

Robotics and Eldercare

Artificial Intelligence for Experts

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CARE ROBOTS IN JAPAN



Robot Suit HAL for Care Assist
(Cyberdyne)



Muscle Suit for Care Assist
(Kikuchi)



Robotic Bed (Panasonic)



ROBOHELPER SASUKA (Muscle)



Transfer Assist Device (Fuji Machinery)



Transfer Support Device (Yasukawa)



Little Keepace (Kowa)



RT.2 (RT Works)



Walking Assist (Kawamura Cycle)



**Portable Toilet with Wastes Processing
(TOTO)**



**Portable Toilet with
Water Washing
(ARONKASEI)**

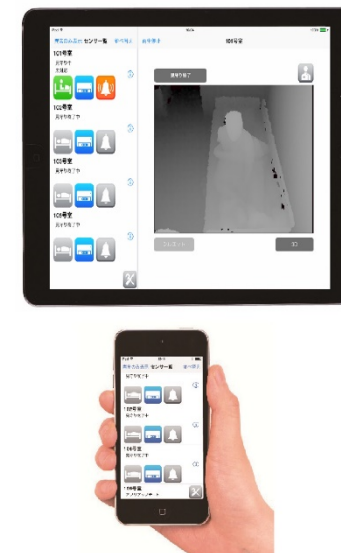


Wells Aids for Bathing (Sekisui Home Techno)

Predictive Watch-over System utilizing 3D electronic mats (sheets)



Neos+Care
(Noritsu Precision)



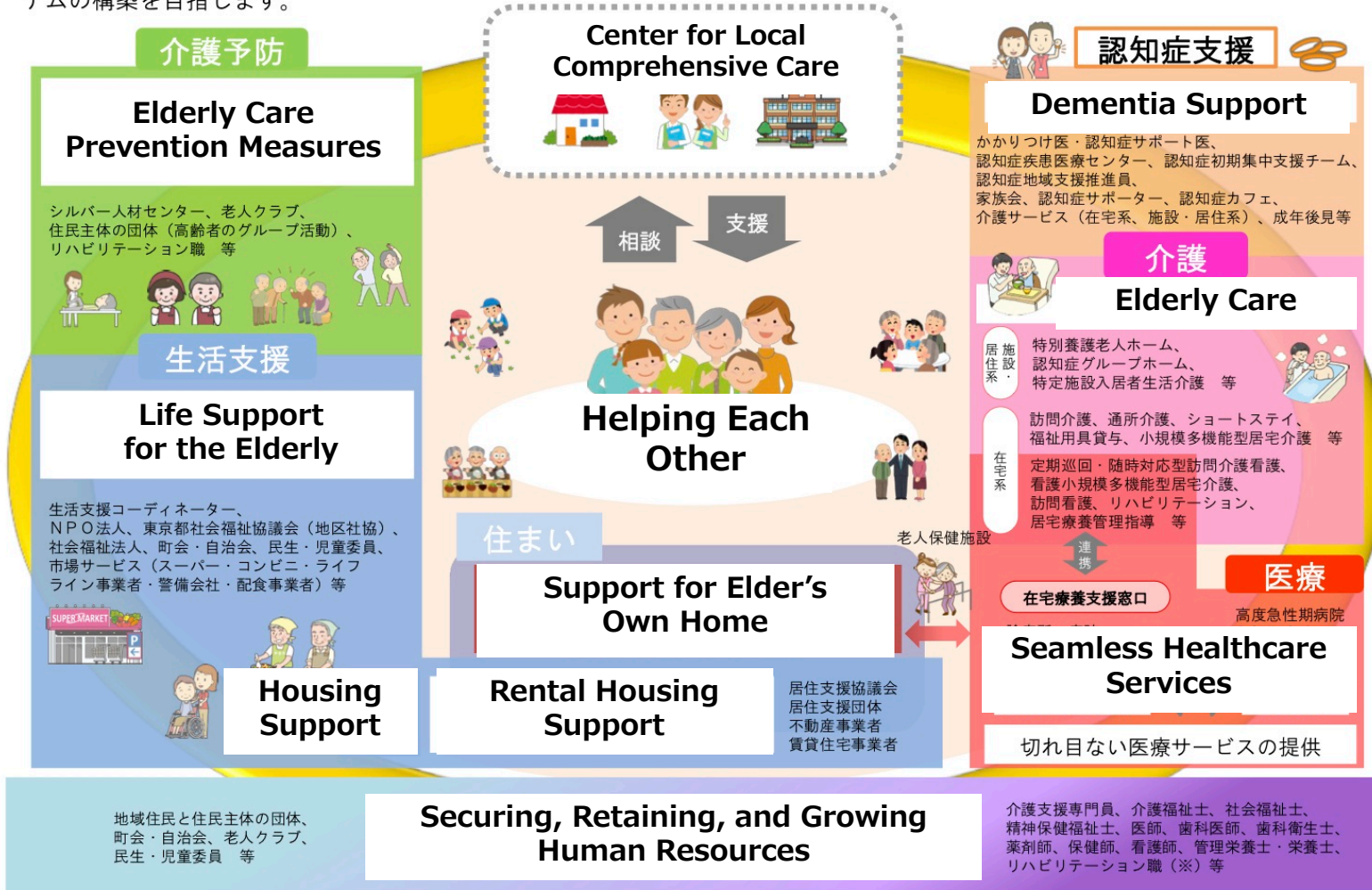
Silhouette Surveillance Sensor
(King Tsushin Kogyo)

