

Supply Chain Management & ICT

- 1 Supply chain management
- 2 ECR methodologies (CMI, VMI, CPFR, cross-docking).
- 3 e-procurement and electronic market places.
- 4 New information technologies & SCM.



Supply chain & ICT

- 1 Supply chain management & ICT
 - a Problems.
 - b How do we get information? Tracking technologies & SCM



Supply chain management?

- Enterprise environment : hyper-competition
 - Companies are seeking low operations costs:
 - Purchasing policy
 - Lowering the level of inventory
 - Building competitive advantage other than price:
 - Production lifecycle mastering
 - Time-to-market competition
 - Time based competition
- This can be achieved only with a strong collaboration among vendor and distributors.



The concept of supply chain management

- Definition:
 - is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption.
 - Raw materials flow, financial flows, information flows.
- Integrated SCM consists in building strong coordination between all the members of a supply chain in order to build a competitive advantage.



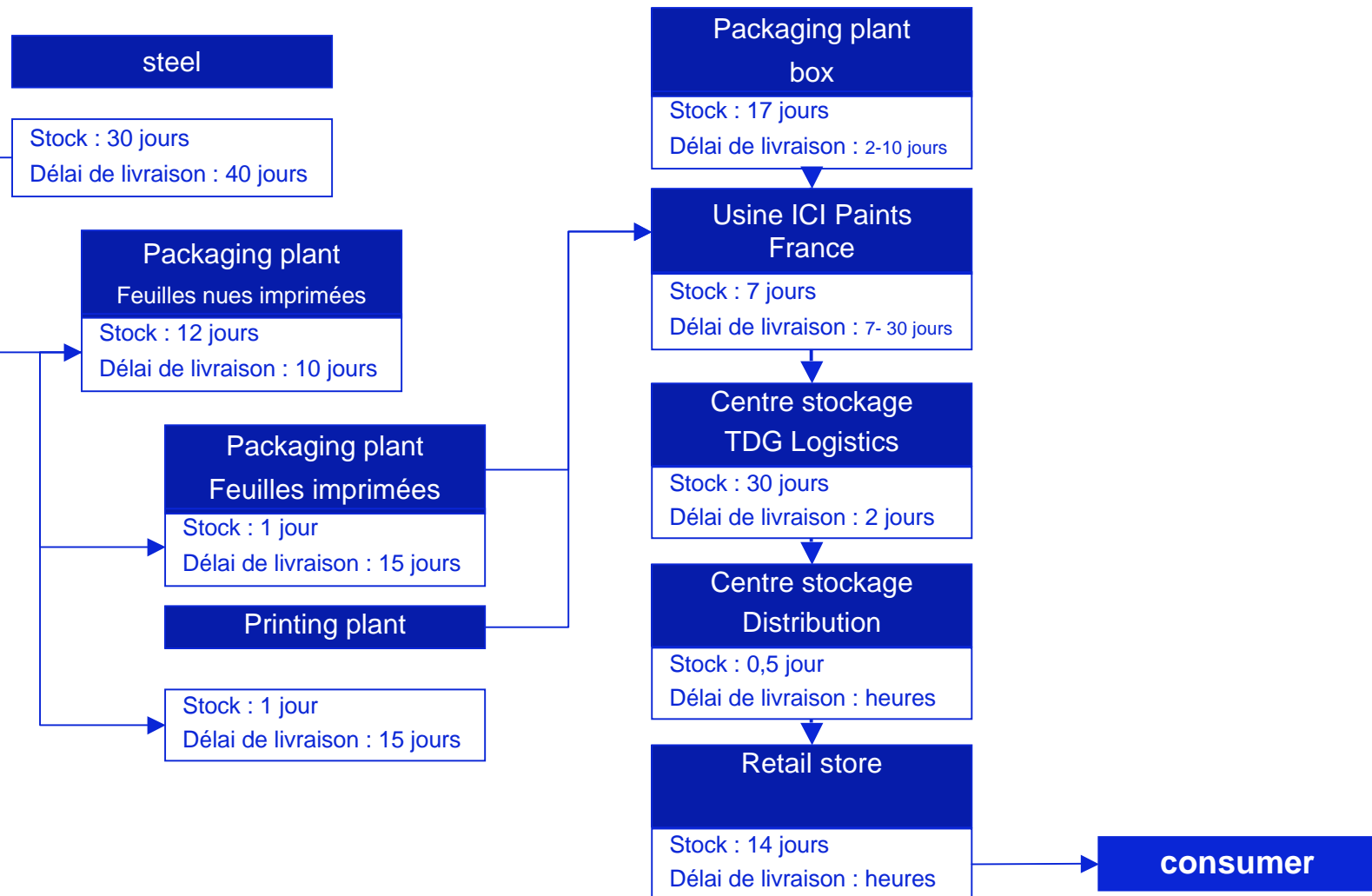
Coordination through ICT

- Building coordination at each step:
 - Rely on information technologies.
 - But are also based on trust...
 - And in a context in which every company try to catch the more value it can.
- Building coordination from the ICT point of view:
 - same network (X25, VAN, webEDI, internet)
 - Same language
 - Same method
- Interoperability of systems is crucial and rely on respect of standards

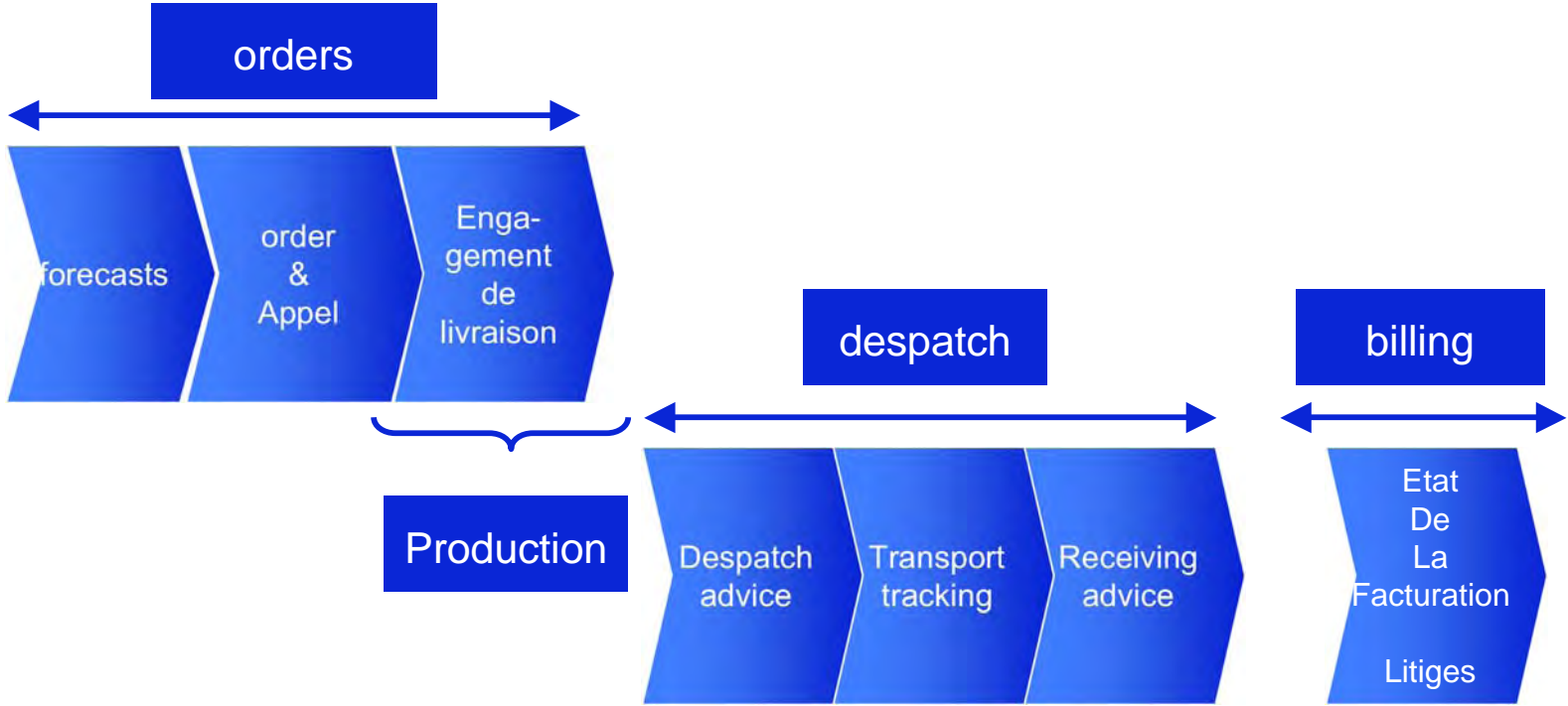


An example of a SC

ICI Paints.



