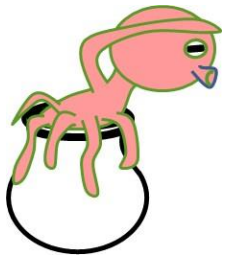
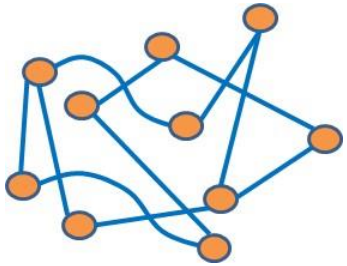


Patient Safety Global Ministerial Summit 2018
(April 13, 2018, Grand Hyatt, Tokyo)

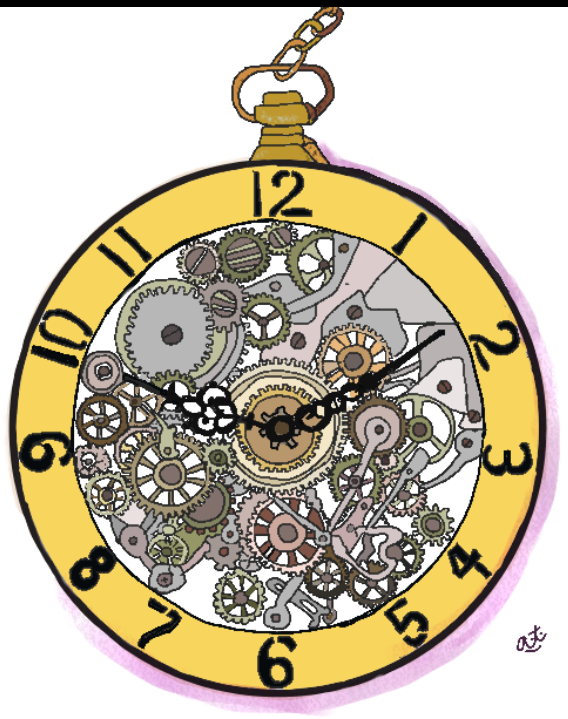
Nurturing resilience in complex adaptive systems for patient safety and quality improvement with the support of ICT

Kazue Nakajima, MD, MS, PhD
Department of Clinical Quality Management
Osaka University Hospital



