The Journey in Achieving Track and Trace of Pharmaceutical Products in Public Hospitals in Hong Kong

Ms CHIANG Sau Chu

Senior Pharmacist
Chief Pharmacist 's Office
Hospital Authority Hong Kong

Singapore Healthcare Supply Chain Management Congress 2013
20th August 2013

醫院管理局
HOSPITAL
AUTHORITY

- **Day 1**

  Sharing on the Journey

- **Day 2 (**2.45pm - **SC 11** **)**

  Dealing with the Exceptions and Overcoming the Challenges in the Supply Chain Modernisation Process

Health Care System in Hong Kong

Dual-track Healthcare System

- Public sector -the cornerstone of the healthcare system

- Private sector – Personalised services for those willing and may afford higher fees

Hospital Authority – Provider of Secondary and Tertiary Medical Services

Public and Private Shares of Hospital Bed-days

10%

90%

- Private hospitals
- Public hospitals
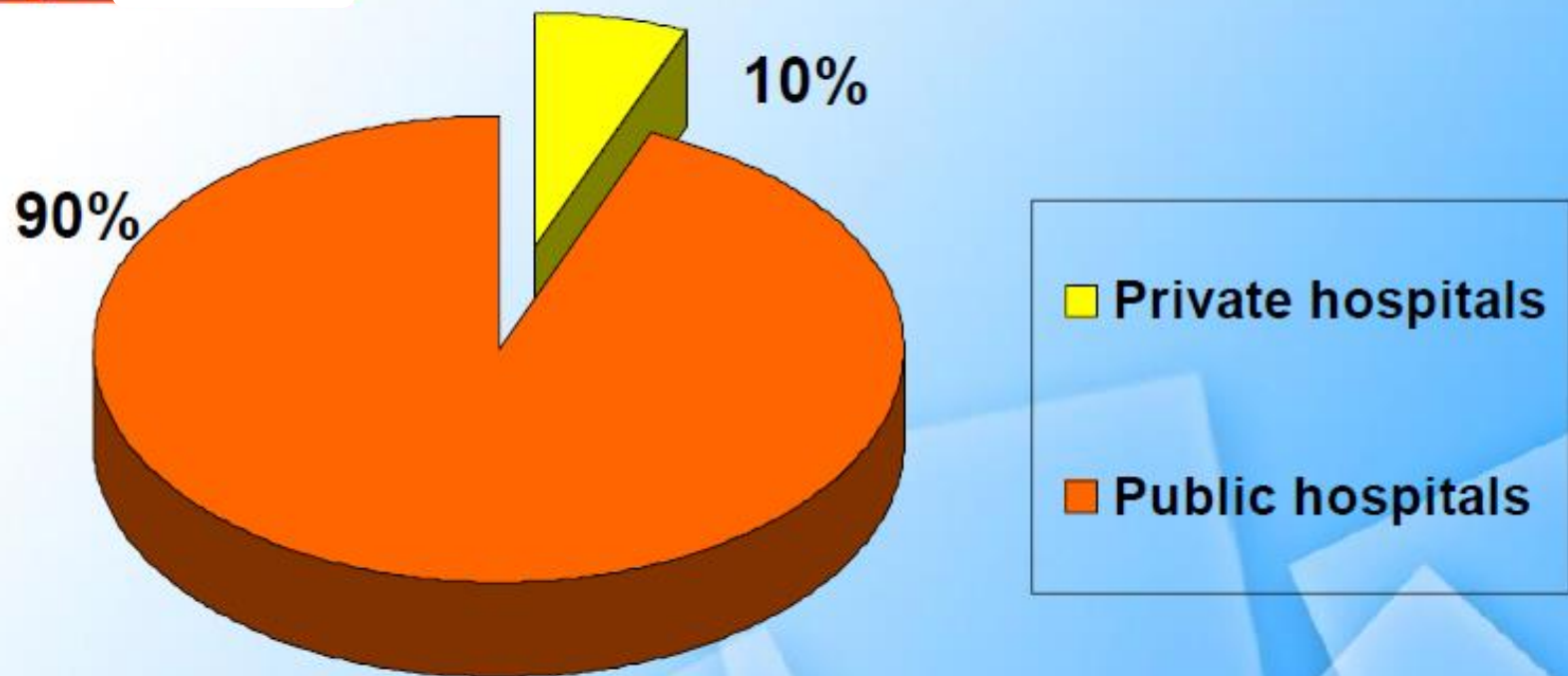
Sources: Hospital Authority Statistical Reports and private hospital statistics from Department of Health

Hospital Authority Hong Kong

- A statutory body established on 1 December 1990

- Manages all public hospitals spread over 7 clusters in HK
  = 41 public hospitals (total 27,900 hospital beds)
     with 47 specialist & 74 general clinics

- Total 63,000 staff
  with 5,475 Doctors & 20,522 Nurses & 5,834 Allied Health

- 2012/13 Government Funding: ~ USD 5.69B (HKD44.4B)

Two Levels of Operational Control for Pharmaceutical Services

- **At Head Office level** :
  - Chief Pharmacist's Office
  - Central steering functions
    - set policy & directions
    - establish professional standards
    - develop and implement & support systems
    - monitor progress on all pharmaceutical issues
- **At Hospital Cluster level** :
  - Hospital Pharmacies Cluster Chiefs
    - Control & perform decentralised operations at local pharmacies

醫院管理局
HOSPITAL
AUTHORITY

Overall Drug Expenditure trends in HA for both hospital in-patients and out-patients drugs

Average annual increase in drug expenditures about 6.9%

Drug Expenditure ($Billion)

Year	Expenditure
00/01	1.69
01/02	1.81
02/03	1.81
03/04	1.9
04/05	2.15
05/06	2.18
06/07	2.15
07/08	2.28
08/09	2.41
09/10	2.68
10/11	2.98
11/12	3.37
12/13	3.77

- HKD3.77Billions = about 8-10% of HA's overall budget
- Covers all drug dispensed to hospital in-patients and out-patients
- About 1500 drug items in the hospital formulary
- Prescription

醫院管理局
HOSPITAL AUTHORITY

Our patients waiting to be served at our HA pharmacies

Magnitude of our total **daily** business in all pharmacies in HAHK

Transaction types	Units
Dispensed Items	226,159
Dispensed Prescriptions	69,561
No. of Patients Served	59,684
No. of Suppliers dealt with	60
No. of Purchase Orders made	620
Stock Receive in HK$	18M
No. of Items involved in stock receipts	1,600
No. of Stores for Stock Receipt/ issue	107
No. of Movement Transactions in these stores	170,94

Quality, Safety and Efficiency
in drug distribution/medication use process

From manufacturers / distributors → Into pharmacy stores → Out from pharmacy stores → Into dispensing areas → To point of care / patient areas

150 suppliers

41 hospitals

100 pharmacies

80 Stores

500 wards

Description of the Major Supply Chain Processes
Each of these processes might be performed by different organisations or by a single entity

Industry →→→

Logistics provider →→→

Healthcare facility →→→
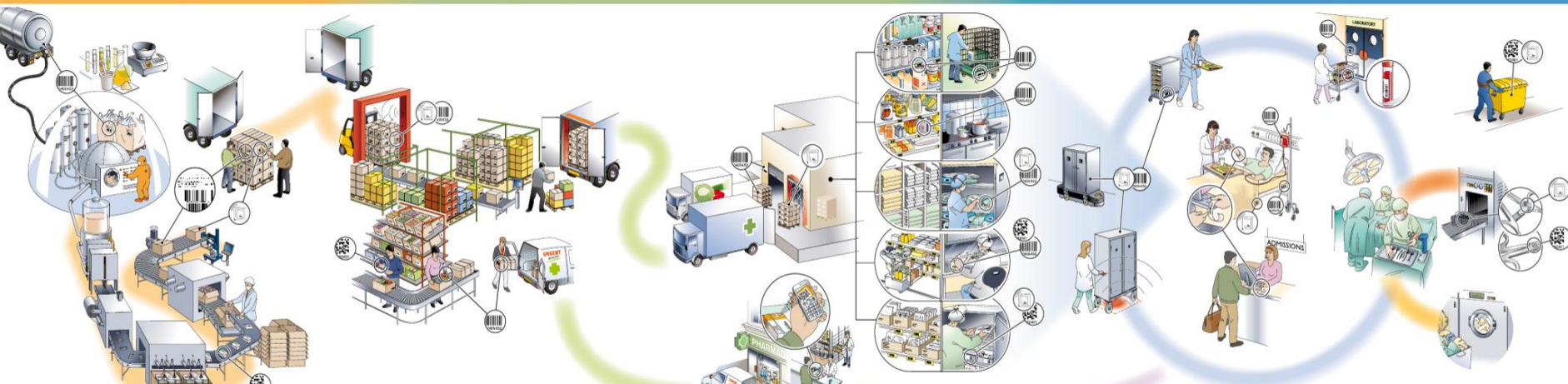
Production ↑
- Receipt of a shipping notice indicating traceability information linked to the raw material and packaging being used.
- Quantity control of merchandise using SSCC.
- Validation of receipt and delivery slip signature.
- Registration of lot/batch numbers and dates.
- Acceptance of primary materials.
- Recording of lot numbers used.
- GTIN assignment and marking for base units and creation of their lot numbers.

- Link between the production lot number and the raw materials used.
- GTIN and SSCC assignment for logistic units.
- Recording the links between SSCC and the content of logistic units: GTIN + lot/batch number + expiration date.

Warehousing – Preparation ↑
- Management of physical product arrivals and shipments using SSCC.
- Management of the separation and release of lots.
- Assignment of locations.
- Registering the movement of merchandise.
- Physical inventory.
- Order picking.
- Creation of logistic units, assignment and remarking of SSCC.
- Tracking inventory movements, linking SSCC, product, lot/batch number, and delivery destination.

Shipping ↑
- Loading.
- Reading and registering SSCC.
- Sending shipping notices to recipients with delivery itemisation.
- Sending shipping orders to the carriers.
- After delivery, the carrier sends a transport status report.
- Integrating information in order to efficiently coordinate orders, deliveries, and invoices.