Steps in supply chain

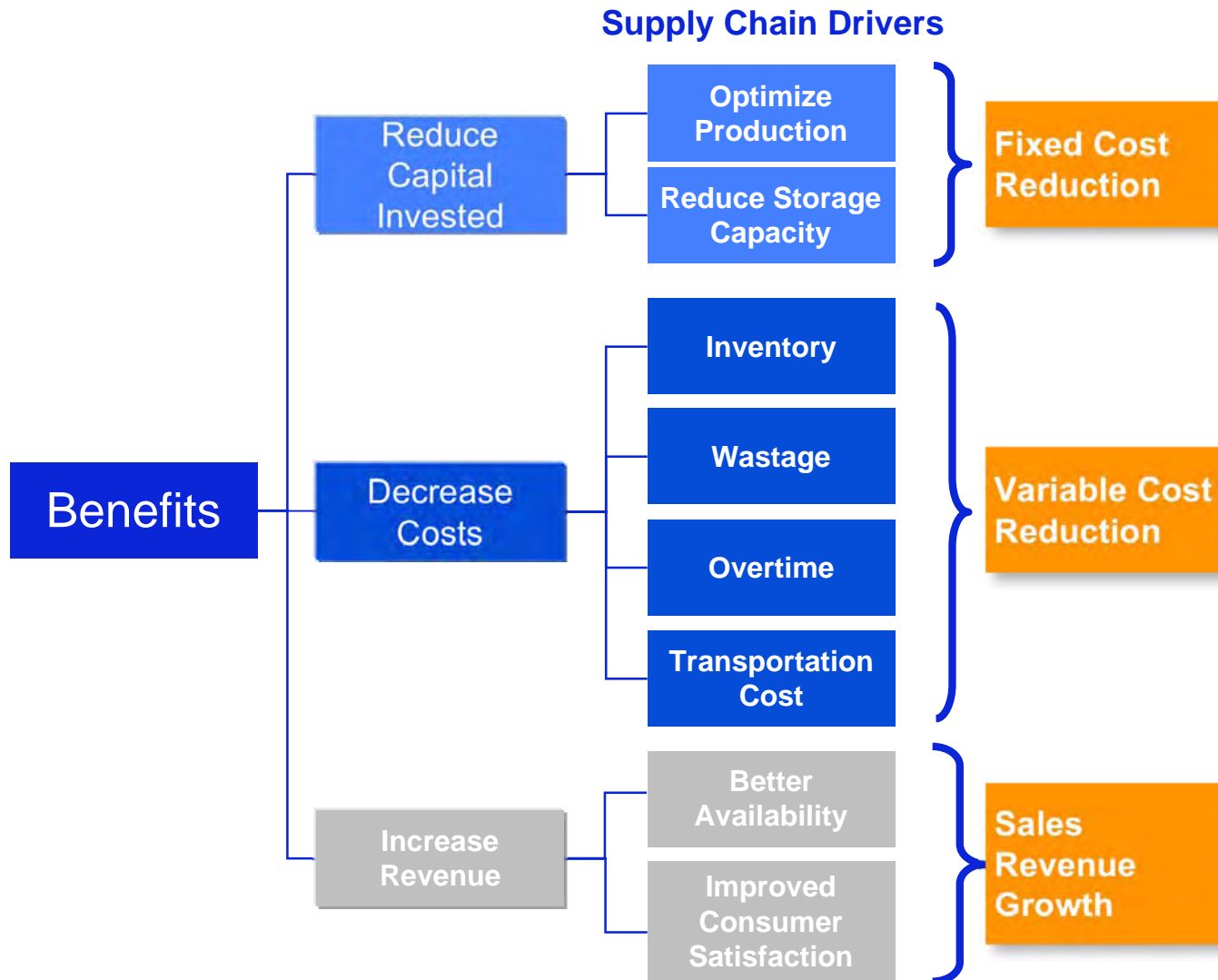


Materials flow

Informations flow



Expected Benefits from a SCM.



What is the role of ICT in SCM?

- Building relationships among partners:
 - Within the company among departments (planning, purchasing, production, logistics, sales, etc...);
 - upstream with vendors;
 - downstream with distributors;
 - or directly with consumer;
- Reducing overtimes among the value chain.
- Inter-Organizational Information Systems (IOIS).
- Rely on the existence of:
 - communications protocols;
 - Common languages (EDI, ebXML)
 - Normalised Methodologies (ECR)

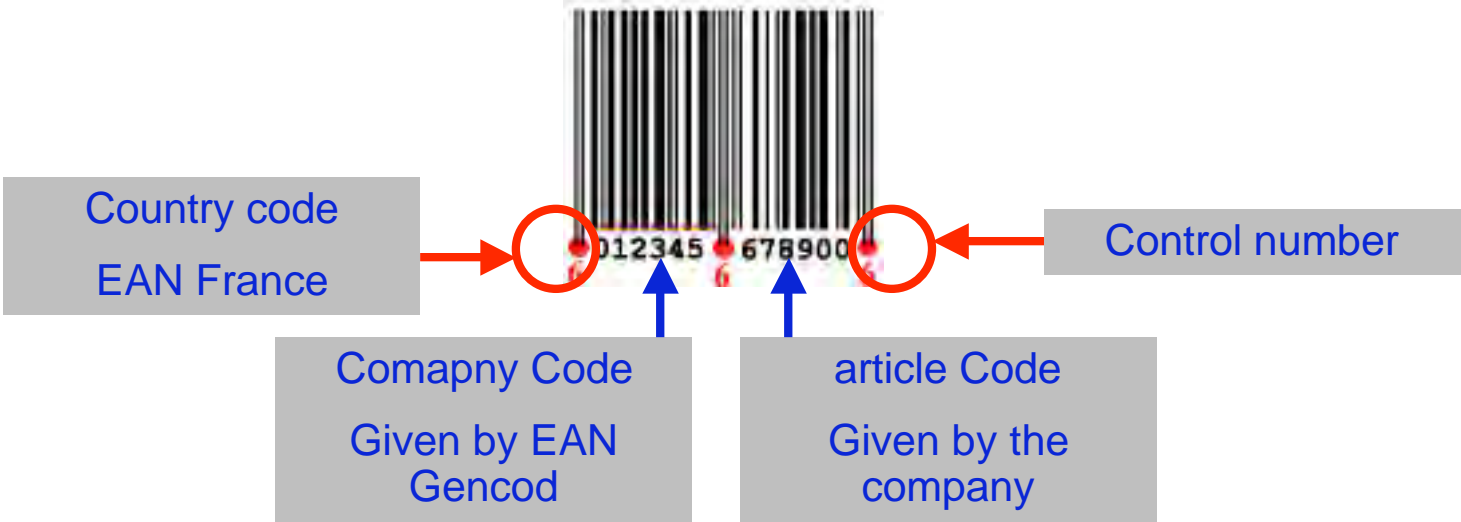


Tracking technologies

- multiplication in commercial exchanges and increase in volumes.
- How can we manage this situation ?
- Need to have accurate informations on sales, inventories, etc...
- How to get this information in real time?
- With a tracking technologies:
 - barcode is a machine-readable representation of information in a visual format on a surface.
 - EAN code (UPC)
 - GTIN 13 digits (*Gobal Trade Item Number*)

