

ENGINEERING PHARMACEUTICAL INNOVATION

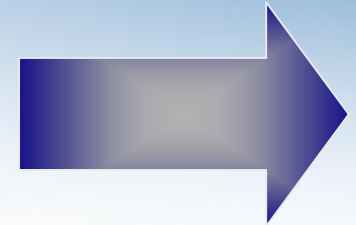


‘Safety In Numbers’

Supply chain and brand protection –

ISPE March 2008

Paul Osborne



Supply chain and brand protection

- Within the USA there has been no major breakout of known toxic or contaminated counterfeits in the past year, although the number of investigations opened by the FDA Office of Criminal Investigation (OCI) remains at a high level.
- FDA investigations are up from 5 per year in the late 1990's to 20 per year since 2000.



Supply chain and brand protection

- This problem is much more severe in developing countries than in countries such as the US, Europe and Canada.
- According to estimates 15% of all sold drugs are fake. In parts of Africa and Asia this figure exceeds 50%. Criminal sales exceed US\$ 35 billion. *
- In 2000, the health ministry in Russia reported that 56 drugs were counterfeit. The following year, approximately 3.6% of all pharmaceuticals in Russia were found to be fake.



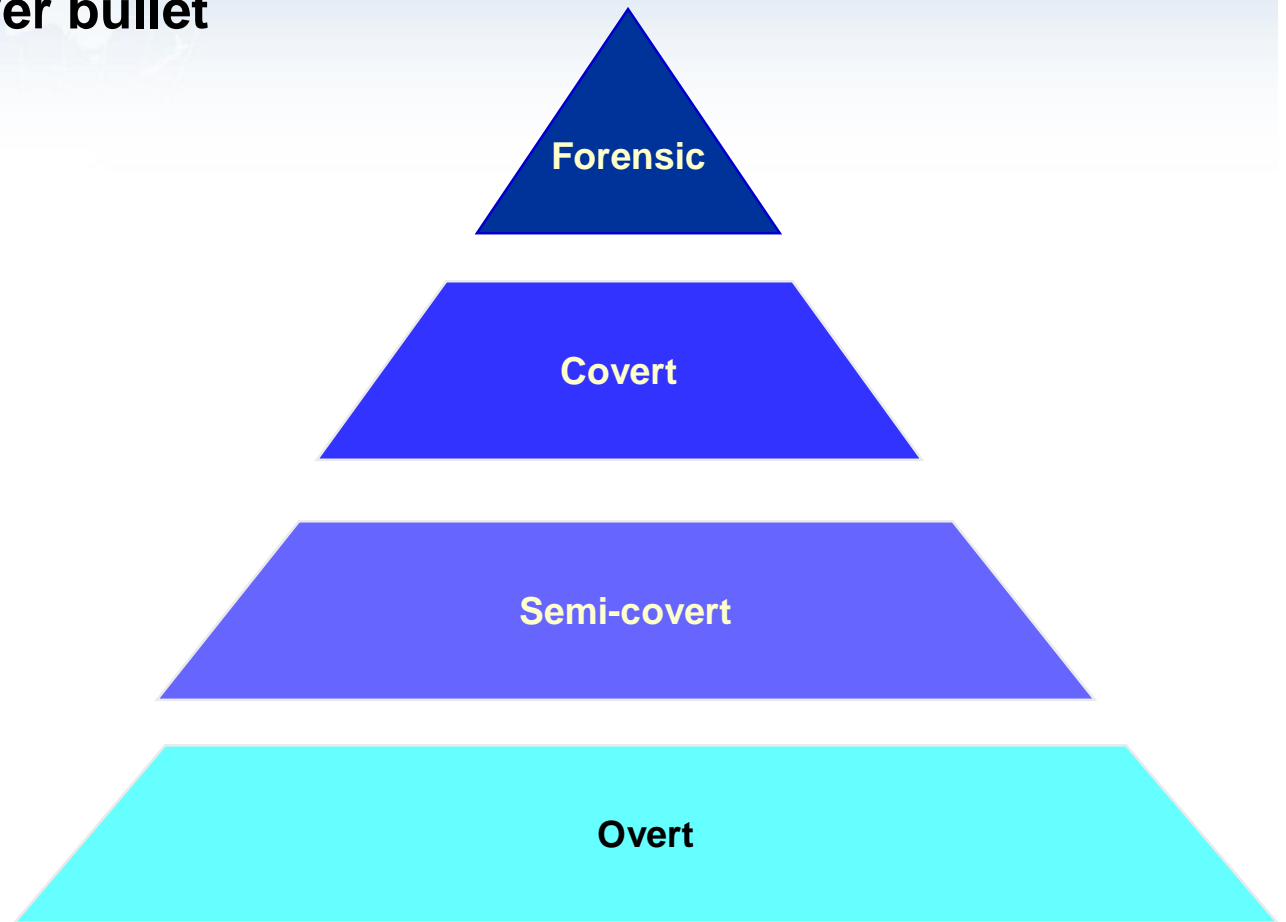
* Source: R.Jones, FDA, E-mail statement, 18 November 2004