Receiving ↑
For every participant receiving merchandise:
- Planning for receipt of goods based on shipping notices.
- Unloading and SSCC reading.
- Control of receiving through efficient coordination with shipping notices.
- Coordinating orders and deliveries, sending acknowledgements of receipt.
- Entering product data into inventory records.
- Transmitting information to efficiently manage orders and invoices.

Healthcare Delivery ↑
- Services and functional units identified by their GLN send out internal requests using the product's GTIN.
- Preparation processes, assignment and registration of SSCC, delivery and receiving, all based on the same information as all other logistics processes.
- Sterilization, bleaching and restoring, are all production processes using the full range of GS1 identifiers: GTIN, SSCC, GRAI.

- Tracking internal deliveries is done with the aid of a GRAI, which identifies the material and also allows for tracking, washing, disinfecting, maintenance, etc.
- Delivery traceability is enabled by the link between the GRAI and the delivery contents as indicated by its SSCC.
- Patients, and the services provided to them, are identified using a GSRN, read and registered in a database at each stage and movement of the

patient, during their hospital stay. The GSRN thus contributes to the safety and traceability of the patient.
- Products are identified by their GTIN + lot/batch number and are recorded in the patient's medical chart/records so as to ensure the complete safety and traceability of all events that take place during the patient's stay. This information facilitates itemized billing.

How can we achieve track and trace in Supply Chain of Pharmaceutical products?

Patient & Consumer Safety

Visibility

Traceability

The backend of
in our pharmacy stores
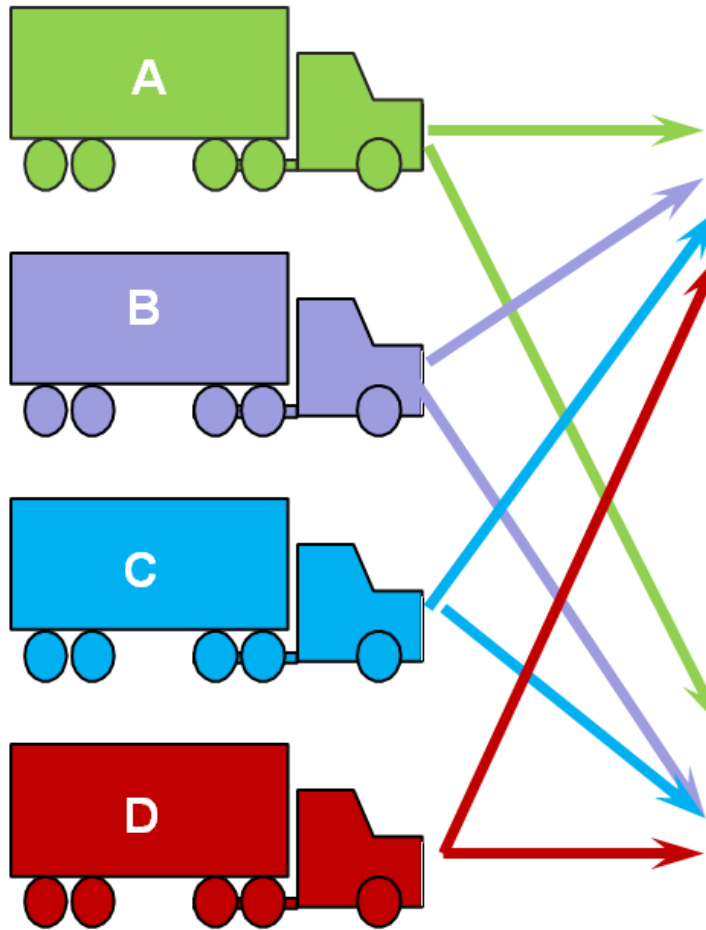# serving the hospitals, SOPC & GOPC

- Where do our drugs come from ?
- How to control and monitor the movement of drugs
- What are the logistics in stock receipts ?
- What are the processes ?
- How to track and trace the Supply Chain ?

The Practice as it used to be – drug delivery into stores

External:
From Suppliers (>150)

Internal:
At Pharmacy stores (>100) in 7 clusters

A

B

C

D

Delivery details on hard copy

ORIGINAL

No electronic nor bar-coded information

1. Manual <u>checking</u> of standard information
   - manufacturer
   - country of origin
   - quantity
   - lot no., expiry date, etc.

2. Manual <u>entry</u> of standard information into Pharmacy system

3. <u>Stocking</u> onto the shelves in the Pharmacy stores

The general situation about our pharmacy stores (too many, too small …… manual processes…..)

Drug distribution from pharmacy stores (today's practice)

Pharmacy main stores

Manual entry of lot no. with expiry date – record only

Pharmacy working stores (for dispensing to out & in-patients & issue to wards)

No functionality to enable track and trace lot no. & expiry information

"Insanity:
Continuing to do the same
thing and expecting different
results."

- Albert Einstein

Catalyst for change….

The Journey on Supply Chain Modernisation Project began when HA announced in March 2009 – The Key Initiatives

6. Enhance the HA's Pharmaceutical IT systems to improve controls by moving progressively towards :
- **introducing bar coding**
- **automatically check what is received against what was ordered**
- **automatically tract and trace drugs to the point of issue and**
- **prevent dispensing of expired items**

HASLink *Express*

HOSPITAL AUTHORITY

Thur, 26 March 2009

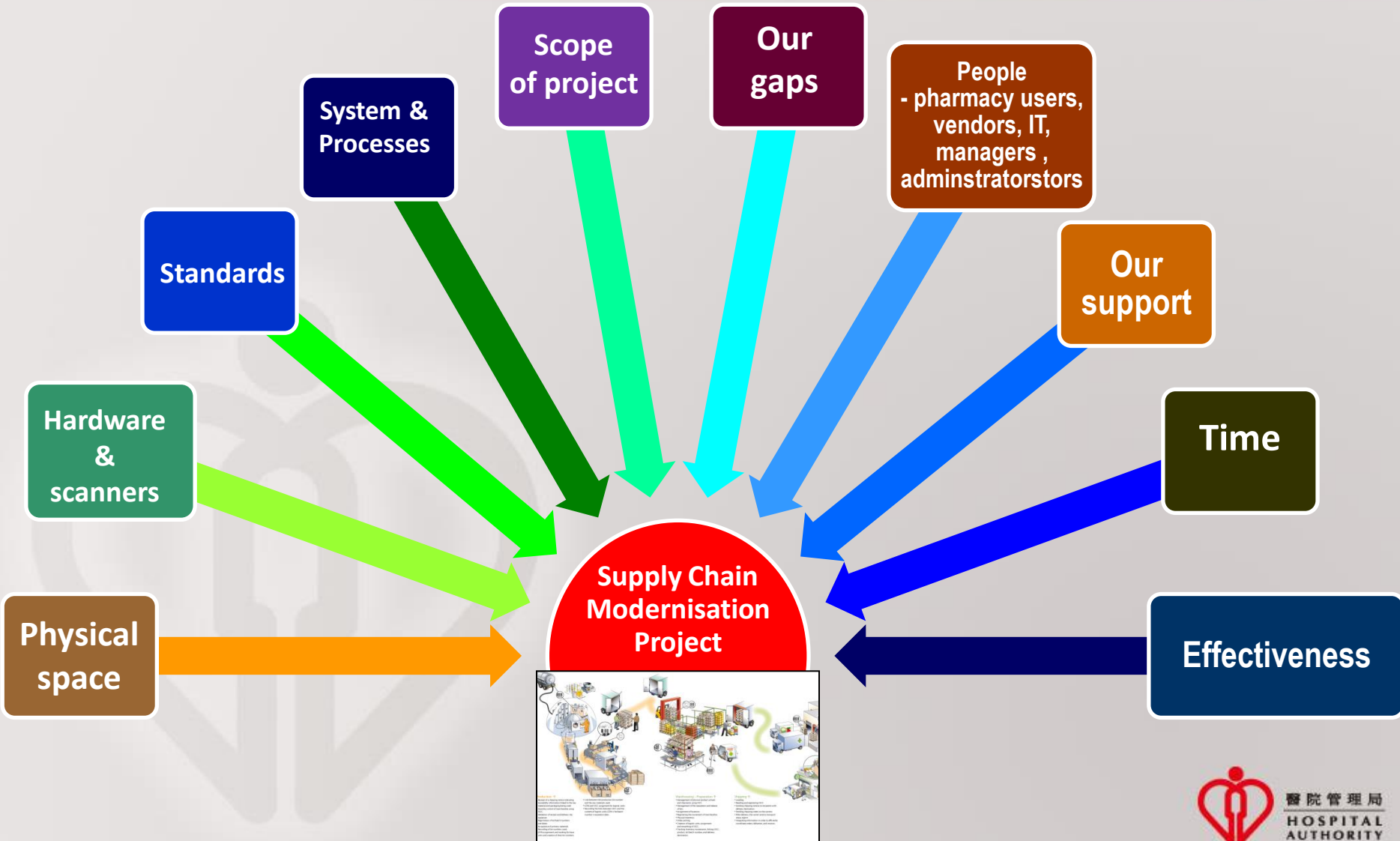## Key initiatives to enhance HA's pharmaceutical products procurement system

To ensure drug quality and safeguard patient safety, the HA announced today the following key initiatives to enhance our pharmaceutical products procurement system:

1. Require manufacturers to introduce microbiology testing as a prerequisite to procurement for high risk drug items and for provision of batch release reports on delivery of drug products.

2. Enhance the HA's sample testing to include a wider range of drugs and microbiology testing based on risk levels.

3. Require suppliers to provide additional standard information for drug delivery documentation to enable more effective physical checking of goods received.

4. Work with the Department of Health to improve ease of access to key additional registration details, including pack sizes to strengthen regulatory compliance.

5. Consider introducing multi-source for high volume/risk drugs.

6. Enhance the HA's Pharmaceutical IT systems to improve controls by moving progressively towards :
   - Introducing bar coding;
   - Automatically check what is received against what was ordered;
   - Automatically track and trace drugs to the point of issue; and
   - Prevent dispensing of expired items.