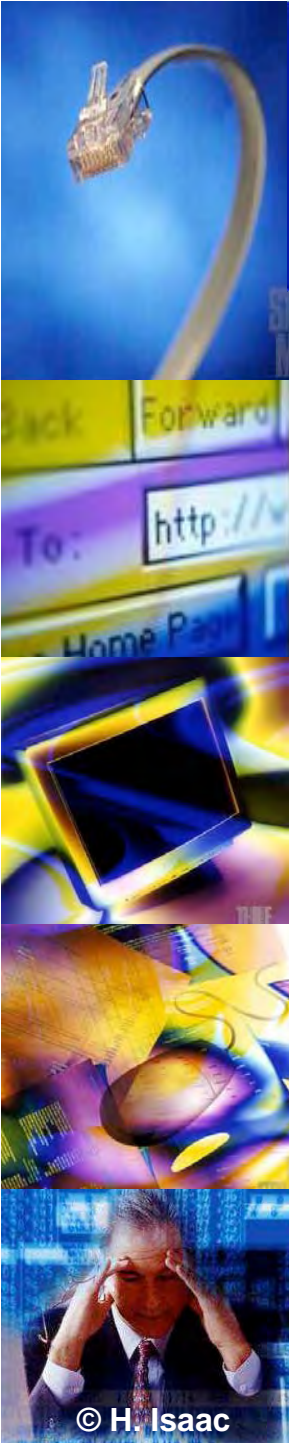


Tracking technologies



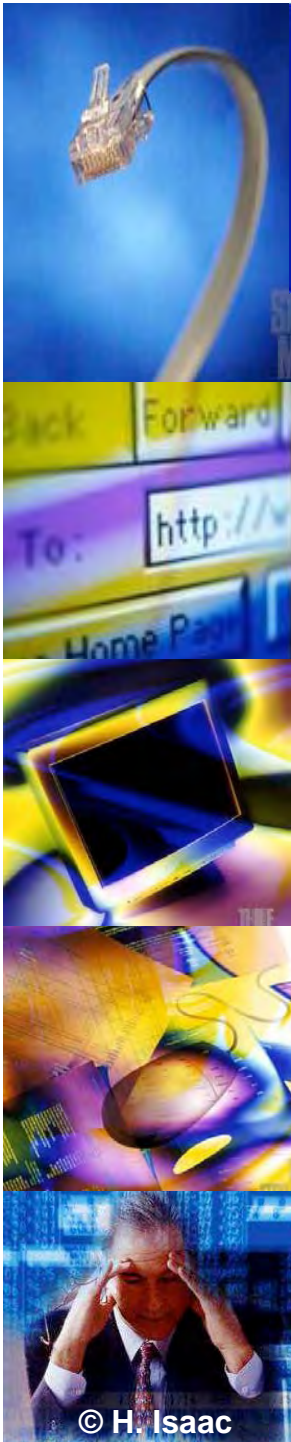
Consumer unit	3	45312	023456	8
	F	CNUF	CIP	C

Logistics unit	1	3	45312	023456	5
	L	F	CNUF	CIP	C



Barcodes limitations

- Requires line of sight for scanning
- Label space issues and limited capacity for encoding information
- Does not have read/write capability
- Static information related to the class of the item
- Cannot simultaneously read & identify multiple codes
- Opportunities for human error

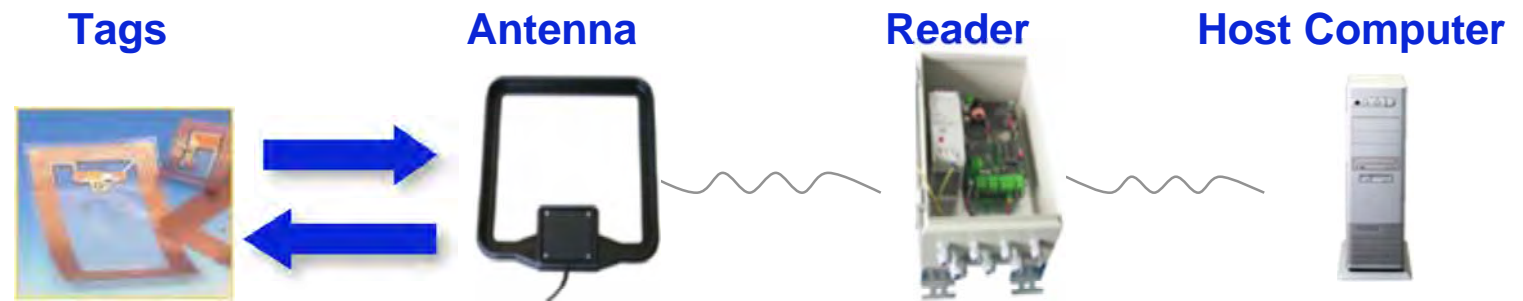


New tracking technologies : RFID & ePC

- RadioFrequency Identification (RFID).
 - chip + antennas.
 - Passive chips versus active chips
 - power supply is given by electromagnetic field from transponders
 - tag contains GTIN + unique serial number
 - Cost of producing a tag is around 0,3 € et 1 € / puce ePC
 - In supply chain management are used on containers, palets
 - No real worldwide standard
 - But...ePC should rapidly become the standard



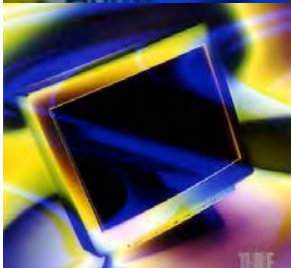
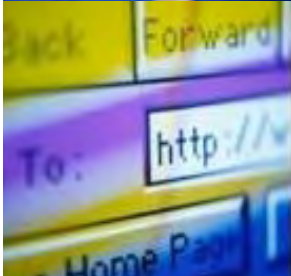
An RFID system consists of four basic components



- Device made up of an electronic circuit and an integrated antenna
- RF used to transfer data between the tag and the antenna
- Portable memory
- Read-only or read/write
- Active or passive
- Usually attached to specific items
- Receives and transmits the electromagnetic waves
- Wireless data transfer
- Communicates with the tag via antenna
- Receives commands from application software
- Interprets radio waves into digital information
- Provides power supply to passive tags
- Reads/writes data from/to the tags through the reader
- Stores and evaluates obtained data
- Links the transceiver to an applications, e.g. ERP

There are a multiplicity of tag types

- Three Basic Types:
 - Active Tags
 - Battery powered memory, radio & circuitry
 - High Read Range (300-750 feet)
 - \$\$\$
 - Semi-Active
 - Reader activates tag, but battery powers memory and circuitry
 - Medium Read Range (10 - 50 feet)
 - \$\$
 - Passive Backscatter
 - Reader powered
 - Shorter Read Range (4 inches - 20 feet)
 - \$



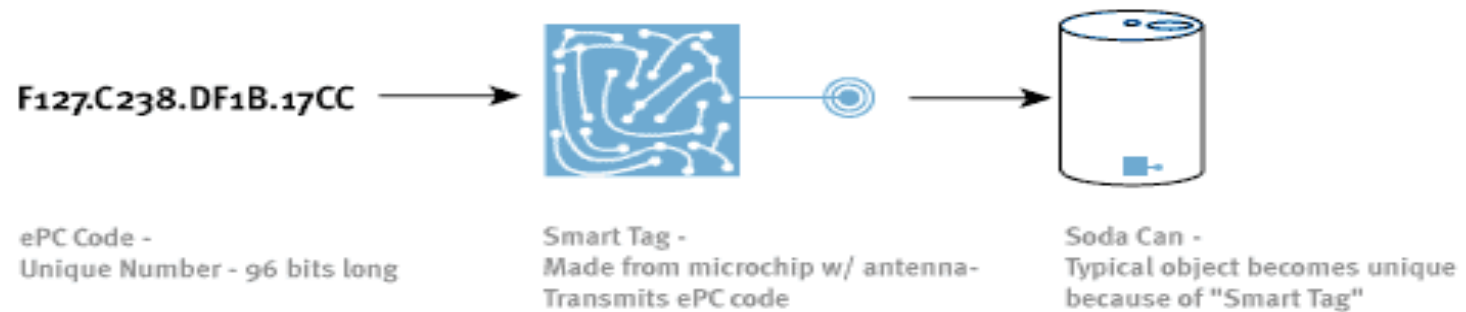
Tags Utilize 5 Frequency Ranges

- **130 KHz (common of pet ID implants)**
 - Very low read speed and very short read range
 - Small amount of data
- **13.56 MHz (common of smartcards)**
 - Low read speed and short read range
 - Small to medium amount of data
- **915 MHz (common of cordless telephones)**
 - Medium read speed and medium read range
 - Medium amount of data
- **2450 MHz (common of Bluetooth or 802.11)**
 - High read speed and long read range
 - Medium amount of data
- **5800 MHz (common of toll road collection passes)**
 - Very high read speed and long read range
 - Medium amount of data



What is an EPC?