Precision vs. Resilience

Complicated System



Static & closed system

Clockwork

Complex Adaptive System

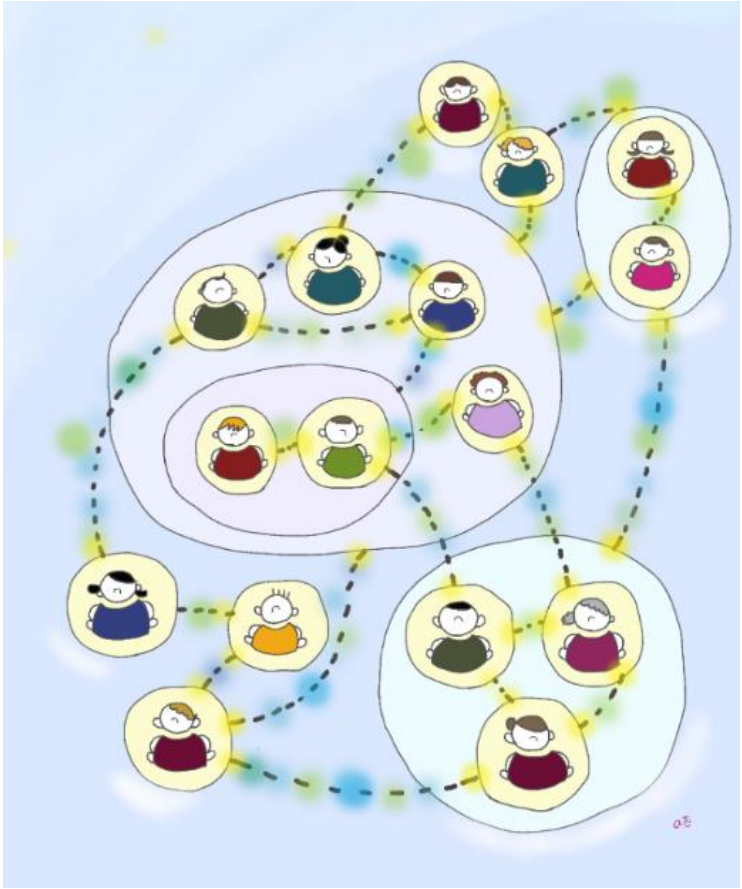
Dynamic & open system

Teamwork

Resilient system

Resilient systems are able to perform as needed in changing environments with a variety of perturbations and constraints.

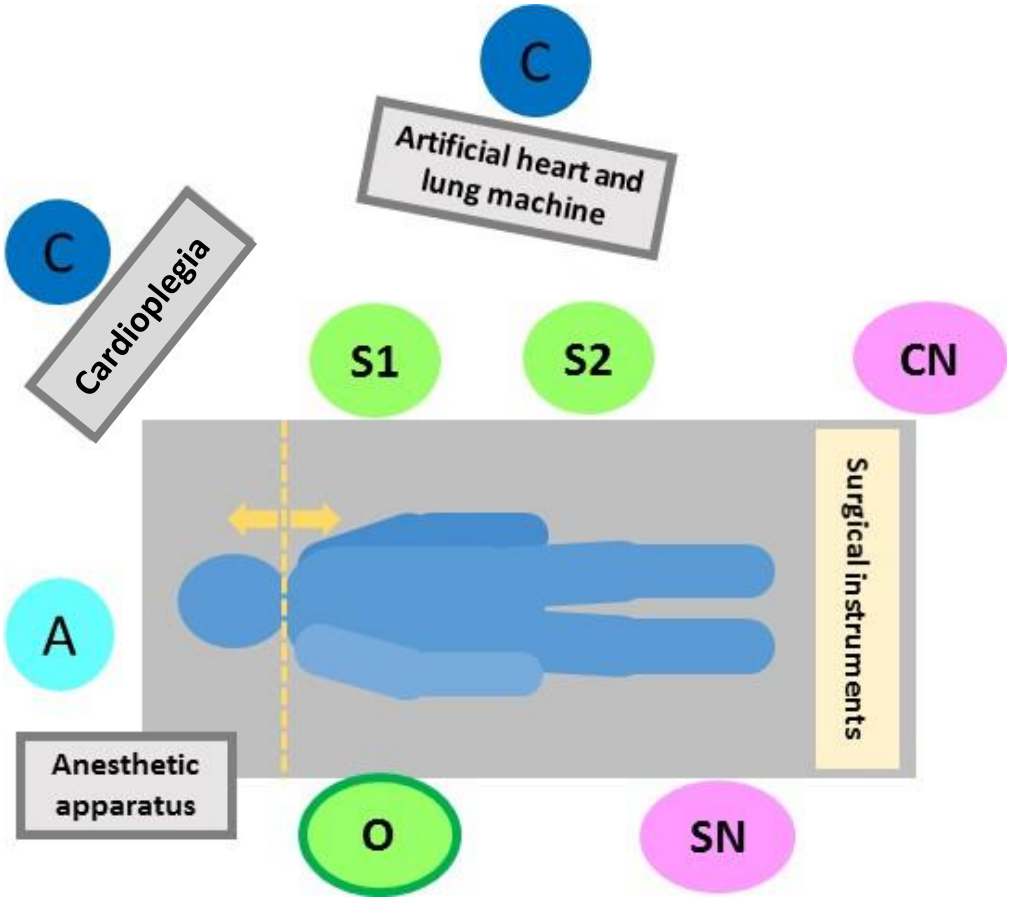
Individual interactions & system performance