Lack of Specialists in Local Comprehensive Care

Concept of Local Comprehensive Care System in Tokyo 2025 - Where Elderly Can Live Safely at Home -

資	料	7
別	紙	1

各要素が連携・協働し、住民が互いに支え合いながら、高齢者が安心して地域で暮らし続けることができる地域包括ケアシステムの構築を目指します。



(※) 理学療法士、作業療法士、言語聴覚士、柔道整復師、鍼灸師、あん摩マッサージ指圧師等

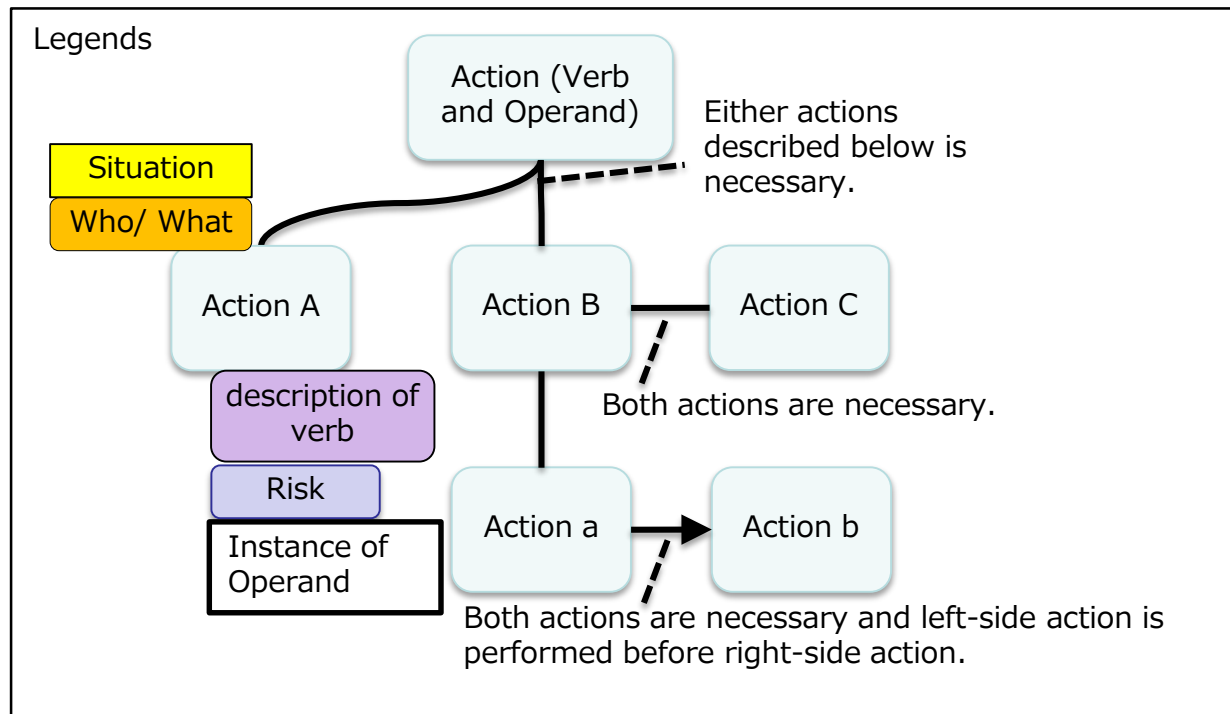
東京都福祉保健局の第5回東京都高齢者保健福祉計画策定委員会資料のポンチ絵
出典 <http://www.fukushihoken.metro.tokyo.jp/kourei/shisaku/koureisyakeikaku/07>

