Considers electronic medical records data by relating them to medical services events	Considers electronic medical records data by organically and logically linking them with medical services events
		Derives medical services innovation on the basis of the relationship between electronic medical records data and medical services events	Considers electronic records data through its integration into medical services events and uncovers knowledge and medical service innovation from new sides
		Constructs a framework of the electronic medical records data which will contribute to medical innovation	Uncovers evidence that has not been identified by the existing electronic medical records system, despite it being useful for medical services innovation. Constructs an electronic medical records system so that such evidence can be integrated into it and utilised

■ Knowledge-evaluation scale
'Understand'; 'Ability to demonstrate in lectures, etc.'; 'Ability to demonstrate on site'

■ Skill-evaluation scale
'Reproducible'; 'Can demonstrate in seminars, etc.'; 'Can demonstrate on site'

Knowledge/Skill Set (2)

Knowledge and Skills related to Competency (A)

▼Competency	▼Knowledge	▼Skills	▼Explanation
【B】 Cross-boundary thinking ● Keywords Metacognitive, goes beyond the existing framework, identifies issues, idea creation	Knowledge that moves beyond the established paradigm in medical services environments, and possesses the attitude and thinking pattern which will form a basis for producing a completely new knowledge paradigm	Critically examines the paradigm established in medical services environments	Critically examines the paradigm established in medical services environments and understands the paradigm's relativity
		Exploits a new paradigm in the medical services environment	Examines the influence of the emergence of a new paradigm in medical services environments over the actors and surrounding environment
	Knowledge that understands the fundamental concepts required to create knowledge in medical services and has to be possessed either as the core for creating knowledge or the core for promoting knowledge creation	Identifies the issues in medical services	Identifies the issues which form the starting points of knowledge creation in medical services
		Medical services data gathering/analysis	Conducts data gathering/analysis which will contribute to knowledge creation in medical services
		Medical services data sharing	Shares data with related actors with a view towards knowledge creation in medical services
		Empathises with others in medical services	Empathises with others with a view towards knowledge creation in medical services
		Converts tacit knowledge in medical services into explicit knowledge	Reflects on experiences, etc., in medical service sites and converts this into explicit knowledge
	Knowledge that, based on metacognition, contextually understands one's own behaviour and thinking within medical services environments	Conducts internal dialogue (thoughts of self) in the medical services environment	Logically states, in writing, one's own thinking in medical services environments
		Conducts internal dialogue (thoughts of others) in the medical services environment	Speculates on others' thinking in medical services environments and writes it logically
		Conducts dialogue with others in the medical services environment	Reflects an internal self-dialogue in the medical services environments onto a dialogue with others
		Uses strategic thinking to conduct a dialogue process in the medical services environment	Strategically develops one's dialogue with others on the basis of the dialogue with others and internal self-dialogue in medical services environments
	Understanding of the medical services structure	-	Understands the structure of medical services events (provision/reception)
	Understanding of medical services innovation	-	Understands innovation in medical services events
	Understanding patients' satisfaction	-	Understands satisfaction from the perspective of those who receive medical services
	Knowledge that goes beyond the specialties of oneself and others in the medical services environment and integrates each other's specialties into achieving innovation	Relativises one's own specialty in medical services environments	Understands one's own specialty in medical services environments in the context of other specialties and conducts dialogue
		Being translational to different specialties within medical services environments	Understands how different specialties in medical services environments relate to goals and task-based events and translates this knowledge in order to motivate the other specialty
		Integrates specialties in medical services environments	Integrates each profession/specialty, draws the vision, and obtains cooperation in order to realise medical services innovation

■ Knowledge-evaluation scale

'Understand'; 'Ability to demonstrate in lectures, etc.'; 'Ability to demonstrate on site'

■ Skill-evaluation scale

'Reproducible'; 'Can demonstrate in seminars, etc.'; 'Can demonstrate on site'

Knowledge/Skill Set (3)

Knowledge and Skills related to Competency (C)

▼Competency	▼Knowledge	▼Skills	▼Explanation
【C】 Plan conception ● Keywords Formulates plans, decision-making, commercialisation, realisation, convergence	Knowledge which utilises/organises and manages/administers personnel, resources, and knowledge in order to achieve goals	Prepares roadmap for the realisation of medical services innovation	Comprehends the various elements needed to realise medical services innovation (personnel, funding, knowledge, etc.), plans to utilise them, and then correlates them as the time schedule of work until the realisation of innovation
		Ranks task-based events in terms of priority	Ranks elements, such as items achieved and action items, in terms of priority and raises the possibility of realising innovation
		Distributes resources	In order to mobilise various necessary elements, obtains the cooperation of related actors and leads these actors or encourages their cooperation
	Socialisation of medical services innovation	-	Understands the possibilities regarding policies to realise medical services innovation and selects appropriate socialisation options to realise one's own innovation
	Finance	-	Procures the finances necessary for the realisation of medical services innovation
	Government policy and industrial/academic partnership	-	Procures community alliances including policy support and industrial/academic partnerships which are necessary for the realisation of medical services innovation
	Organisation/people/information	-	Procures the organisation, personnel, and information necessary for the realisation of medical services innovation
	Intellectual property	-	Formulates plans for the intellectual property required to realise medical services innovation
	Internationalisation	-	Conducts the international development and procurement necessary for the realisation of medical services innovation
	Research and development	-	Sets into action research and development activities which are necessary for the realisation of medical services innovation
	Marketing	-	Plans the realisation of medical services innovation from a marketing perspective
	Knowledge which strategically comprehends the reality and strategically solves problems	Strategically analyses medical services innovation	Examines medical services innovation from a strategic perspective and analyses its effects and impact
		Strategically plans development	Conducts an investigatory analysis of the process leading up to the realisation of medical services innovation from a strategic perspective
		Applies strategy to the real world	Uses strategic thinking with a view to the realisation of medical services innovation
	Solves set task-based events through process development	Considers the overall development of the process whereby issues are identified and ultimately solved	Identifies the issues in medical services environments and assumes the process development that will ultimately solve the issues by relating them to elements such as actors in medical services environments
		Plans process development in detail	After identifying the issues in medical services environments and relating to actors the process development which will ultimately solve the issues, then designs each process, each actors' role, output, and results
		Puts process development into practice	Puts the planned process development into actual operation with the cooperation of the actors while exercising leadership
		Conducts effective process development	Improves the effectiveness/efficiency of the planned process development