How surgical team members are connected

Interactions in a single system

A cardiac surgery team



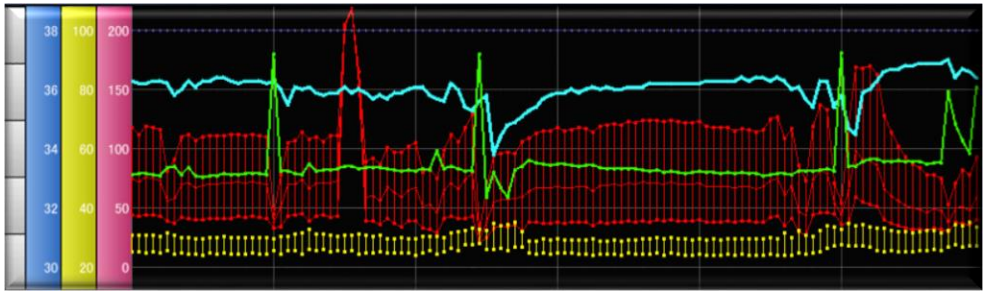
Clinicians	
O	Operator
S1	1st assstant surgeon
S2	2nd assistant surgeon
A	Anesthesiologist
C1	Clinical engineer
C2	Clinical engineer
SN	Scrub nurse
CN	Circulating nurse

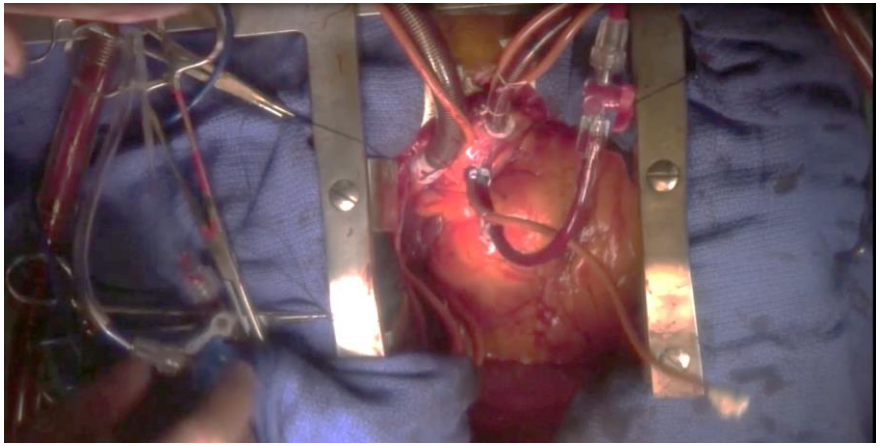
Interactions among surgical team members

