The Global Language of Business

IoT Use Cases and Standards

Internet of Things Applications
Connecting the Intelligence at the Edge
Oslo, 21 April 2015

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Vice President GS1 System Integrity and Global Partnerships
GS1 Global Office

Speaker

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Vice President System Integrity & Global Partnerships

- Working for GS1 Global Office in Brussels since July 1988
- Responsible for protecting the integrity of the GS1 system & for managing the partnerships with external standards organisations
- Co-chairman of the GS1 Architecture Committee
- Chairman of SC31/WG4, the ISO working group dealing with RFID standardisation for item management
- Chairman of CEN/TC 225, the European standards committee on Automatic Identification and Data Capture (AIDC) Technologies and Applications

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GS1: Global reach, local presence

GS1 is a not-for-profit organization dedicated to the design and implementation of **global standards** and solutions to improve the efficiency & visibility of the **supply and demand chains** globally and across sectors

Countries with a GS1 Member Organisation

Countries served directly by GS1 Global Office

111 Member Organisations
1,5 million member companies

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Internet of Things

"When wireless is perfectly applied the whole earth will be converted into a huge brain, which in fact it is, all things being particles of a real and rhythmic whole.....and the instruments through which we shall be able to do this will be amazingly simple compared with our present telephone. A man will be able to carry one in his vest pocket".

Nikola Tesla, 1926

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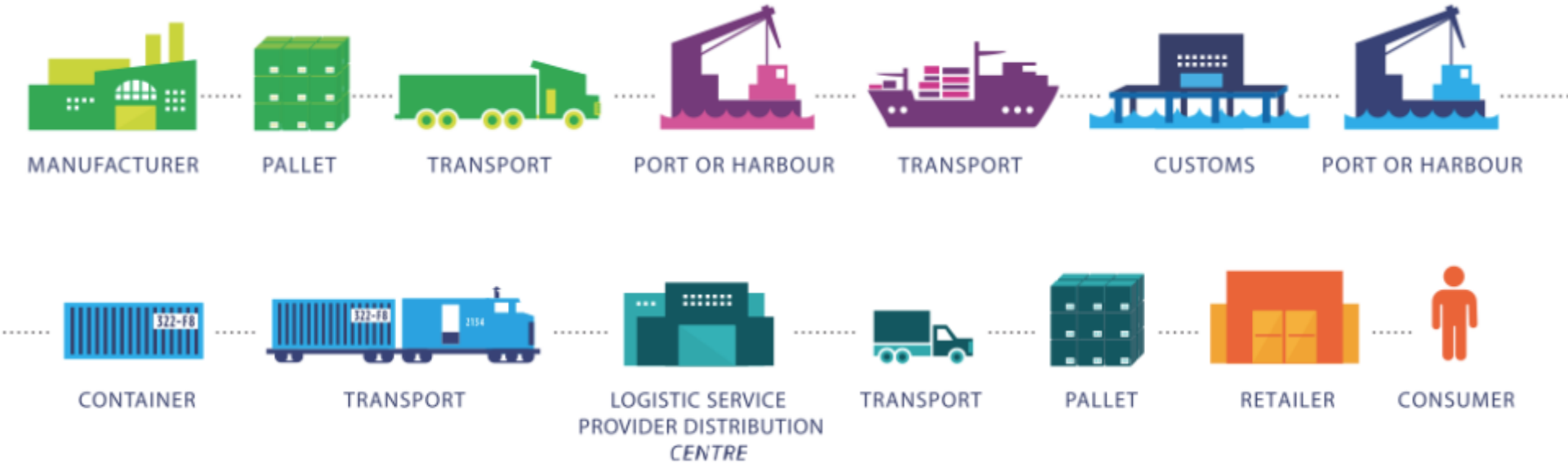
Supply and demand chains



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The last 40 years

The roots of RFID

The root of radio frequency identification technology can be traced back to World War II. The radar system led to the first identity friend or foe (IFF) system by the British.

RFID works on this same basic concept. A signal is sent to a transponder, which wakes up and either reflects back a signal (passive system) or broadcasts a signal (active system).

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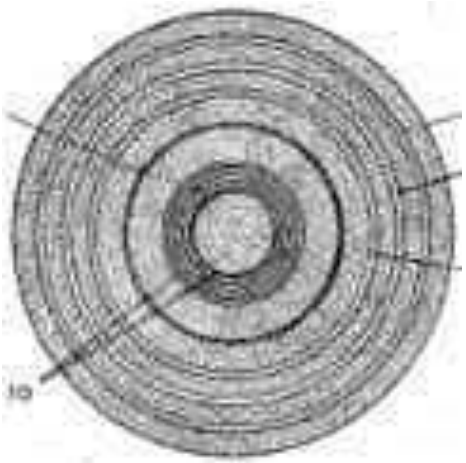
The birth of the bar code

- The first patent for a bar code type product (US Patent #2,612,994) was issued to inventors Joseph Woodland and Bernard Silver on October 7, 1952.