Artificial Intelligence

Learning from the enormous knowledge base and experience of specialists, and in turn supporting them.

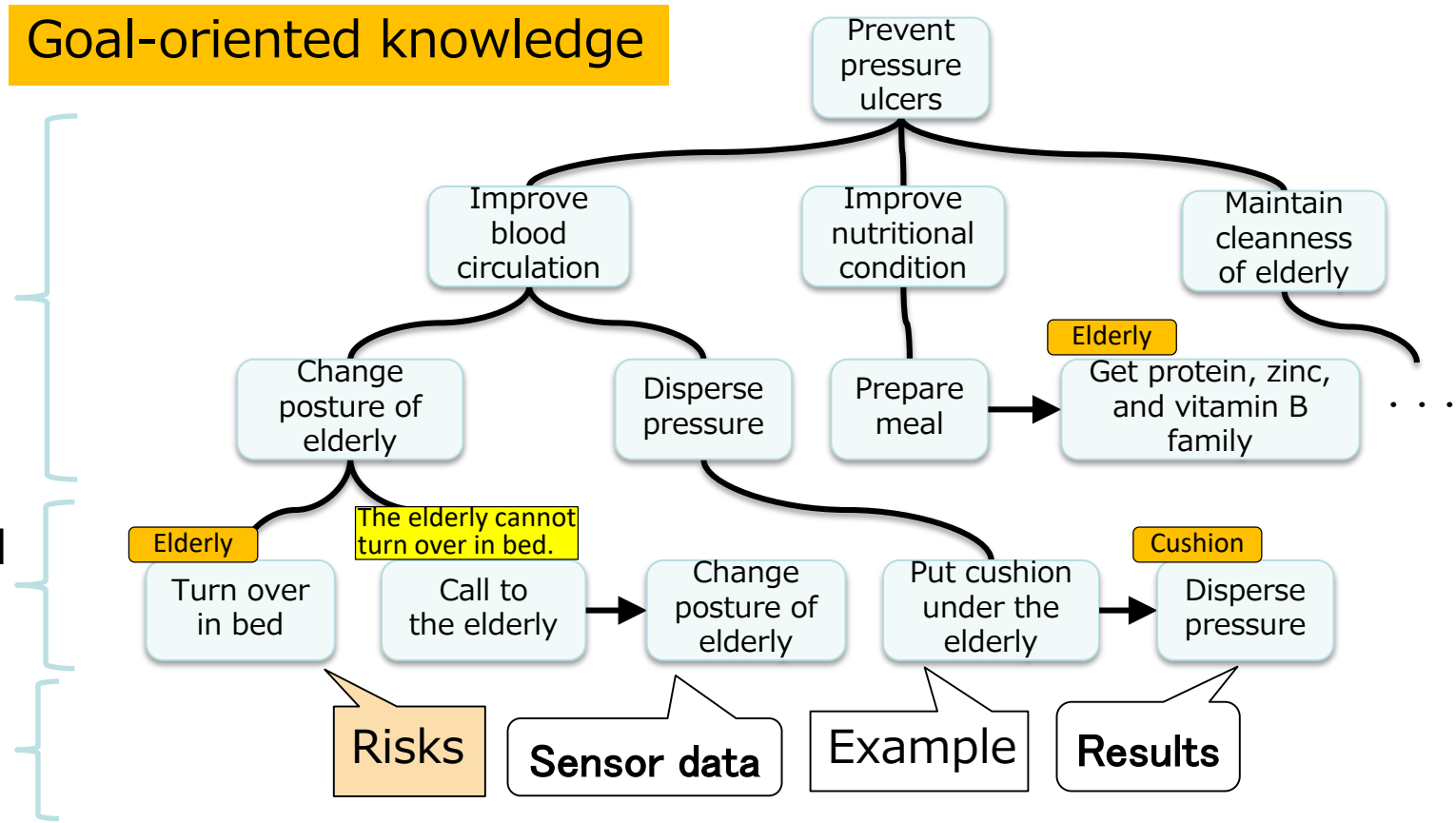
Goal Oriented Structured Knowledge