Photo Source: Pharmaceutical
Manufacturer Research Association

Supply chain and brand protection

FDA states - there is no silver bullet

- **Forensic**
 - DNA marking
 - Chemical marking
- **Covert**
 - Invisible taggant
 - RFID
- **Semi Covert**
 - Microtext
 - Watermarks / Intaglio
 - Barcodes
 - **Serialisation**
- **Overt**
 - Holograms or OVD's
 - Optically variable inks



Supply chain and brand protection

- Holograms, more correctly referred to as Optically variable devices (OVD) are becoming ever more popular as tools to provide security for documents and products subject to counterfeiting.
- Issues faced during the design and implementation of OVD's for a specific security application include matching the proper security feature for its intended function, determining the method of the security features authenticity and incorporating effective anti-counterfeiting protection for the OVD itself.



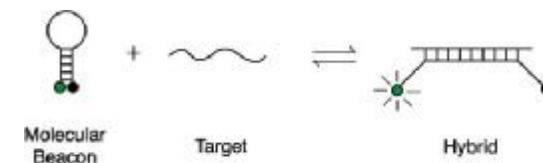
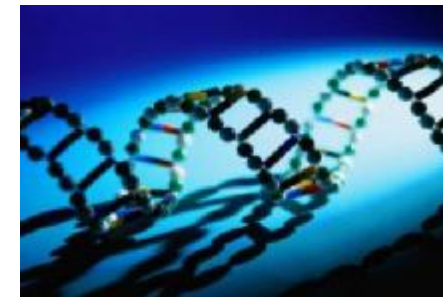
Supply chain and brand protection

- Optically variable inks or OVI contain tiny flakes of special film which changes colour as the viewing angle is varied. The result is an ink which has this same optical property, changing colour as the viewing angle is varied.
- They are very expensive inks and generally only used in small areas. An OVI feature is printed using the silk screen process.
- They do however offer excellent protection against all counterfeiting methods and can also be used in tamper evident applications.



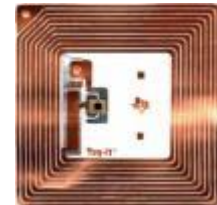
Supply chain and brand protection

- Security tags that use unique DNA authenticators that can be used as labels, or actually built into a product along with a logo. A strand of DNA from twenty to tens of thousands of base pairs long is synthesized or extracted from a plant genome. This DNA strand is assigned a unique product name, and then is replicated to produce bulk quantities of pure DNA material. This material can then be mixed with ink for tags or actual use on the product carton or label itself
- Inspectors can easily test this DNA in real-time in the field using a special test kit with a reverse complement of the DNA tag. Only a perfect match will spark a fluorescent reaction; this reaction authenticates the product for the inspectors



Supply chain and brand protection

- One challenge that producers face is defining the data carrier for serialisation technology.
- 2-D Data Matrix serialized codes and high-frequency (HF), ultra-high-frequency (UHF), and UHF near-field (NF) RFID are options both at the case and item level, with proven field read rates.
- Both technologies (2D and RFID) can help the pharmaceutical industry comply with mass serialisation and ePedigree, but each has distinct differences.
- The real difference comes down to cost, reliability, line of sight and data storage.



