The MIT Center for Digital Business

RFID pilot in Japan using SGTIN
~ Hospital case study ~

Granted by

Ministry of Economy, Trade and Industry (METI)

Supported with GS1 Japan

Ministry of Health, Labor and Welfare (MHLW)

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Point of Act System (POAS) Overview

4 hospitals introduced POAS as health information system

International Medical Center of Japan (925 Beds)
Morioka Red Cross Hospital (464 Beds)
Kyoto Second Red Cross Hospital (680 Beds)
Japanese Red Cross Kochi Hospital (500 Beds)

International Medical Center of Japan (IMCJ) is Japan national center for advanced and pioneering medical care and have a function of national central hospital including care for VIP patients.

History of Implementation
5/2001 IMCJ
1/2003 Morioka Red Cross
3/2003 Kyoto 2nd and Kochi Red Cross

For Patient Satisfaction

POAS was designed to capture <u>all acts</u> in a hospital.

1.Risk management

analyzing causes of Medical accidents.

Entire Data of medical acts By auto identification electrical data capturing

2.Hospital Management

- Quality analysis: ABPM
- Performance measurement: ABC

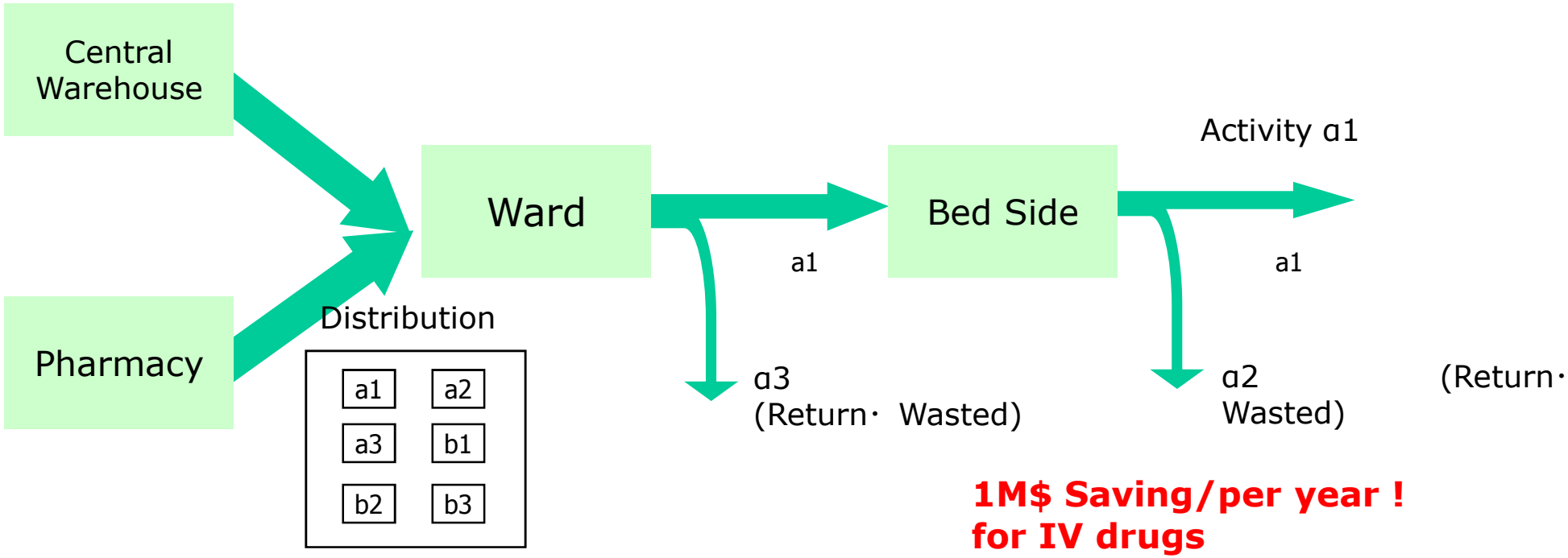
3.Clinical Trial

- Cohort Study
- Adverse event

In real-time!

Supply chain management of POAS

POAS manage materials and drugs by Serialized GTIN (SGTIN)



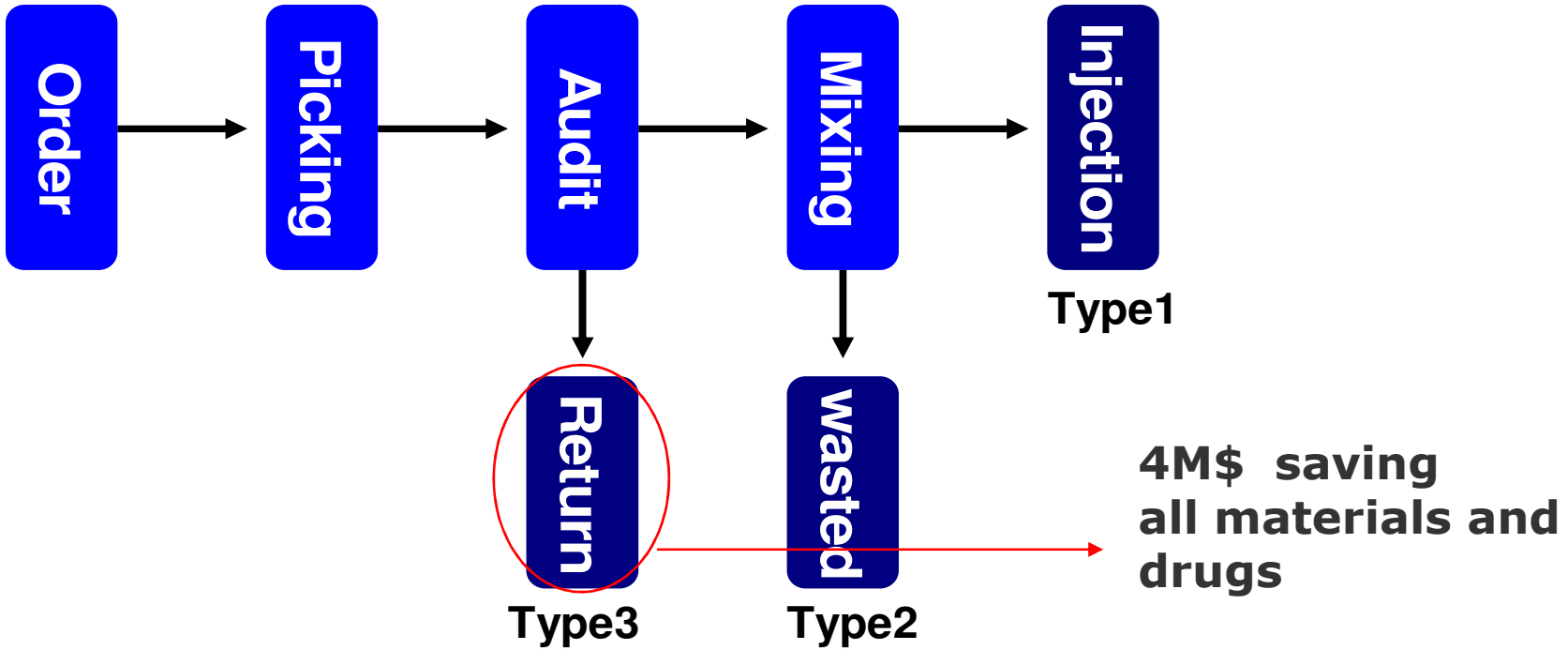
1M$ Saving/per year !
for IV drugs

POAS and SGTIN enable IMCJ to

1. **pay for drugs and materials at the point of action**
2. **link medical activity and materials/drugs (α1=a1)**
3. **capture α2 and α3 that weren't used for medical activities**

Accurate Activity Based Costing and Inventory management

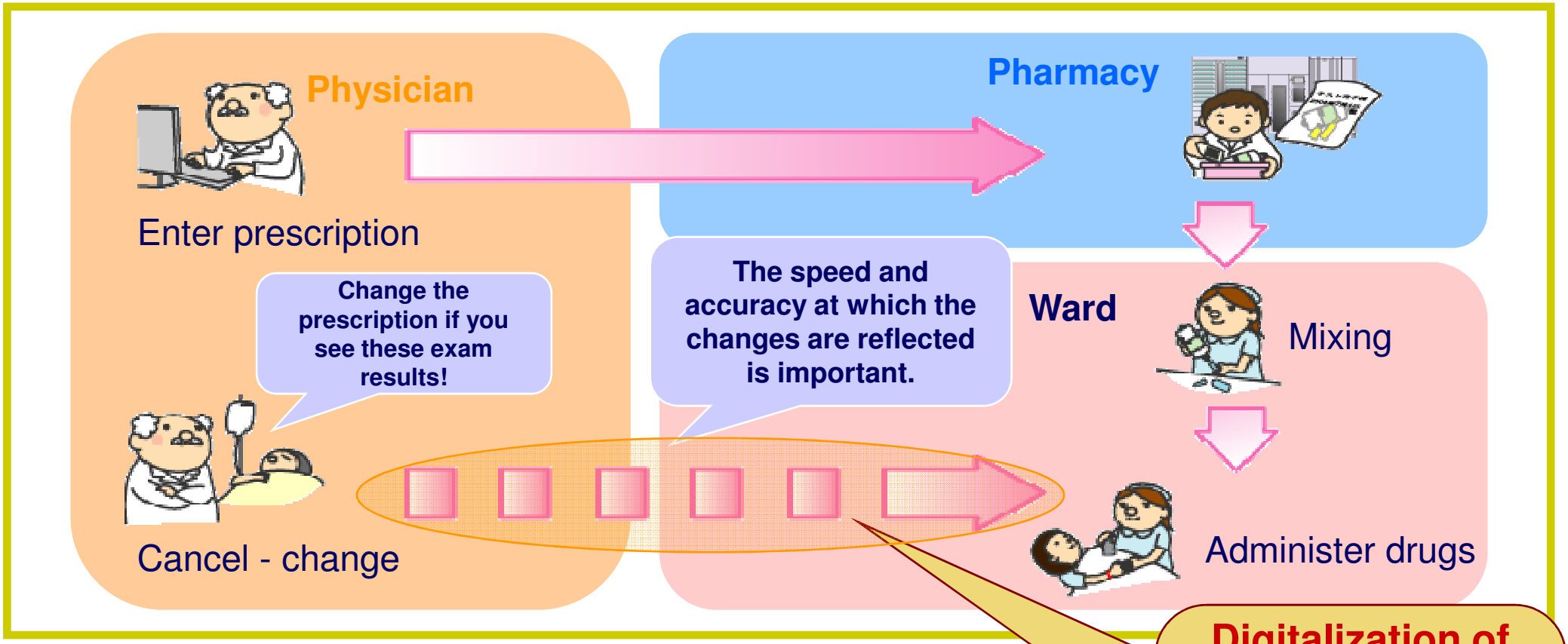
Movement of material or change of status = Activity



Change of status or movement of drugs or materials means there are activities to cause these change or movements.