It is interesting to note that RFID was invented before the bar code …

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The 1970's – 1D bar codes use in retail and industry

The most widely used bar code in the world

Introduced in 1974; still growing in 2015

Code 39, invented by David Allais in 1974

Widely used in industrial applications

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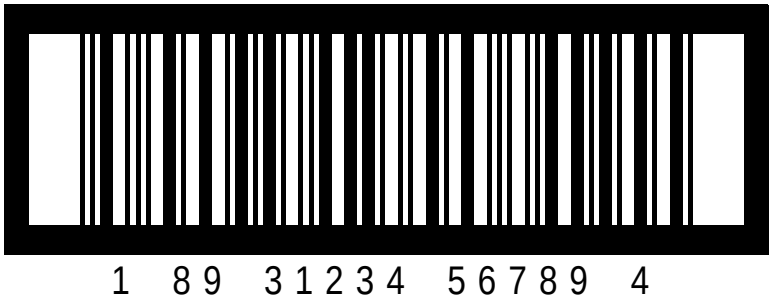
The 1980’s - Logistics applications

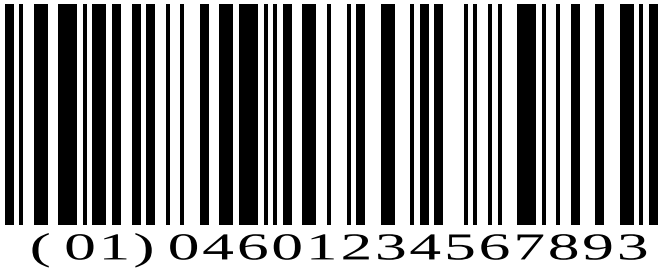


GS1 LOGISTICS LABEL

SSCC :

2 541234 0089765002 4

COUNT :	CONTENT :	BATCH :
64	0541234 5678908	879654



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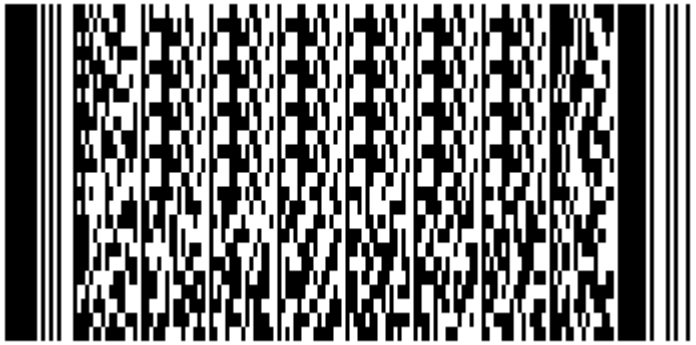
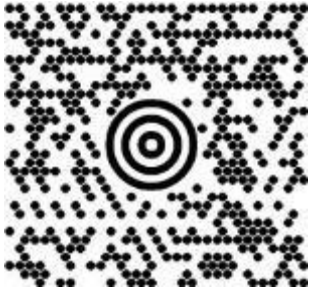
The 1990's – 1D & 2D bar codes