Number of phrases: the operator & the others

Contents of phrases

From snapshot to dynamics





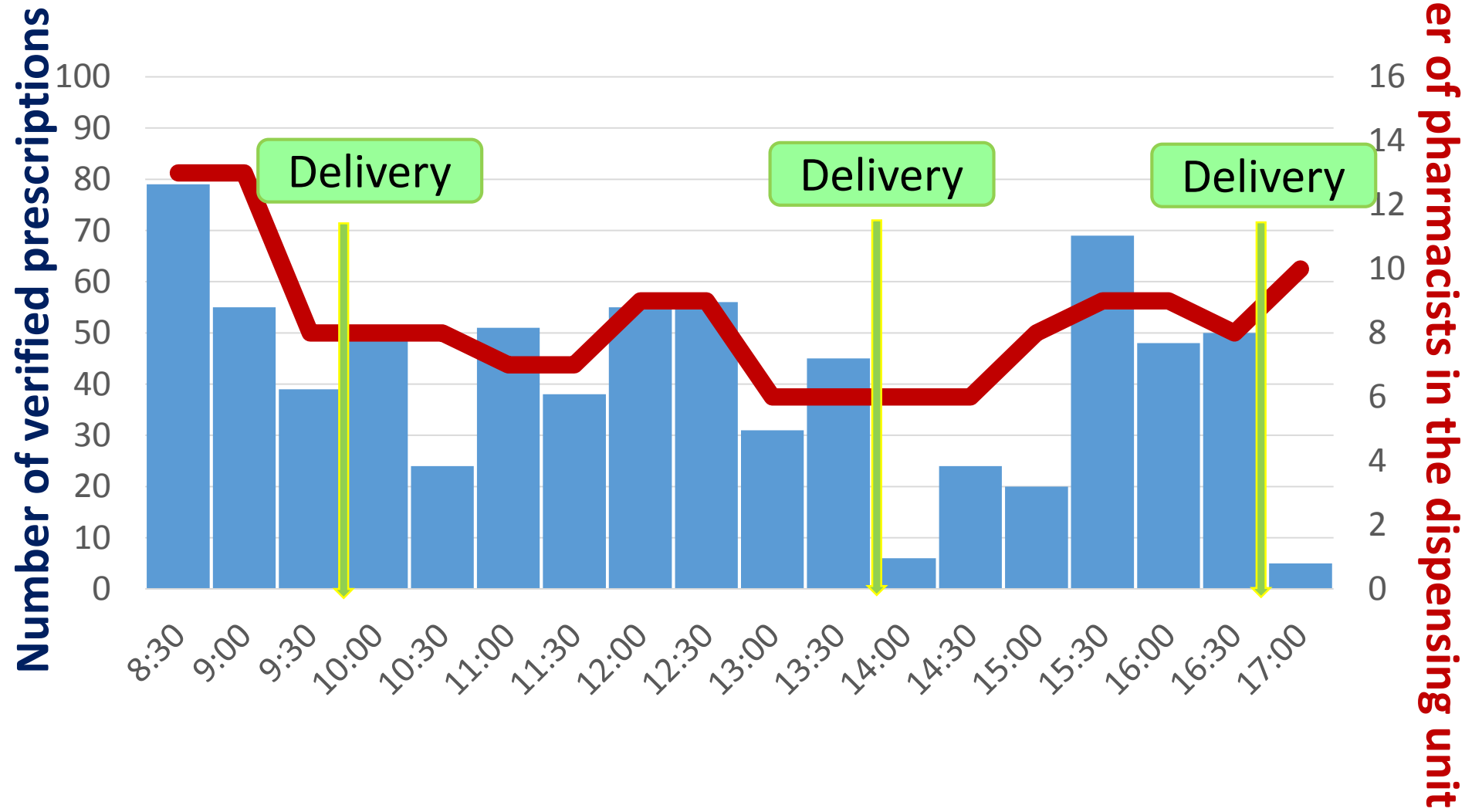
How the pharmacy department is connected with other systems

Subsystem
(Pharmacy department)

Subsystems
(Patient wards)

