Enhance Intelligence for Service by Data and Knowledge

Takuichi Nishimura

Service Intelligence Research Team,
AI Research Center, National Institute of Advanced Industrial Science and Technology, Japan

AIRC's Organizations & 12 Research Teams

Department of Information Technology and Human Factors
(Director-General: Satoshi Sekiguchi)

Artificial Intelligence Research Center (AIRC)
Director: Jun-ichi Tsujii

Deputy Director:
Hideki Asoh, Tamio Tanikawa

Advisor | Planning Team Leader

Supervisory Innovation Coordinator (X2) | Deputy Director (X4)

NEC-AIST AI Cooperative Research Laboratory
Leader: Takashi Washio

Prime Senior Researcher (X3) | Principal Research Manager | Research Manager

Knowledge and Information Research Team
Team leader: Hiroya Takamura

Probabilistic Modeling Research Team
Team leader: Yoichi Motomura

Data Platform Research Team
Team leader: Kyoungsook Kim

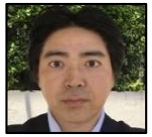
Artificial Intelligence Applications Research Team
Team leader: Masahiro Murakawa

Artificial Intelligence Cloud Research Team
Team leader: Hirotaka Ogawa

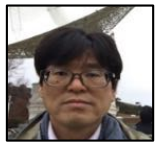
Machine Learning Research Team
Team leader: Jun Sese

Service Intelligence Research Team
Team leader: Takuichi Nishimura

Social Intelligence Research Team
Team leader: Masaki Onishi

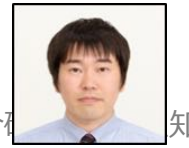


Living Intelligence Research Team
Team leader: Yoshifumi Nishida



Geoinformation Science Team
Team leader: Ryosuke Nakamura

Computational Omics Research Team
Team leader: Totai Mitsuyama



Intelligent Bioinformatics Research Team
Team leader: Kentaro Tomii

Service Intelligence Research Team

Enhance community **intelligence** (observation, judgment, cooperation) to **create value** based on **data and knowledge**

Target Service Fields

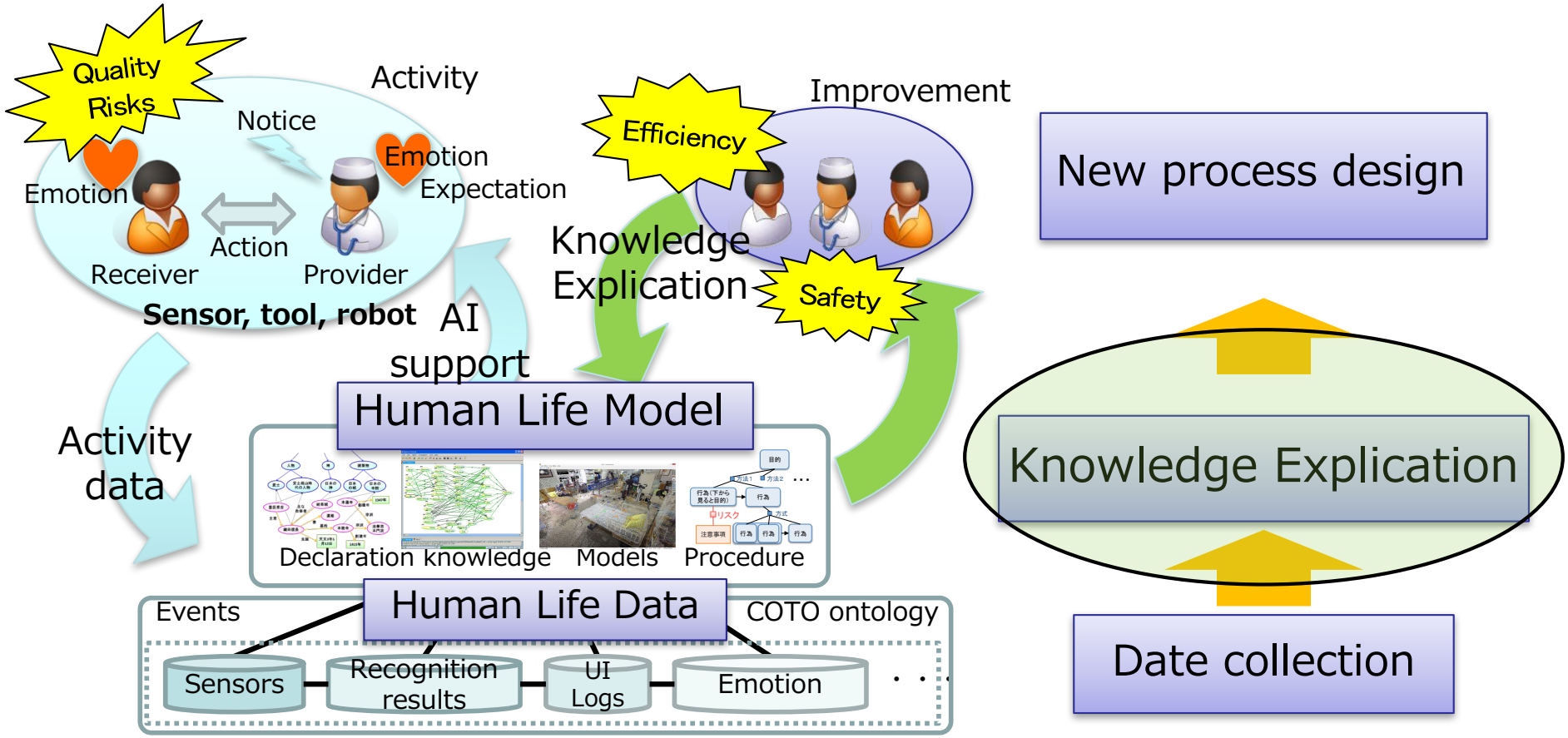
- Nursing, care, education, production
  - Incident prevention, Quality control, efficiency
  - Cost and physical burden reduction, efficient OJT
- Local community activation
  - Care prevention, Health/Activity promotion
  - Injury prevention, therapy (cognitive, music, dance) popularization, Smooth community management