■ Knowledge-evaluation scale

'Understand'; 'Ability to demonstrate in lectures, etc.'; 'Ability to demonstrate on site'

■ Skill-evaluation scale

'Reproducible'; 'Can demonstrate in seminars, etc.'; 'Can demonstrate on site'

Knowledge/Skill Set (4)

Knowledge and Skills related to Competency (D) (E) (F)

▼Competency	▼Knowledge	▼Skills	▼Explanation
【D】 **Perseverance/leadership** ● Keywords Perseverance, leading others, personnel management, guidance, driving forward	Acts in such a way that the desires of oneself and others are managed without being swayed by changes and difficulties in medical services environments	Spontaneous motivation management	Spontaneously manages desires and acts proactively, irrespective of the influence from surrounding medical services environments
		Motivation management of others	Stimulates and motivates others and manages the psychological environment of team members and the parties concerned, who work towards accomplishing innovation
		Recuperative power	Has recuperative power including the durability/resilience against difficulties, adversity, resistance, etc.
		Adaptability	Even when faced with adversity, sufficiently comprehends the environment and prepares strategic development with a view to realising innovation
		Forward thinking	Presents the vision which needs to be realised (principle/ideal) and convinces those surrounding oneself
【E】 **Controlled thinking** ● Keywords Highly principled, ethical, conscientious, reliable, controlled, continuous	Knowledge which considers MSI in a controlled manner	Conscientious	Copes with any situation with sincerity and acts with an open mind
		Acts according to ethics	Has not only the ethics based on external control, such as rules and regulations, but also an internal ethical view and acts according to this
		Example by leadership	Takes the initiative without demanding recompense; brings together and encourages those surrounding oneself
【F】 **Co-production** ● Keywords Cooperation, communication, careful listening, respect for others	Carries out communication which contributes to medical services innovation	Relationship building	Builds human relationships based on which innovation will be produced
		Acute awareness	Identifies people's psychological changes, both in oneself and in others, and changes in the organisation's atmosphere, incorporating this in his/her judgements
		Conflict management	Resolves various conflicts which arise in the process of accomplishing goals
		Negotiation	Comprehends specialties, organisational culture, public and private networks, power balance, etc., and maximises their potential with a view to accomplishing goals
		Careful listening/receptivity	Encourages communication so as to make the other feel at ease when talking
		Stability/constancy	Shows psychological stability and constancy in any critical phases of work
		Respect for a diverse range of specialties	Respects a diverse range of specialties and makes efforts towards accomplishing goals

■ Knowledge-evaluation scale

'Understand'; 'Ability to demonstrate in lectures, etc.'; 'Ability to demonstrate on site'

■ Skill-evaluation scale

'Reproducible'; 'Can demonstrate in seminars, etc.'; 'Can demonstrate on site'

MSI Personnel Performance

【A】Act logically on the basis of evidence

【B】Act according to cross-boundary/metacognitive thinking

【C】Plan strategies through innovation

【D】Lead others/team with perseverance

【E】View innovation from a controlling angle

【F】Co-produce through cooperation with others

Relationship between Module Developed and Performance Acquisition

	Medical services innovation theory	Medical services statistics theory	Medical services statistics theory seminar	Medical services knowledge creation theory	Medical services knowledge creation theory seminar	Medical services innovation seminar I	Medical services innovation seminar II
	Having taught the basics of knowledge science and services innovation, give an overview on how to apply this to hospital management, community cooperation, medical safety, etc.	Having taught the basics of medical statistics through lectures, help learners acquire the skills by conducting seminars which make use of anonymous electronic medical records and foster basic skills for turning on hypothesis-testing cycles on sites.		Help learners master the theories of metacognition/critical thinking/internal reflection/argumentation required for medical services knowledge creation, through active learning-type lectures/seminars, and foster independent problem-solving ability.		Use PBL-type workshops to foster a comprehensive ability to apply what was learned in the module to the real problems faced by the Faculty of Medicine, University of Miyazaki Hospital, as well as Kurume University Hospital	
【A】 Understand, consider and search logically on the basis of evidence	●	●	●	●			●
【B】 Act according to cross-boundary/metacognitive thinking	●	●	●	●	●		●
【C】 Draw/Design innovation as a strategy	●	●	●		●		●
【D】 Lead others/team with perseverance					●	●	●
【E】 View innovation from a controlling angle					●	●	●
【F】 Co-produce through cooperation with others						●	●

Medical Knowledge Science

- Medical Service Knowledge Circulation by Medical Record System.
- Education Program for Medical Knowledge Co-creation Skill
- Patients Centered Quality Indicator Ontology
- Learning/Knowledge Sharing Support of Medical Incident Analysis
- SNS to Foster Diabetes Patients Community

Background

By participating workshop in collaborative medical institutions, We have discovered that each institution have its own demand of education, because philosophy and missions of organizations are various.

e.g.

Wakayama Medical University Hospital (Teaching Hospital)