- Action A or (Action B and Action C) are necessary to achieve the top Action



Explainable AI

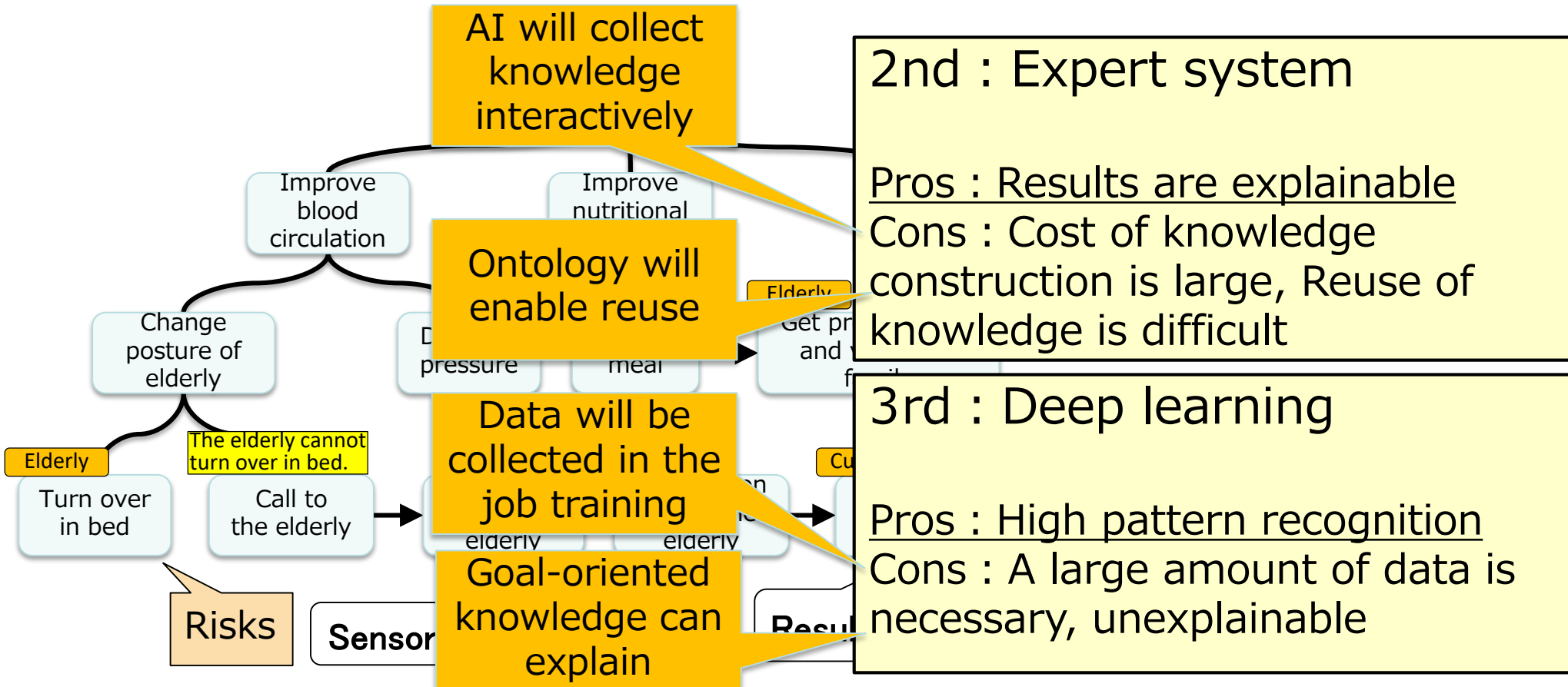
- Integrate data and knowledge
 - Explain sub-goal by goal-oriented knowledge
 - Explain reason by objective data