Employee-driven data accumulation and innovation

Intelligence will be enhanced by

Employee-driven

Date collection, Knowledge Explication, New process design because of **site-specific tacit knowledge**



kNeXI 2017

the first workshop on

kNowledge eXplication for Industy

November 14-15, 2017 Tokyo, JAPAN

https://sites.google.com/view/knexi2017/top

Aim & Scope:

Workshop theme is making knowledge explicit and shared in order to following two goals:

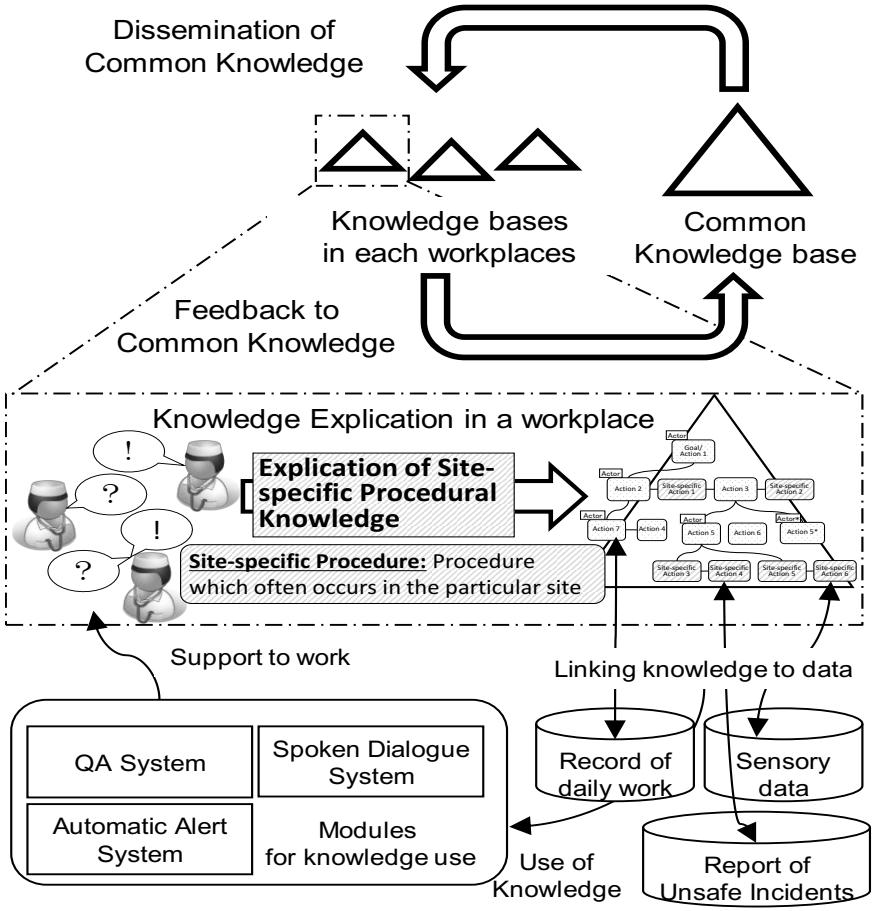
1. Enhancement of awareness, decision-making, teamwork based on shared knowledge
2. Automation of simple work based on shared knowledge