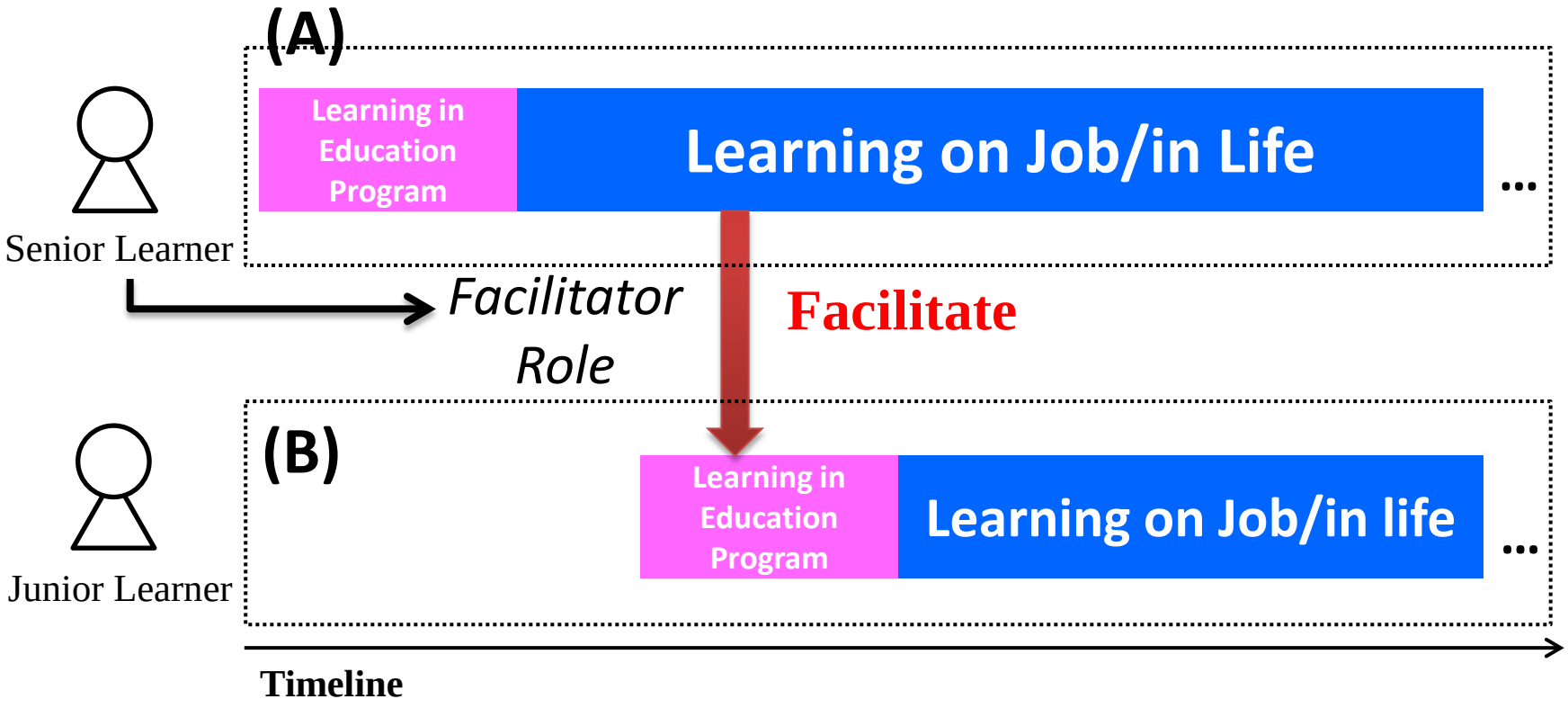
Request to require skills of leading the discussion.

Houju Memorial Hospital (Regional Hospital)

Request to require skills of discussion with patients.

It is necessary to provide an **education supporting mechanism** that can help each medical institution to design the education that can match the institution's conditions and requirement.

Characteristic of Education We Preferred



Role of "facilitator" for shaping the education mechanism in organization

Research Objective

To develop an education program design modeling tools for supporting facilitators

1. To understand design intention (especially learning goal, and strategies for facilitating) of education program.
2. To design education program that can match their institution’s conditions and requirement.

Research Questions

To clarify and represent design intention of education program

Issue of Research: How to help facilitator to understand design intentions of education program, which are complex and abstract because of unstructured and implicit background knowledge.

RQ1: What is background knowledge behind design intentions of education program?

RQ2: How to represent background knowledge?

Theoretical Background

Metacognition

- "thinking about thinking" (Flavell, 1979)
- Complex constructs (Sannomiya, 2008; Tarricone, 2011)
- Related to "Reflection" (Dewey, 1933; Piaget, 1970; Vygotsky, 1978)

Collaborative learning

- A concept rooted in philosophy, especially in Piagetian and Vygotskyian traditions (Stahl, 2006)
- "scaffolding" vs. "teaching" (Maruno, 2010; Saweyr, 2006)

Instructional Design

- "linking science" (Reigeluth, 1983)
- Many theories and models
  - ADDIE (Gagné et al., 2004)
  - Gagné's Theory of Instruction (Driscoll, 2004)
  - ARCS Model (Keller, 2000)

Ontological Engineering

- Common vocabularies for conceptual framework that can representing knowledge (Gómez-Pérez et al., 2004)
- AI-ED research (Mizoguchi et al., 2000)
- OMNIBUS Ontology (Hayashi et al., 2009)

Theoretical Background

Object of Education

Team medicine requires a medical profession to think while considering the viewpoint of patient, doctor and nurse in the higher level. It is related to “Metacognition”, which means “thinking about thinking”.