By tracking these changes and movements, it would be possible to capture whole process of medical actions.

Injection operations from the perspective of medical safety



- An inter-divisional safety system is needed.
- A system is needed that reflects changes and cancellations in the information given to medical staff within a timeframe of 2 seconds.

Digitalization of this section was achieved with Single Item management as POAS.

Conventional system ID: GTIN
POAS system ID: GTIN + serial number

Data granularity

Management of the number of items

Individual (ID) management

Order

Act1

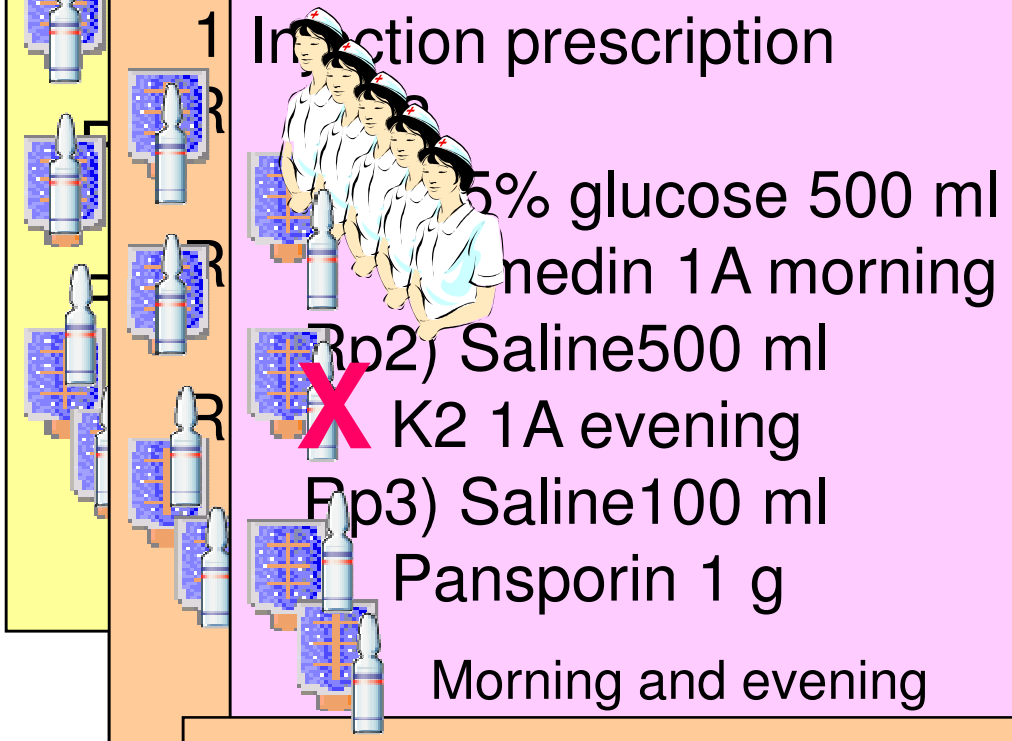
Task:5W1H

Act2

Task:5W1H

Act3

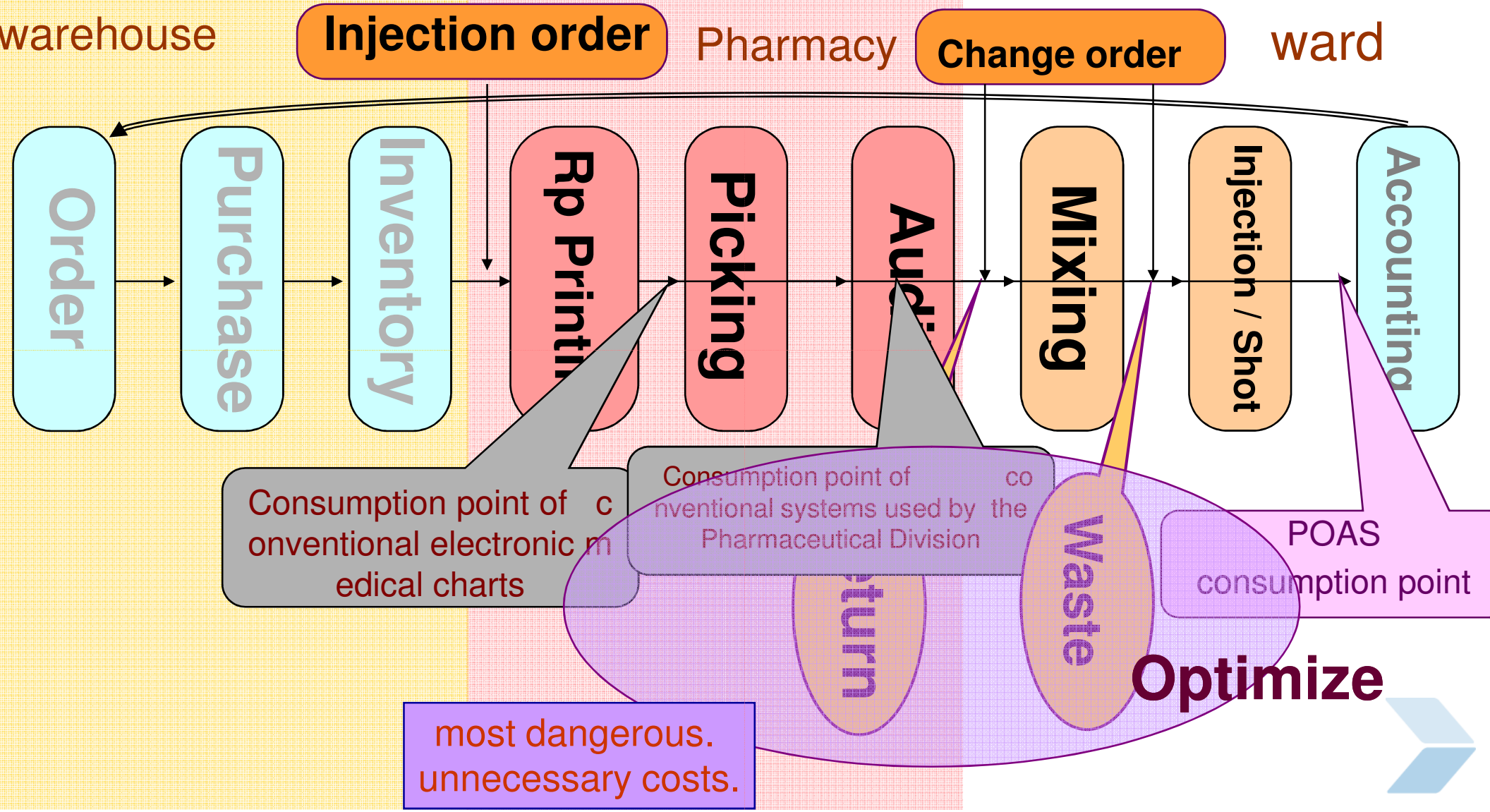
Task:5W1H



Data unit = People's actions (changes) single item based

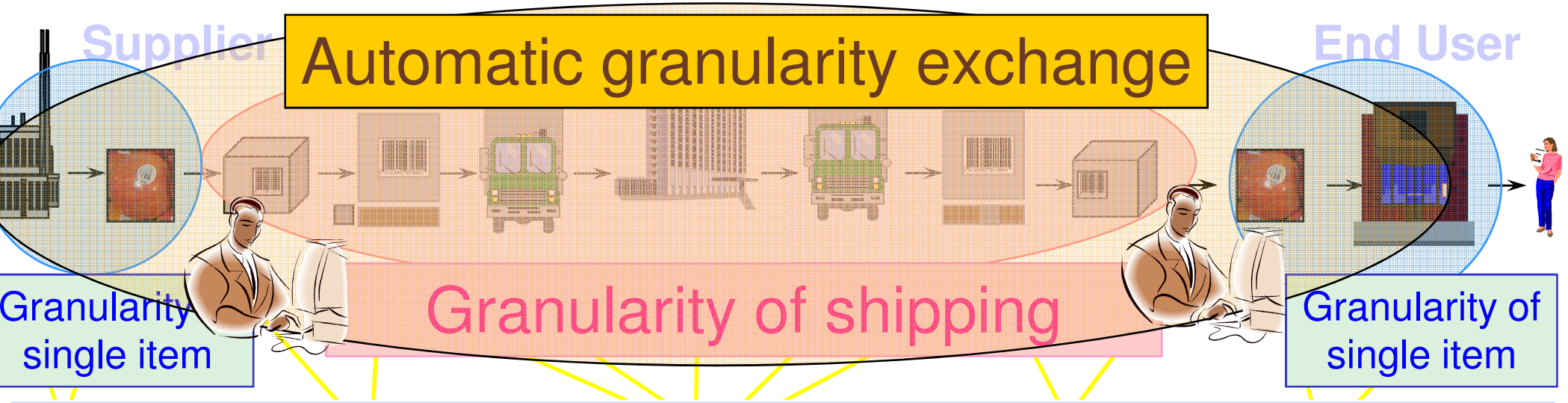
Data unit = Invoice (payment) unit

Automatically acquired information : Digitize



GS1: Product Identification through the Supply Chain

PHYSICAL ITEMS & DATA FLOW



GTIN / Serial ID	GTIN	SSCC	GTIN	GTIN / Serial ID
RSS / RFID	**GS1-128**	**GS1-128**	**GS1-128**	**RSS / RFID**

Item data , sales catalog, ship notice, invoice

request for quotation, planning schedule, POS

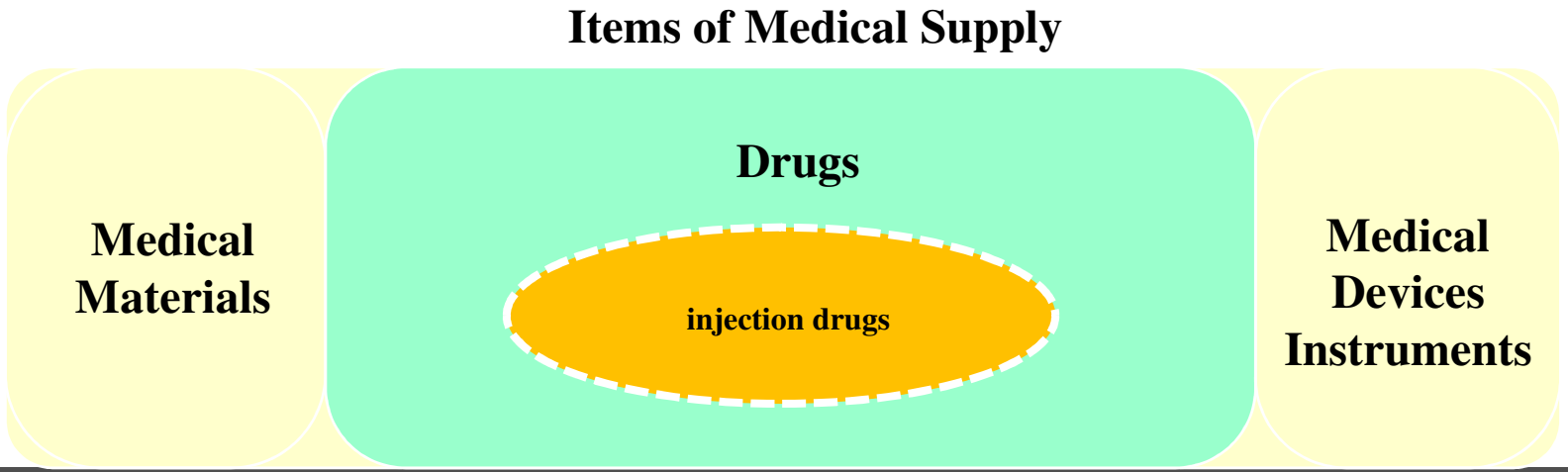
Electronic Commerce Information Flow

Facts of the Pilot Study

1. 1st Project scoped from the Source Marking to Bed-Sides

2. 1st Project adopting GS1 Standards in Japan (SGTIN/GLN)

3. SGTIN (GTIN + Serialized Number) on RFID



Pilot study for single item management and traceability

Method

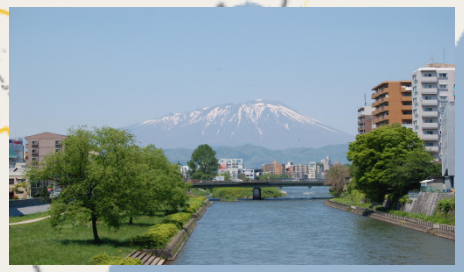
・ Single item management of drugs by RFID with SGTIN96