To achieve these goals, we expect following topics:

- **Ontology / Knowledge model**
- **Knowledge-based dialogue management**
- Workshop method, Service engineering
- Participatory approach, Case Study
- Knowledge-based human-computer interaction
- Reasoning / Information retrieval from shared knowledge
- Data mining / Text mining

Keynote Speakers:

Prof. Riichiro Mizoguchi (JAIST)
Mr. Hiroshi Ohtani (Medical Corporation, Hanamaru group)
Dr. Kristina Jokinen (AIRC, AIST)
Prof. Hideaki Takeda (NII)



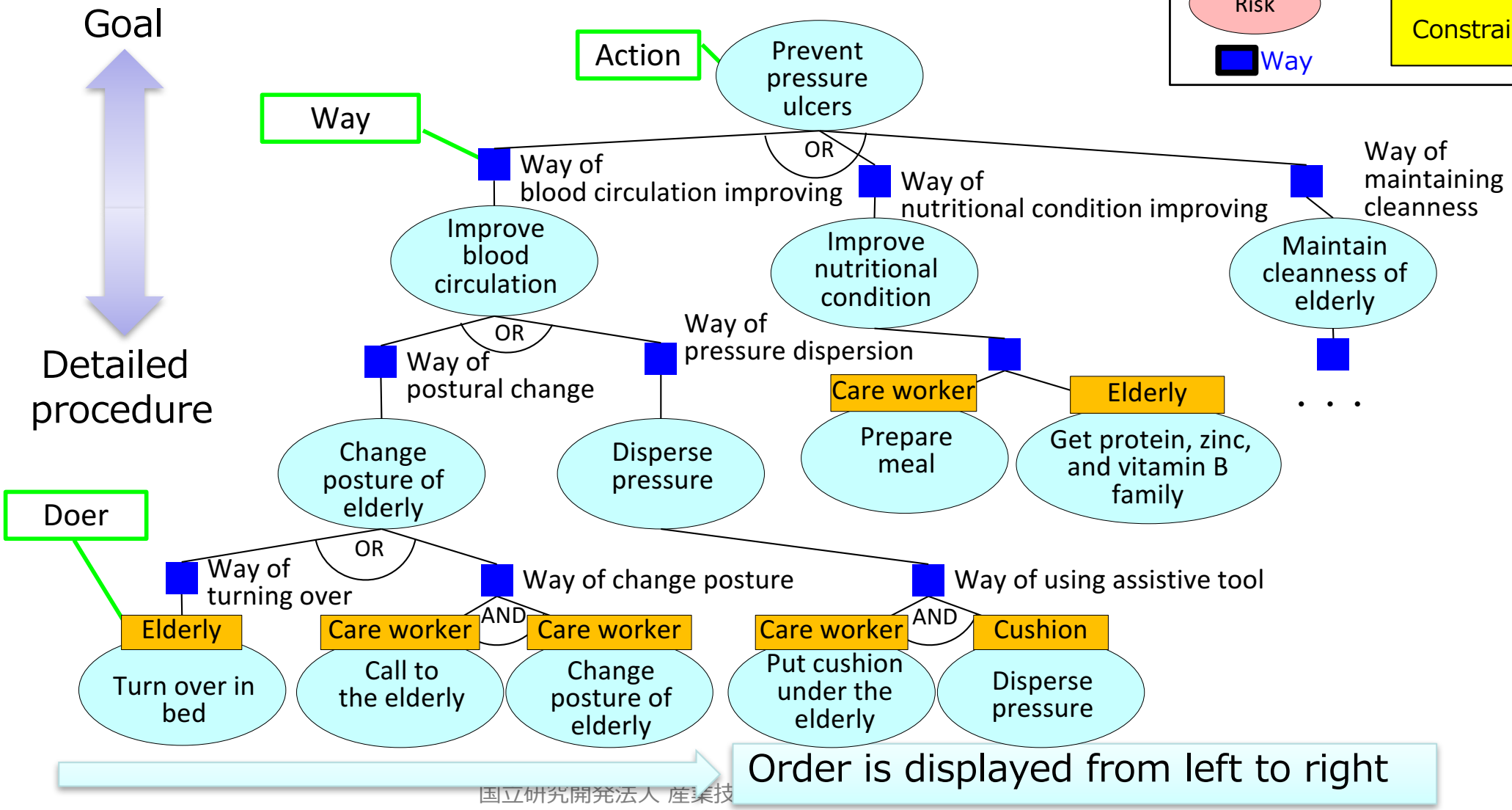
2017/11/14
kNeXI2017@Tokyo

Knowledge Explication: Towards enhancement of human intelligence with explicit knowledge

Satoshi Nishimura
Ken Fukuda
Takuichi Nishimura

Artificial Intelligence Research Center
National Institute for Advanced Industrial Science and Technology

Systematization of common procedural knowledge



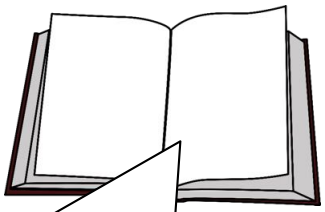
Goal oriented knowledge Graph

Easy to browse

- Rule is easy to develop
  - Eligible for human and AI
  - Draw out tacit knowledge clearly