An Electronic Product Code (EPC) is a unique 96 bit number embedded onto individual RFID "smart tag".



EPC technology allows everyday objects to be uniquely identified and connected in a dynamic, automated supply chain that joins businesses and consumers together in a mutually beneficial relationship.

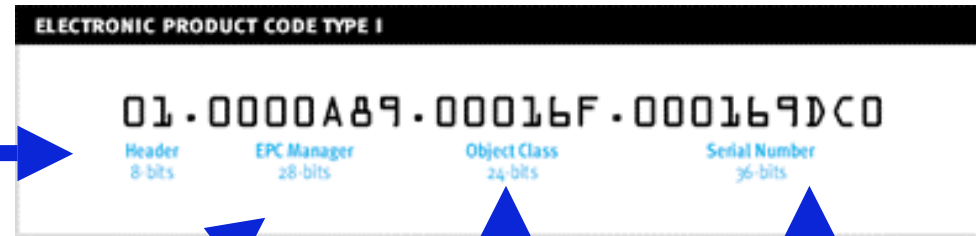
Anatomy of an ePC

The **HEADER** identifies the EPC version number, enabling different types and future revisions of EPC

The **EPC MANAGER** is the name of the enterprise, typically the company responsible for maintaining the Object Class and Serial Number

The **OBJECT CLASS** is the class of the product, usually the stock-keeping unit or other object-grouping schema

The **SERIAL NUMBER** is the unique object identifier



RFID Holds Several Value Propositions

- Ability to read multiple tags simultaneously with greater speed and efficiency
- No contact or line of sight required
- Tags have read/write capabilities
- Tags are less susceptible to damage and can withstand extreme abrasive washes, bleaching, and heat
- Tags can be read through dirt, paint, steam, mud, and plastic



ECR methodologies

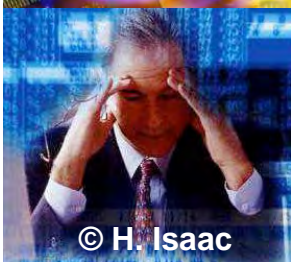
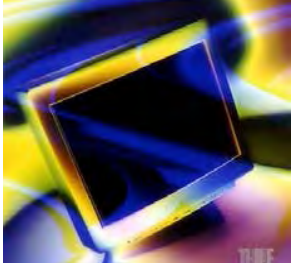
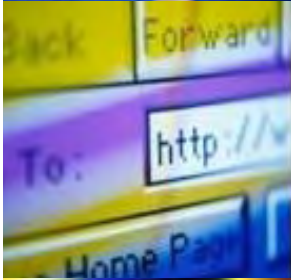
2 Efficient Consumer Response

a Informational Issues.

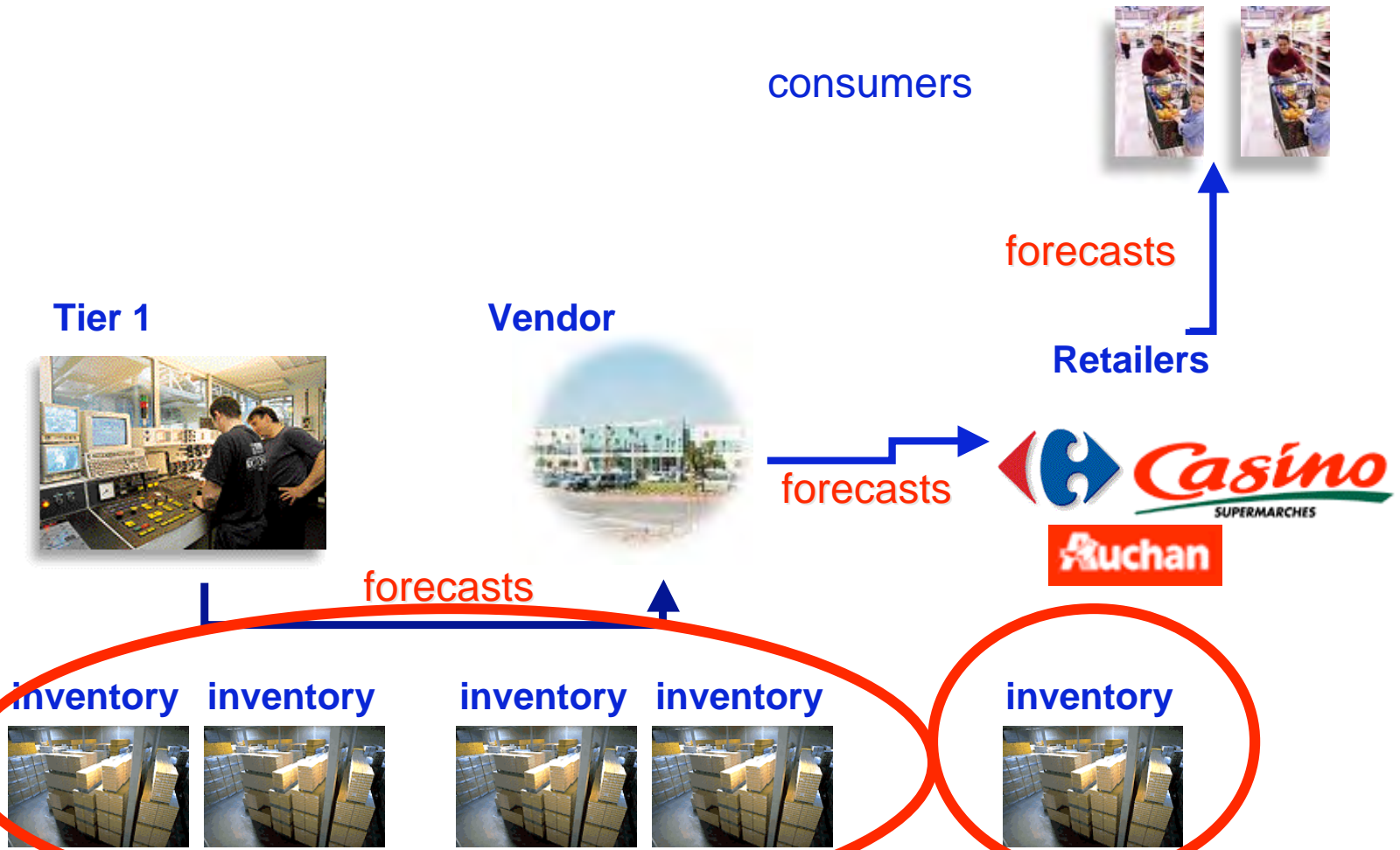
b EDI

c CMI & VMI models.

d CPFR or total ECR.



ECR Methodologies : an introduction



E.D.I. technologies

E.D.I. (*Echange de Données Informatisées*). Electronic Data Interchange (EDI) is the computer-to-computer exchange of structured information, by agreed message standards, from one computer application to another by electronic means and with a minimum of human intervention

- Normalised (language EANCOM®) by countries and by activities
 - examples :
 - ANSI ASC X12 in the USA (1979)
 - EANCOM / Gencod pour la distribution
 - Galia for France automotive industry
 - Odette for European automotive industry
- reliable, secure.
- but expensive to deploy.