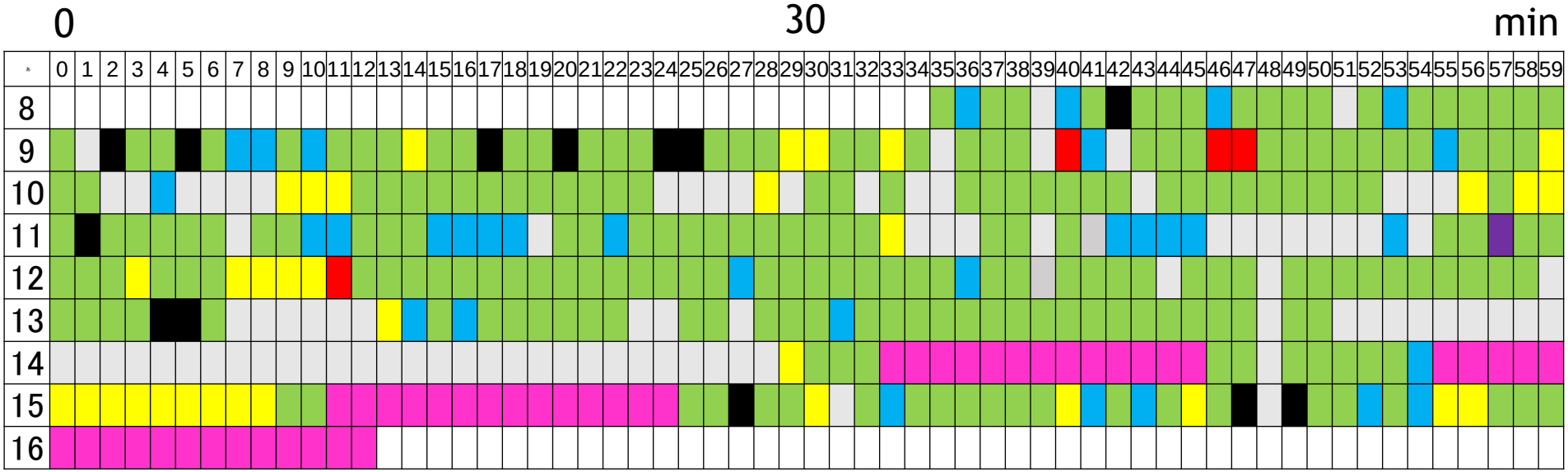
Interactions between subsystems

Dynamic manpower adjustment: department level

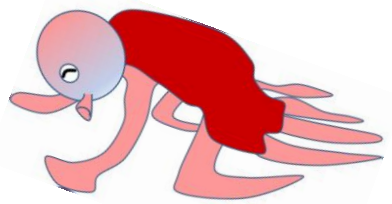


Dynamic manpower adjustment: individual level

Dynamic task adjustment

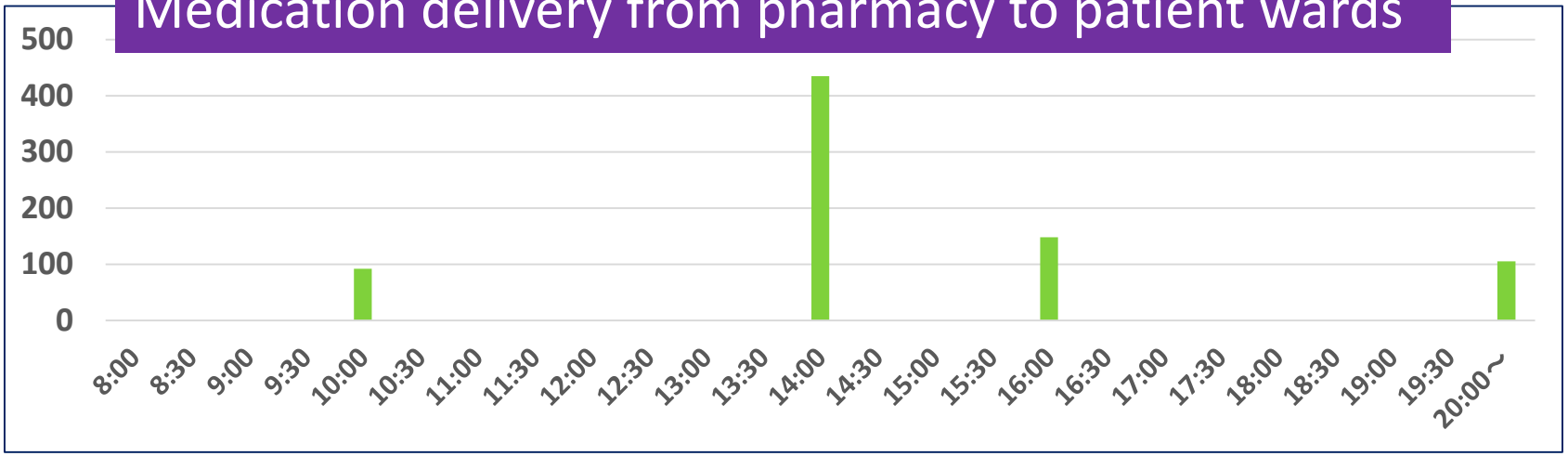


Verification
Manpower control
Education
Dispensing
Instruction
Others
Counter Services
Phone Calls