7. Establish a Drug Quality Assurance Office to enhance quality monitoring and implementation of improvement initiatives.
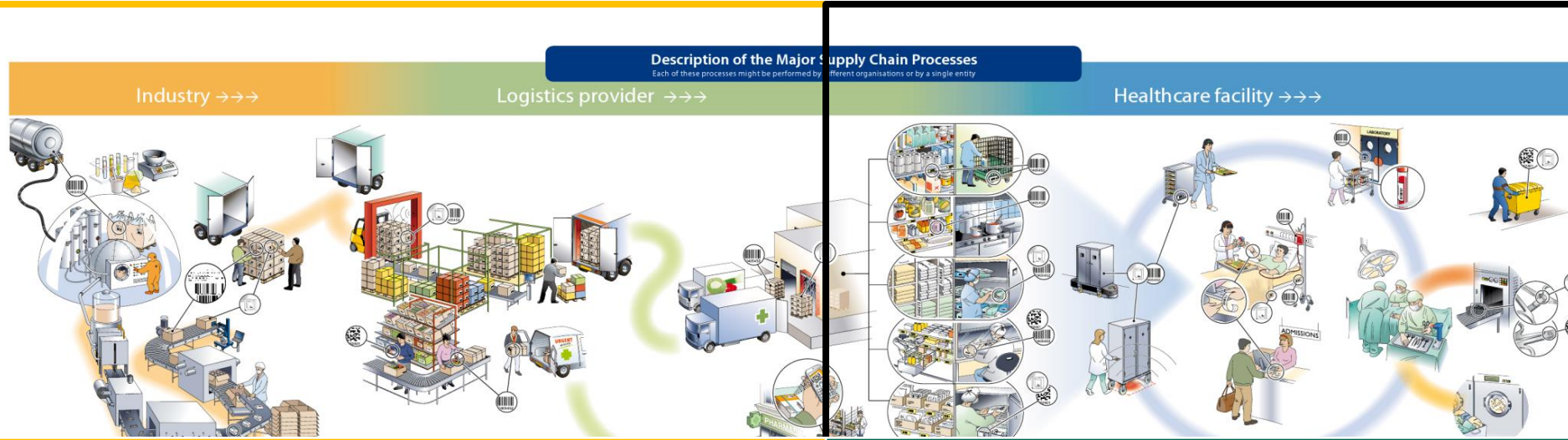
HOSPITAL AUTHORITY

Please send your suggestions via fax: 2808 0242 or e-mail: ehaslink@ho.ha.org.hk

The Challenges in SCM Project:
fighting the unknowns

1st step – understand the need to Modernise the Supply Chain on Pharmaceutical Products

Description of the Major Supply Chain Processes
Each of these processes might be performed by different organisations or by a single entity

Industry →→→   Logistics provider →→→   Healthcare facility →→→

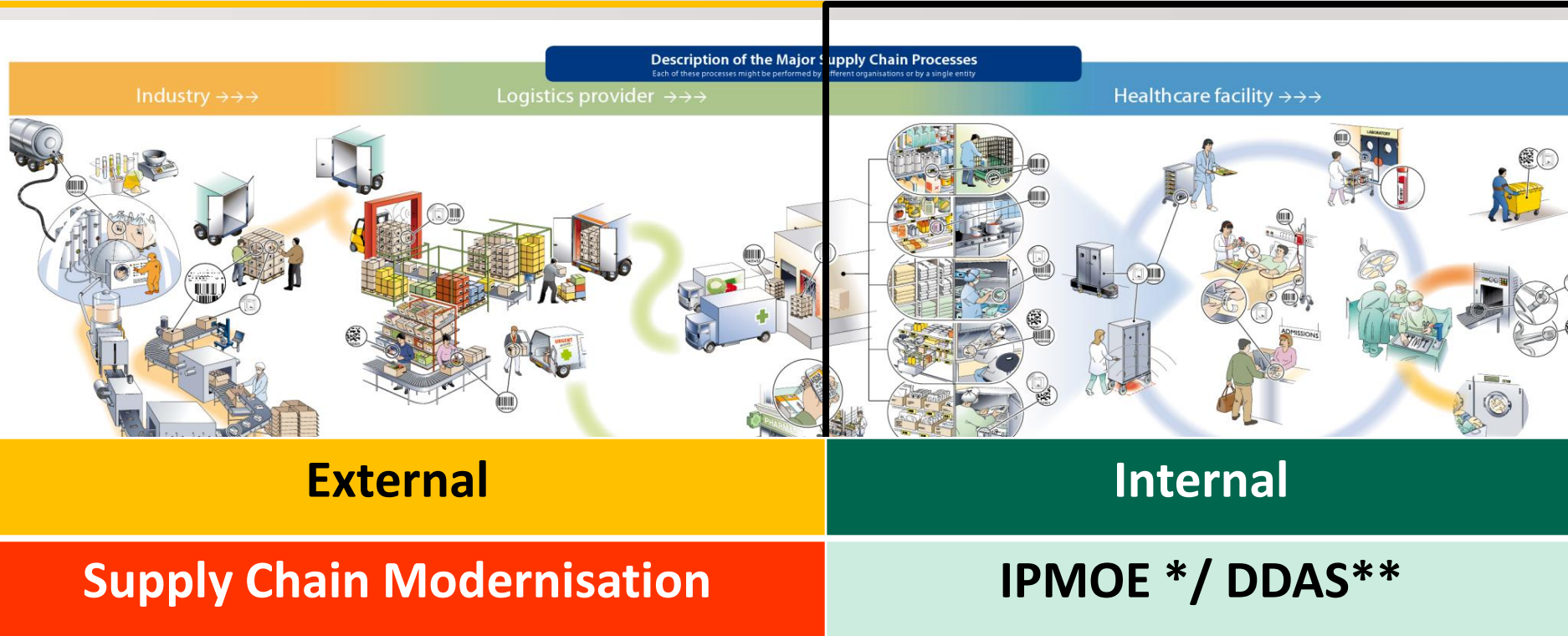| From manufacturers	→ into pharmacy stores	→ into Dispensing area
	out from pharmacy stores →	→ to point of care (patients)

1st step – identify the scope to be covered in the Supply Chain Modernisation project on Pharmaceutical Products

External	Internal
Supply Chain Modernisation	IPMOE */ DDAS**

*IPMOE = In-patient Medication Order Entry
**DDAS= Drug Distribution and Administration System

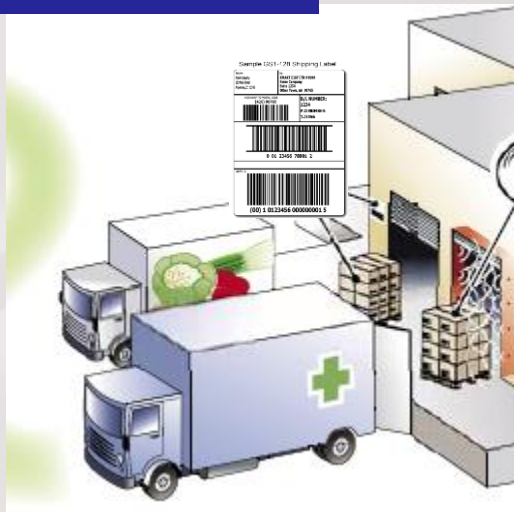# 2nd Step – Defining what we want to do in SCM ?

**External :
From Suppliers**

Order &
Product
Information
(ASN)