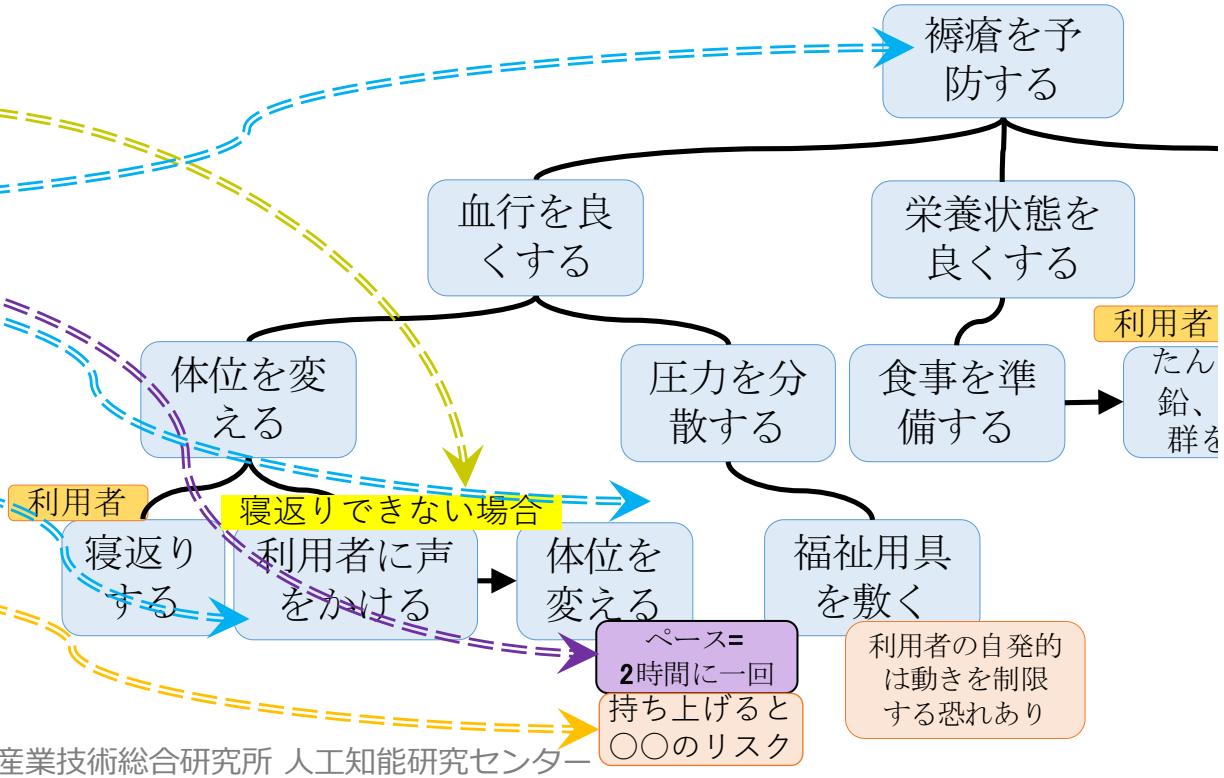
Skill for application

- Easy to understand the goal

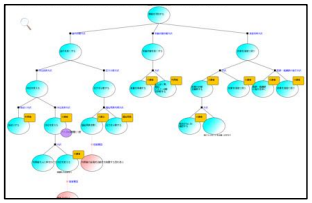


Manuals

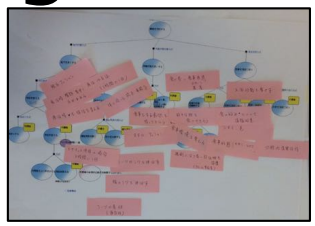
身体の特定の部位に常に重力がかかっていることが褥瘡の発生要因になります．寝たきりで自分で寝返りをして体位を変えることができない人の場合は，
褥瘡を予防するために
少なくとも2時間に1回のペースで
体位変換を行う
のが望ましいとされています．意識のはっきりしない人でも，
体位変換をする前には必ず声掛けをし，
利用者の身体を持ち上げないように
行います．