Medication flow and queue

Medication delivery from pharmacy to patient wards



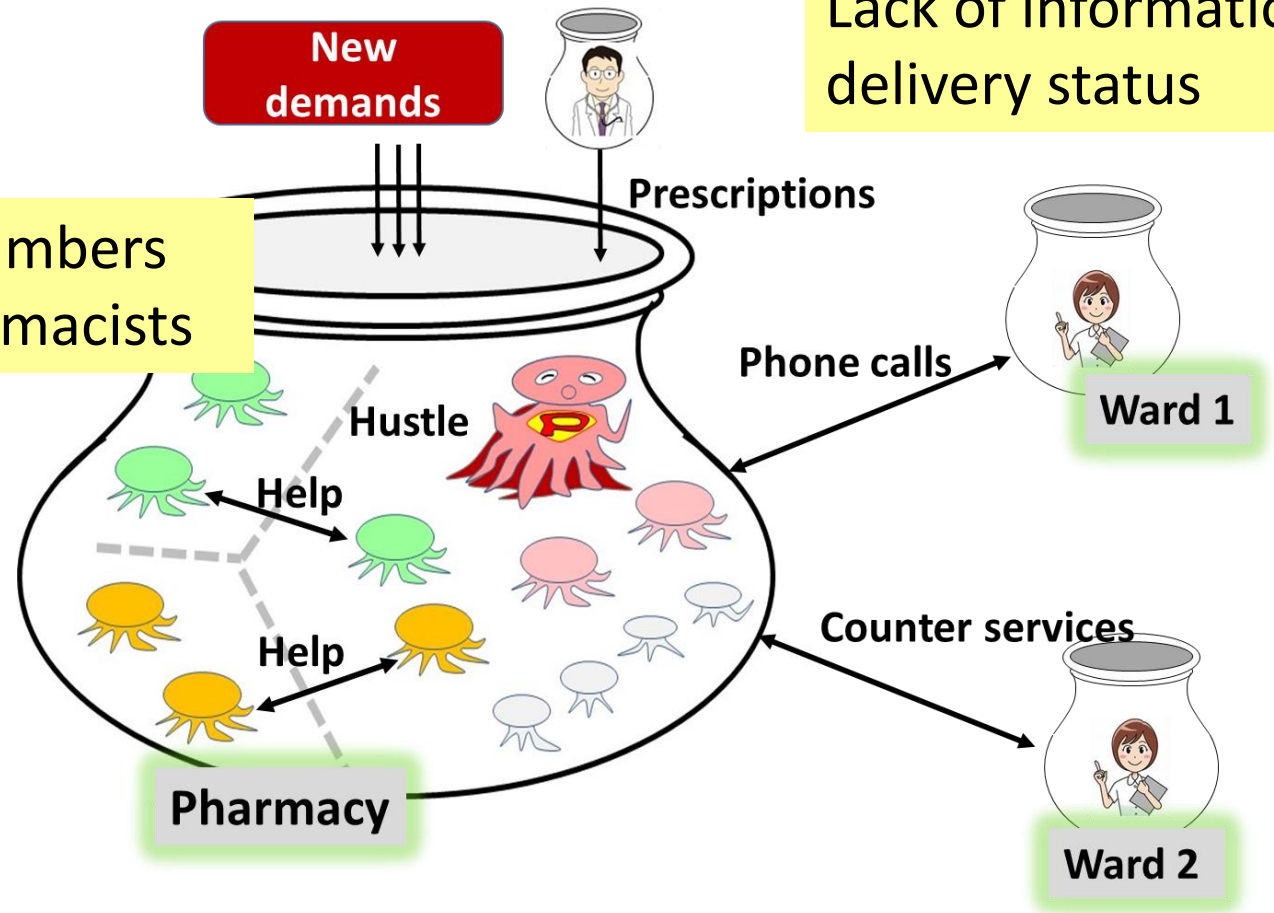
Phone calls from patient wards to Pharmacy

- Phone calls every 4 minutes
  - Requests for counter services
  - Asking about delivery status
- Counter service every 11 minutes