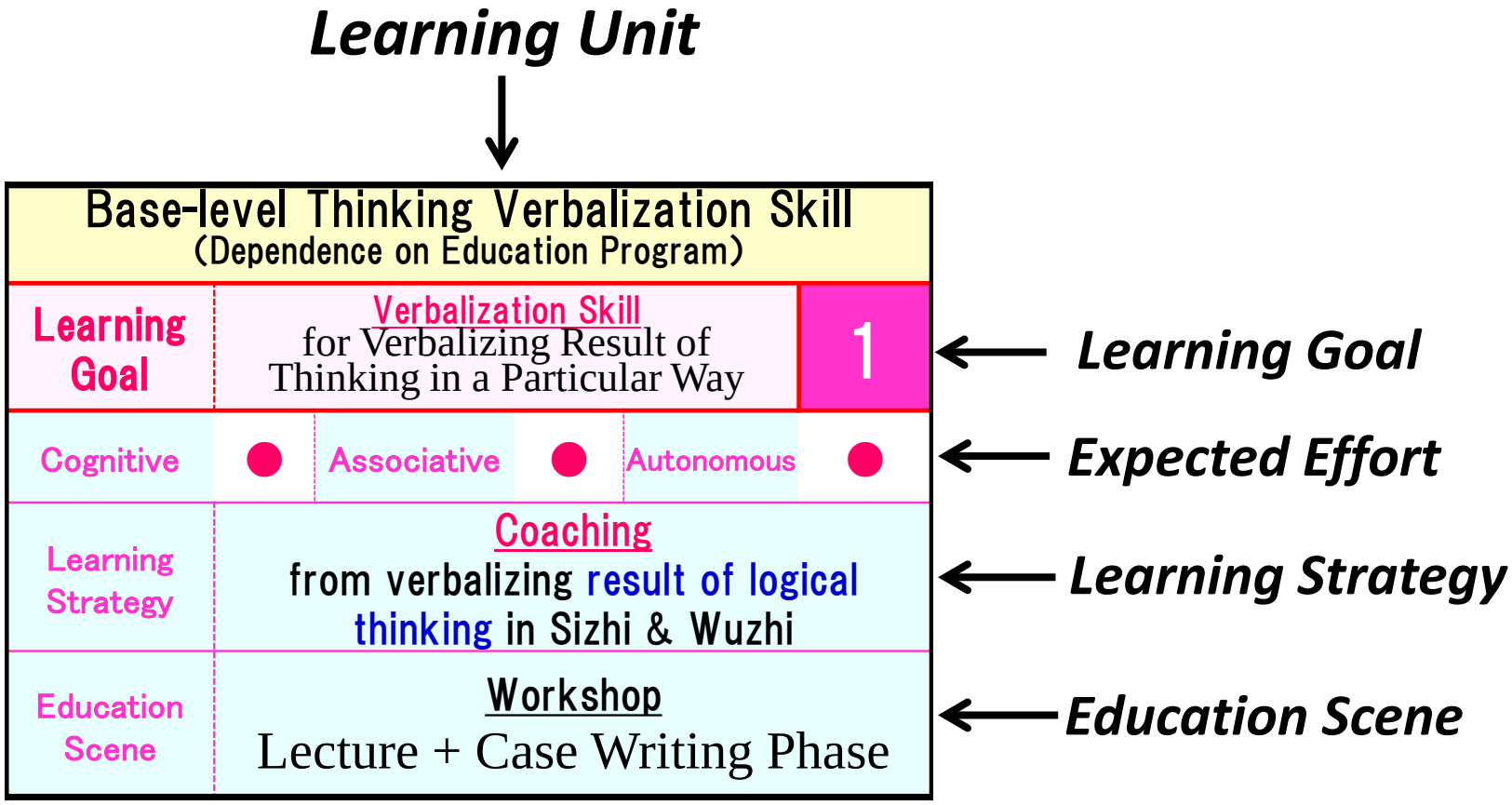
Education Methods

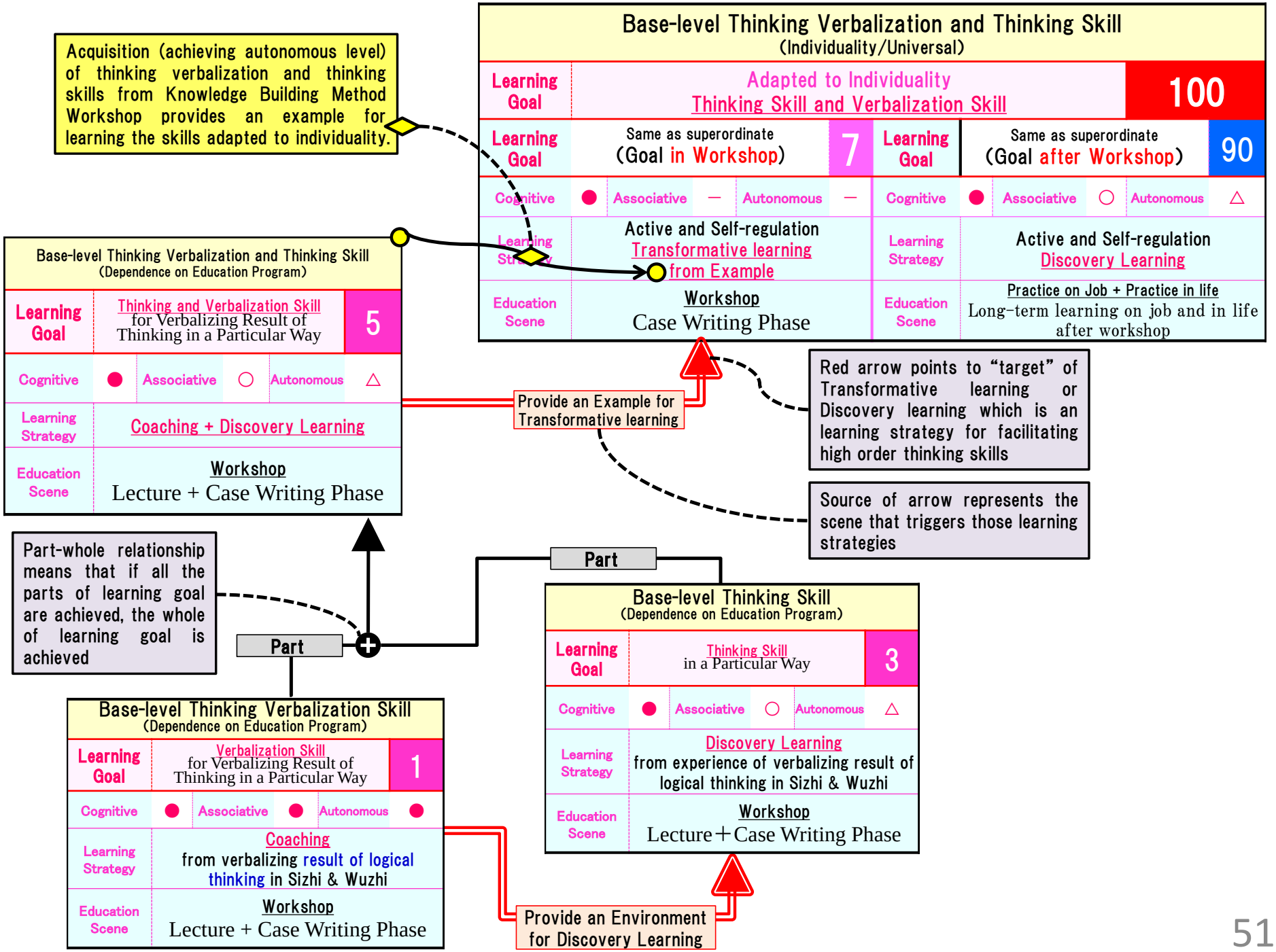
“Learning in social interaction" can provide the learners rich resources for learning knowledge and skill related with unformulated problems.

Design of Education

Affective domain of intelligence (such as motivation) is considered important for education of high order thinking skills (such as metacognition).