・ Collecting and tracing history of distribution of each drug by SGTIN-96

	Header	Filter Value	Partition	Company Prefix	Item Reference	Serial Number
SGTIN-96	8	3	3	20-40	24-4	38
	0011 0000 (Binary value)	8 (Decimal capacity)	8 (Decimal capacity)	999,999 – 999,999,999,999 (Decimal capacity*)	9,999,999 – 9 (Decimal capacity*)	274,877,906,943 (Decimal capacity)

Source: GS1homepage

Location of Pilot Study



Morioka city
is rural city in northern part of Japan

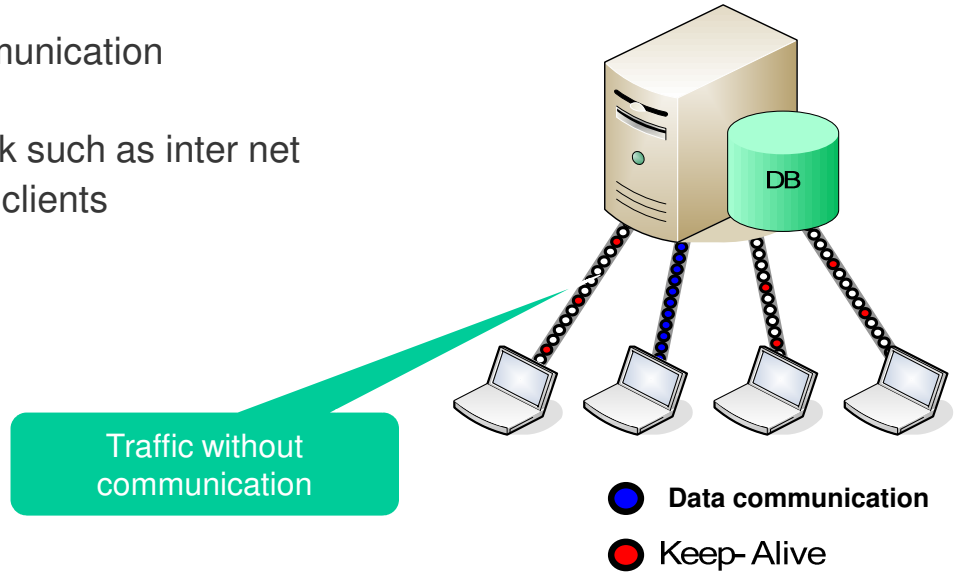
Morioka Red Cross Hospital

Wholesaler (Vital Net)

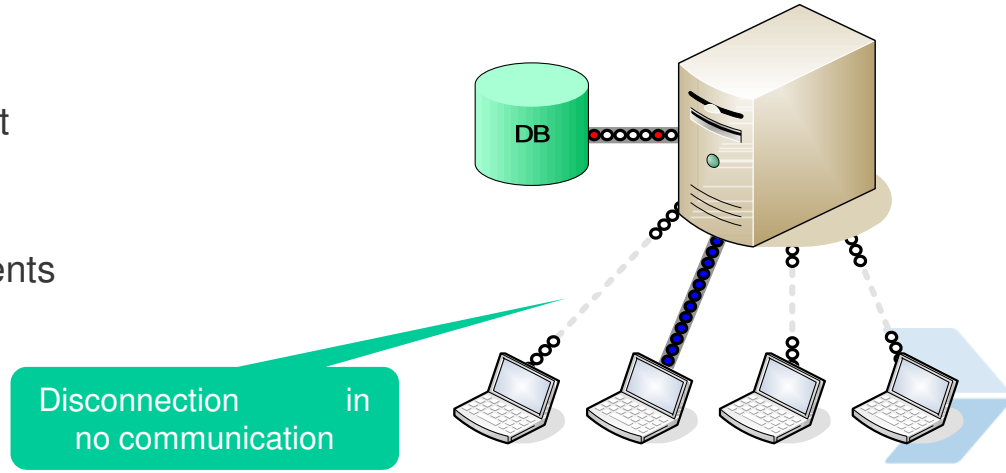
From Morioka to Nagoya
400 Miles (600Km)
Form Boston to
- Washington D.C.
- Niagara Falls

Web based Transmission Method

- Conventional (C/S) Application
  - Keep connection regardless of the existence of communication
    - “Keep-Alive” for sustaining connection
    - Difficult to operate stably under unstable network such as inter net
    - Overpressure on network band with increase of clients
  - Increase of clients = Increase of connections
    - Overpressure on bandwidth of server database

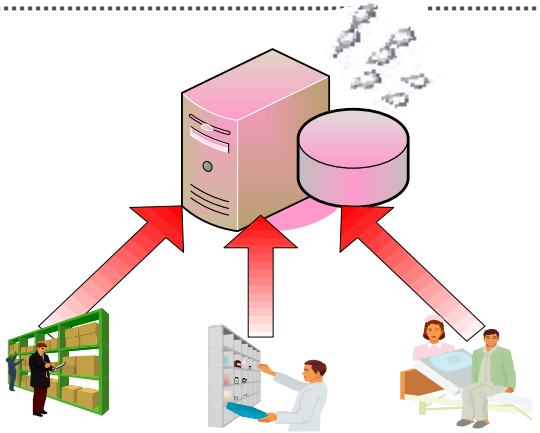


- Web based Transmission Method
  - Using HTTP for connection between server and client
    - Disconnection in no communication
    - Strong for unstable network
  - Increase of connection is smaller with increase of clients



Distribute Data Management

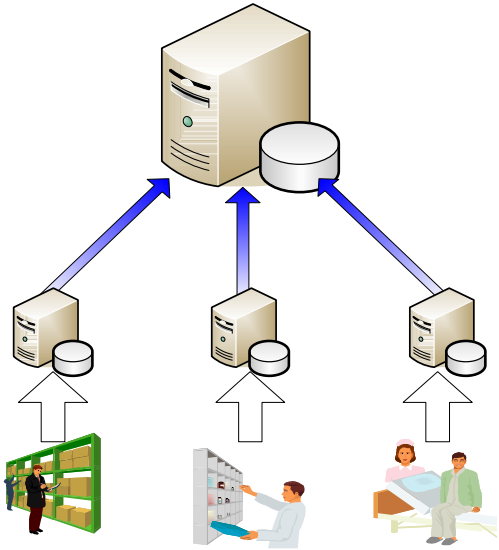
- Centralized information management
  - Concentration of database access
  - Periodical Data Transcription by batch processing
    - Lose freshness of data