PDF 417

Aztec code



Maxicode

Some 250 bar codes have been invented
10 to 15 of them are largely implemented

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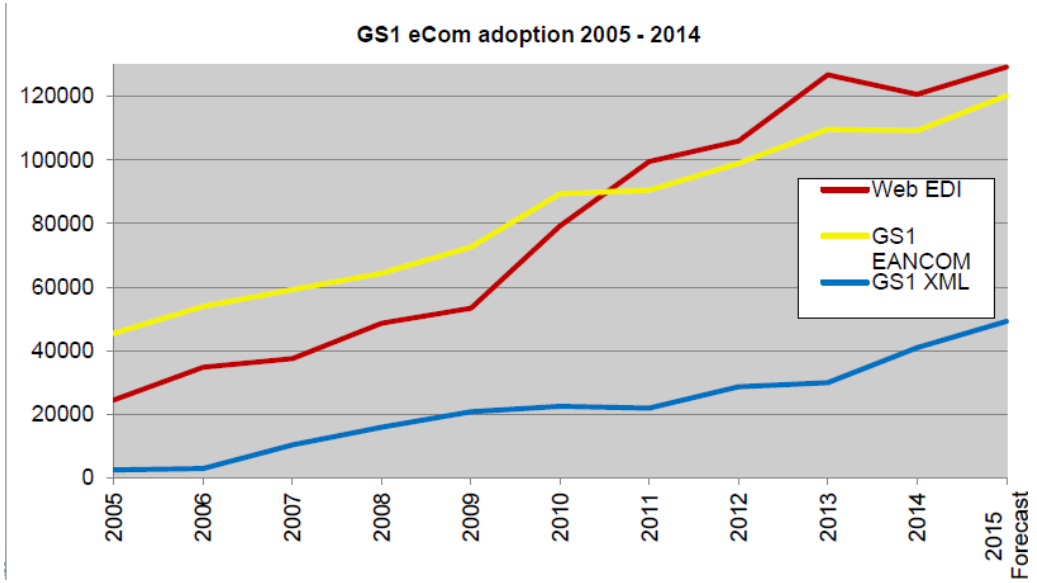
The 1990's – Electronic Data Interchange

- EDI: The computer-to-computer interchange of standard messages between two parties.

Typical applications:

- Order
- Delivery
- Invoice
- Payments

GS1 member companies using EDI – 2005 to 2014



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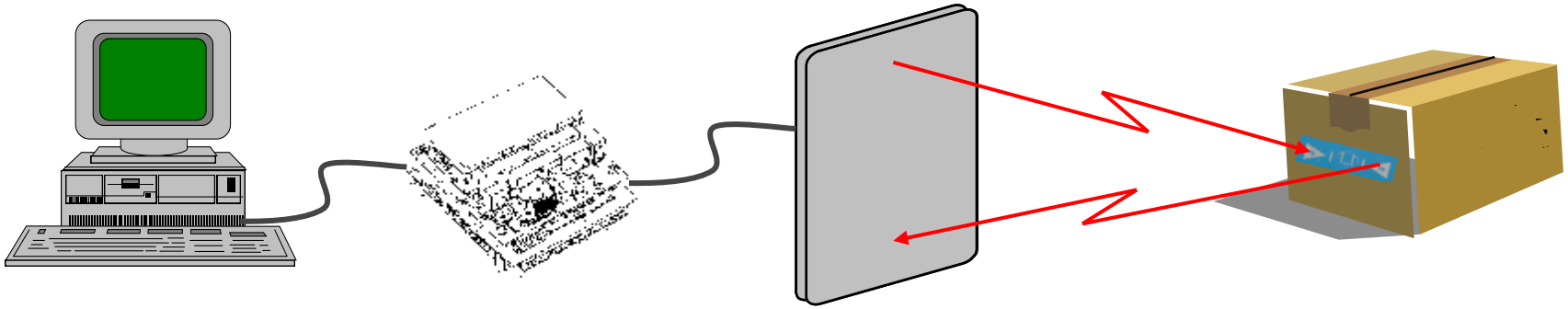
The 2000's: RFID and …