Supply chain and brand protection

<p>PRINTED OPTION</p>				
				
<p>u Unit Dose</p>	<p>u Item</p>	<p>u Case</p>	<p>u Pallet</p>	
<p>RFID OPTION</p>				

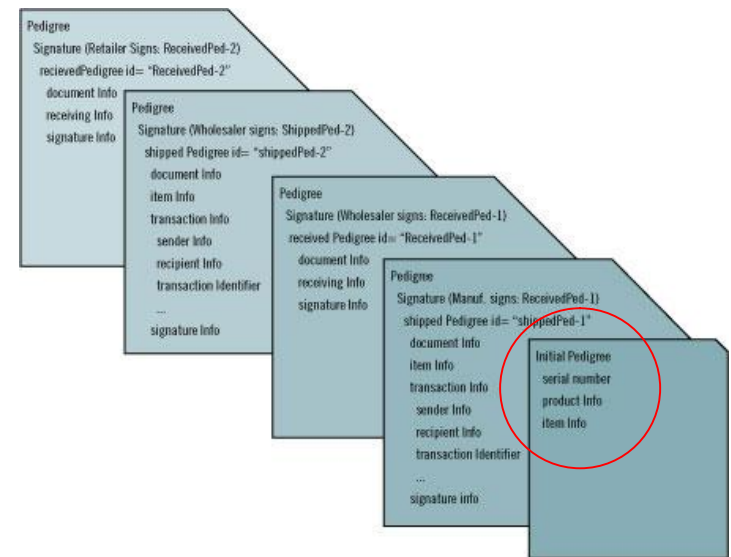
Picture courtesy of Domino Ltd

Supply chain and brand protection

- When discussing either Bar Code or RFID utilisation as a control in the supply chain using mass serialisation, additional facts must be considered. The drug must be Serialised by a unique identifier on each saleable unit of drug product. Pedigree and Serialisation are independent but interrelated concepts and are not Track and Trace.
- **Pedigree** seeks to control the flow of the legitimate product from manufacturing to dispensation by dynamic paper or electronic records. This historically was considered from the first point of vulnerability onwards (the first distribution point). Now the manufacturers are being involved under the California Pedigree Laws.
- **Serialisation** seeks to enable the authentication of a pharmaceutical product and to be able to obtain a pedigree for this item by the model of 'pedigree fragment on demand'.
- Once **Track-and-Trace** efforts do bear fruit down the road they will result in an evolutionary step forward for the existing pedigree standard.

Supply chain and brand protection

- In the USA the California statute requires both key elements: electronic **Pedigree** and **Serialisation**.
- The ePedigree must track each drug at the smallest saleable package, carton or bottle.
- This must be initiated by the manufacturer.
- The drug must be Serialised by a unique identifier on each saleable unit of drug product.
- EPCglobal has developed its Pedigree Messaging Standard. This ePedigree works with a Serialized Global Trade Item Number (SGTIN) 96- bit code. This 24-character code encompasses such items as manager number, item number, and a serialised code.
- The California Board will announce its final timeline on March 25th 2008.



Supply chain and brand protection

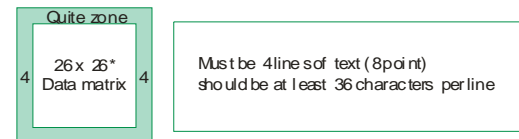
Business Drivers for the Pedigree laws in the USA include:

- Goal - A Safe and Secure Supply Chain, with counterfeit prevention.
- Recalls – by control of batch and individual cartons / bottles.
- Trigger – Compliance - FDA and EFPIA.
- Effort led by States: CA, FL, and more. There are now at least 35 states with electronic pedigree (e-pedigree) legislation being considered. Twenty one of those states have passed laws requiring an e-pedigree.
- Florida: July 1, 2006 – Paper pedigree only starting at 1st distribution point.
- California: 2009, possible delay to 2011 only – Electronic pedigree, starting at manufacturer.



Supply chain and brand protection

- In Europe EFPIA is introducing a 2D (Two Dimensional Data Matrix) Bar Code system based on GS1/ EFPIA standards, ECC200.
- This mechanism includes the use of unique Serial numbers on each saleable unit of drug product.
- A five million Euro pilot is planned in 2008.
- The proposed EFPIA solution includes all relevant product data:
 - Identity (GTIN or CIP for France)
 - Expiry date
 - Unique Serial number
 - Batch number



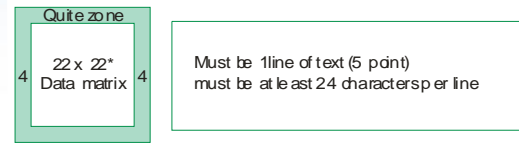
1 cell = must be a minimum of 0.3mm

* or equivalent rectangular

GS1/EFPIA

Supply chain and brand protection

- The USA are basing their scheme on EPC (Electronic Product Code) numbers, supported by GS1.



California

- The data stored in the 2D Data Matrix barcode will be the Serialized Global Trade Identification Number (SGTIN). Data follows GS1 and is 34 Numeric Characters in the ECC200 Data Matrix code.
- The number is made up of the combination of application identifiers, the product NDC (National Drug Code) code, and a unique serial number.