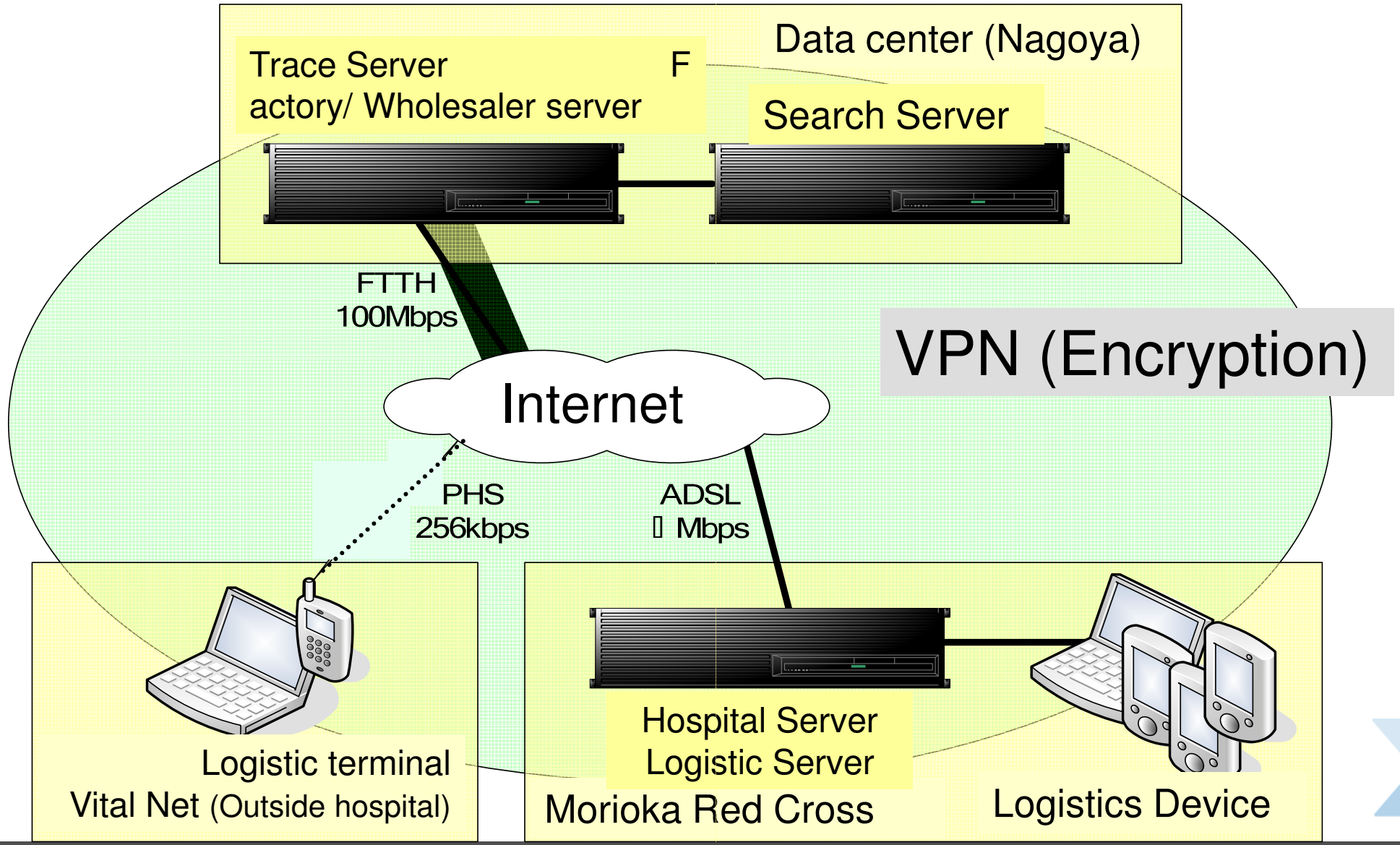
- Distribute Data Management

  Recording pointer for data at repository

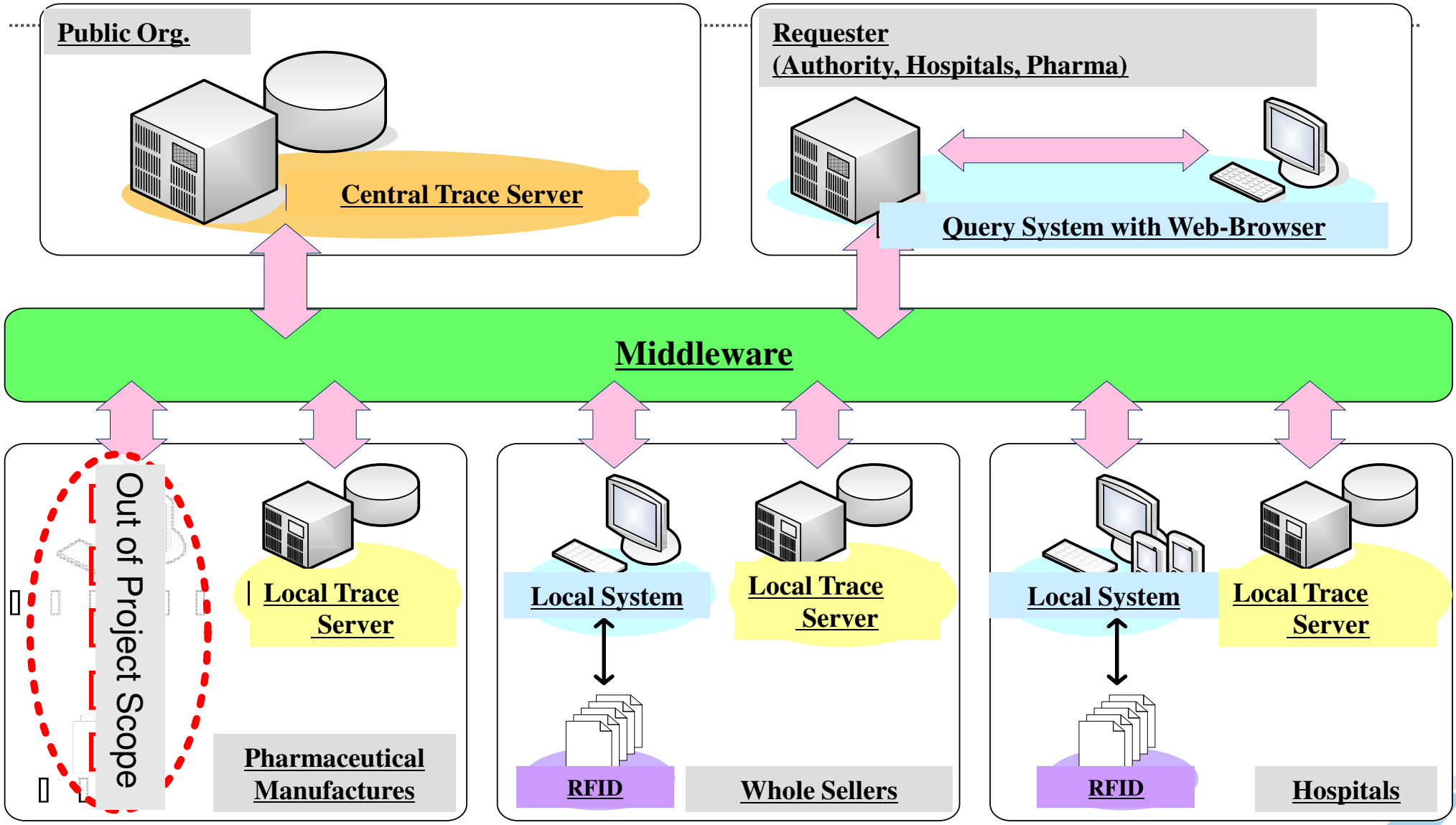
- Recording data at the point of release
  - Using latest data at all time
    - Assuring real time