**Internal :
At Pharmacy stores**
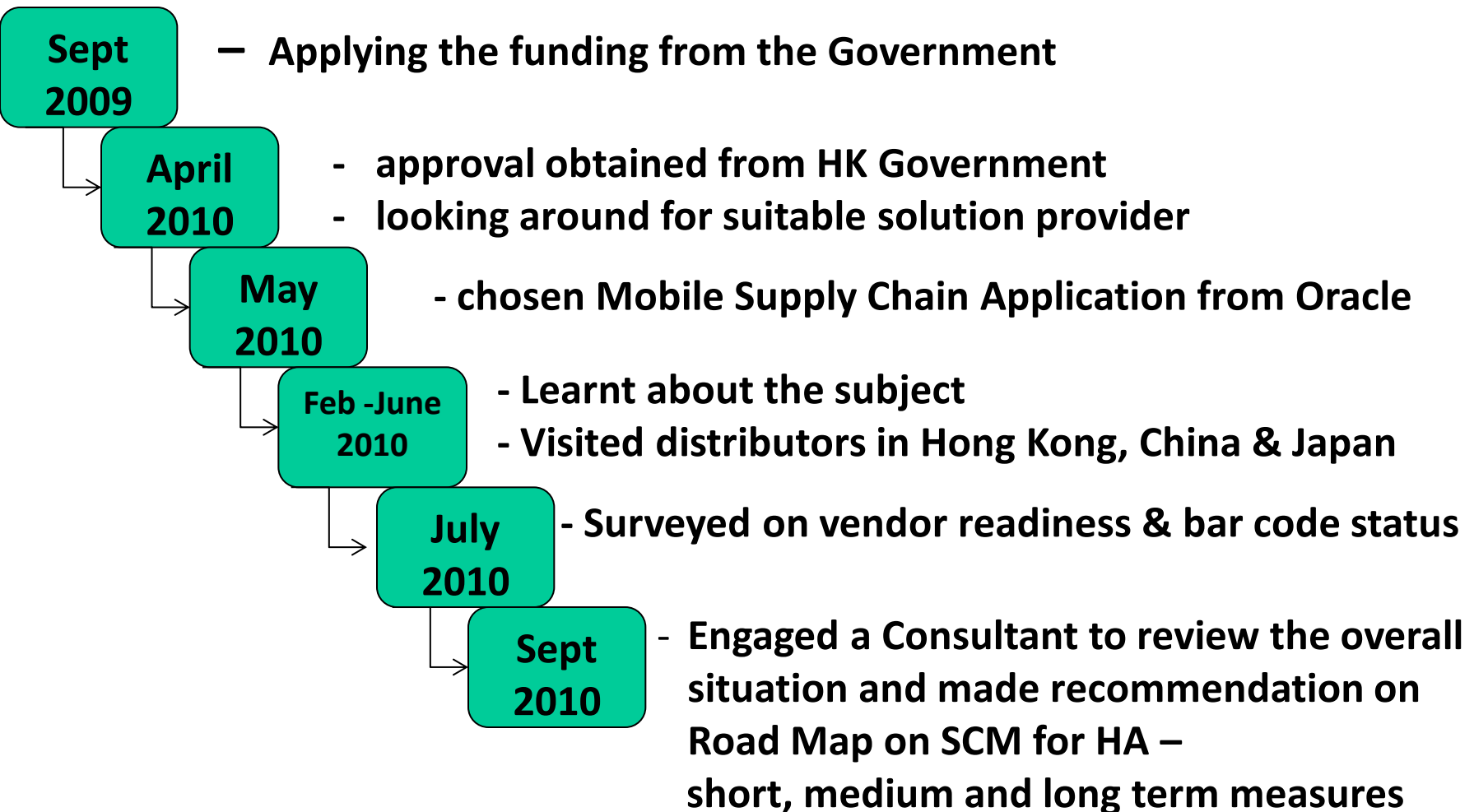
Drug delivery

Drug Receiving

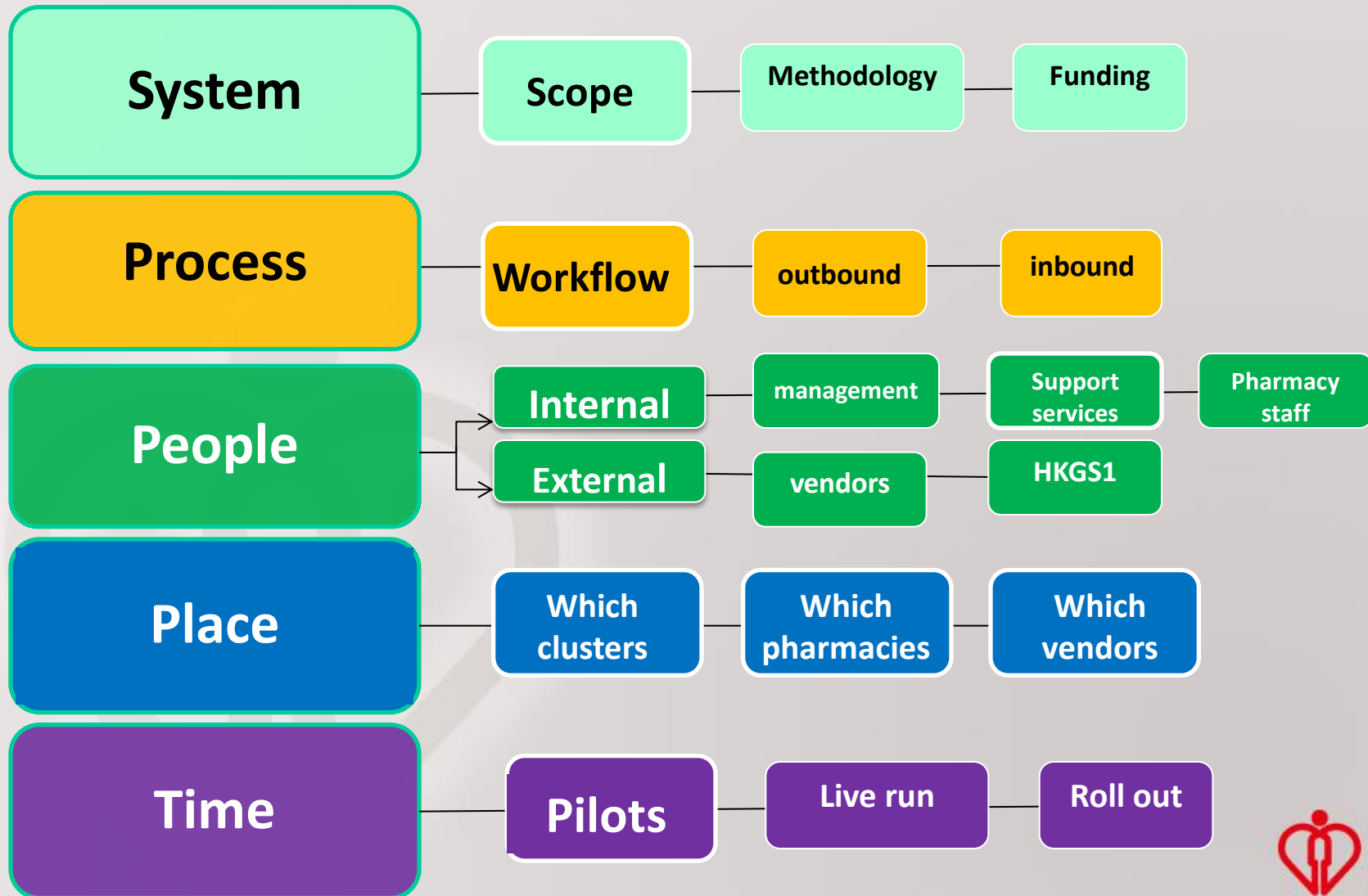**Scanning of bar coded information on outer pack for checking, verification & tracking**

Enable track and trace of product movement from suppliers to pharmacy stores through MSCA with provision of :
- Advance Shipping Notice (ASN) from suppliers to pharmacy ERP to verify PO
- Bar coded information on individual product and outer delivery pack from suppliers to verify required information, manufacturer, lot no., expiry dates etc

醫院管理局
HOSPITAL
AUTHORITY

3rd Step : Finding out the means and how's to do the project

Sept 2009 — **Applying the funding from the Government**

April 2010
- approval obtained from HK Government
- looking around for suitable solution provider

May 2010
- chosen Mobile Supply Chain Application from Oracle

Feb -June 2010
- Learnt about the subject
- Visited distributors in Hong Kong, China & Japan

July 2010
- Surveyed on vendor readiness & bar code status

Sept 2010
- Engaged a Consultant to review the overall situation and made recommendation on Road Map on SCM for HA – short, medium and long term measures

Supply Chain Modernisation on pharmaceutical products – areas of concerns

System — Scope — Methodology — Funding

Process — Workflow — outbound — inbound

People —
- Internal — management — Support services — Pharmacy staff
- External — vendors — HKGS1

Place — Which clusters — Which pharmacies — Which vendors

Time — Pilots — Live run — Roll out

醫院管理局
HOSPITAL
AUTHORITY

The technology support

What is Mobile Supply Chain Application?

- Making use of mobile devices to support the Supply Chain Process from Goods receipt to Goods issue as much as possible
- Use wireless connection, scanners, bar codes, data transmission
- Minimize manual data entry
- Improve accuracy & efficiency of data capture
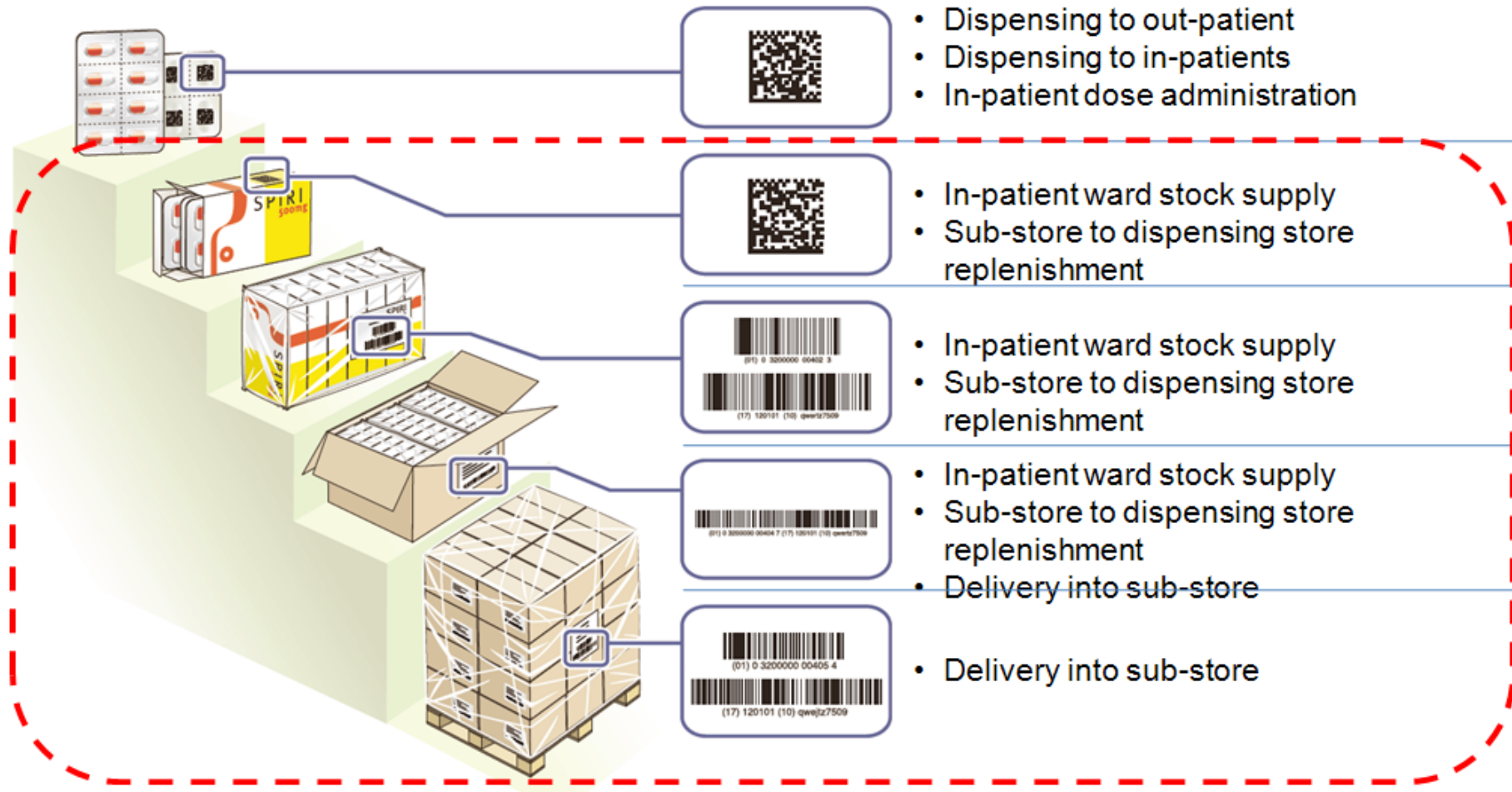- Not RFID but bar codes

Radio Frequency Network

ERP Server

Bar-code track-and-trace

- Dispensing to out-patient
- Dispensing to in-patients
- In-patient dose administration

- In-patient ward stock supply
- Sub-store to dispensing store replenishment

(01) 0 3200000 00402 3
(17) 120101 (10) qwertz7509

- In-patient ward stock supply
- Sub-store to dispensing store replenishment

(01) 0 3200000 00404 7 (17) 120101 (10) qwertz7509

- In-patient ward stock supply
- Sub-store to dispensing store replenishment
- Delivery into sub-store

(01) 0 3200000 00405 4
(17) 120101 (10) qwertz7509

- Delivery into sub-store

Target areas for direct-from-supplier bar-coding

Standards provided by GS1

GS1 Identifiers in Healthcare

GS1 Key	Represented Information
GTIN (Global Trade Item Number)	Identification of Healthcare Product
GLN (Global Location Number)	Identification of Location & Legal Entity
GSRN (Global Service Relation Number)	Identification of Patient & Care Giver

Application Identifier	Represented Information
AI(01)	Global Trade Item Number
AI(10)	Batch Number
AI(17)	Expiration Date
AI(21)	Serial Number

* GS1 keys & Application Identifiers are recognised by ISO.