Host **Reader module** **Antenna** **Tag**

The birth of the Internet of Things

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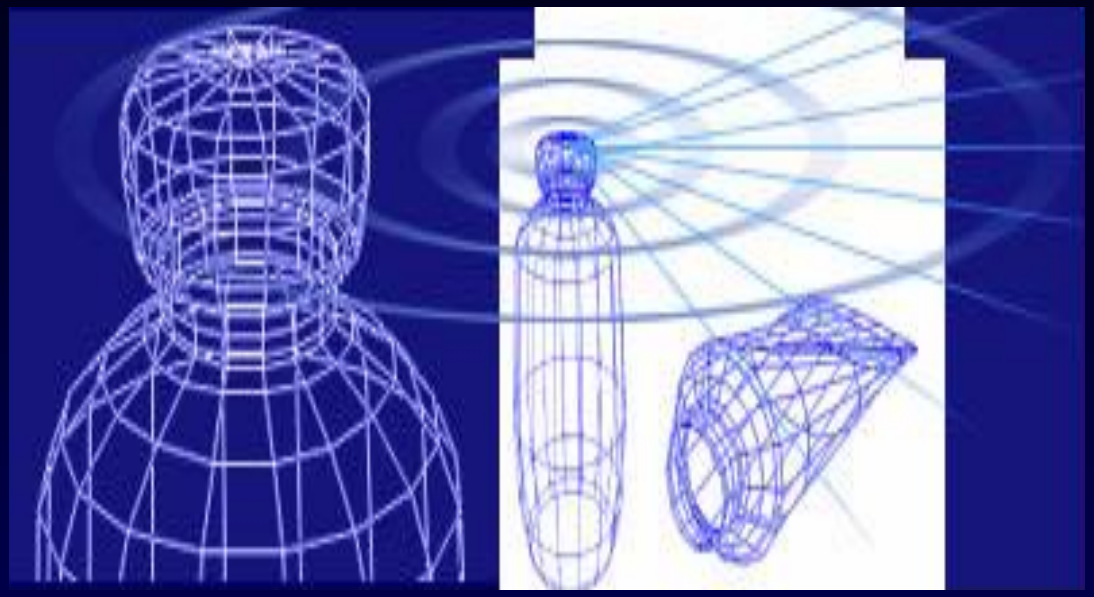
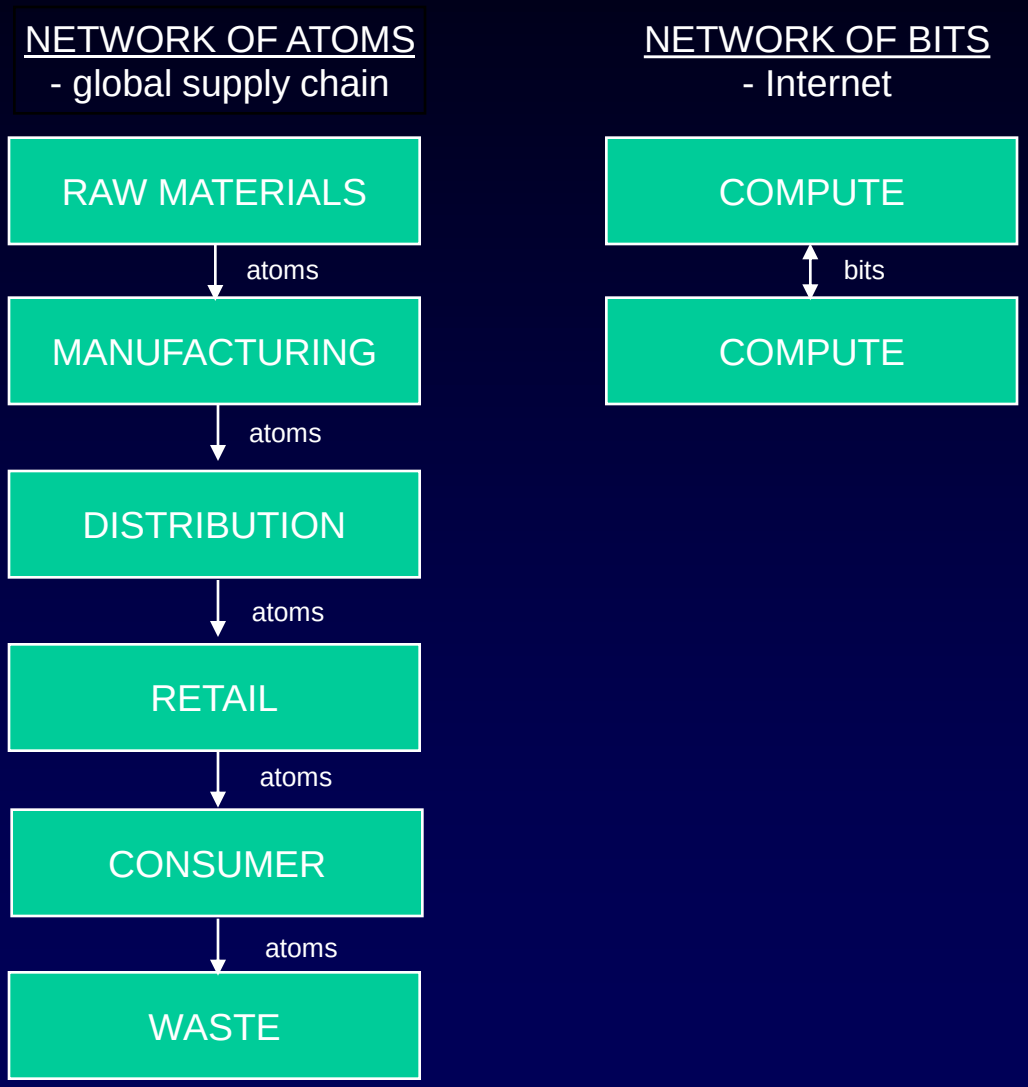