Intention of Education Program




Acquisition (achieving autonomous level) of thinking verbalization and thinking skills from Knowledge Building Method Workshop provides an example for learning the skills adapted to individuality.
Base-level Thinking Verbalization and Thinking Skill
(Individuality/Universal)
Learning Goal
Adapted to Individuality
Thinking Skill and Verbalization Skill
100
Learning Goal
Same as superordinate
(Goal in Workshop)
7
Learning Goal
Same as superordinate
(Goal after Workshop)
90
Cognitive ● Associative — Autonomous —
Cognitive ● Associative ○ Autonomous △
Learning Strategy
Active and Self-regulation
Transformative learning
from Example
Learning Strategy
Active and Self-regulation
Discovery Learning
Education Scene
Workshop
Case Writing Phase
Education Scene
Practice on Job + Practice in life
Long-term learning on job and in life after workshop
Base-level Thinking Verbalization and Thinking Skill
(Dependence on Education Program)
Learning Goal
Thinking and Verbalization Skill
for Verbalizing Result of Thinking in a Particular Way
5
Cognitive ● Associative ○ Autonomous △
Learning Strategy
Coaching + Discovery Learning
Education Scene
Workshop
Lecture + Case Writing Phase
Provide an Example for Transformative learning
Red arrow points to "target" of Transformative learning or Discovery learning which is an learning strategy for facilitating high order thinking skills
Source of arrow represents the scene that triggers those learning strategies
Part-whole relationship means that if all the parts of learning goal are achieved, the whole of learning goal is achieved
Part
Part
Base-level Thinking Skill
(Dependence on Education Program)
Learning Goal
Thinking Skill
in a Particular Way
3
Cognitive ● Associative ○ Autonomous △
Learning Strategy
Discovery Learning
from experience of verbalizing result of logical thinking in Sizhi & Wuzhi
Education Scene
Workshop
Lecture＋Case Writing Phase
Base-level Thinking Verbalization Skill
(Dependence on Education Program)
Learning Goal
Verbalization Skill
for Verbalizing Result of Thinking in a Particular Way
1
Cognitive ● Associative ● Autonomous ●
Learning Strategy
Coaching
from verbalizing result of logical thinking in Sizhi & Wuzhi
Education Scene
Workshop
Lecture + Case Writing Phase
Provide an Environment for Discovery Learning

Importance of Thinking Skills

In the real world, there are so many problems, which do not have correct answers.

Especially, in medical service practice, each position or role (such as patient, doctor, and nurse) has its own viewpoint.

In the future trend of *patient centered medical service and team medicine*, it is crucial to acquire the abilities of

- **Thinking from various viewpoints**
- **Understanding essence of idea from each viewpoint**
- **Balancing or overcoming conflicts between these viewpoints**

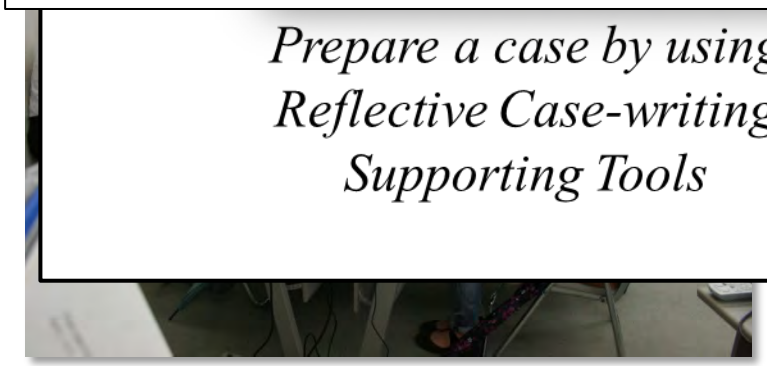
Knowledge Building Method(KBM) Workshop

Fundamental Structure of Workshop

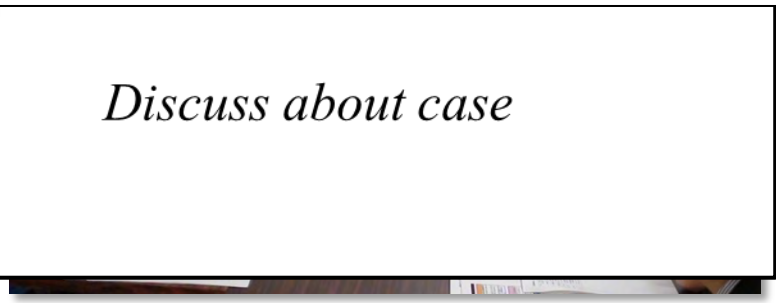
Impression: Many medical professions are facing a lot of serious problems, but it is quite difficult for them to express them smoothly and clearly.

Prepare a case by using Reflective Case-writing Supporting Tools

Discuss about case



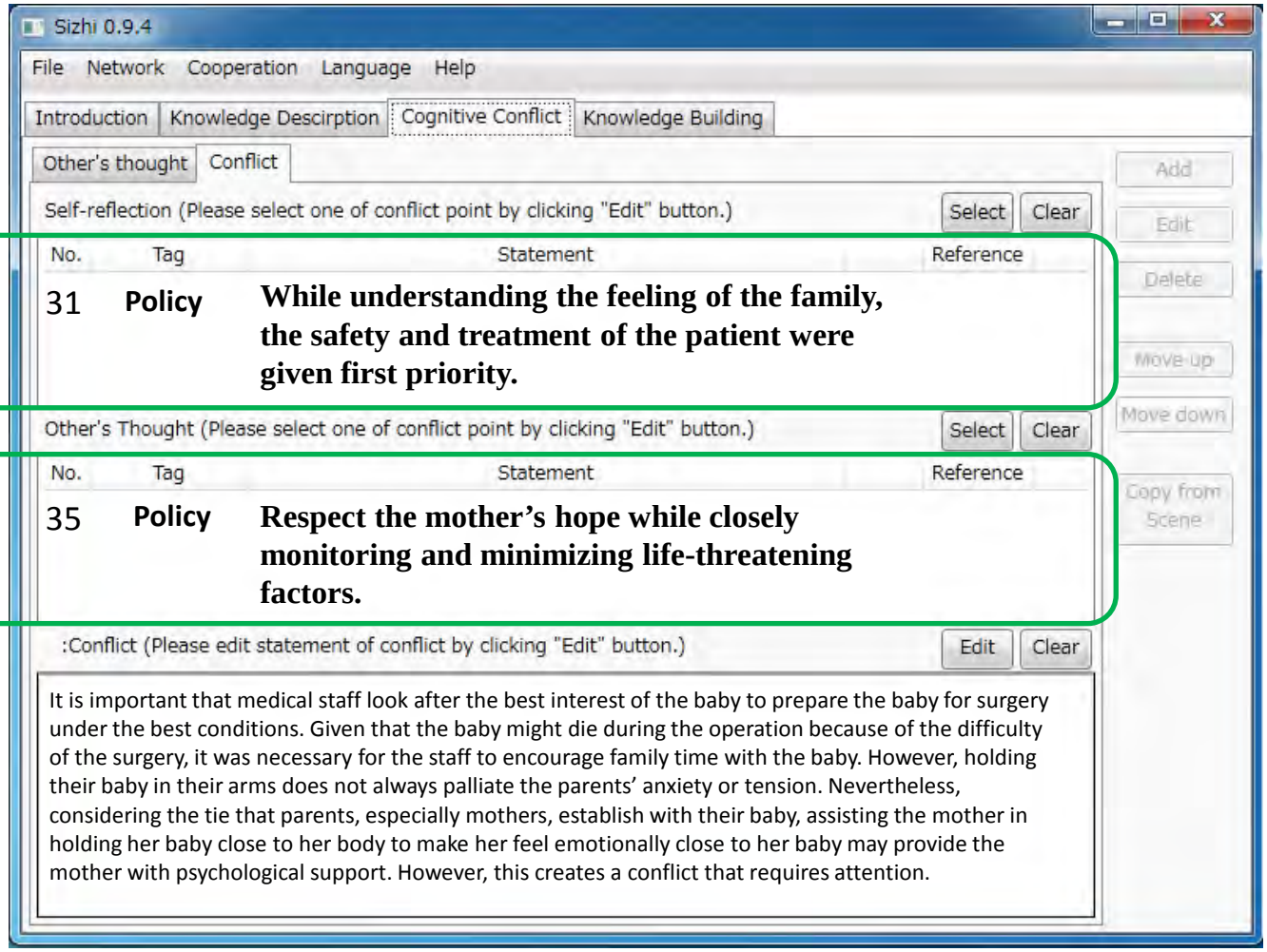
Wakayama Medical University Hospital
(3 times, 5 participants at maximum numbers)