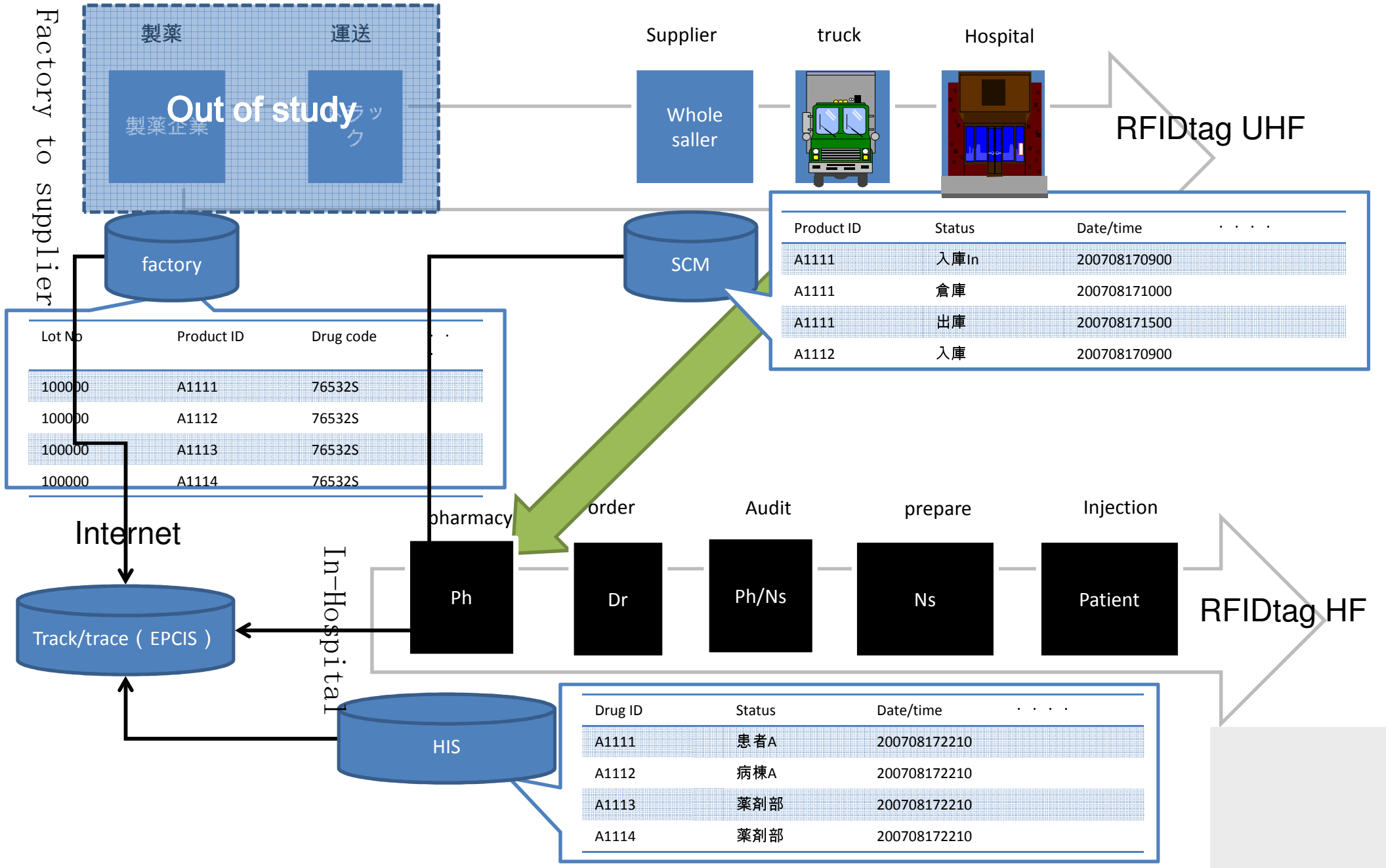
Network Structure of Pilot Study

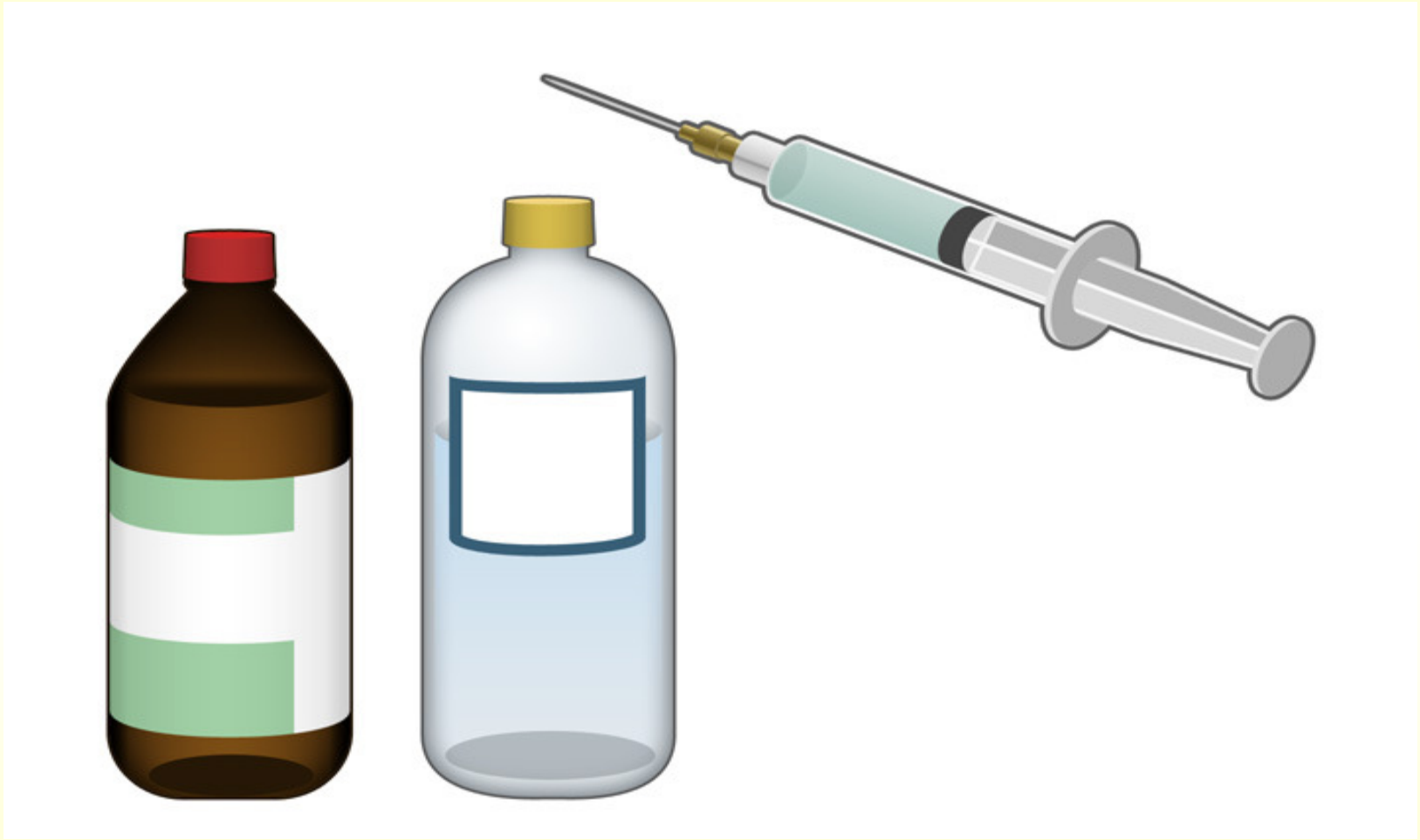


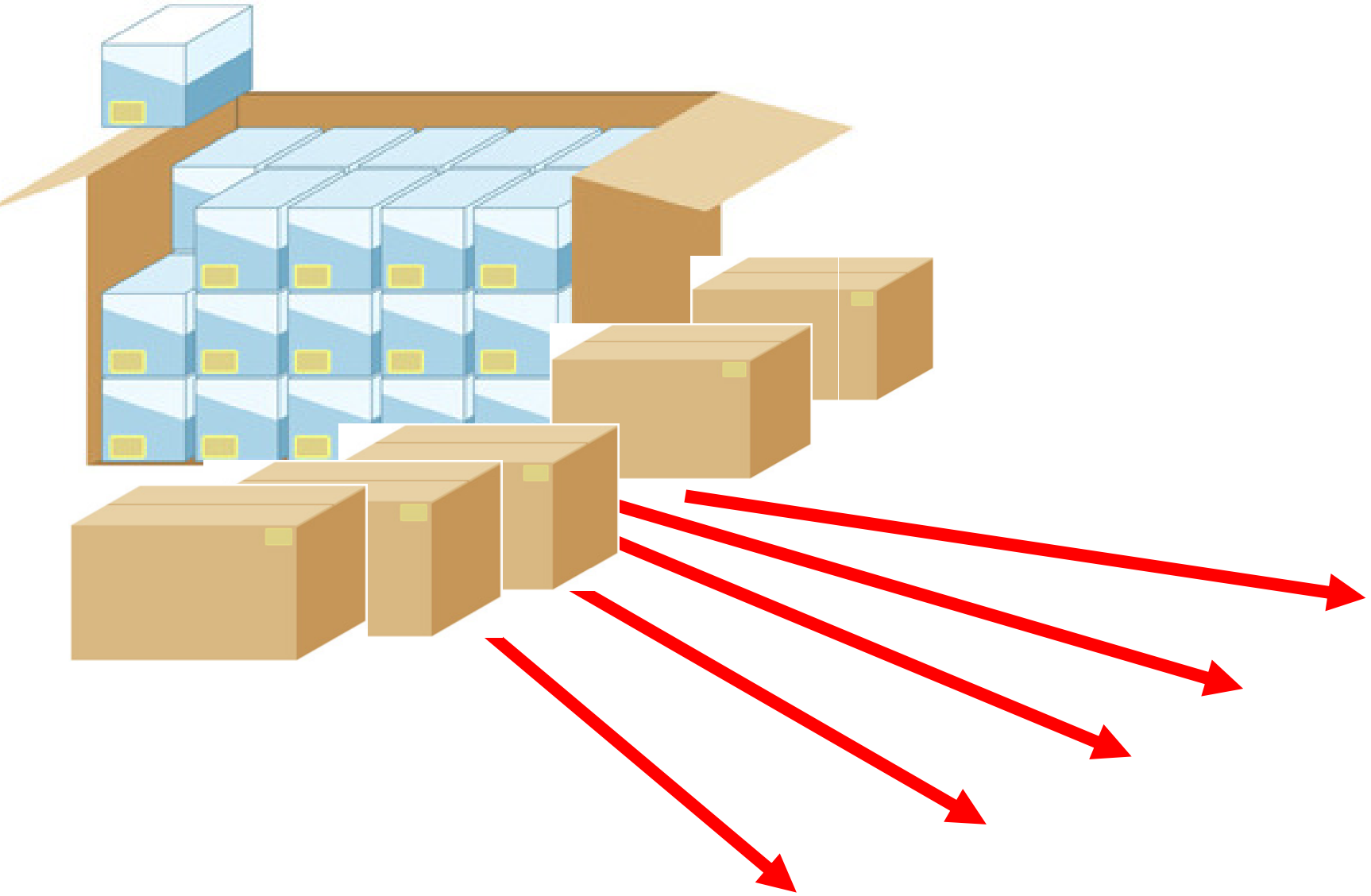
System Overview

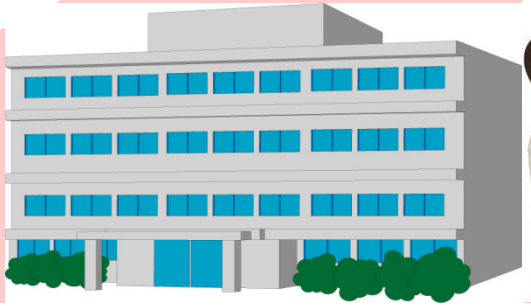


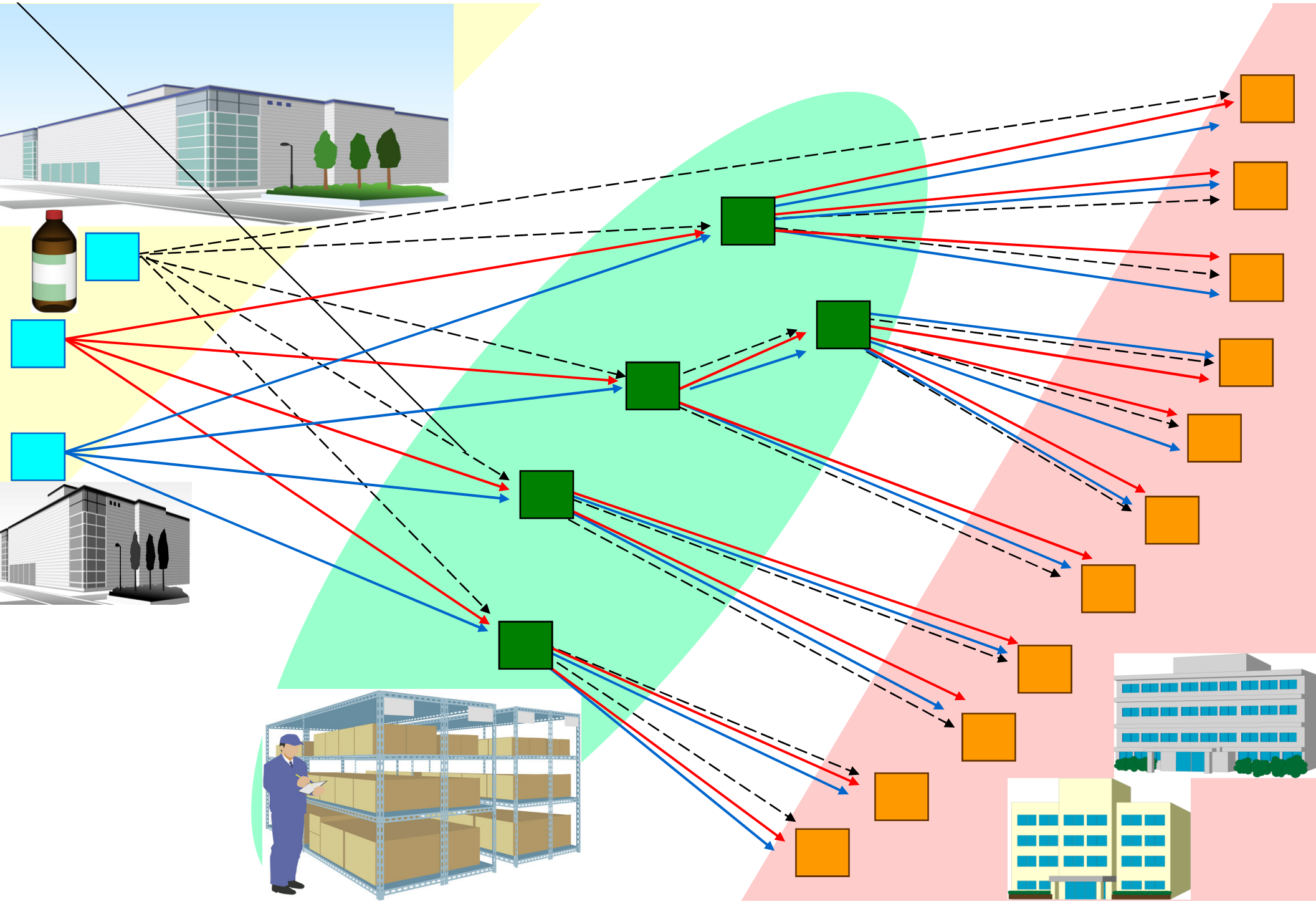
Feasibility study on medical field in Japan

