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UK Medicines Manufacturing Industry Partnership

Intelligent 'Smart' Design in Medicines Supply

Greg Anderson - GSK

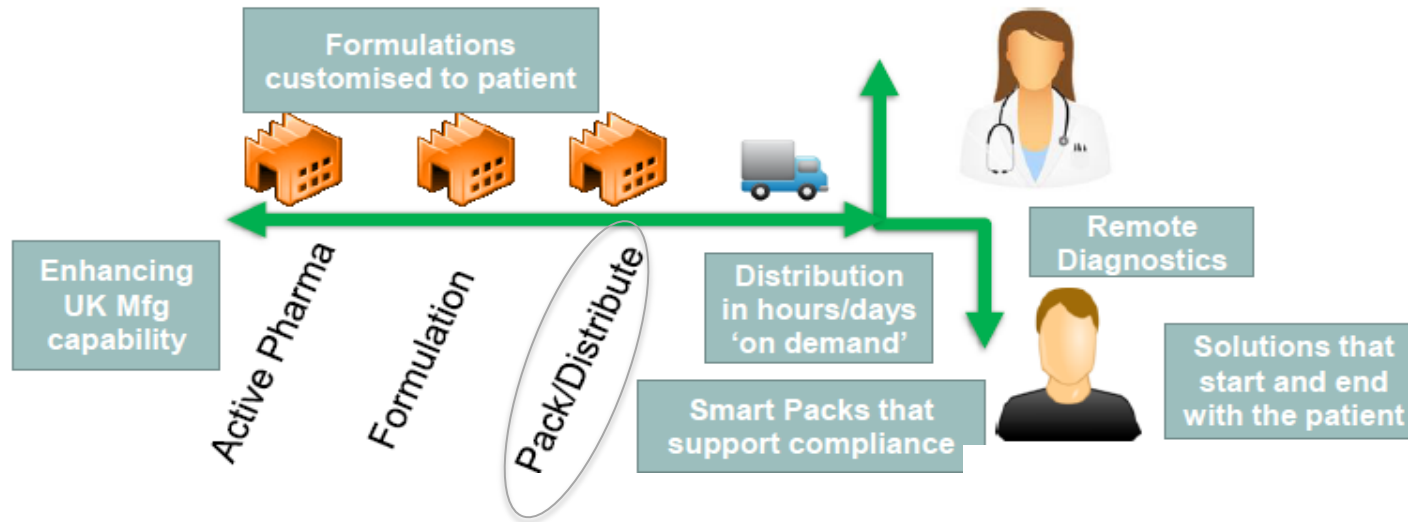
What we'll (quickly) walk through today



- Use of design/technology in Pharma
- Challenges & initiatives
- Drivers
- Future of Medicines supply

With any new technology - Key is you ensure you know exactly what the real need is

Supply Chain needs, opportunities & challenges

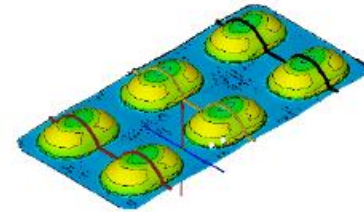


- Simplified supply chain
- API/Formulations covered in other MMIP presentations
- Focus on **packaging and distribution**
- Challenges:
 - **Reducing Inventory** – enhance supply
 - Ensuring high quality maintained – product is protected **end to end**
 - Opportunity to **reduce development times** and be cost effective
 - Meeting **new medicines** needs / **appropriate** packaging
 - **Patient centric** – positive patient experience (through **VoC**)

Intelligent design introduced on many formats



- Large range of formats-Typical primary/secondary
 - **Blisters** for tablets/dry powder/capsules
 - **Bottles** for liquids/suspensions
 - **Tubes**
 - **Cartons/labels/leaflets**
 - **Syringes/vials**
- However we need to also include:
 - **Combination devices** (ones that contain the drug and the dispensing system in an integrated unit)
 - Tertiary packs
- Added complexity from:
 - **Global** products for **global** markets
 - **Extended** supply chains (including **cold**)
 - Developed and **Emerging** markets
 - Cultural expectations



All challenges that offer opportunities for intelligent design

Serialisation



- Increased security and control are key drivers
- From product security to transitional security and digitisation
- Journey started 2009/2010 – rolling program with EU **becoming mandatory in 2019**
- If you don't have serialization in place by then....**you cannot market your medicines**
- Industry focus is on-boarding capability
- Further exciting potential? (personalised medicine /small batch production etc)

2D Matrix Barcode

The label of the bottle will have a 2D matrix Barcode having following details:

- GS1 Country Code
- GS1 Company Code
- GS1 registered Product Code
- Manufacturing Batch No.
- Manufacturing Date & Time
- Best before usages / Expire date
- Unique Serial No.