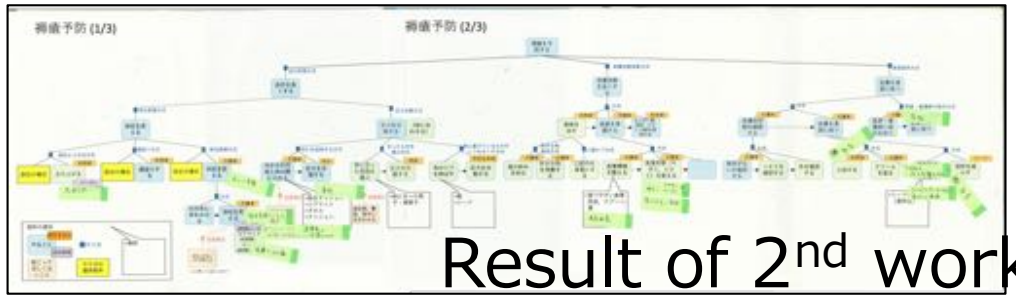
Explication of site-specific knowledge



Knowledge from textbook

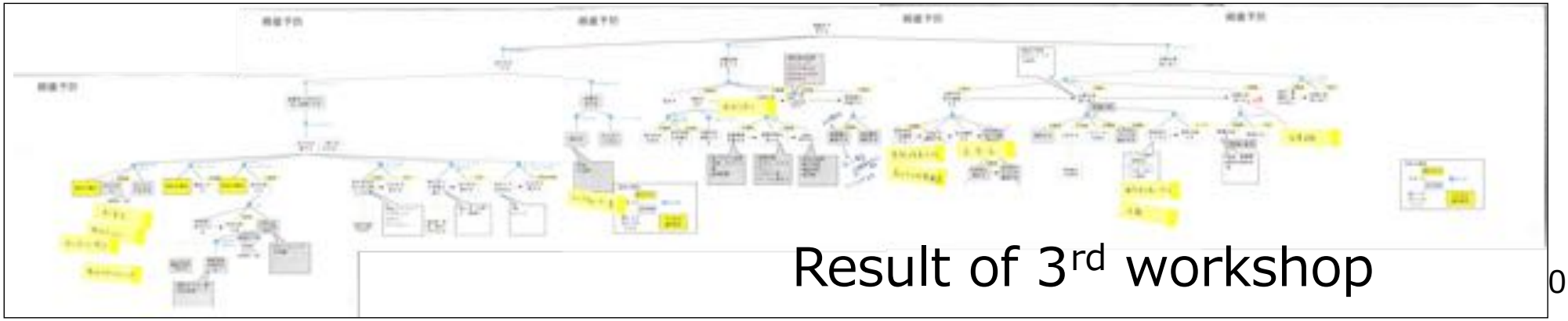


Result of 1st workshop



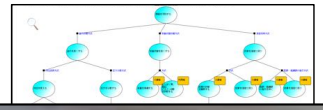
Result of 2nd workshop

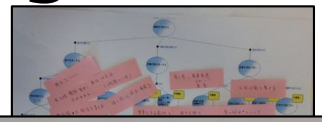
3 times bigger
than initial one



Result of 3rd workshop

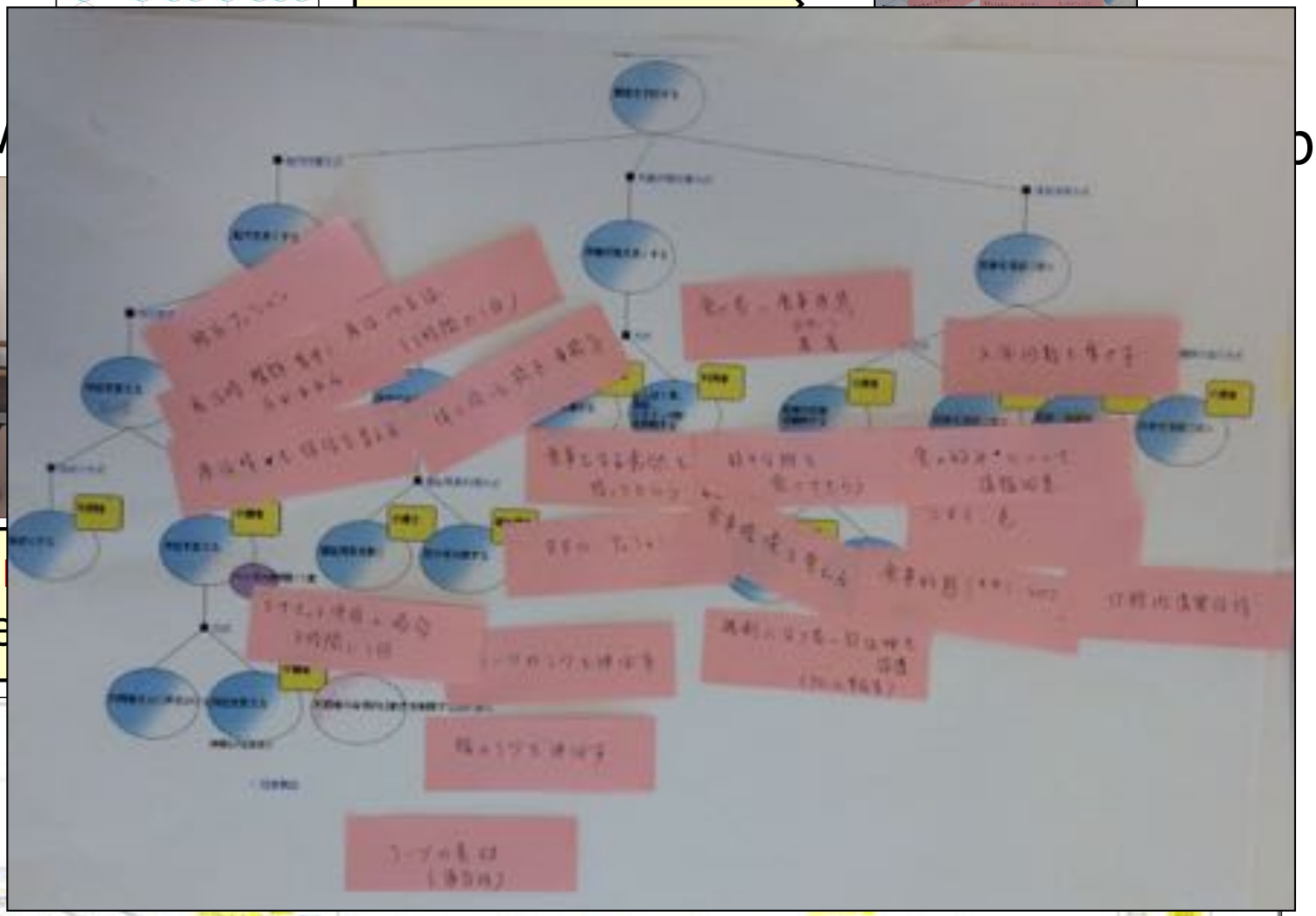
Explication of site-specific knowledge

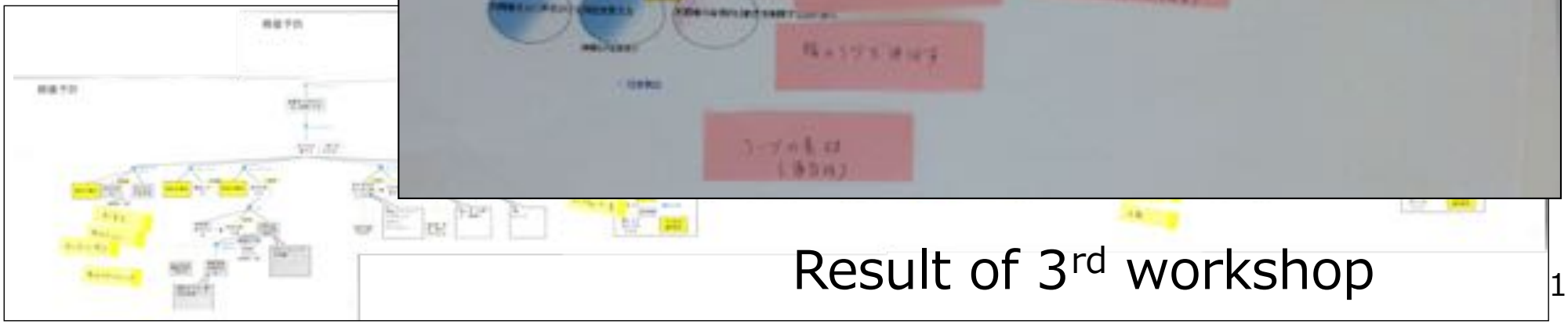