Networking the Physical World

- the next wave of the Internet revolution

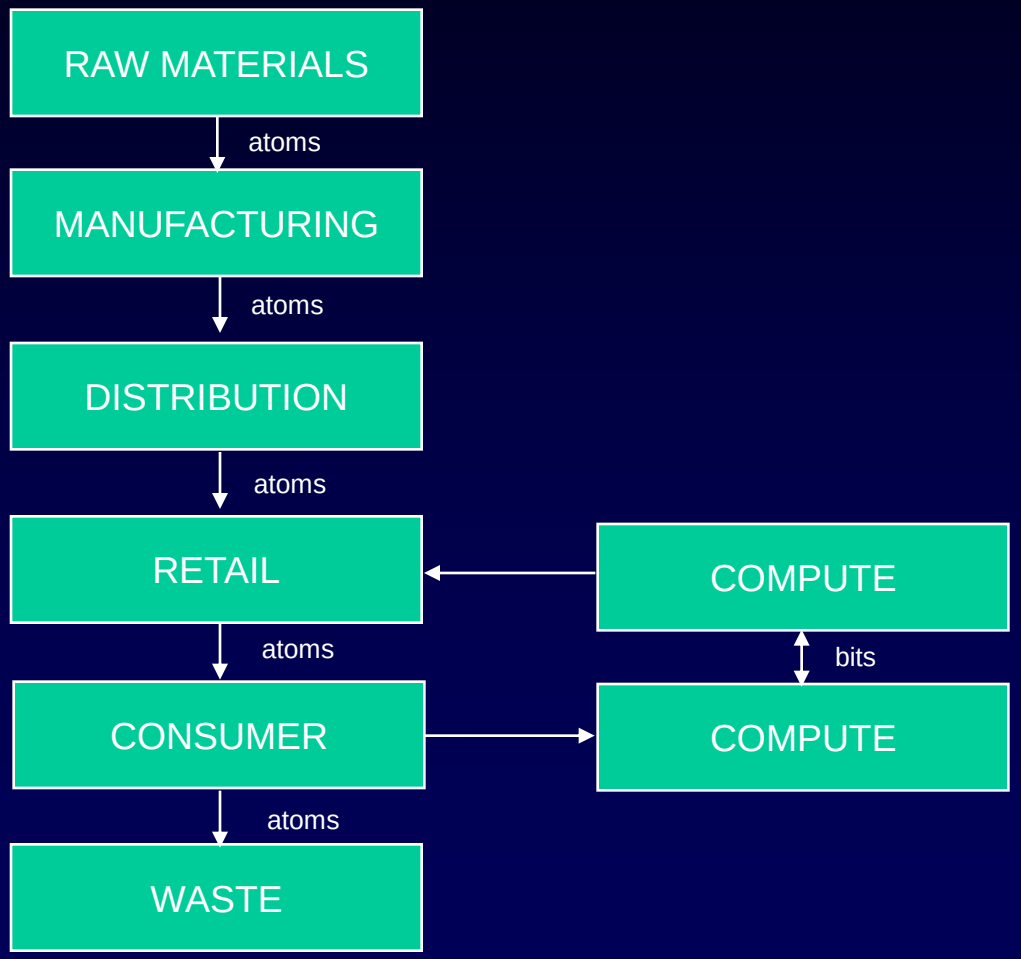
AUTO-ID CENTER
Massachusetts Institute Of Technology & University Of Cambridge

PAST

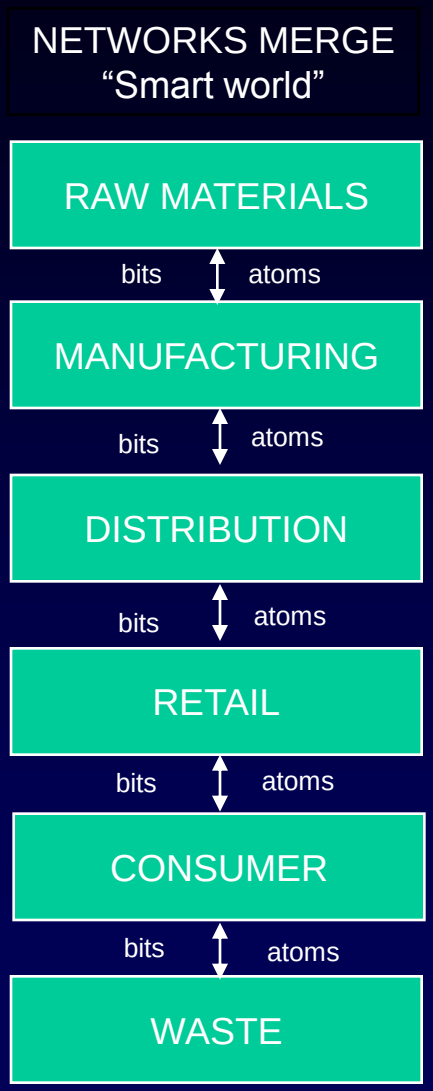

NETWORK OF ATOMS
- global supply chain
RAW MATERIALS
atoms
MANUFACTURING
atoms
DISTRIBUTION
atoms
RETAIL
atoms
CONSUMER
atoms
WASTE
NETWORK OF BITS
- Internet
COMPUTE
bits
COMPUTE