Pack security

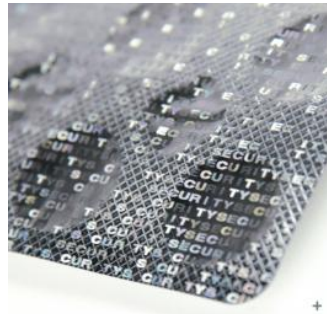
Counterfeiting is still a massive threat to the industry



- Serialization will be a game changer
- Not a global solution
- Still rely on covert/overt technologies
- Ongoing mix and match used
- Challenge is to identify highest security at appropriate cost
- Apply to all levels/components of pack

FEATURES AT A GLANCE

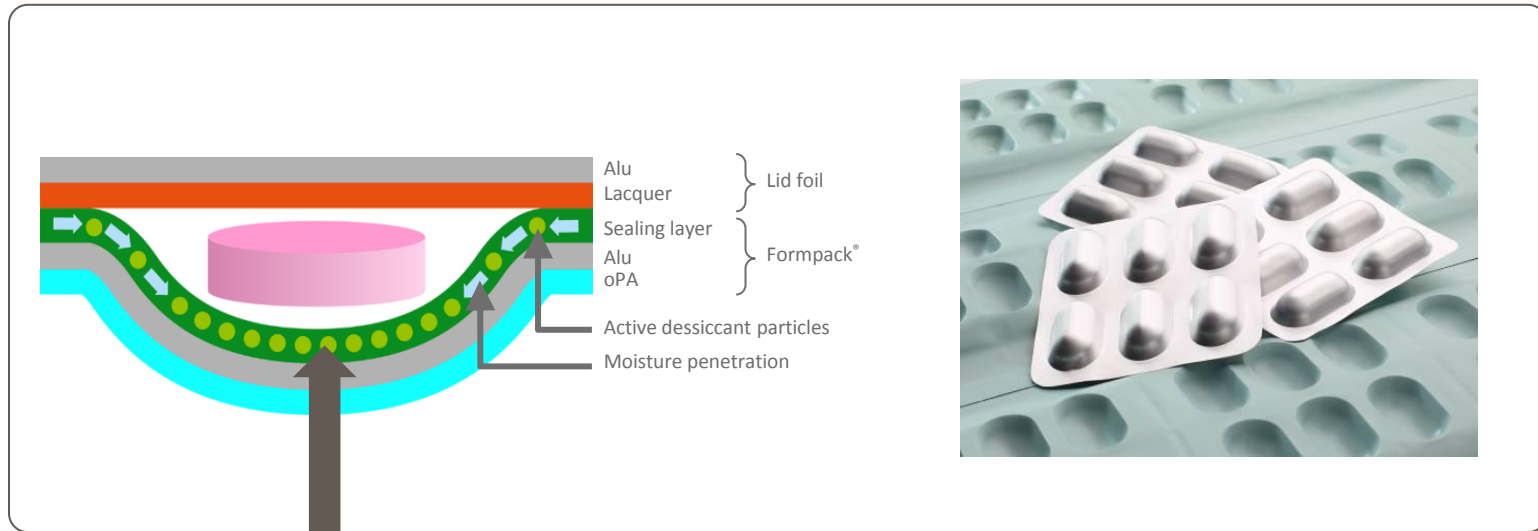
Category	Feature	Overt	Covert	Forensic
Hologram	Optically variable feature	●	●	
Security foil	Customised security foil	●	●	●
Security pigments and inks	Colour-shifting ink	●		
	Reactive inks		●	
	Taggants/markers		●	●
Security graphics	Microtext	●	●	
	Security patterns	●	●	
	Deliberately integrated errors		●	
	Complex multicolour designs	●	●	
	Covert graphics		●	
Temper evidence	Opening system	●	●	



Extending shelf life –controlled performance



Dessiflex® Controlled Humidity Blister System

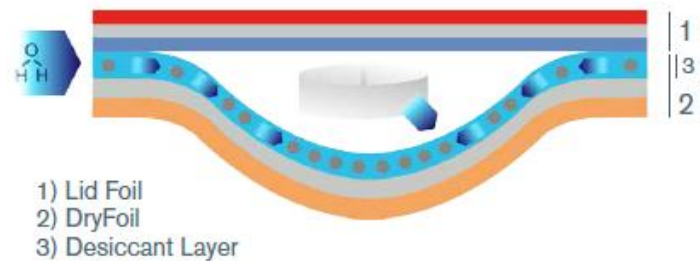


'humidity controller' in the seal layer adjusts the relative humidity in the cavity to a pre-defined level

Application: tablets and capsules (gelatine, softgel, HPMC)