2009 GS1

Data Structure of a GTIN

GTIN-13

4 891668 326689

GS1 PREFIX
To identify territory of the GS1 organization issuing the number. In Hong Kong, the GS1 Prefix assigned to GS1 HK is 489

GS1 COMPANY NUMBER
To identify the member company; assigned by the local GS1 organization

ITEM REFERENCE
To identify the unique product and service; assigned by the member company

CHECK DIGIT
Calculated by modulo-10 formula to serve as an accuracy check on the entire number by scanning devices.

©2009 GS1

Batch Level Identification & Expiration Control

- For batch control or expiry date control, which are common to healthcare items, people may prefer encoding batch number and expiration date in barcode.

- GS1 System provides data structure standard for them as well:
  - Batch number – Alphanumeric data format with variable length up to 20 characters
  - Expiration date – Numeric data format (YYMMDD) with fixed length of 6 digits

(01)04912345678904(17)990101(10)ABC123

| GTIN (n2+n14) | Expiration Date (YYMMDD) (n2+n6) | Batch No. (n2+an..20) |

Application Identifiers (AIs)
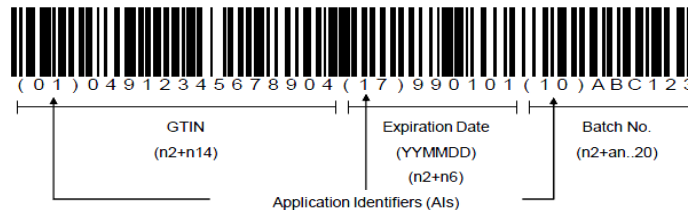
Expiration date & batch no. must be used with GTIN and application identifier (AI) in a barcode.

©2009 GS1

surveyed status of
various bar coded packing units in pharmacy

Bar & Code (Bar Code)

4 891668 326689

GS1 PREFIX

To identify territory of the GS1 organization issuing the number.
In Hong Kong, the GS1 Prefix assigned to GS1 HK is 489

GS1 COMPANY NUMBER

To identify the member company; assigned by the local GS1 organization

ITEM REFERENCE

To identify the unique product and service; assigned by the member company

CHECK DIGIT

Calculated by modulo-10 formula to serve as an accuracy check on the entire number by scanning devices.
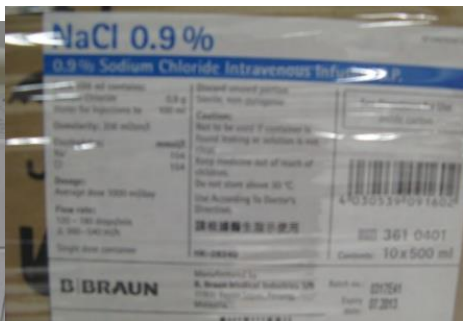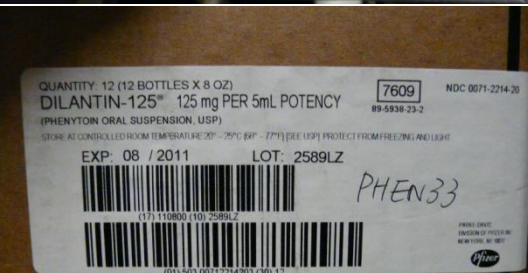
Survey on bar code status

	Level 2	Level 4
Scannable item identity	405 (50%)	116 (14%)
Items with lot no. in bar code	6 (0.7%)	102 (13%)
Items with expiry date in bar code	6 (0.7%)	86 (11%)
Items with full set of bar code (Item + Lot No. + Expiration date)	6 (0.7%)	85 (10%)

1

2

3

4

5
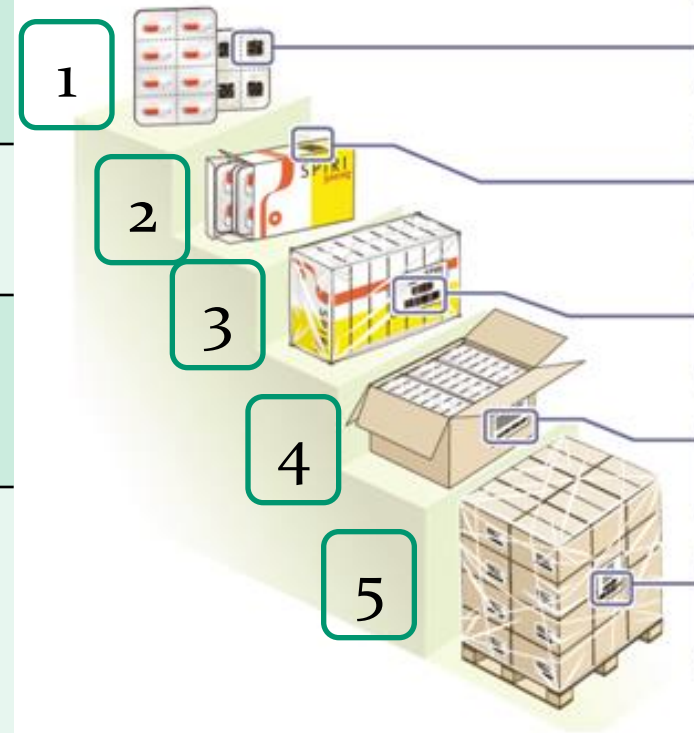
Examples of problems encountered on bar codes

Difficulties to identify the correct bar code to scan
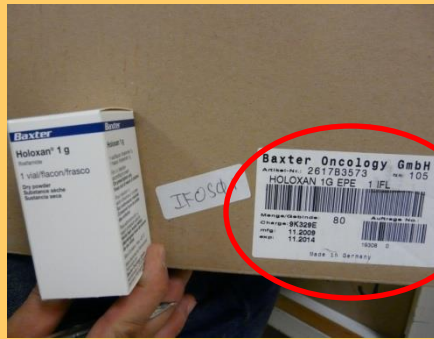
Some bar codes are not in black and white

Bar code printed in red color

Not a GTIN bar code, only a supplier Item bar code

AI (241) which is a customer Part Number and cannot be used as an item identifier
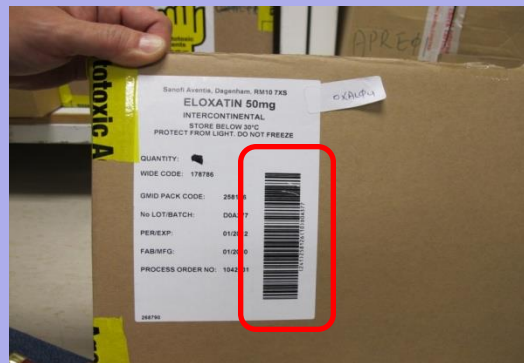
Bar-code track-and-trace all the way ?
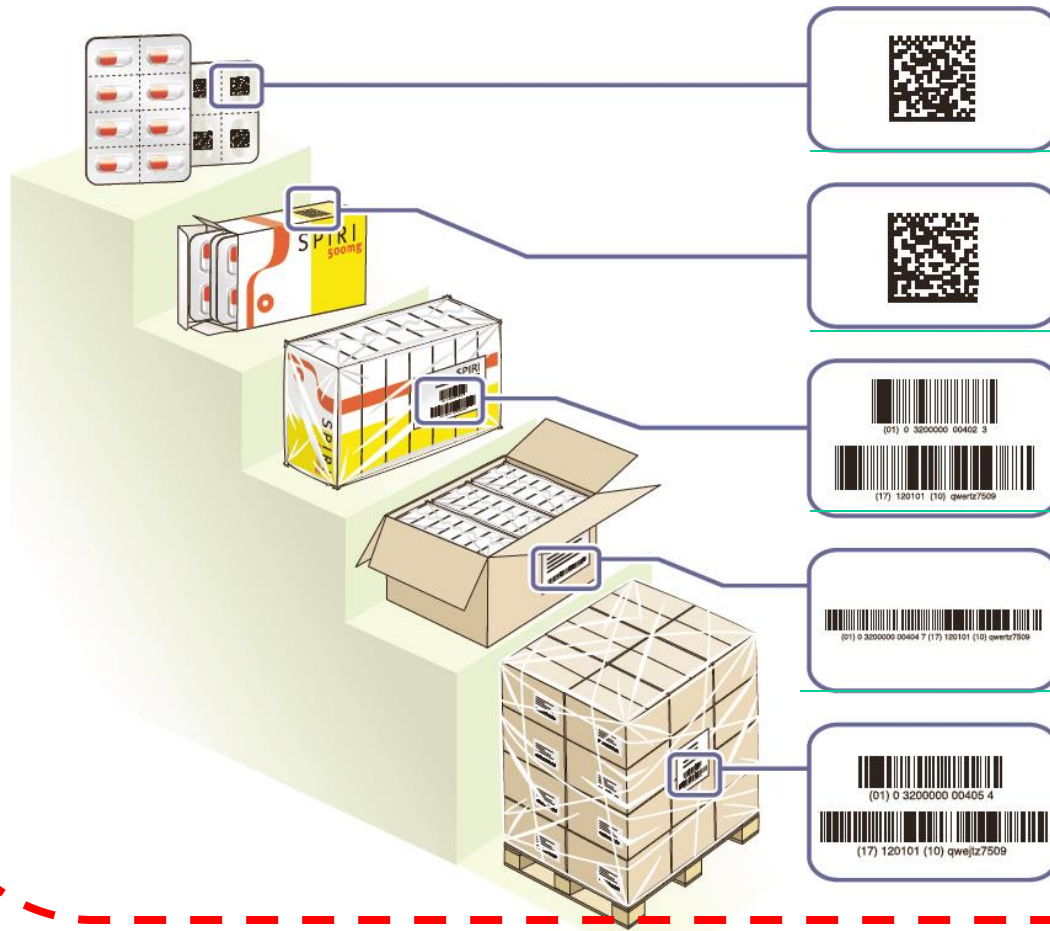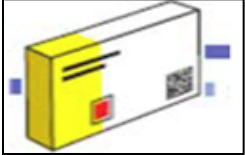
stop at the logistic units!