Know

3 times bigge
than initial one





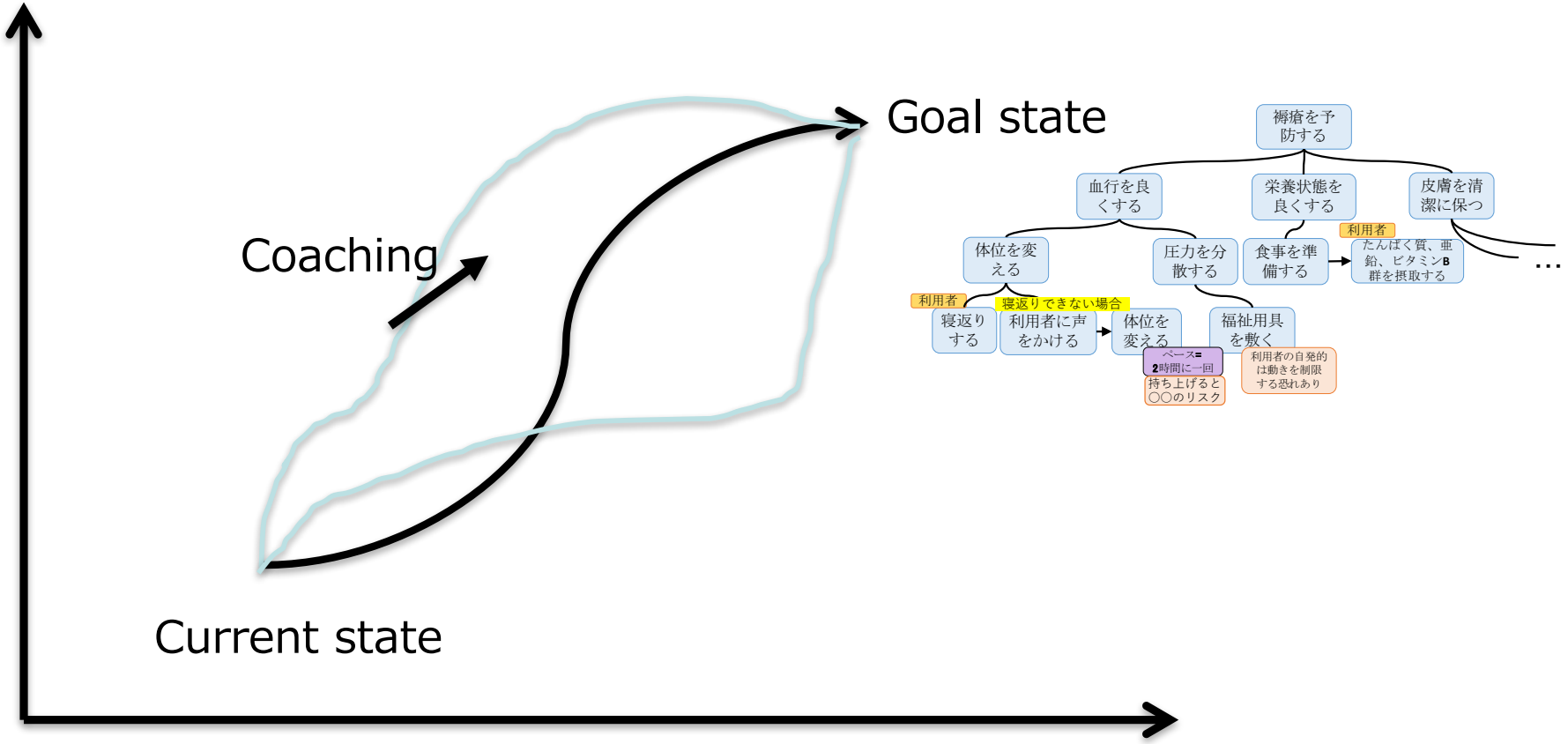
Result of 3rd workshop

Other application domains

- Done
  - Care-giving
  - Autonomous vehicle system (Only knowledge modeling)
- Work-in-progress
  - Active Learning (Education)
  - Community support for local vitalization
- In future
  - Production, Construction, Machine operation
  - Care prevention, Health/Activity promotion