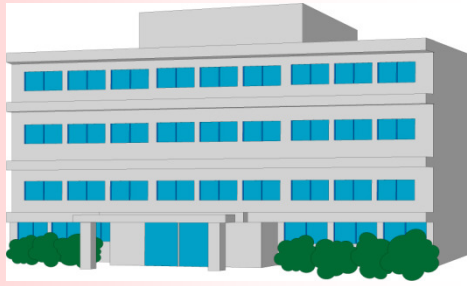


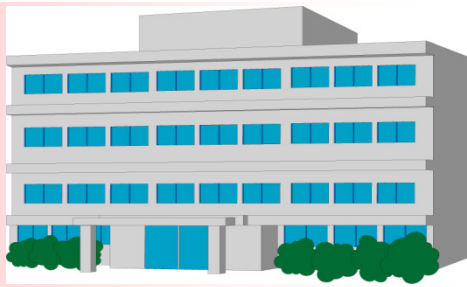












OK

OK

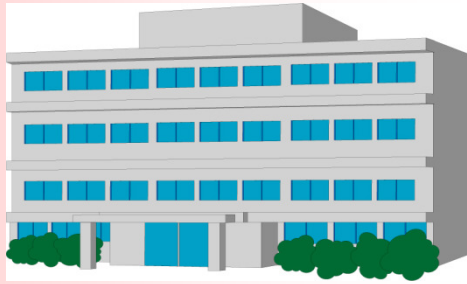
Questionable

NG

NG

OK

OK



OK

OK

OK

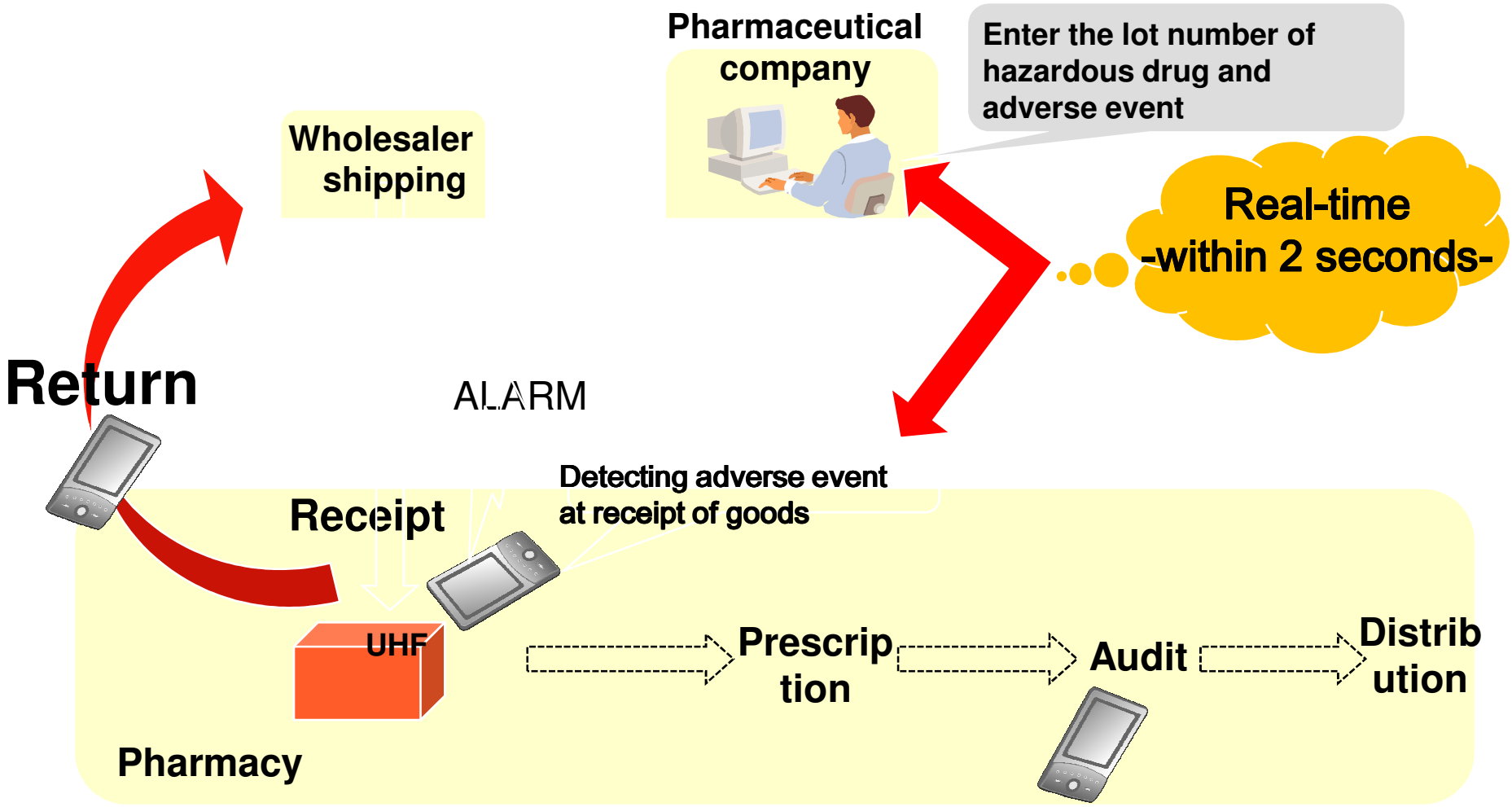
OK

Questionable

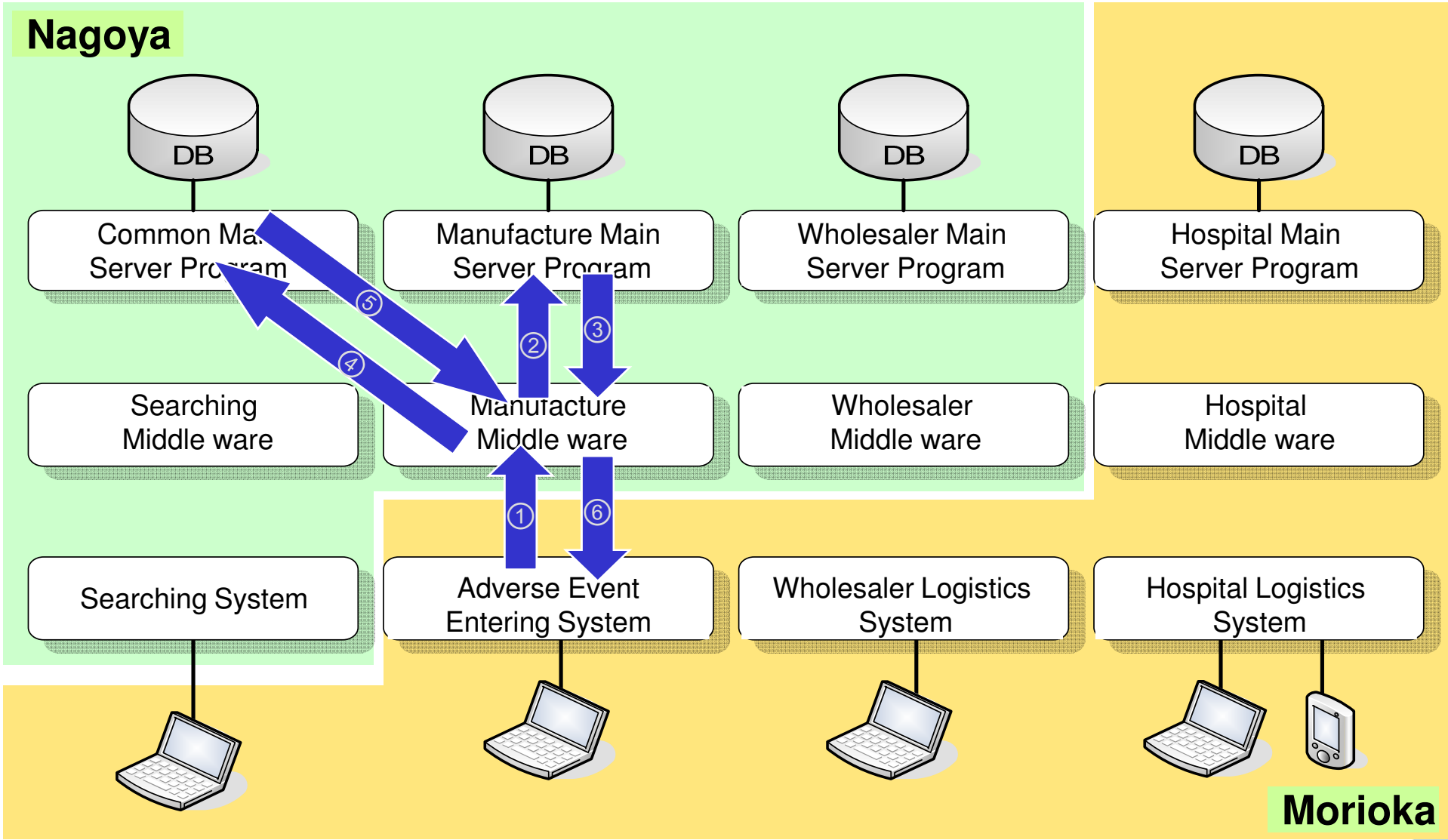
OK

Example of experimental scenario in pilot study

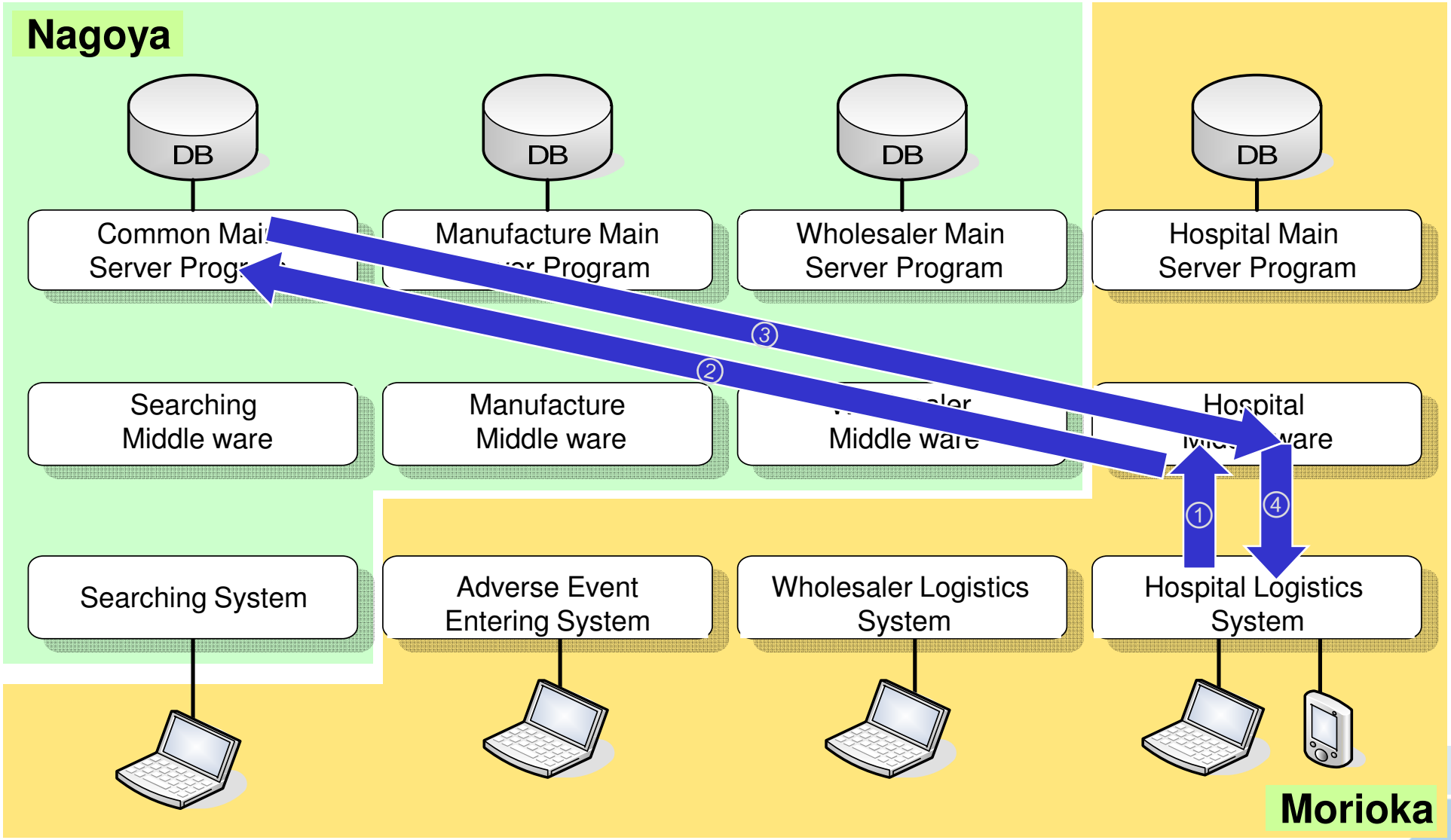
Detecting adverse event at receipt of Drugs