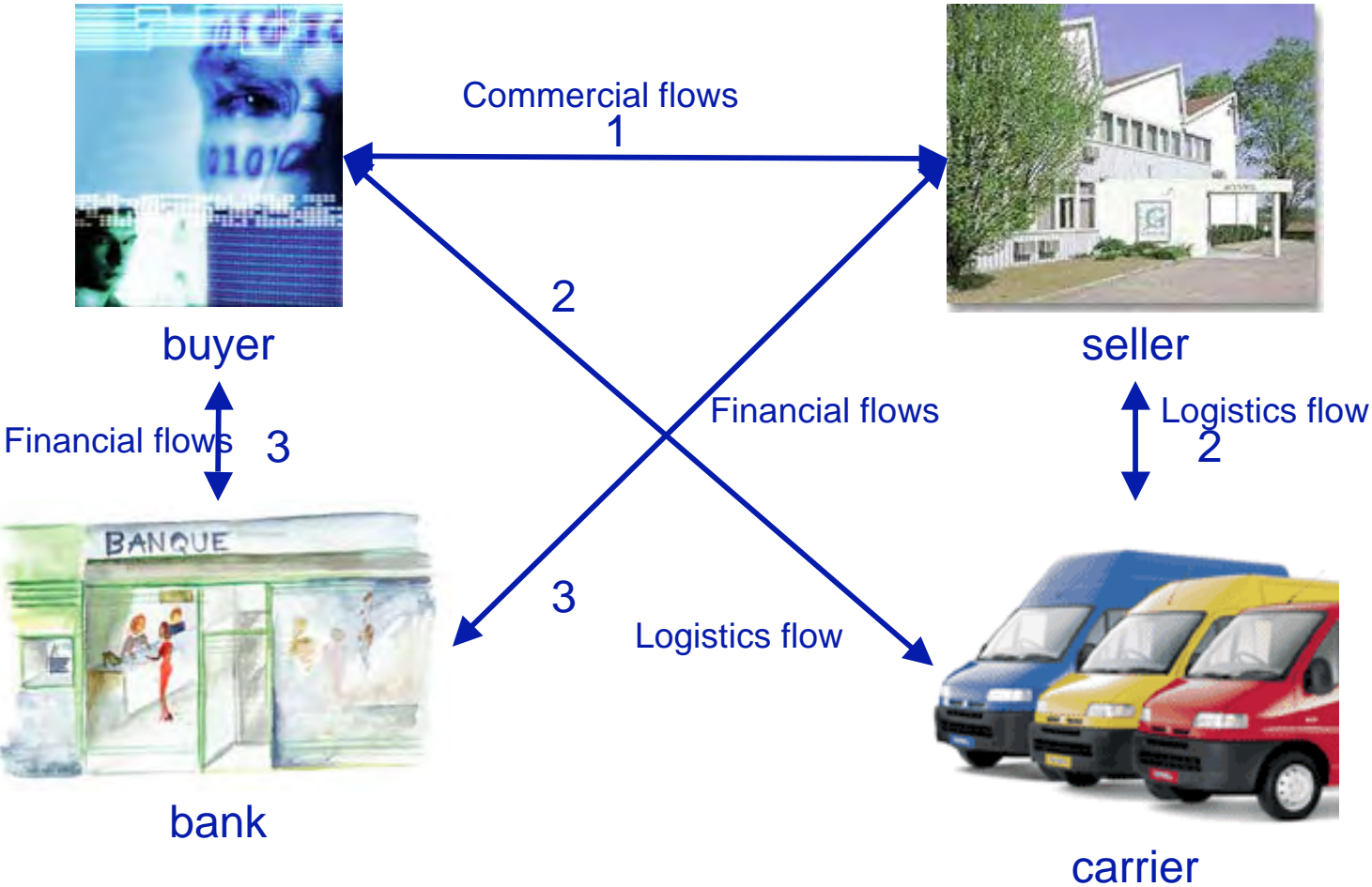


E.D.I. technologies

- EDI is a structured language
- But also an infrastructure of communication usually called value-added network (VAN)
- VAN is a specialized application service provider (ASP) that acts as an intermediary between trading partners sharing data or business processes.
- VANs usually service a given vertical or industry and provide value-added services such as data transformation between formats (EDI↔XML, EDI↔EDI, etc.).



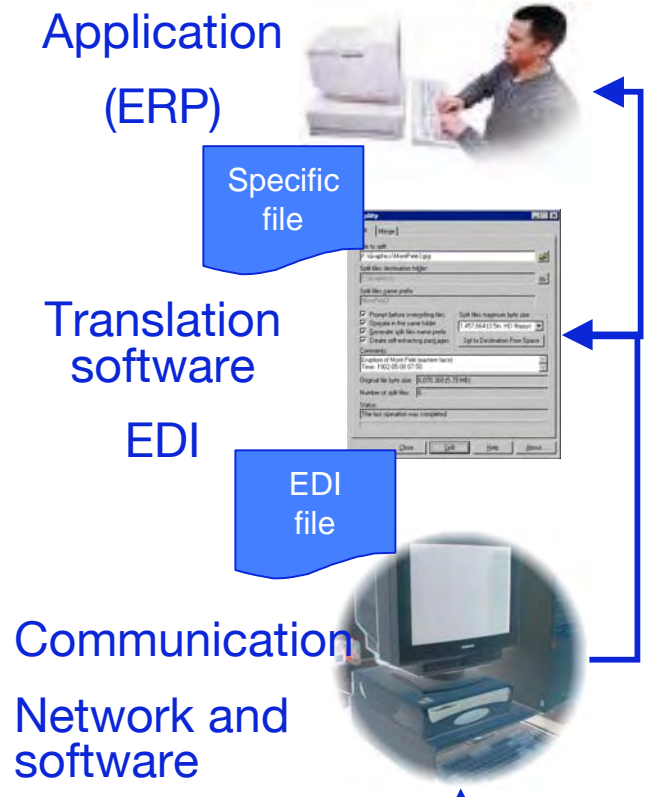
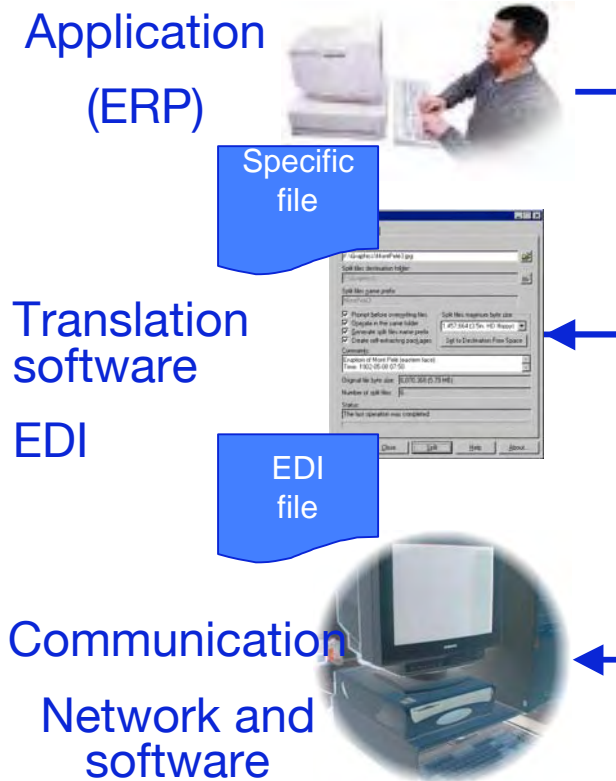
Business flows covered by E.D.I