Silos and interdependency

Lack of information on delivery status

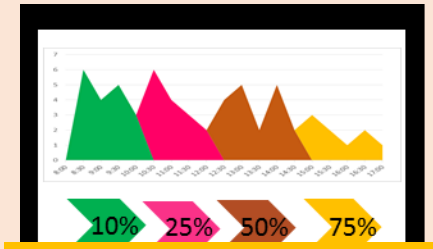
Insufficient numbers of skilled pharmacists



Infrequent medication delivery

From a seat-of-the-pants to data analytics

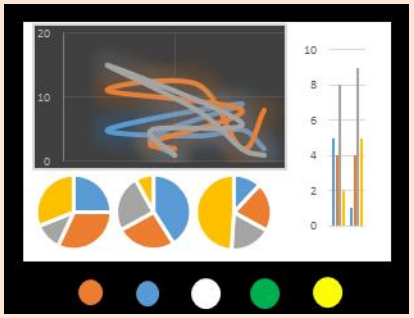
Expected Volume



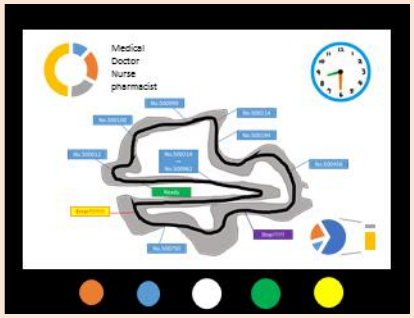
Human Resource

Real Time Information

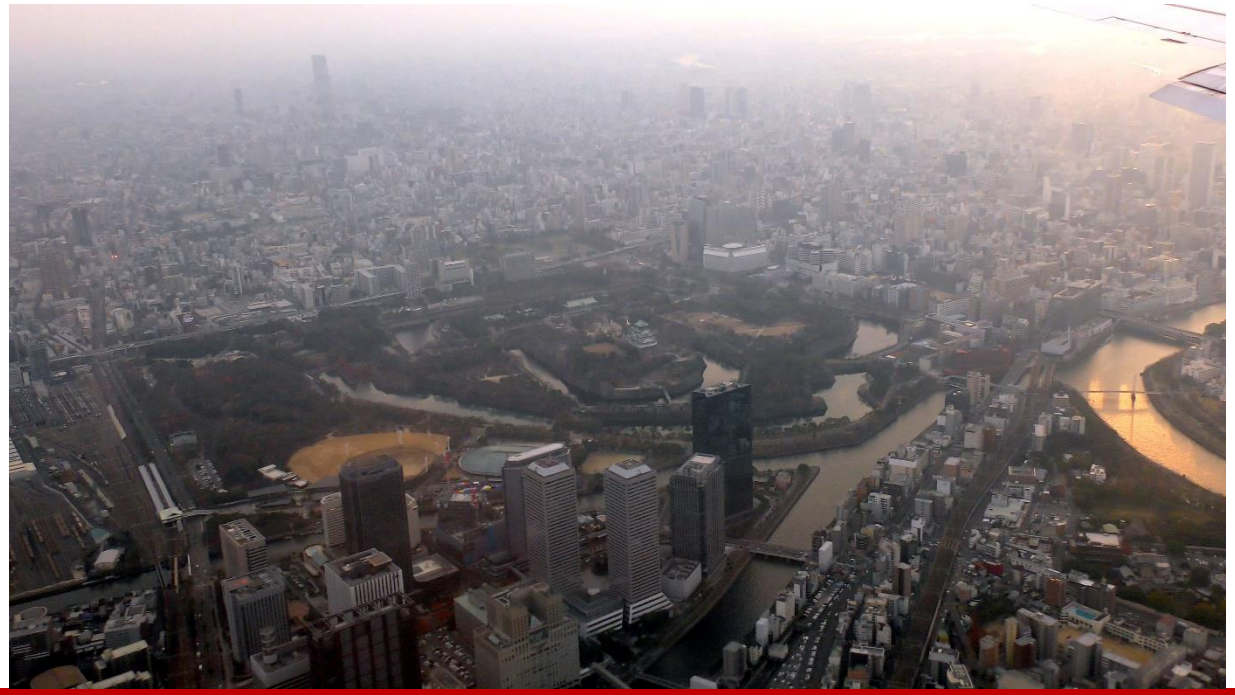
Performance



location



How patients are connected with health care systems



Interactions among many subsystems in a larger system

Acute dementia?