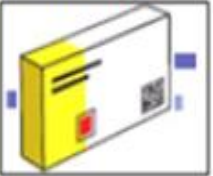- item identity , batch no. expiry date

- item identity , batch no. expiry date

Target areas for direct-from-supplier bar-coding

GTIN & Barcoding requirement

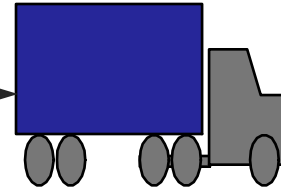| Packaging Hierarchy	Example		
Primary Packaging	A pill in blister cell		
Secondary Packaging (Ordering base unit)	2 blisters in 1 box	Unique GTIN	
Multi Pack	7 boxed bound to create one package		
Shipper Case	8 multi pack in a corrugated Cardboard carton	Unique Bar code	
Logistic Unit	8 cartons bound on a pallet	Unique Bar code	Pallet

The HA requirement on GTIN and bar codes on the different levels of pack

Packaging Hierarchy	Example	Identification Key	Example	Bar code	Bar Code Type
Primary Packaging	A pill in blister cell	No	NA	No	NA
Ordering base unit	2 blisters in 1 box	GTIN ✓	GTIN A: 489-1668-00002-2	Optional	GS1-128, GS1 Data Bar, GS1 Data Matrix, EAN/UPC.
Multi Pack	7 boxed bound to create one package	No	NA	No	NA
Case	8 multi pack in a corrugated cardboard cartons	Optional	GTIN B: 489-1668-00001-5 (1 unit of GTIN B = 56 units of GTIN A)	✓	GS1-128, GS1 Data Matrix
Logistic Unit	Pallet of 8 cases	SSCC ✓	SSCC: 1-489-1668-000000001-2	✓	GS1-128

Defining the process with MSCA

External : From Suppliers
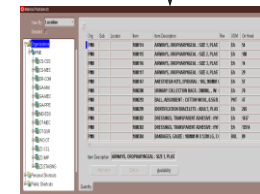
Entire shipment with bar coded SSCC on each logistic unit
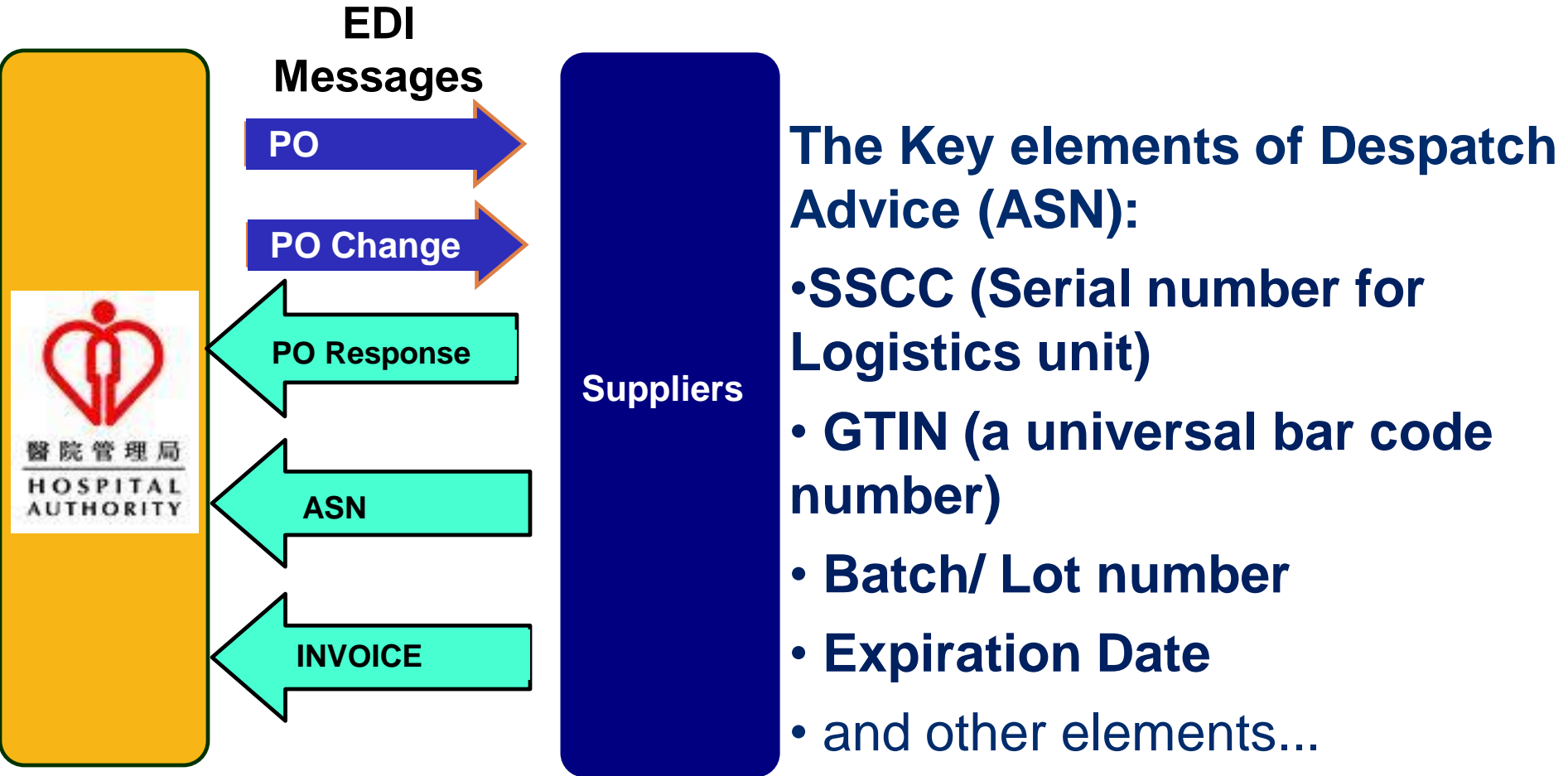
Advanced Shipping Notice (ASN)

Internal : At Pharmacy stores

Before goods arrive	1. Prior validation of manufacturer, country of origin, quantity, etc. 2. Online provision of lot no, expiry date
When goods arrive (at staging process)	3. Scan outer pack bar code label to verify Purchase Order (PO) 4. PO details displayed in scanner for inspection 5. Confirm receipt & instant update into system
Stock into stores	6. Pack-unpack containers to separate items 7. Scan GTIN with lot no. expiry date and confirm qty 8. Stock to pre-defined location in stores
Drug distribution	9. Enable lot-control with track-and-trace functionality

The electronic information exchange in MSCA process

EDI Messages

PO →

PO Change →

← PO Response

← ASN

← INVOICE

Suppliers

The Key elements of Despatch Advice (ASN):

- SSCC (Serial number for Logistics unit)
- GTIN (a universal bar code number)
- Batch/ Lot number
- Expiration Date
- and other elements...

*The Despatch Advice (ASN) should be sent 24 hours before the Physical Goods Delivery.

4th step : Defining our action plans

External

HKGS1:

- Technical guidelines

- industry standards on ASN, SSCC, GTIN,GLN

Pharmaceutical vendors:

– System interface to HA

– GTIN on smallest order unit

– bar code readiness to include GTIN, Qty, BN, Expiry date

– Bar coded Labels for shipper case & logistic units

– Testing and preparation

Internal

Hospital side :

- Management buy in

- Support services

- Pharmacies

Engagement & support :

– implementing MSCA

– renovating stores & facilities

– adding manpower

– supporting user training

Vendor Engagement

- No less than 6 vendor briefings, 20 meetings, training workshops, testing, emails, etc…
  - Clarifications on project objectives, process, technical requirement, time frame…..
  - Frequently Ask Questions (FAQ)
- Mock ups on bar code labels
- EDI testing
- End to End testing with mock up products
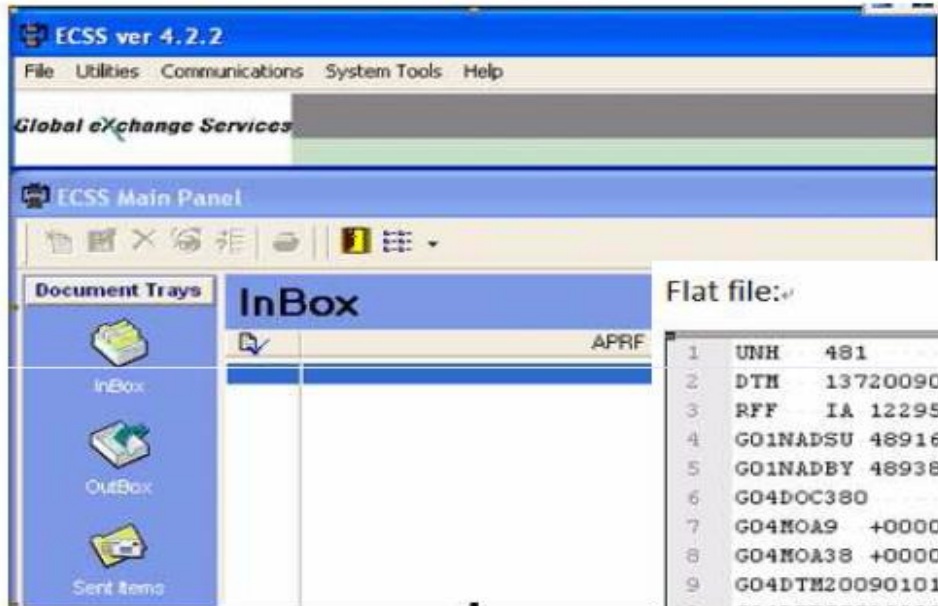- On site testing at pilot sites

for vendors with no in house IT system ability

Cat A – EDI Gateway (EDI PO, PO Response, PO Change, ASN, Invoice)