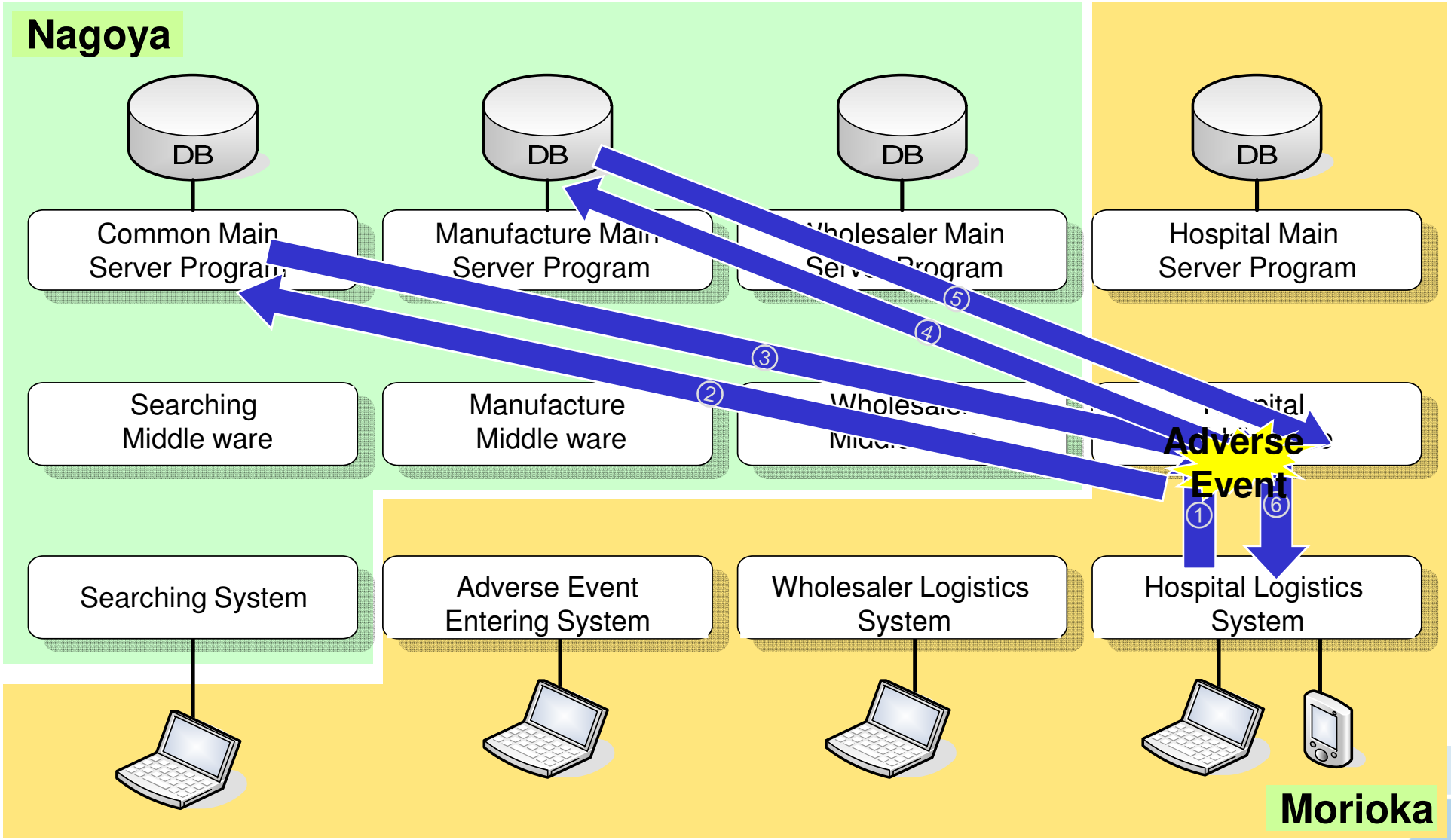
Process of entering adverse events



Process of entering adverse events



Process of Checking drugs



Result of investigation 1

- Average Processing time in hospital （ mili second)

Operation	Number of Operation	Time to reffer DB (⑥－①)
Audit	310	0.314
Mixing	307	0.264
Injection	601	0.292

Demonstrating within 2 seconds

Result of investigation2

Average Processing time outside hospital （ mili second)