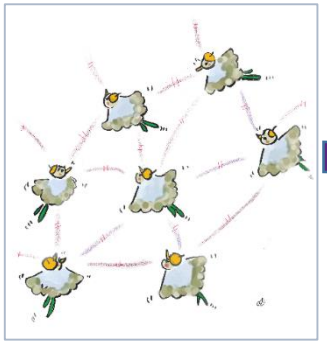
- 80 year-old male
- Violent language
- Parkinson's disease, stroke, hypertension, overactive bladder, prostatic cancer

Medication list

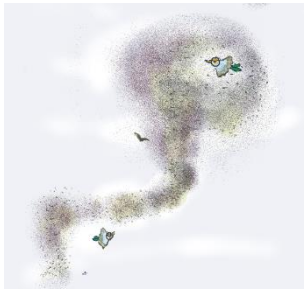
medicine	2015					2016					
	8	9	10	11	12	1	2	3	**4**	5	6
Mirabegron											
Naftopidil											
cernitin pollen extract											
Lansoprazole											
vitamin B1, B6, B12											
candesartan											
selegiline hydrochloride											
levodopa-carbidopa combination											
Solifenacin											
Chai Hu Qing Gan Tang											
Memantine											
Yi Gan San Jia Chen Pi Ban Xia											
Tiapride											
Loxoprofensodium											
Leuprorelin acetate											
Bicalutamide											
Felbinac											
Chimaphila umbellata extract, etc.											
symptom			violent lungage								
number of oral medicine	8	7	8	11	12	11	10	10	10	10	9	5

Doctor's simple rule

- Cohesion
- Separation
- Alignment



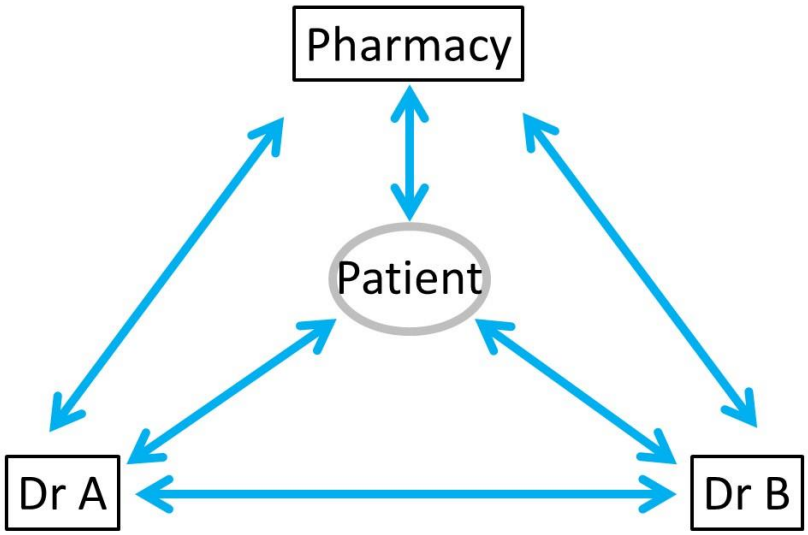
Micro



Macro

1. Respond to patient's complaints
2. Work efficiently in the limited time
3. Solve problems within his/her authority (a silo)

From external force to self-organization



Conclusions

- Set a goal for patient safety to synthesize resilient systems
- Understand connections behind system performance
- Implement ICT to visualize system dynamics, to support decision-making, and to facilitate autonomous distributed control