Combination of Advantages

of 2nd and 3rd AI boom

Overcome disadvantages of the two methods



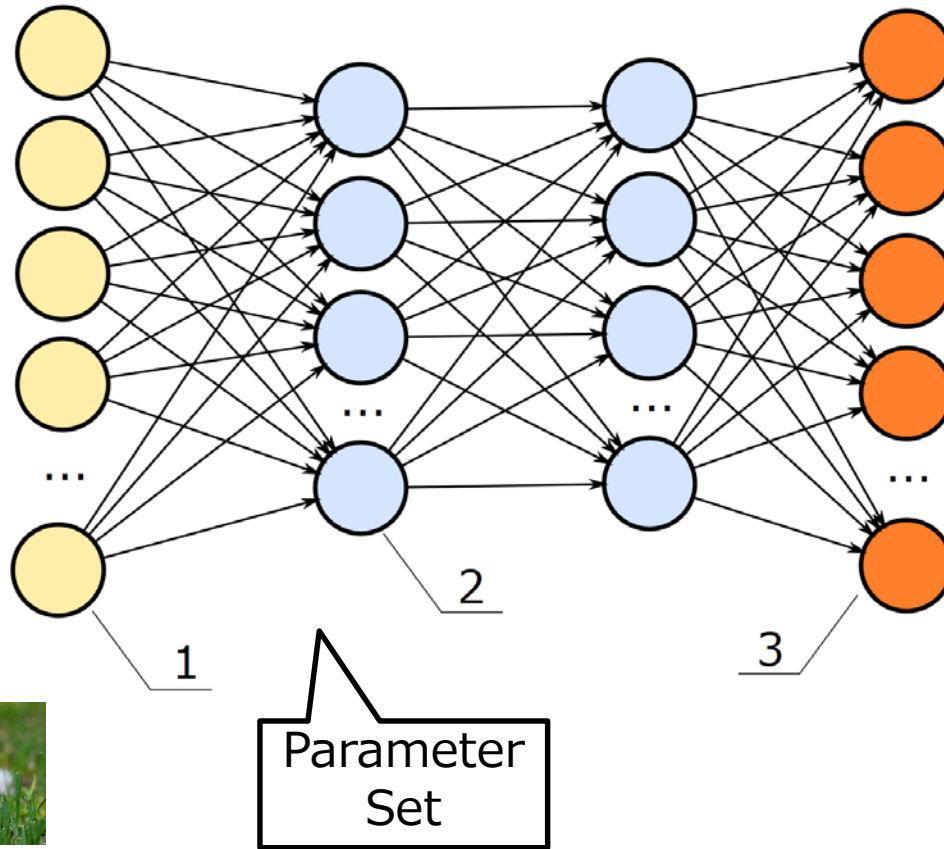
Inexplainable AI (Deep Learning)