1 cell = must be a minimum of 0.3mm

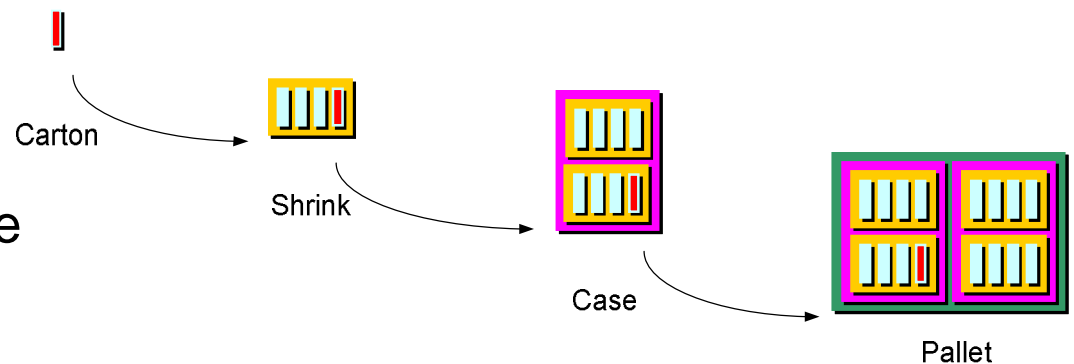
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Supply chain and brand protection

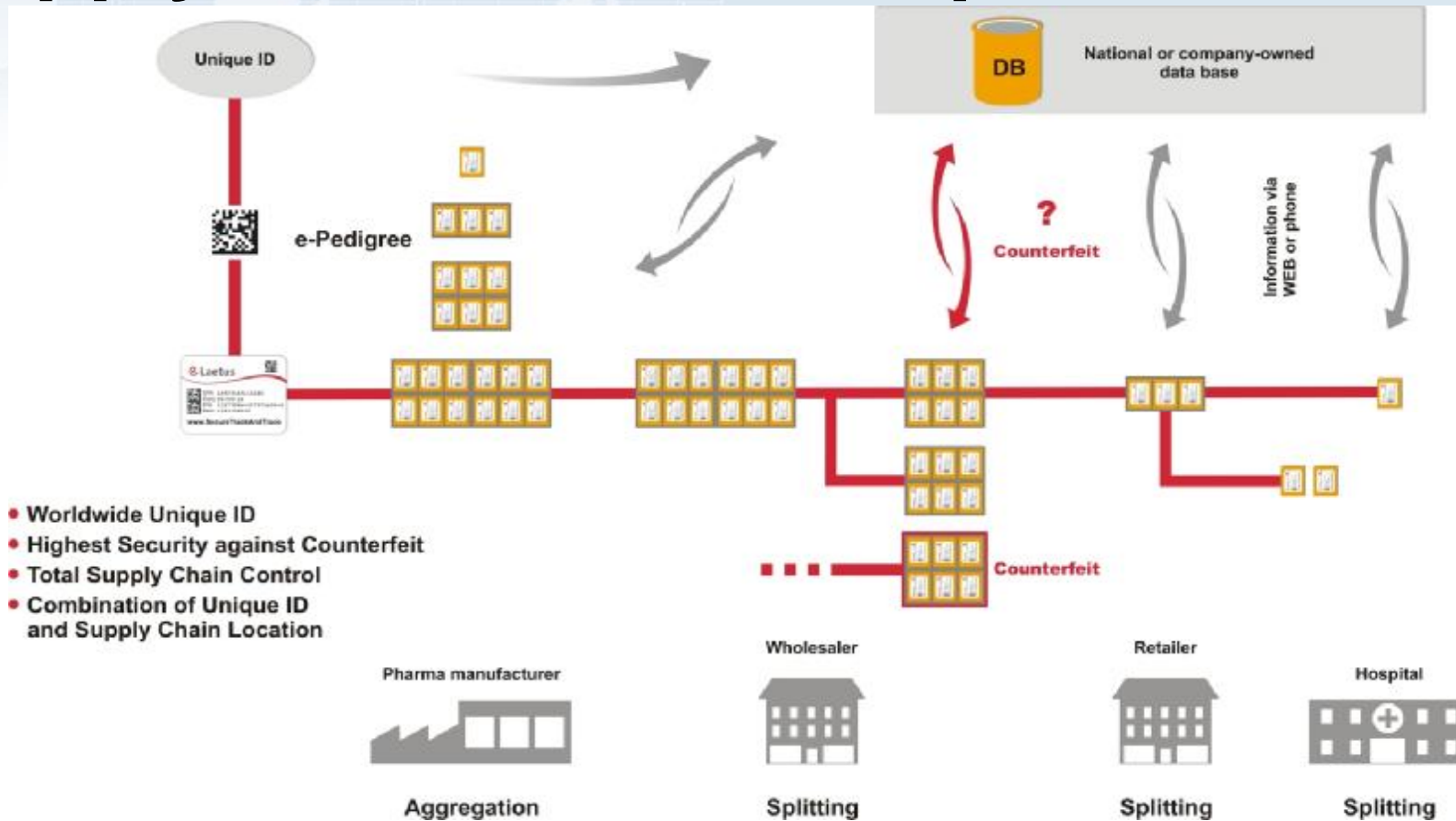
- France - ECC200 – GS1 encoded, have made provision in their legislation for a serial number. Total data to be included (excluding serial no.) 20 numeric and 20 Alpha Numeric characters in the DM.
- Turkey - ECC200 – GS1 encoded, Information changes with every pack that is marked. Data follows GS1 and is 40 Alpha Numeric and 20 Numeric Characters in the DM.
- California - ECC200 – GS1 encoded, Information changes with every pack that is marked. Data follows GS1 and is 34 Numeric Characters in the datamatrix.
- Korea - ECC200 – GS1 encoded, have made provision in their legislation for a serial number. Total data to be included (excluding serial no.) 20 numeric and 20 Alpha Numeric characters in the DM.