Houju Memorial Hospital
(4 times, 5 participants at maximum numbers)

Sizhi: A Reflective Case-writing Supporting Tool

"Scaffolding" of Thinking in Two Different Viewpoints



Wei CHEN, Masaki FUJII, Liang CUI, Mitsuru IKEDA, Kazuhisa SETA & Noriyuki MATSUDA: Sizhi: Self-Dialogue Training through Reflective Case-Writing for Medical Service Education, Workshop Proceedings of the 19th International Conference on Computers in Education (in CD-ROM), Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education, p.551-558, 2011.

A Practical Case from KBM Workshop (1)

Briefing of Case

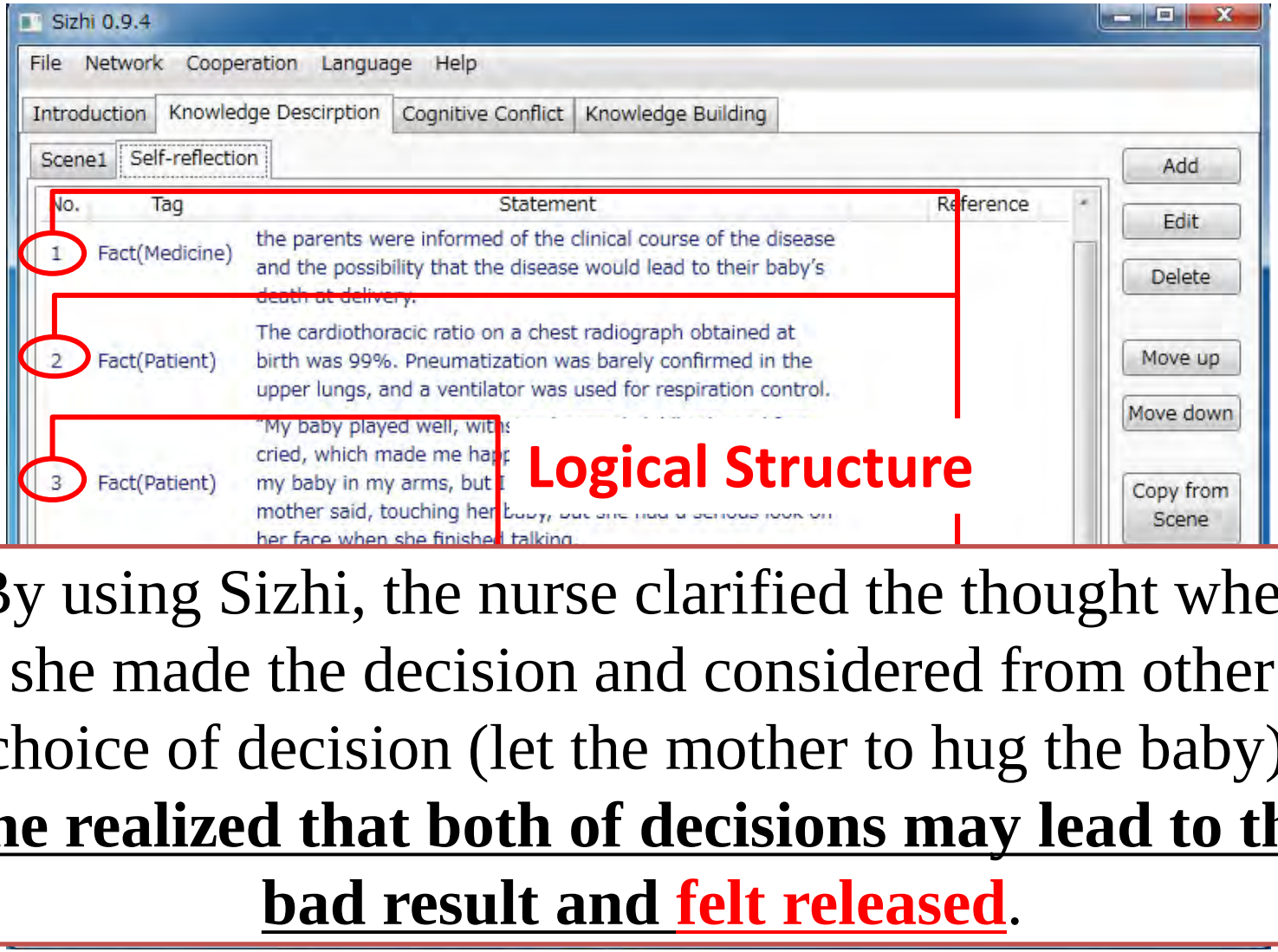
A nurse's hard decision on :

a. let the mother to hug the baby who is in danger (if bad situation happens, she will have no chance to do it),
b. refuse her considering about baby's safety

Because the nurse refused the mother and the baby passed away, **the nurse felt very distressed** for thinking that it would be better if let the mother give a hug.