PRESENT

NETWORKS LINKED
- e-commerce



FUTURE


NETWORKS MERGE
“Smart world”
RAW MATERIALS
bits
atoms
MANUFACTURING
bits
atoms
DISTRIBUTION
bits
atoms
RETAIL
bits
atoms
CONSUMER
bits
atoms
WASTE

The 2010's: Mobile

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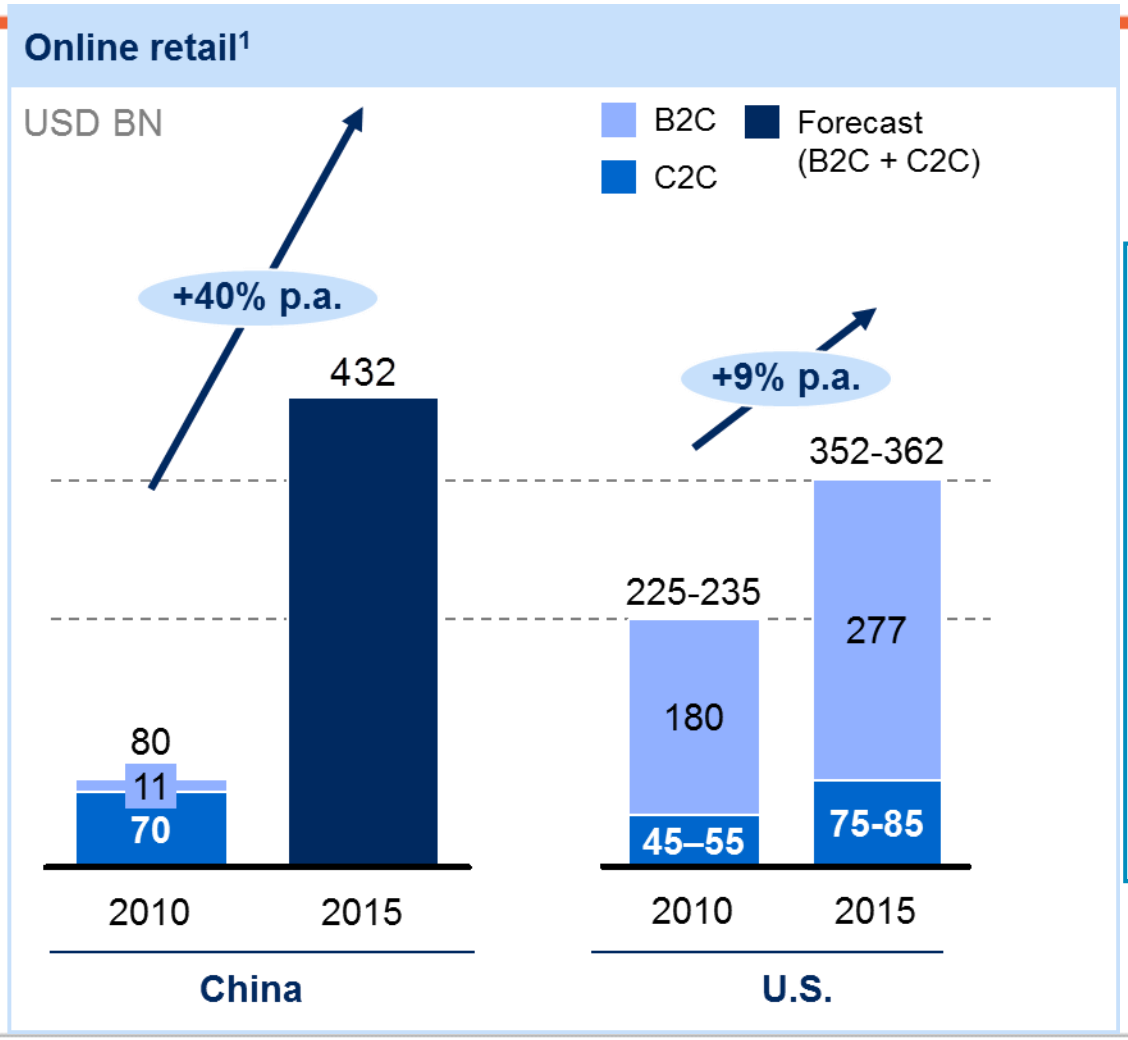
The 2010's: Digital – E-commerce