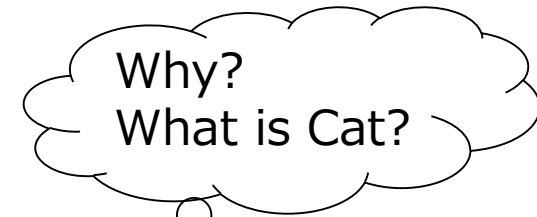
Input image



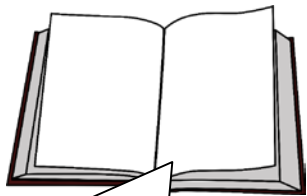
Input image



Cat output



Goal oriented knowledge Graph



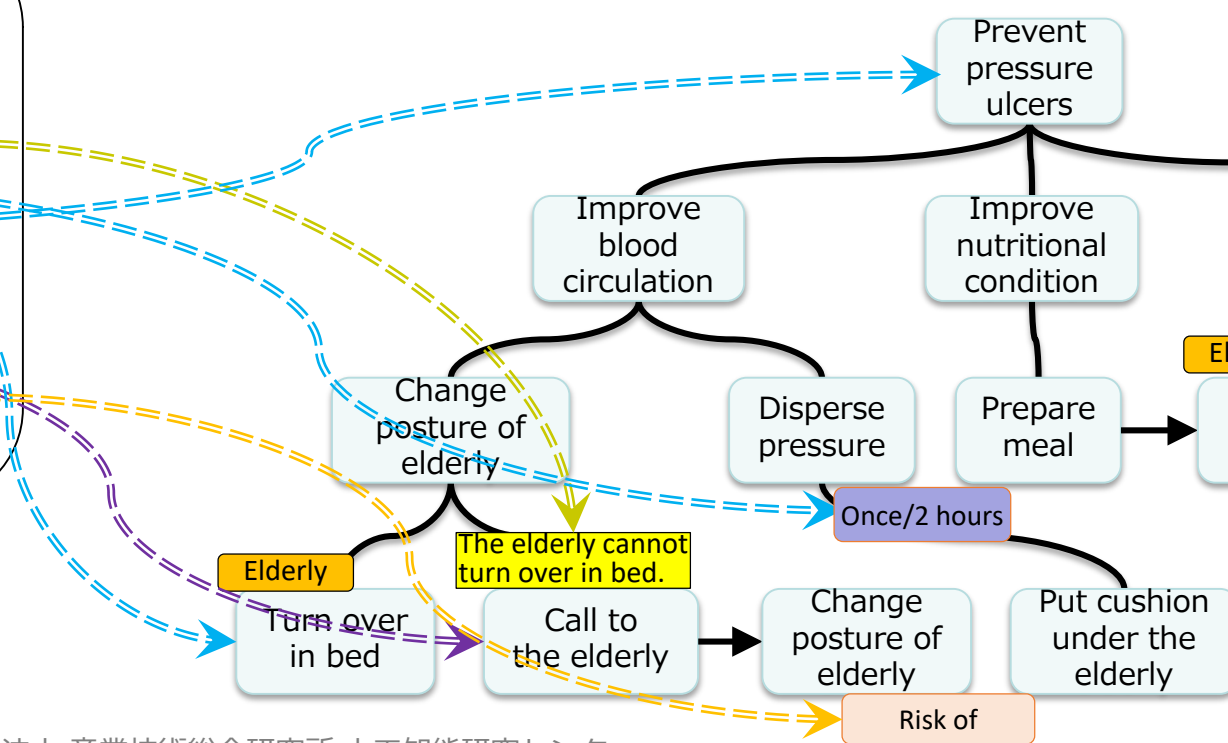
Manuals

Constant pressure on a certain part of the body is the cause of pressure ulcer. For those who stay in bed the whole time and **cannot change their posture by themselves**, it is desirable to **change postures every 2 hours to prevent pressure ulcer**. Even for those with low levels of consciousness, always **call out to the person** before changing postures, and **do not lift their body** during the process.