  - Injury prevention, therapy (cognitive, music, dance) popularization, Smooth community management

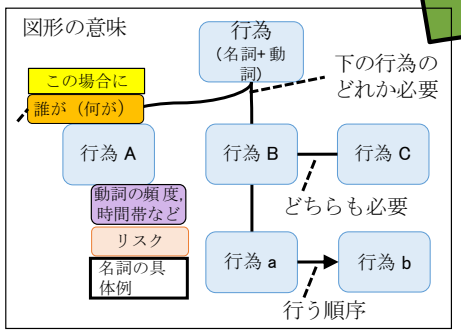
Two knowledge Graph

- Develop **coaching knowledge** from instructions of expert
  - connected with **procedure/declaration knowledge**
  - **Labeled Data** for machine learning



Enhance Intelligence for Service by Data and Knowledge

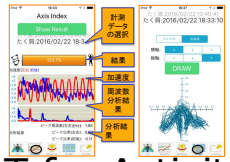
STEP1:Common Knowledge



STEP2: Knowledge based Activity Model

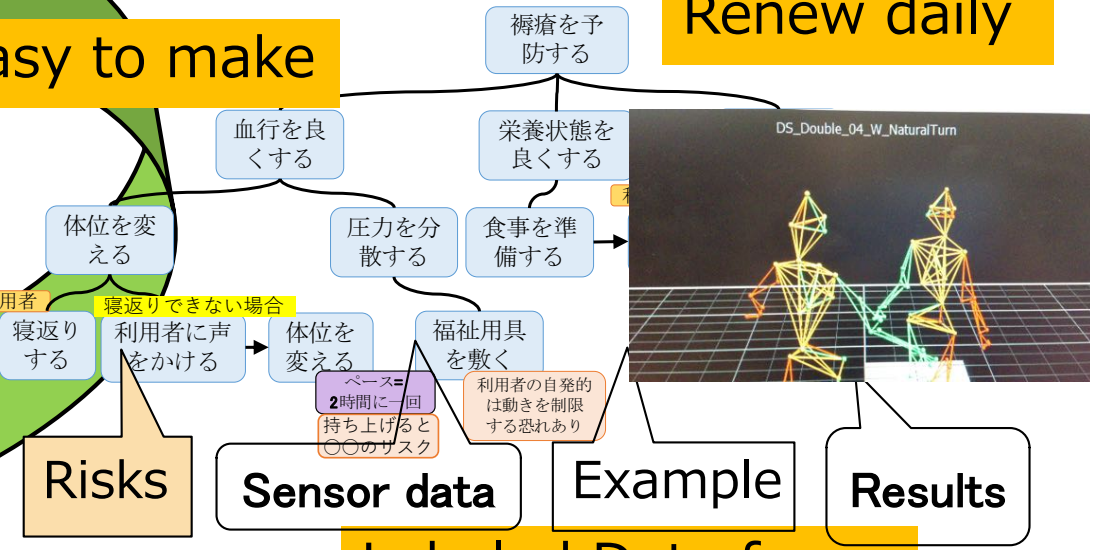
Users

Easy to make



IoT for Activity

Renew daily



Risks

Sensor data

Example

Results

Labeled Data for machine learning

STEP3: Creation of New Activities

Dialogue
Data Accumulation

Community Members

AI, Robots

Development and Supply knowledge from Activity Model

Deployment of New tech.

Indirect collaboration with AI researchers and Local Community
→ New Service design

AI will provide knowledge
(Image Video)