#	Contents of Operation	Line	Number of Operation	Average Time
1	Operation of common trace server	-	338	42.3ms
2	Entering information on adverse event	PHS	3	724.0ms
3	Handling wholesaler's distribution	PHS	14	1130.9ms
4	Returned incoming at wholesaler	PHS	3	988.9ms
5	detection of Adverse drug event	ADSL	618	187.2ms
6	Entering information on adverse event with LAN environment	LAN	10	73.3ms

Demonstrating within 2 seconds

Sample of Data log (Outside hospital)

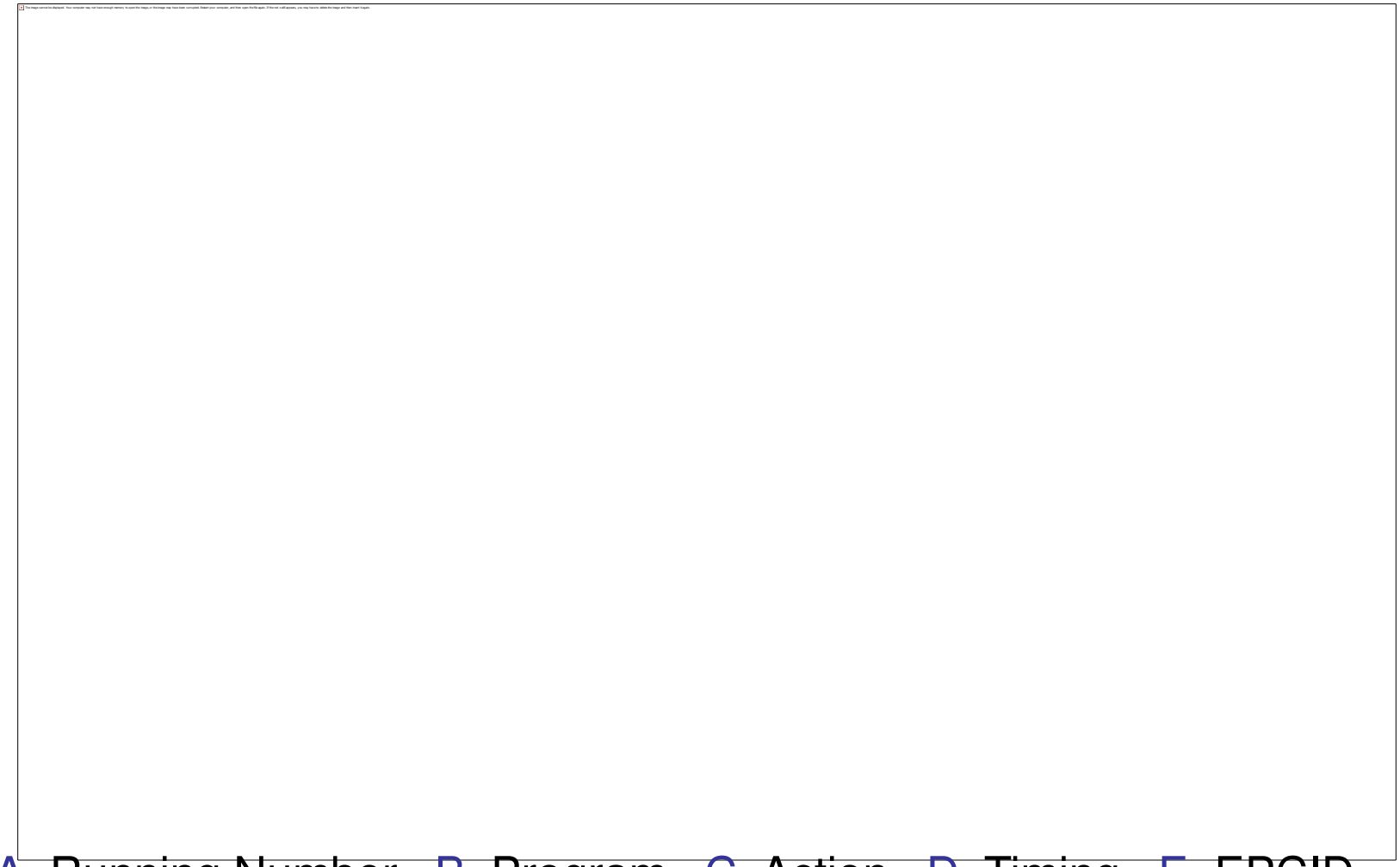
日時	端末IP	API	処理時間
2008/02/08 11:22:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	203ms
2008/02/08 11:22:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	187ms
2008/02/08 11:22:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	188ms
2008/02/08 11:23:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	187ms
2008/02/08 11:23:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	188ms
2008/02/08 11:24:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	204ms
2008/02/08 11:24:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	172ms
2008/02/08 11:25:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	18[illegible]ms
2008/02/08 11:25:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	19[illegible]ms
2008/02/08 11:25:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	[illegible]
2008/02/08 11:26:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	[illegible]
2008/02/08 11:26:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	[illegible]
2008/02/08 11:27:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	187ms
2008/02/08 11:27:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	188ms
2008/02/08 11:27:08	[192.168.5.111]	URI:http//:192.168.5.100:8080/iryoA/searchProductInfo	172ms

A B C D.

図 5-2 共通トレースサーバー(院外)ログ抜粋

A. Data B. PDA ID C. API D. Time to process

Sample of data log (Inside Hospital)



A. Running Number B. Program C. Action D. Timing E. EPCID
F. Name of Drugs G. PDA ID H. User ID I. Time Stamp

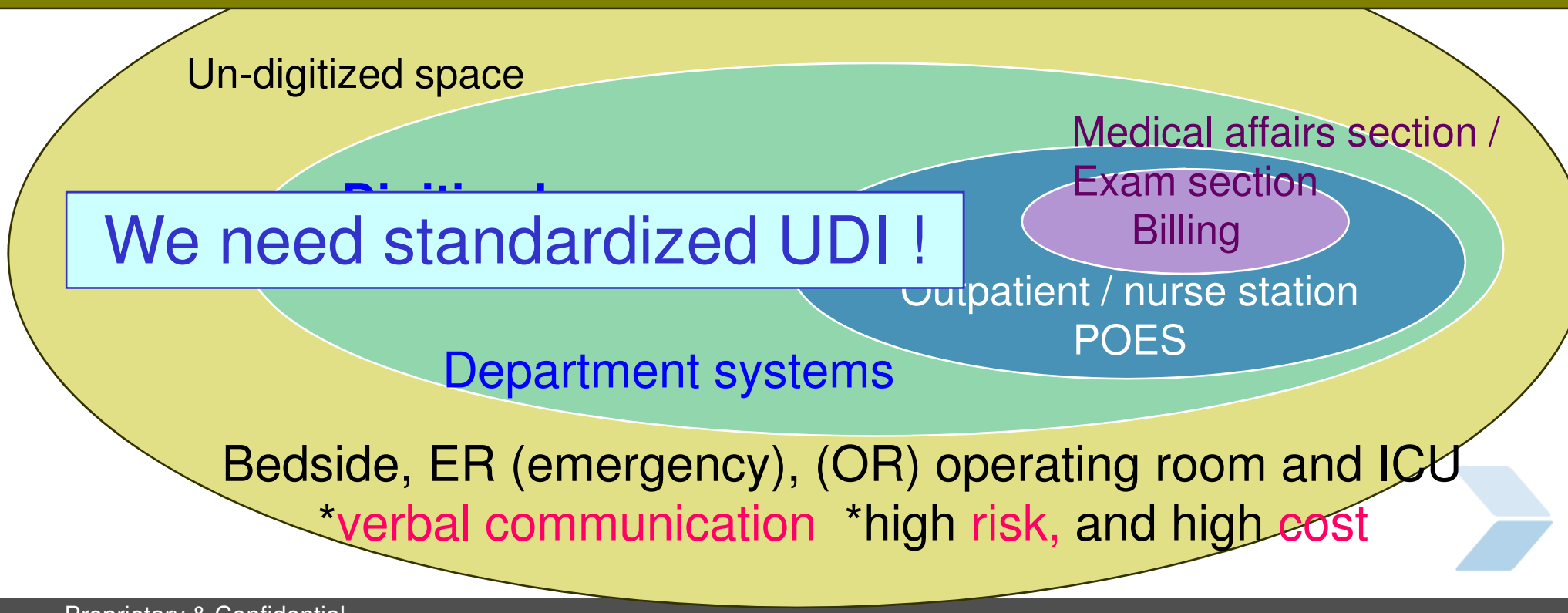
The evolution of hospital information systems

1G: Billing and Lab test : medical affairs and specimen exams

2G: CPOE : ordering

3G: EPR : paperless electronic medical charts

4G: Ubiquitous medical information systems for most dangerous / high costs areas



Conclusion

Not only cost saving but also Patient safety ---

- important to manage the verbal communication in Bedside, ER (emergency), (OR) operating room and ICU

- Single item management with unique serialized number

References:

M Akiyama.
Risk Management and Measuring Productivity with POAS - Point of Act System.
A Medical Information System as ERP (Enterprise Resource Planning) for Hospital Management.
Methods Inf Med. 2007;46(6):686-93.

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Risk management and measuring productivity with POAS--point of act system.
Medinfo. 2007;12(Pt 1):208-12.

World Alliance for Patient Safety - Technology for Patient Safety

Core Group Meeting

Imperial College, London

Monday 29-30, September 2008

WHO representative: Ed Kelley, Head, Strategic Programs, WHO World Alliance for Patient Safety, Geneva, Switzerland

Pauline Philip, Program Lead, WHO World Alliance for Patient Safety, Geneva, Switzerland

Chair: Prof Guang-Zhong Yang, Imperial College London, UK

Prof Stuart Whittaker, South Africa; Prof Azeem Majeed, UK

Prof Masanori Akiyama,Japan; Prof Richard Reznick, Canada

Dr Enrique Ruelas, Mexico; Raj Aggarwal, UK;

Discussion on information technology

- Micro vs. macro, example issues
- Primary care
- Emerging technologies
- Population level (detecting threats at a higher level)
- Guidelines for guidelines
- Design/interoperability/customisation
- Appropriate and accurate data capture
- Training and linkage to curriculum
- Evolvable

Thank you for your attention.
Any Questions?

- Think !
- What kind of system do you want, if your son or daughter were a patient?

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