China's total online retail market will outpace that in the U.S. by 2015

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Use Cases

Pharmaceuticals Traceability

Reusable Transport Items

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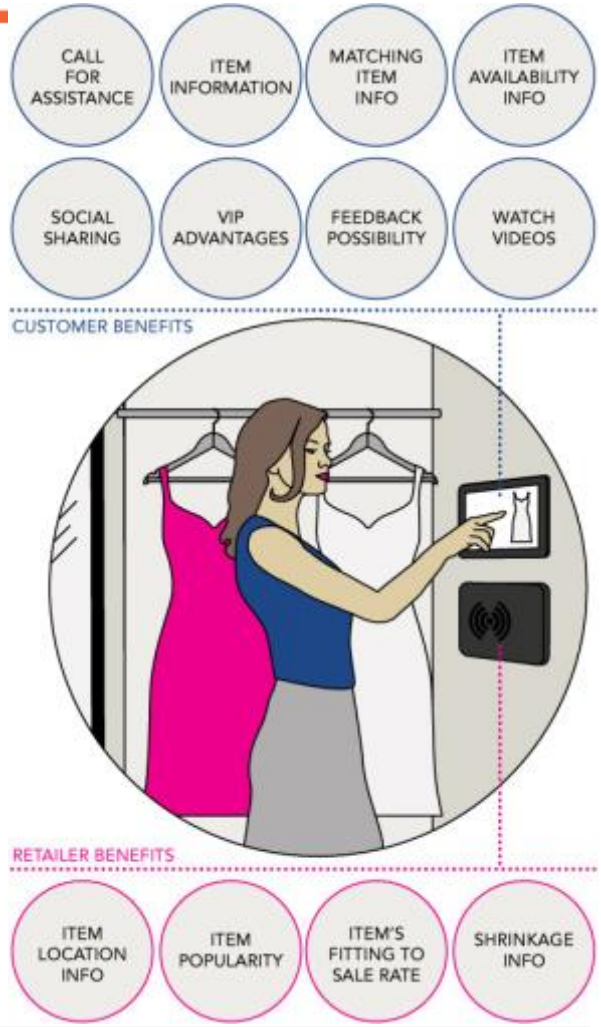
The “intelligent” store



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Inventory Management

Mix & Match

Smart Fitting Room

Smart Dressing Mirror

Faster (self) check-out

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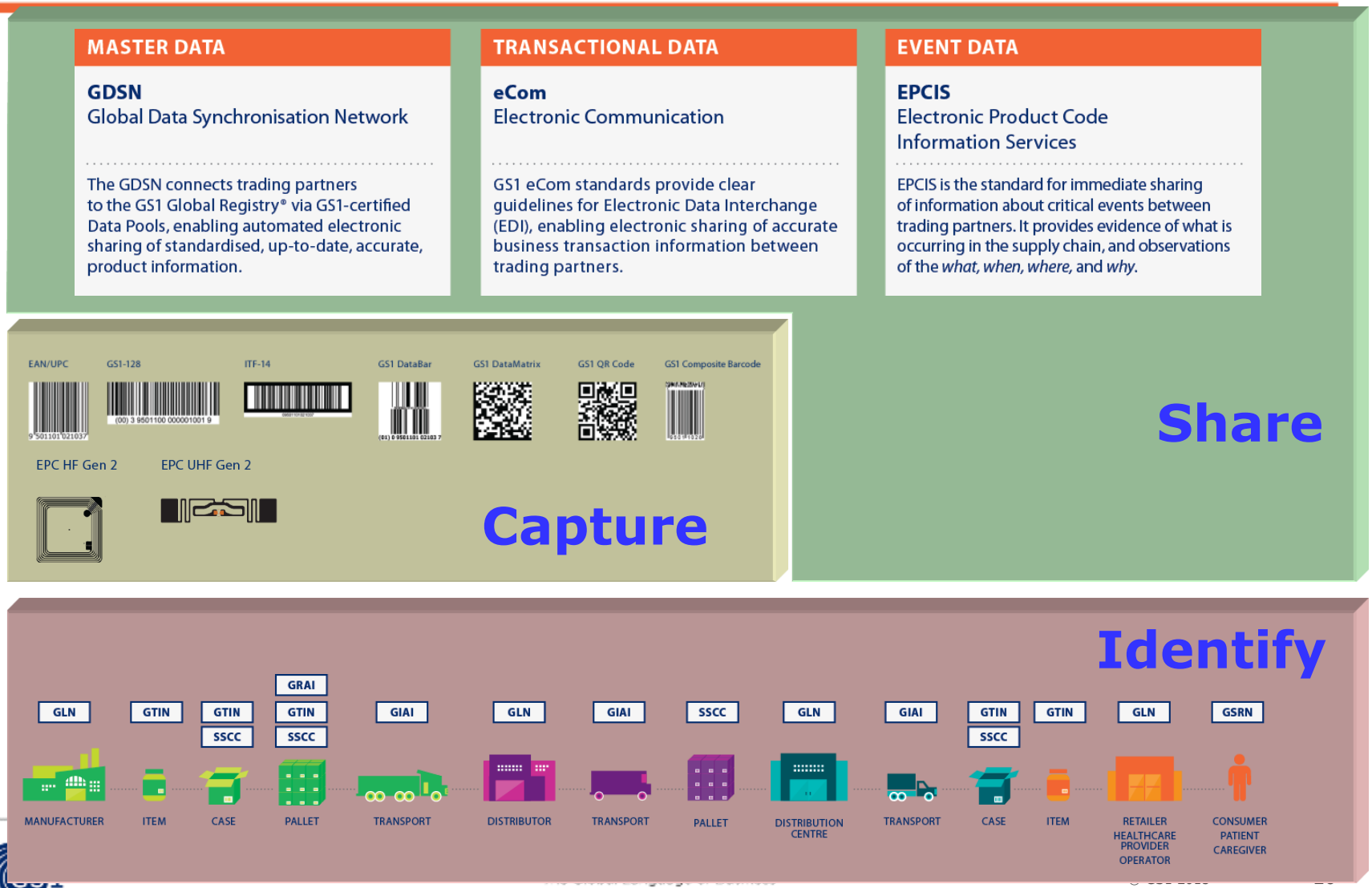
Standardizing the IoT