Programming and Integration is needed

ERP Capable Suppliers

Flat file:

```
1   UNH    481                            RA00002
2   DTM    13720090808                    102
3   RFF    IA 12295
4   G01NADSU 4891668900032                VENDOR ABC
5   G01NADBY 4893899000000                MANNINGS
6   G04DOC380                             INV0000
7   G04MOA9   +0000000000180000.00
8   G04MOA38  +0000000000001000.00
9   G04DTM20090101                        102
10  G04RFFZZZ20090102
11  G04RFFON PO00000
12  G04DOC380                             INV0001
13  G04MOA9   +0000000000010000.00
14  G04MOA38  +0000000000011000.00
15  G04DTM20090201                        102
16  G04RFFZZZ20090111
17  G04RFFON PO00001
18  G06AJT4
19  G06MOA+0000000000001000.00
20  G08DLI1   +000001
21  G08MOA146+0000000000000011.00
22  G08PIA4890000000011                   EN
```

Tendering of Hardware & printers & labels

Hospitals side

- ERP System
    - Early engagement
    - Data preparation
    - Data cleansing
    - Data conversion
- MSCA / SCM

    Hospitals Stores Facilities
- Manpower
- Training

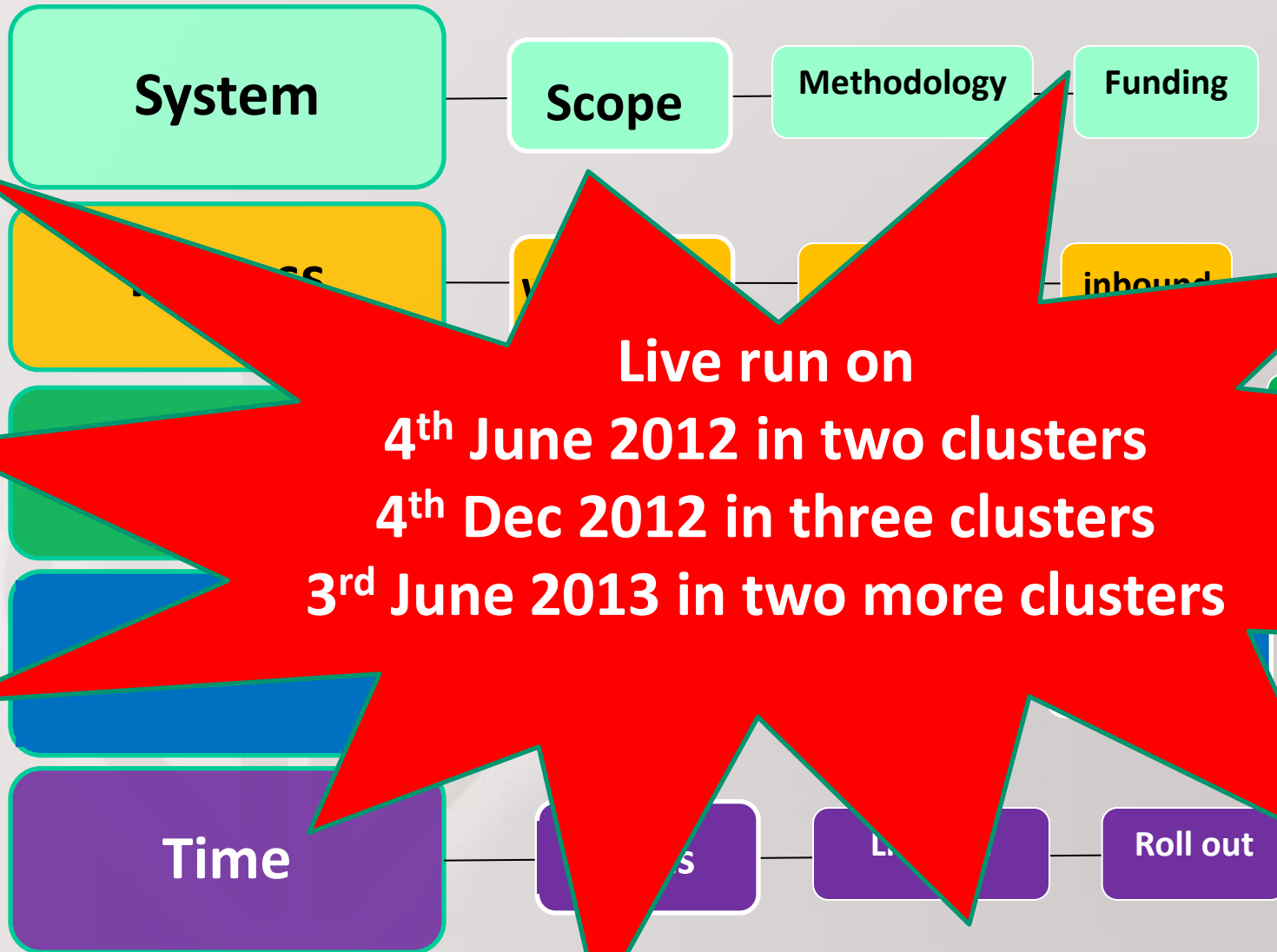# The Challenges encountered

infrastructure

leadership

technology

- Entire SCM process is voluntary for vendors
- No credit , no penalty (yet)
- Depends on the vendors readiness & willingness & ability
- first batch involving 13 vendors (out of 150+)
- Pharmacy users' acceptance to adopt new processes
- Increase in manpower with skills and knowledge on SCM
- Installation of wi fi in our pharmacy stores, modernise the environment, increase space and layout….
- Choice of hardware,
- Training of staff, vendors….
- …………

resources

Working out the overall project plan – Supply Chain Modernisation on pharmaceutical products

System — **Scope** — **Methodology** — **Funding**

inbound

Live run on
4th June 2012 in two clusters
4th Dec 2012 in three clusters
3rd June 2013 in two more clusters

Time — **Live** — **Roll out**

醫院管理局
HOSPITAL
AUTHORITY

SCM Project implementation: by batch & phase approach

Batch I	Batch II
- Batch I EDI suppliers 13+1 vendors 136,667 PO lines (Jan to July 13) = about 70% of order lines - About 38% of item sources - To all clusters - Live run with ERP	- Batch II EDI suppliers + 14 or 5 vendors 21,434 order lines = about 16% more order lines - About 13 % item sources - to meet vendors on 13th August - To live run in March 2014 - To all clusters
Phase I	**Phase II**
- Track into the main stores - Applicable to all pharmacy stores	- Track out to the dispensing stores - Pilot in PWH and QEH on Dangerous Drugs

The Gains
better & improved storage facilities
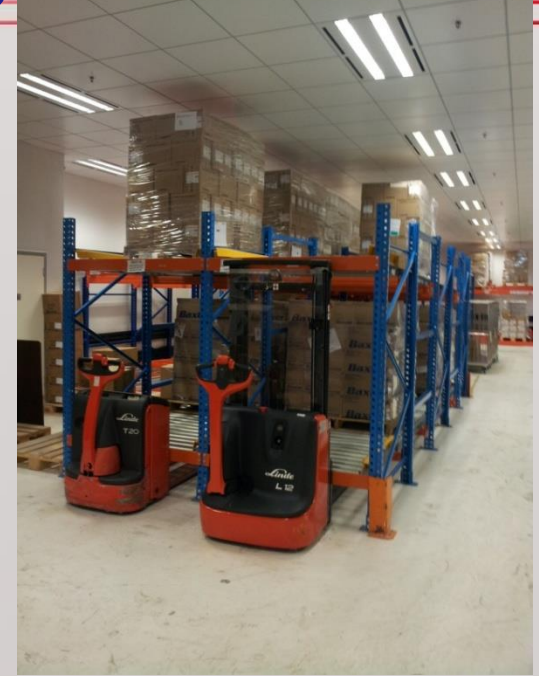
The Gains –
a smooth, efficient, neat and tidy process
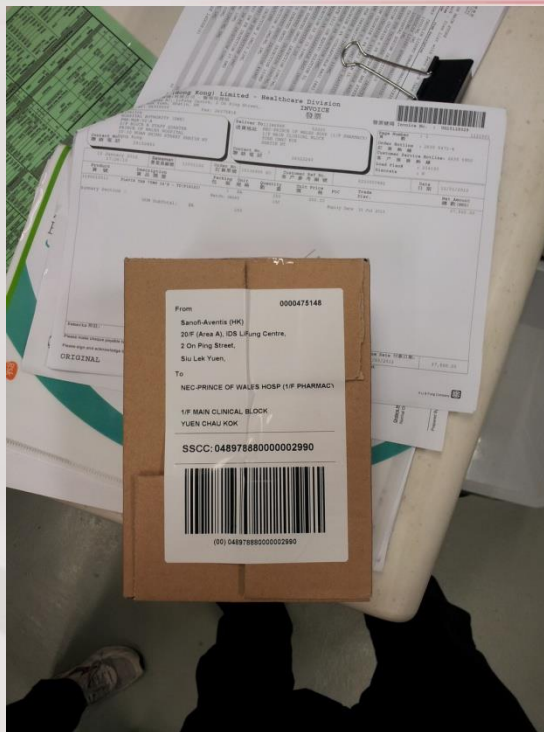
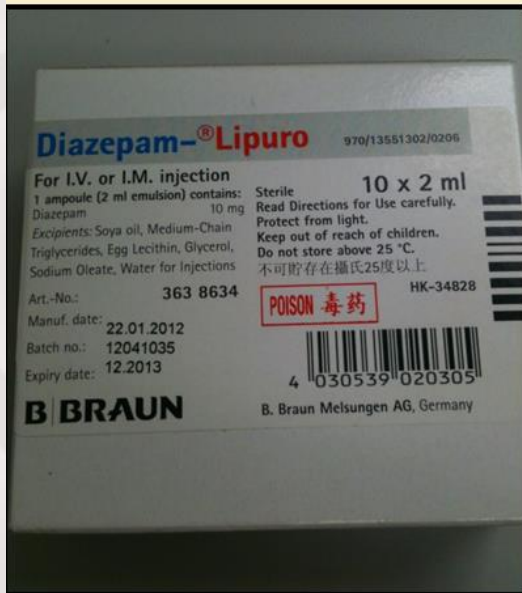# Problems yet to be overcome
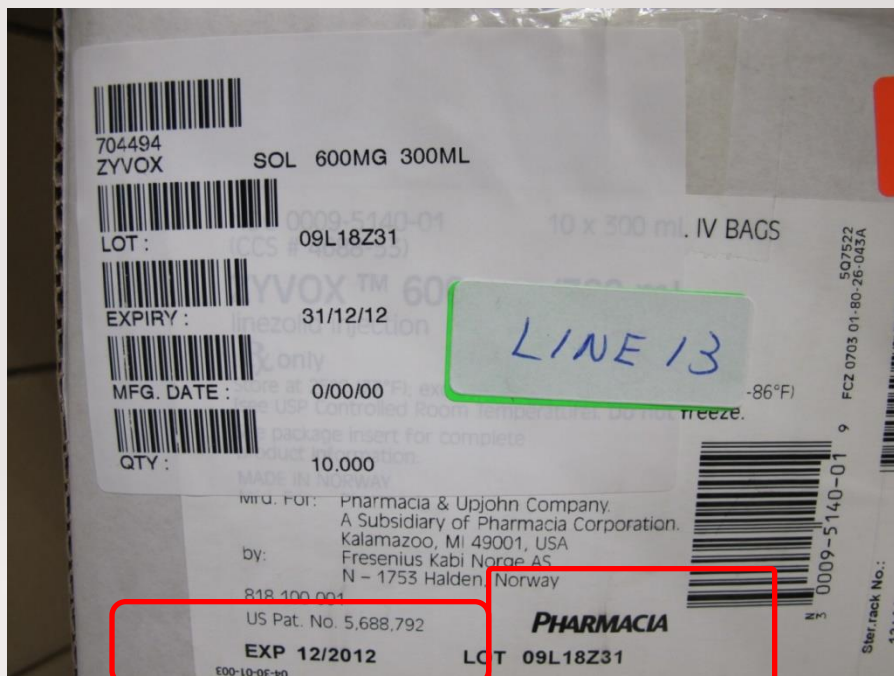
Expiration date on printed label is DDMMYY which does not match ERP expiration date format "YYMMDD"