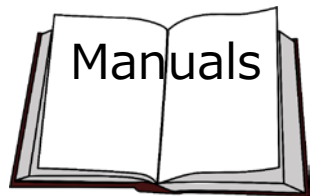
- Rule is easy to develop
 - Eligible for human and AI
 - Draw out tacit knowledge clearly
- Easy to understand the goal

Easy to browse

Skill for application



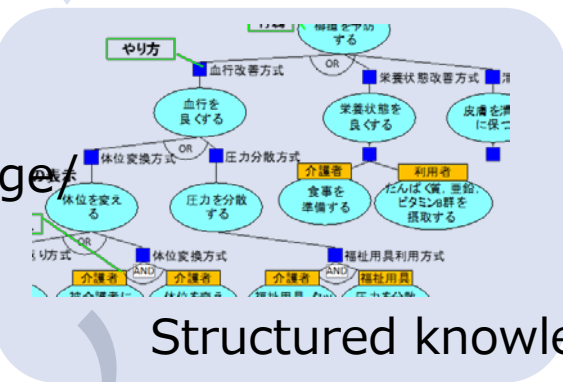
Future: AI will bring / provide knowledge



Develop structured knowledge



Add knowledge/
examples



Structured knowledge

Recognition of user situation
Explain and persuade with data

Novices

IoT, Sensor

Incidents, Results

collection

Explain

Question

Explain



AI/Robot
Chatbot
tablet

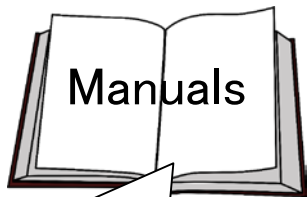
Question

Explain with expert



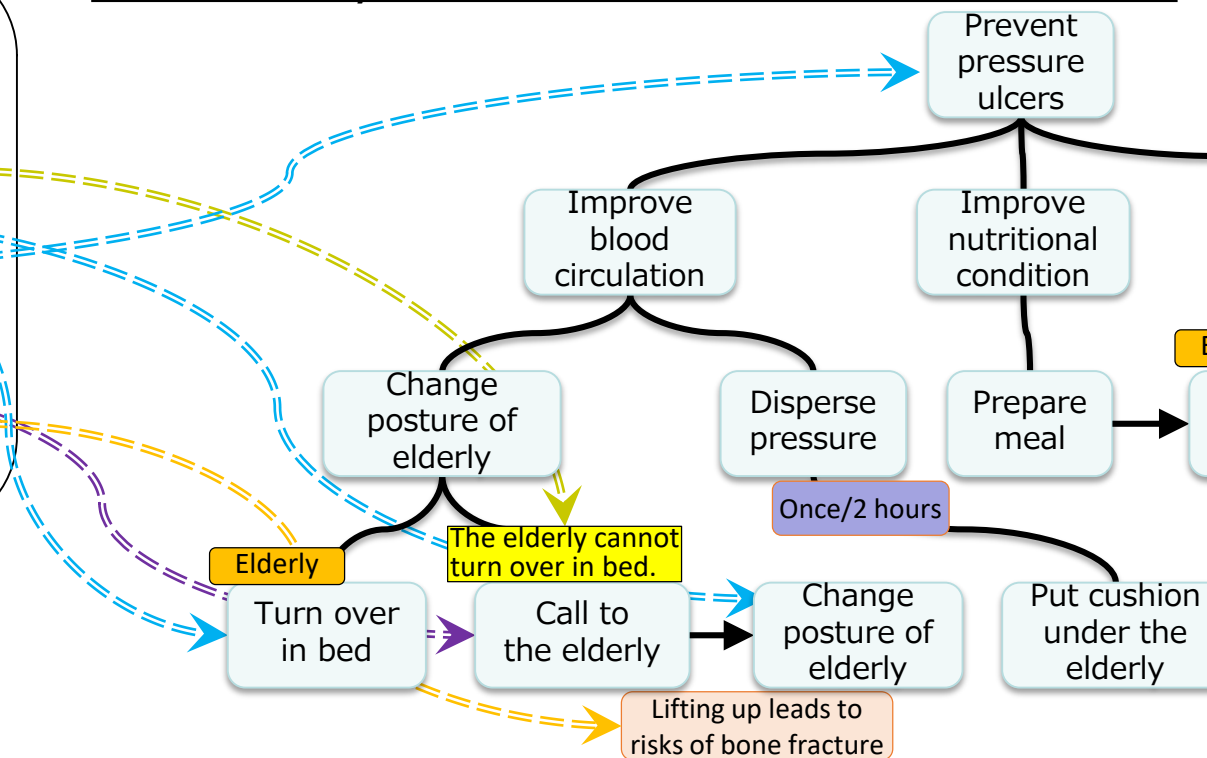
Experts

Can we construct structured knowledge from manuals?



- Full automation is difficult