Supply chain and brand protection

- Main features of the required system for Pharmaceutical Manufacturers is to track and record the packs through the manufacturing process.
- This creates corresponding information of individual packs at the aggregated levels of packaging (carton, shrink packer, case and pallet).
- This produces the front-end information package ready for the ePedigree requirements.

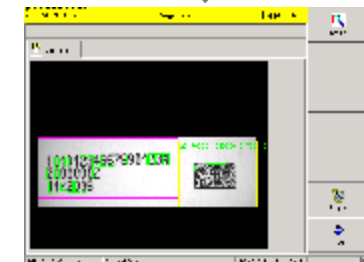
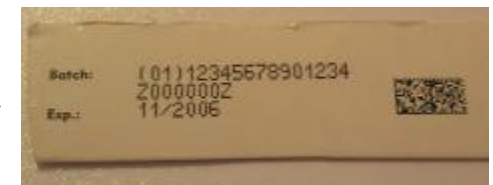
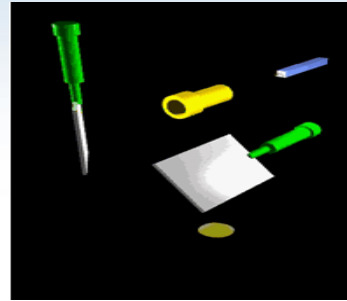


Supply chain and brand protection



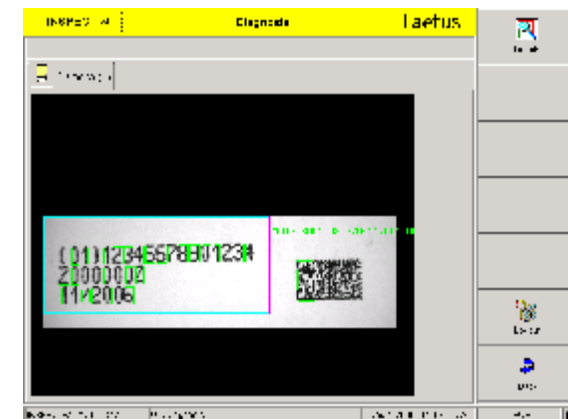
Supply chain and brand protection

- Scribe (or 'Vector') Laser creates Human and Machine Readable Codes (MRC's) including Data Matrix
- Inkjet printing, the print head contains a series of nozzles that are used to spray drops of ink.



Supply chain and brand protection

- When we consider the in-line printing and marking of various data, or RFID implementation we must also consider that such data can also be corrupted in the printing or marking process.
- So it is necessary check the printed quality of this data and to log it for serialisation. This is achieved by 100% on-line inspection and collection of this information.
- The Laetus wt (web technology) range of modular solutions offers this functionality.



Supply chain and brand protection

*Thank you
for your attention!*

A short film !