Vendor & Product preparation

All manufacturers should do this !

there should be bar coded information on
GTIN, Batch, Expiry Date and QTY
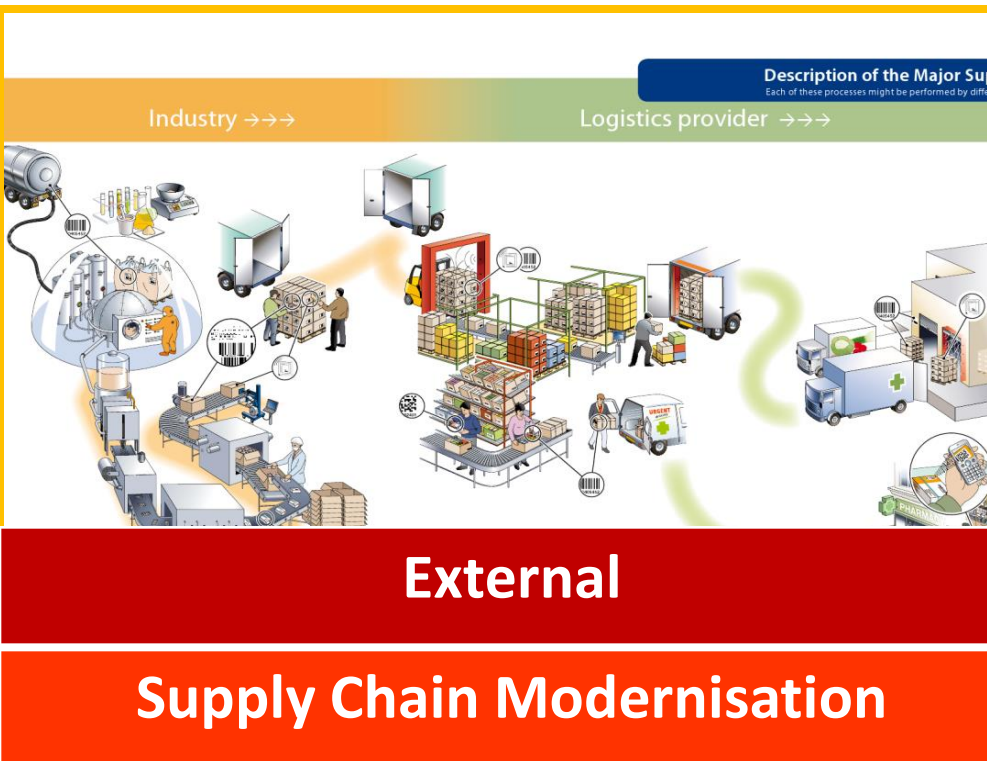at the primary packing

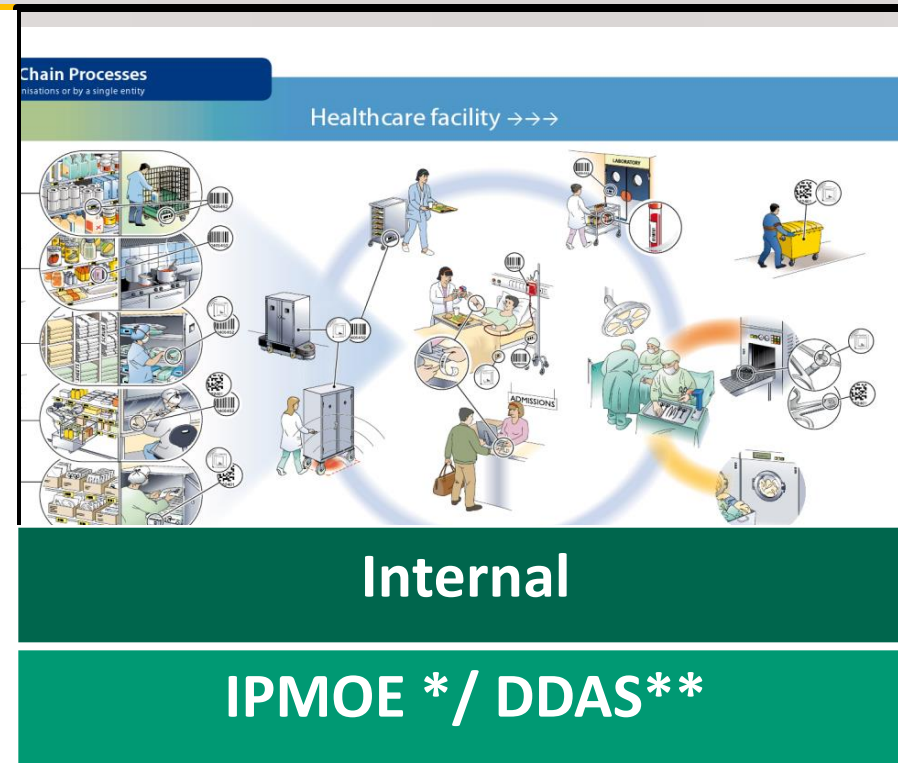**Patient & Medication Safety**

Visibility

Traceability

where we are now

where we want to go via the SCM Project

Project scope of
The Supply Chain Modernisation on Pharmaceutical Products

Description of the Major Sup
Each of these processes might be performed by diff

Industry →→→   Logistics provider →→→

External

Supply Chain Modernisation

*IPMOE = In-patient Medication Order Entry
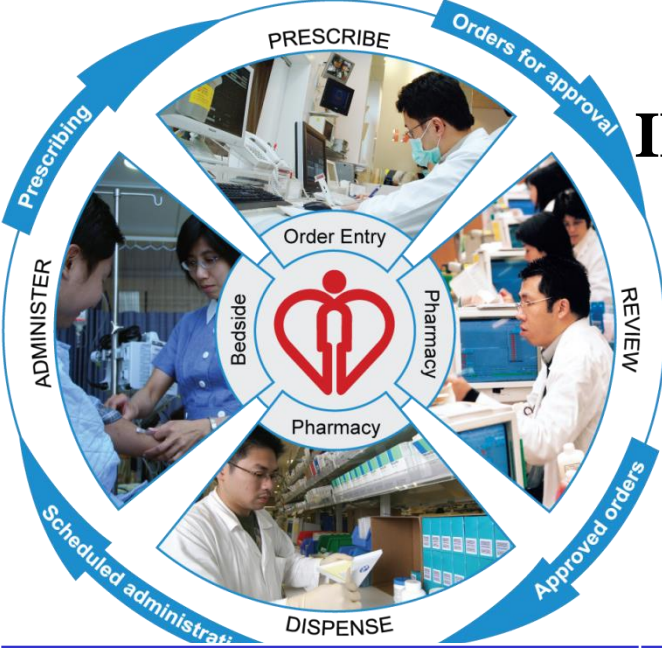**DDAS= Drug Distribution and Administration System

Project scope of
The Supply Chain Modernisation on Pharmaceutical Products

Internal

IPMOE */ DDAS*

*IPMOE = In-patient Medication Order Entry
**DDAS= Drug Distribution and Administration System

Track and Trace to the point of care

IPMOE */ DDAS**

Doctors	pharmacy	Nurses

- **Electronic prescribing by clinicians**
- **Vetting & dispensing with workflow reengineering at Pharmacies**
- **Drug administration by nurses using BCMA**

The Journey is long & tough

Insanity :

Continuing to believe that if we insist and persist , we can make the difference,
some day ….

- S C Chiang

Thank you

scchiang@ha.org.hk
tel: 852-39121638