 - Not systematically, but natural language processing-wise difficult
 - Lack of intermediate goals
 - **Oftentimes, trainers themselves do not know**

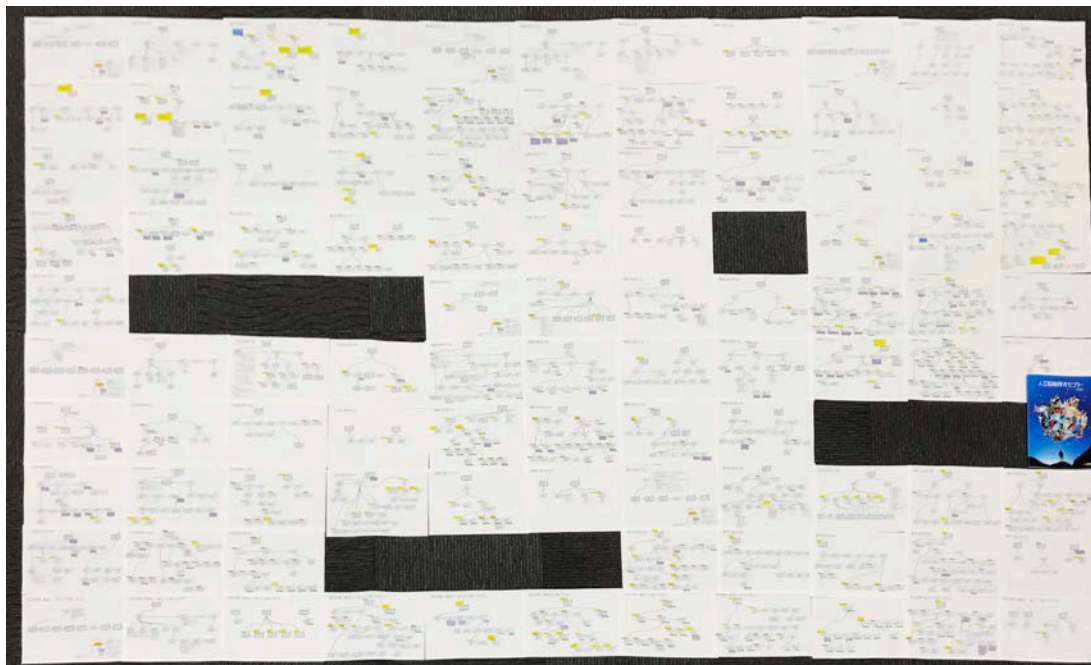
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Current Achievements

- Manual Structuring of Knowledge -

- Manually constructed basic structured knowledge on elderly care tasks from multiple textbooks.
- Past utilization of fully structured knowledge
Before : Over 50 manuals with overlaps in content.
 Difficult to integrate.
After : Organize into one structured knowledge.



Type of Elderly Care	Times Executed
Toilet Support	277
Bath Support	253
Transfer Support	247
Moving Support	236
Changing Support	226
Change Posture	197
Oral Care	170
Eating Support	140