E.D.I. technologies

Buyer side

seller side

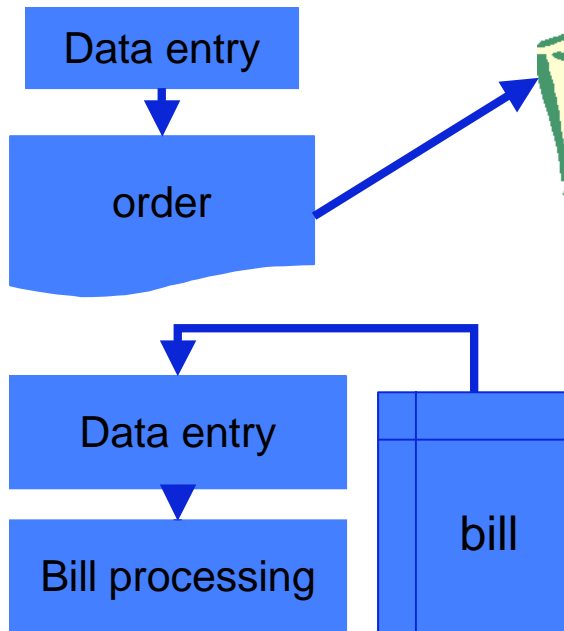


VAN
Value Added Network

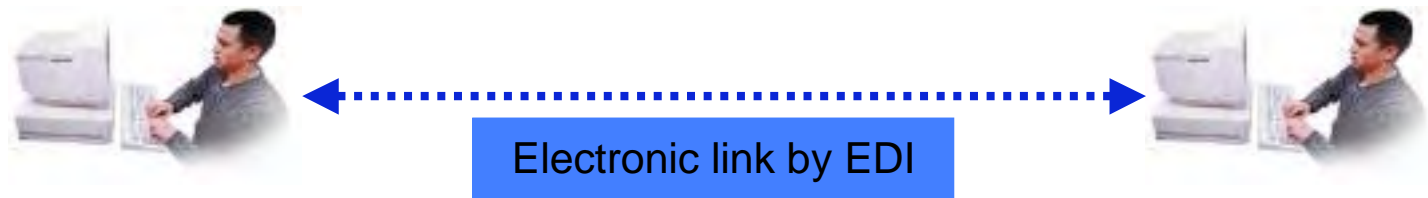
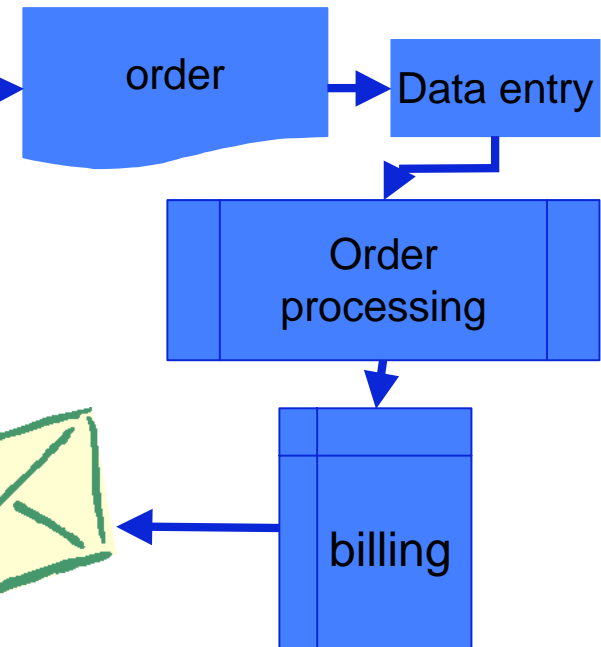


E.D.I. technologies

Buy side



seller side



E.D.I. technologies

- When should EDI be used?
 - High level of inventory and high costs in transport;
 - High inventory turnover;
 - Time based competition, time to market, just-in-time;
 - Standardised products;
- Benefits of EDI:
 - Coordination improvement;
 - Suppression of redundant informations
 - Multiple entries limited => diminishing errors in data entry;
 - Reducing overtime
 - Lowering the cost of an order.



From EDI to Web EDI

- EDI expensive for SME.
- Issues in Integrating EDI with IS
- Using Internet as an interface for EDI:
 - Solution Web EDI





EDI / EAN GENCOD: some EDI messages

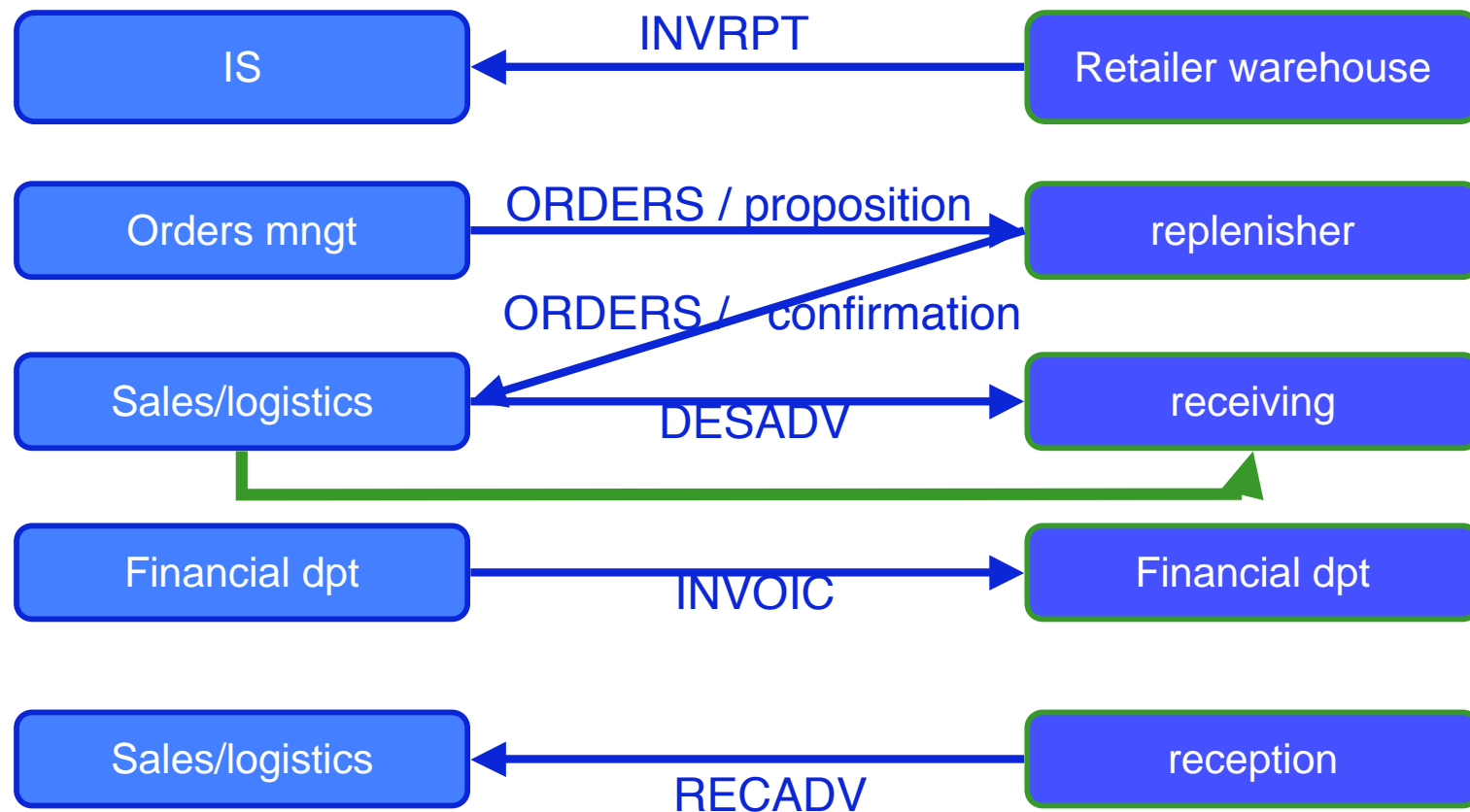
- Messages EDI utilisés en logistique:
 - INVRPT (Inventory report)
 - Message EANCOM qui permet de transmettre les états de stocks, les mouvements (entrées et sorties) de stocks et les données de vente.
 - ORDERS (Purchase order)
 - Message donnant le détail des biens et services commandés dans les conditions acceptées par l'acheteur et le vendeur.
 - DESADV (Despatch advice) avis d'expédition
 - Message EANCOM donnant des renseignements sur les marchandises expédiées ou prêtes à l'expédition dans les conditions acceptées.
 - INVOIC (Invoice) facture
 - Message EANCOM demandant le paiement pour les marchandises dans les conditions acceptées par le vendeur et l'acheteur.
 - RECADV (Receiving advice) Accusé de réception de livraison.
 - Message EANCOM utilisé pour accuser réception des marchandises en coordination avec l'avis d'expédition et pour indiquer les éventuelles différences recensées après réception.