The GS1 System Architecture



Standardisation initiatives (partial list)

- ITU-T: International Telecommunications Union
- IEEE: Institute of Electrical and Electronics Engineers
- ISO: International Organization for Standardization
- IEC: International Electrotechnical Commission
- IETF: Internet Engineering Task Force
- oneM2M: Standards for M2M and the Internet of Things
- W3C: World Wide Web Consortium

- IPSO Alliance: http://www.ipso-alliance.org/
- IoT Forum: http://iotforum.org/
- Industrial Internet Consortium: http://www.iiconsortium.org/
- Thread Group: http://www.threadgroup.org/
- AllSeen Alliance: https://allseenalliance.org/
- Open Interconnect Consortium: http://www.openinterconnect.org/

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ISO/IEC JTC 1 WG 10: Working Group on Internet of Things – terms of reference

- Serve as a focus of and proponent for JTC 1's IoT standardization program.
- Develop foundational standards for IoT related to JTC 1 for guiding IoT efforts throughout JTC 1 upon which other standards can be developed.
- Work will include:
  - Developing Terms and Definitions for JTC 1 IoT Vocabulary
  - Developing IoT Reference Architecture and other foundational specifications as JTC 1 standards
  - Monitoring the ongoing IoT regulatory, market, business and technology requirements
  - Developing other IoT standards that build on the foundational standards when relevant JTC 1 subgroups that could address these standards do not exist or are unable to develop them
  - …

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ISO/IEC JTC 1 WG 10 – work items

- One formal work item: IoT Reference Architecture
- Other activities:
  - Standardization Gaps
  - Network Level Technologies for IoT
  - IoT Identification

- First meeting was held in January 2015
- Next meeting will held in Brussels during the week of 18 May 2015

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IoT Standards

- Standards stimulate innovations
- Standards help ensuring interoperability, which is critical for growing adoption of the technologies

However …

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IoT Standards, yes but …

- Since IoT is
  - Not clearly defined
  - A concept rather a specific application
  - Not a technology but a collection of many
  - A myriad of applications that are not necessarily related

- It is probably illusory to define a single roadmap for IoT standardisation

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Standards are important for …

- Bar Codes
- RFID
- RTLS
- NFC
- Sensors
- Identification
- Data
- Communications
- Internet resolution
- Security

Standard development in these areas and many more are addressed and this needs to continue

If we want to call them “Standards for the IoT”, that’s totally fine

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Conclusions

- The Internet of Things is there here and now
  - *Don’t wait for it to happen*
- IoT is a concept covering multiple technologies and applications
- Laws and regulations need to take IoT and other developments like social networks, cloud computing, etc. into account as they evolve

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