A Practical Case from KBM Workshop (2)

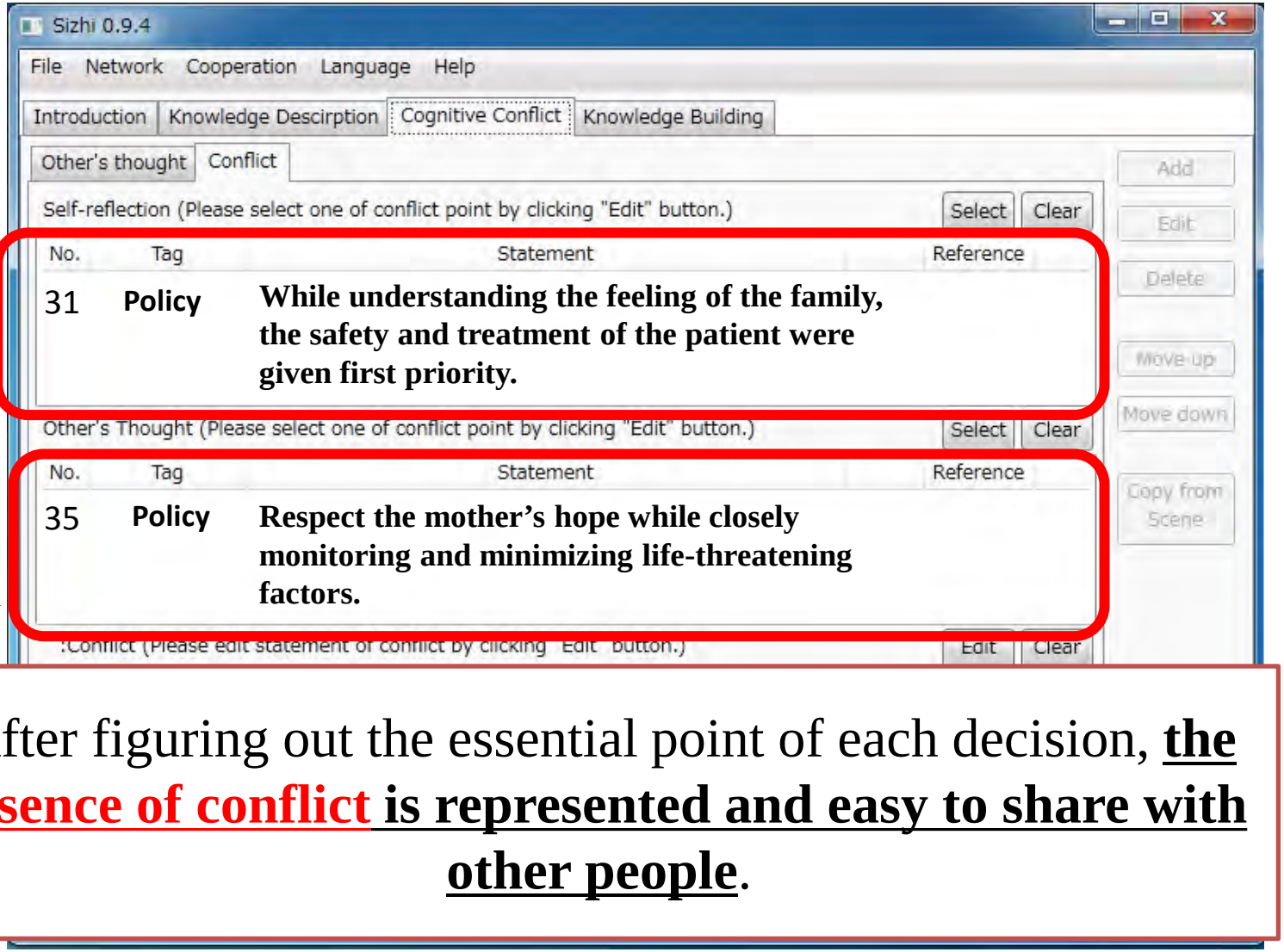
Case-writing Stage (Self-reflection and Other's thought)



By using Sizhi, the nurse clarified the thought when she made the decision and considered from other choice of decision (let the mother to hug the baby), **she realized that both of decisions may lead to the bad result and felt released**.

A Practical Case from KBM Workshop (3)

Case-writing Stage (Conflict)



Conflict between two different viewpoints

After figuring out the essential point of each decision, **the essence of conflict is represented and easy to share with other people**.

A Practical Case from KBM Workshop (4)

Discussion Stage

A Practical Education Program in Medical Service Education

In the discussion, the nurse shared the situation in the case and the essence of problems with other medical professions. They had made **a high-quality discussion on how to solve this problem on patient-centered viewpoint**.

Workshop Report

芳珠知識構築法ワークショップ

報告書

平成 25 年 2 月

付録 2（ワークショップの様子）
第 1 回目　2012 年 12 月 8 日（土）
場所：芳珠記念病院会議室
参加者 7 名：

第 2 回目　2013 年 1 月 13 日（日）
場所：芳珠記念病院会議室

付録 1（ケースと添削コメント）

添削後の[redacted]のケース

自分の思考に近い思考の振り返り

No.	タグ	内容	根拠タグ	根拠
1	前提	研修は時間外に実施する。		
2	前提	研修は看護職員全員参加対象である。		
3	前提	ビデオ受講よりも，教室受講のほうが効果がある。		
4	事実（職員）	看護師のなかには，個人的用件で時間外は多忙な人が多い。		
5	事実（職員）	特に平日の時間外は時間外に重要な（子供の送迎など）個人的用件で研修に参加できない人がいる。		
6	事実（職員）	病棟の勤務シフトの都合で時間外受講が難しいスタッフがいる。		
7	指針	スタッフの個人的事情よりも，公平性を優先する。		
8	判断	個人的な事情は認めず時間外での研修参加を徹底する。ただし，病棟の事情が難しい場合はビデオ受講を	根拠	1,2,3,4,5,6,7
		迎えがあり平日時間外に参い看護師には，休日開催のに参加させることにした（B病棟）	根拠	8
		にもっと配慮して欲しいという高まった。	根拠	9
		講者が多かったので，教室講性度が高く，研修の効果が高	根拠	9