Co-managed inventory

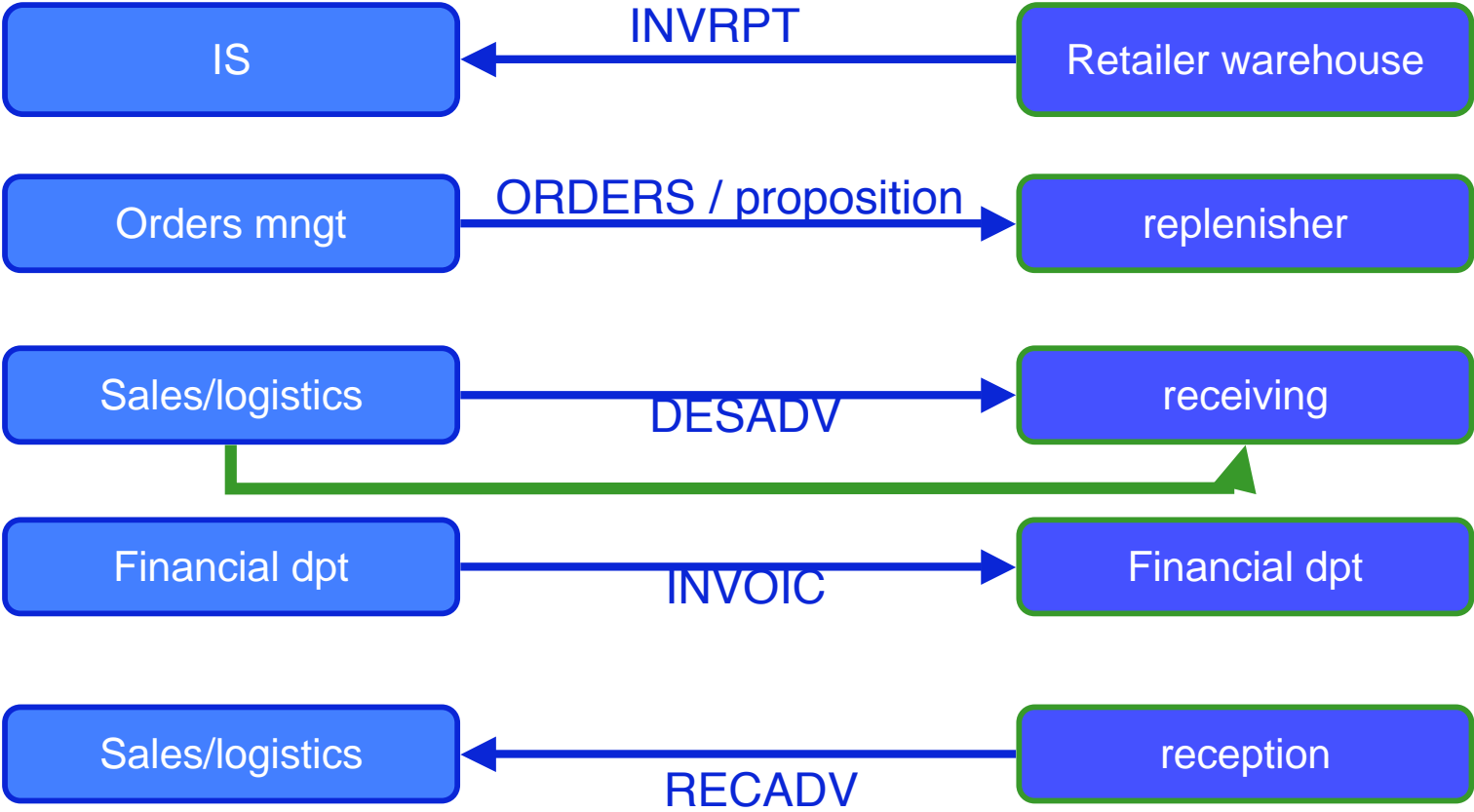
- Why cooperation?
 - Variations brutales de la demande finale;
 - Rupture de stocks , dysfonctionnement des plans de production.
- CMI, objectives:
 - Increasing sales (better availability);
 - Reducing inventory;
 - Reducing the cost of replenishment.
- CMI, how:
 - Automatic replenishment based on inventory;
 - Based on sales information;
 - EDI utilization to speed information exchanges.



CMI model (Co-Managed Inventory)



VMI model (Vendor Managed Inventory)

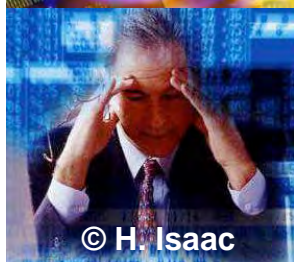
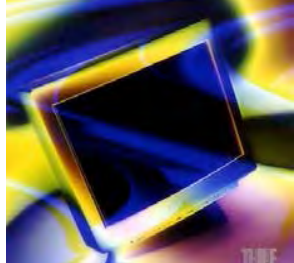
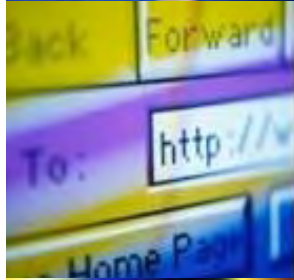
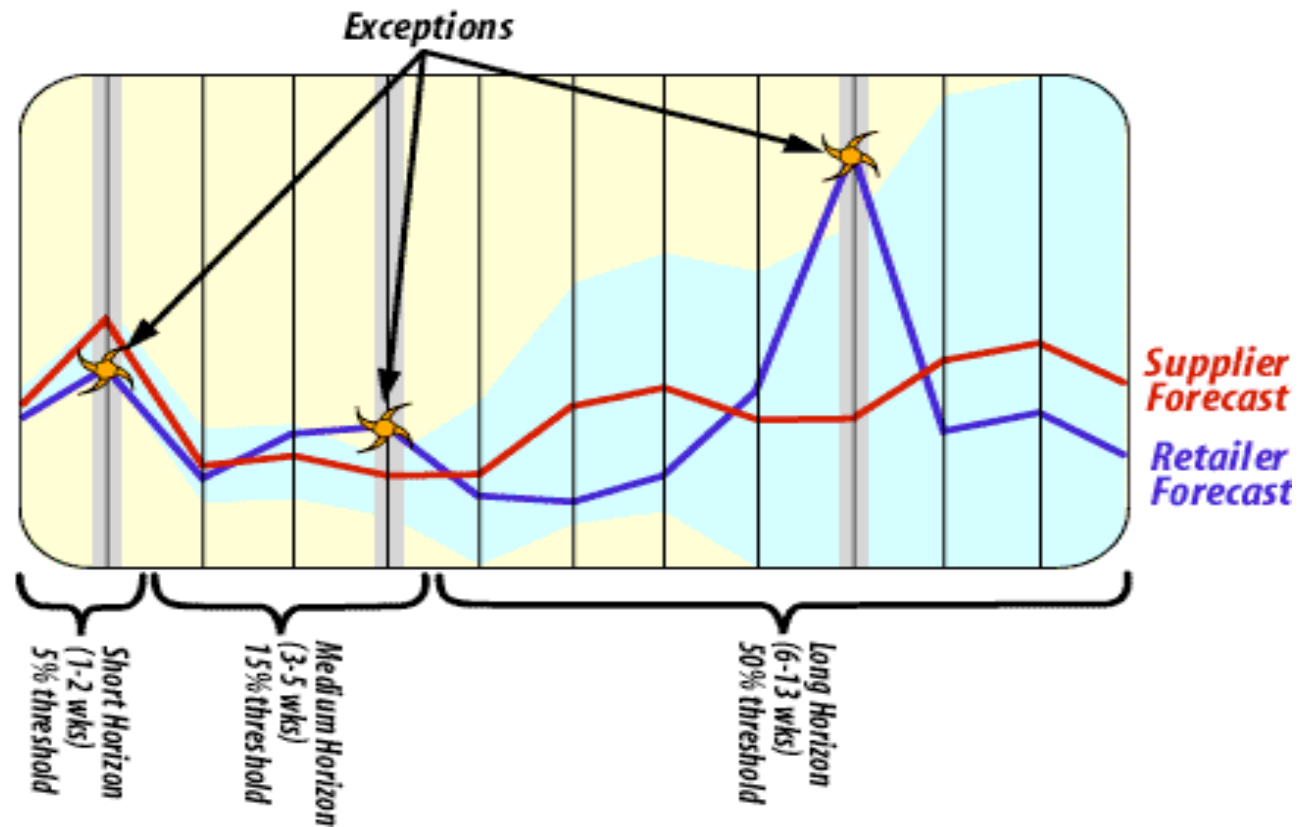


Collaborative Planning Forecasting & Replenishment.

- A shared process of creation between two or more parties with diverse skills and knowledge delivering a unified approach that provides the optimal framework for customer satisfaction
- Sharing information on **forecasts, production plannings, promotions, and marketing.**
- Same goals as VMI
- No standard as today.



Coordinating forecasts between distributors/manufacturers



© H. Isaac

The CPFR Process

Once

1. Front-End Agreement

Collaborative Planning

Qtr.

2. Joint Business Plan

Wk, Mo

3. Create Sales Forecast
4. Identify exceptions
5. Resolve exceptions

Collaborative Forecasting

Wk, Mo

6. Create Order Forecast
7. Identify exceptions
8. Resolve exceptions

Collaborative Replenishment

9. Generate Order



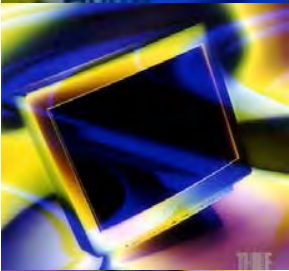
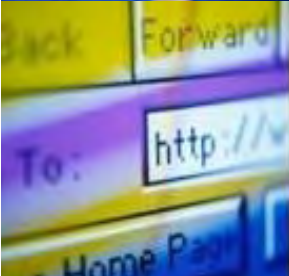
CPFR Value creation

Value Delivery

- Increased Sales
- Reduced Operations Cost
- Reduced Inventory
- Improved Relations

CPFR[®] Driver

- ➔ • Improved In-Stock
- Shared insights to Demand
 - Seasonality/Regionality
 - Promotional Causality
- ➔ • Lower Product Returns
- Reduced Expediting Costs
- Optimized Production Cycles
- ➔ • Less “Just-In Case” Stock
- Build to Order vs. Build to Stock
- Jointly solve problems vs. blaming other party



CPFR ROI Benefit Categories

Inventory

41%

Storage Costs	22%
Inventory Expense	17%
Intransit inventory for Rail	>1%
Reduced 3 rd Party Storage	13%

Sales Benefits

34%

Increased Sales	25%
Improved Margin	1%
Customer Retention	8%

Process Efficiencies

6%

Inventory Control	1%
Logistics	2%
Order Management / CSR	2%
Purchasing	>1%

Transportation

19%

Carrier Management	>1%
Load Planning	>1%
Truck Tendering/Carrier Selection	1%
Truck Cycle Time	6%
Rail Cycle Time	10%
Demurrage	>1%
Excess Freight Charges	2%

Real World ROI Examples

Firms	Customer Service	Inventory	Forecast
AMR Retailers Summary	Sales +6 to 20%	Store Inv down 10 to 40%	
AMR Suppliers Summary	Shipment +2 to 10%	Del. Cycle cut 10 to 40%	
Metro/Herlitz	In Stock + 50% Sales +4%	Down 15%	
Canadian Tire/ 25 Suppliers	Sales +30% Fill Rate +1%	Down 10%	Improved
Sainsbury/Nestle	In Stock + 30% Supplier Fill +24%	Exp/Short Sav. £ 2.8 Million	
TruValue/ Suppliers	7 Sales +10 to 20%	Logistics Saving 10 to 30%	Improved
Ace/Manco	Sales +12%		Improved 10%
Tesco/ P&G	In Stock 100%	DC Stock -75%	Improved 10%
Conad/Barilla	Item Sales +167%		85% Accuracy

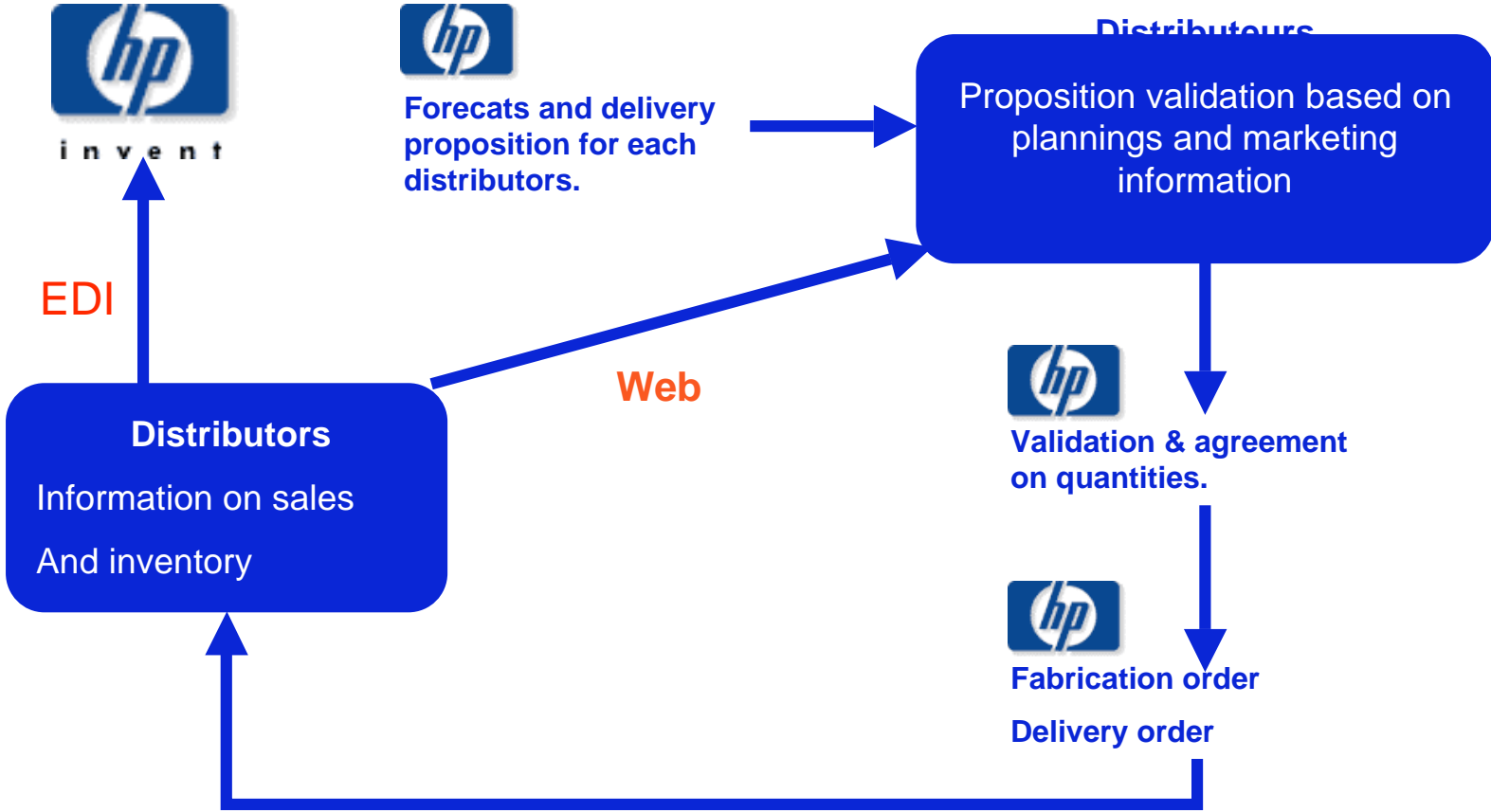


CPFR : an example

- Printer Division :
 - Short lifecycle product.
 - Risk: obsolete inventory at the retail level => financial risk.
- Goals:
 - Just-in time production.
 - Reducing returning obsolete product.
- CPFR:
 - Access created for distributors (VAR) to production planning
 - Information exchange on demand variations.



CPFR : an example



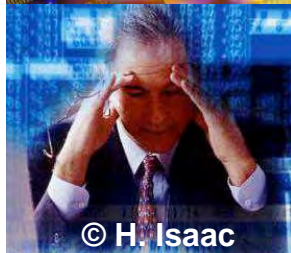
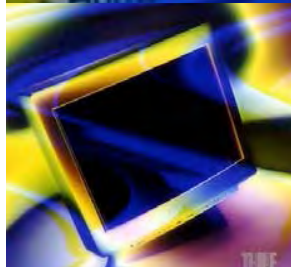
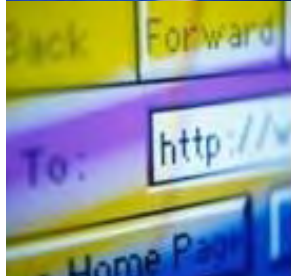
SCM : some intermediate conclusions.

- Collaborations :
 - Deeply relying on ICT;
 - But many standards issues;
 - Trust needed....
- Virtual vertical integration....
- Enabled by ICT.
- New industry organization leading to virtual company



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