別の考え方の振り返り

No.	タグ	内容	根拠タグ	根拠
1	前提	研修は時間外に実施する。		
2	前提	研修は看護職員全員参加対象である。		
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6	事実（職員）	病棟の勤務シフトの都合で時間外受講が難しいスタッフがいる。		
7	指針	公平性よりも，スタッフの個人的事情を優先する。		
8	判断	時間外での研修参加を原則とし，病棟の事情で参加が難しい場合と，重要な個人的事情がある場合はビデオ受講を認めることにした。	根拠	1,2,3,4,5,6,7
9	推定	教室受講をしたスタッフから，個別事情でビデオ受講した人にだして不公平感を感じるという不満があがる。	根拠	8
10	推定	個人的事情でビデオ受講をするスタッフが増え，教室受講者が減る。そのため，教室講義の活性度が低下する。	根拠	9

[redacted]様への添削コメント

するという難しい作業に，お忙しい中，お時間をさいていただいてありがとうございます。
せるにはどうしたらいいかという問題はとても難しく，悩みも大きいことと思います。知識構築
てもいいケースです。
述において知識構築法の考え方が適切に活用されていないように思われます。主な問題点は，悩
他人の振り返りの二つの考え方が分離できていないことです。その原因は，自分の振り返りに，
，つまり，二つの考えを混在させていることです。これを改善するためには，意図的に異なる二
方を学ぶ必要があります。そのように考えることができると，悩みの本質が明確になり，解決法
ます。
，葛藤の記述において，指針が選ばれていないことです。葛藤の原因をよく考え，よい指針を見
次の方法が見いだせません。これを改善するためには，悩みの原因を表す指針の見いだし方を学
立する指針をうまく見いだすことができれば，自分の考えを整理したり，人に悩みを的確に説明
。
ことを中心にコメントしますので，今後の学習の参考にしてください。

4

4.2　参加者別のケース講評概要とアンケートにも続くコメント

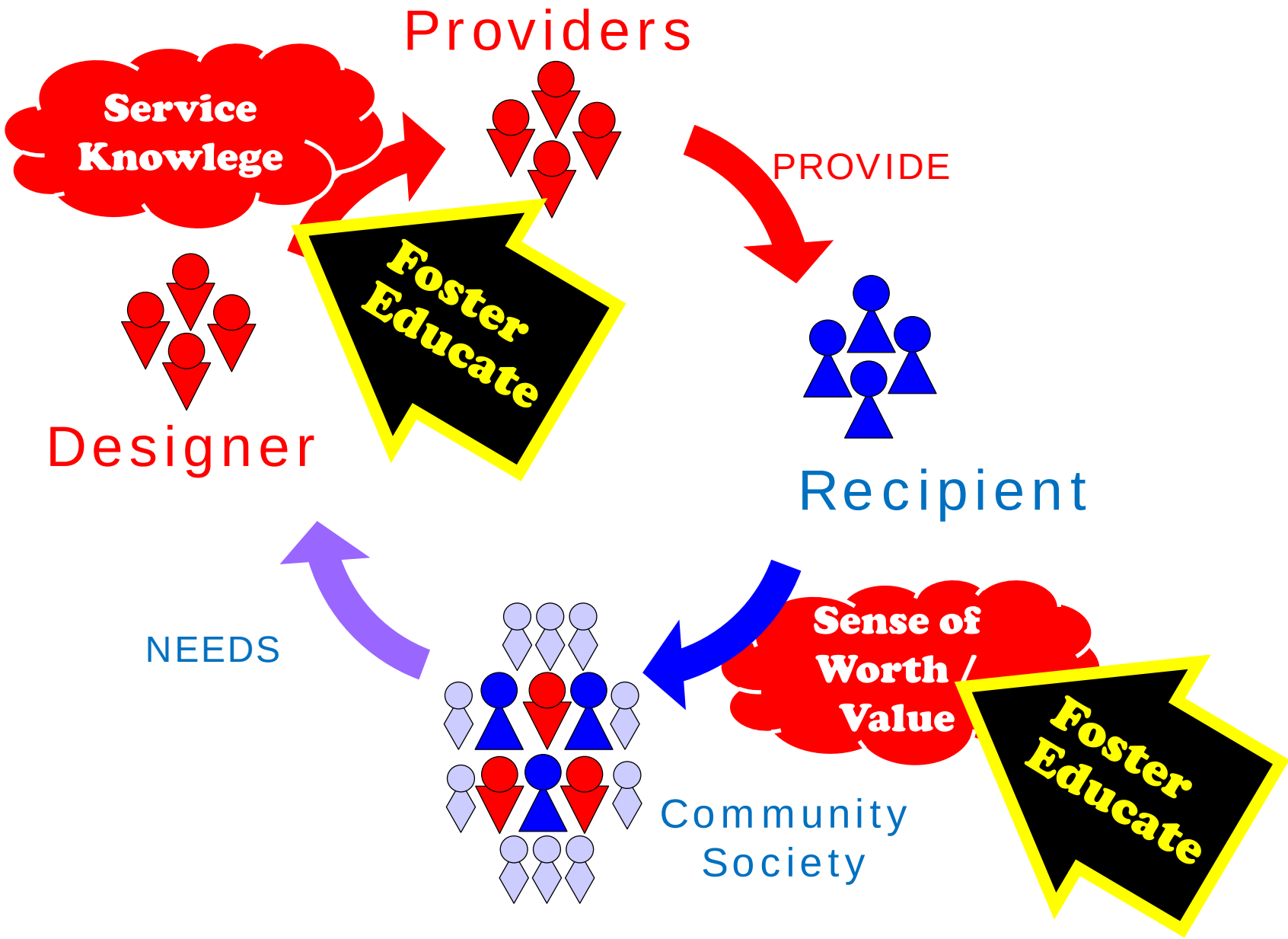
1 月 13 日（土）に参加された 5 名様のケースの講評概要と，アンケートに基づくコメントを下記に記載します．なお，ケース講評の詳細も，付録として本文書の末尾に掲載しています．

[redacted]様

ケース講評概要：研修時間の設定についての悩まれていたケースを取り上げておられました．研修を設定するうえで，講義の活性度を高めることが研修の効果を高めるうえで重要なことに気づくことができました．また，それを根拠として，自分の考えを説明することが重要であることに気づくことができました．

アンケートへのコメント：正解のない問題を考えるときの"対立"の意義をよく理解しておられます．特に立場の異なる人の話を取り入れて良い考えをまとめることについて学習意欲が高まっているようです．今後も，この意欲を持ち続けるようにしてください．

Life Cycle of Service



Ontology engineering as a Foundation of Service Knowledge Circulation

The direct use of ontological modeling aims at

- ✓ filling the knowledge gap among the service agents (designers, providers, recipients, communities) and
- ✓ promoting knowledge circulation (creation, sharing, inheritance of knowledge)