Range of suppliers starting to offer these innovative formats

FUNCTIONALITY OF DRYFOIL MECHANISM



Patient Instruction Leaflets



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- Regulatory requirement: Key component in any pack

- PILs have many associated disadvantages:

- Large size to enable various languages
- Difficult to read (small text)
- Difficult to find information easily
- Lag with regulatory updates
- Difficult to catch emerging adverse effects in a timely manner
- Manufacturing issues with larger leaflets (folding)
- Supply buffers needed so increased inventory
- Limited application for future patient driven initiatives (personalised meds)
- Sustainability



You're suffering from information overload. I'm going to give you some booklets describing the problem

Potential for electronic leaflets



- Requires aligned Industry standardisation stakeholder buy in
- Already in Finland / Australia

Opportunities

- Simple table of contents
- Animated Icons
- Visual Instructions
- Multiple Languages
- Multiple Font sizes
- Etc



Audio

Connected Devices (and Packs) – CH/Rx?



Key Benefits for Customer

Engage Consumers
with personalised, dynamic two-way conversations



Target Your Campaigns
with omni-channel insight into consumer behaviour



Run Promotions Efficiently
with smart, flexible and fast promotion management



Protect Your Brand
proactively fight counterfeits



Key Benefits for End-Consumer

Product Appeal
intuitive and rewarding experiences



Product Safety
with instant verification of authenticity



Packaging in the age of digital marketing



MaXQ offers unlimited unique, secure, digital codes printed at industrial speed

Features



Dynamic experiences
Create targeted consumer interactions, that can be changed by you at any time



Product authentication
Enable both professional and consumer verification of product authenticity



Valuable data
Gain visibility of true consumer purchasing behaviours across channels

Courtesy of Amcor

Propeller Health – Intelligent Devices (Rx)



- Patient adherence and monitoring
- Opportunity to better inform and manage disease
- Potential to enhance demand signals etc



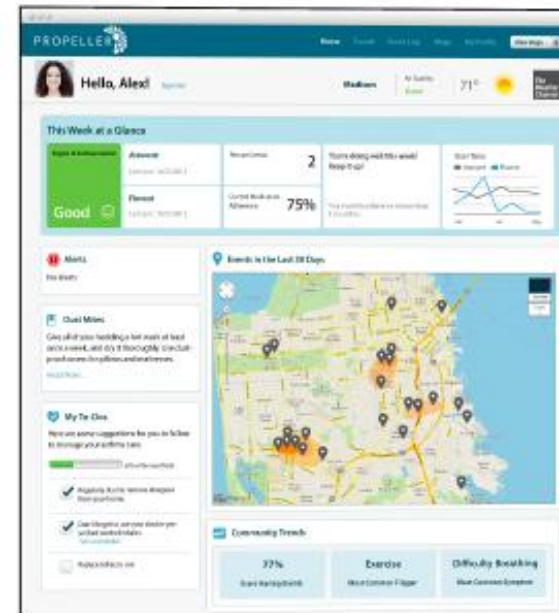
Inhaler Sensors

- Automatically tracks date and time of use of most MDIs
- Transmits data to mobile phone or Qualcomm basestation



Mobile Applications

- Transfer data from sensor to server
- Obtains event location and other contextual details
- Mobile dashboard to engage and educate the patient
- Alerts and notifications



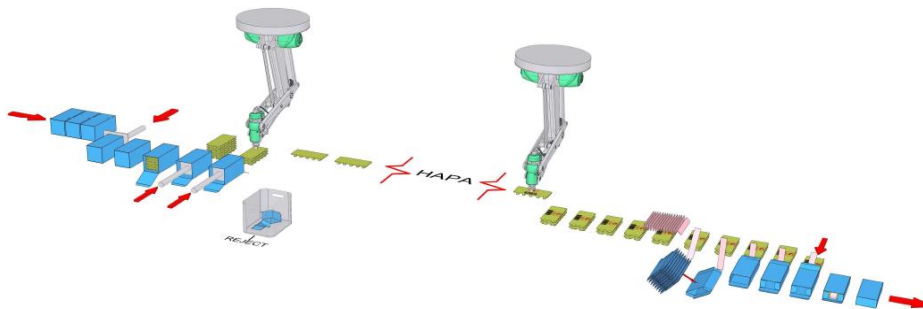
SMS Alerts, Email Reports, Dashboards

- Personalized, actionable feedback, guidance and education to optimize self-management
- “Smart” medication reminders encourage adherence
- Community data support engagement

New medicine formats - manufacturing impact



- Historically Pharma - high volumes/inflexible/change-overs/etc
- Personalised medicines will require personalised packs?
- Packaging requirements will change:
 - Waste of materials on setting up low volume SKUs on high volume blister lines
 - Quality improvement – set up errors on high volume lines
 - Faster launch of new SKUs
 - Faster response
 - Avoid out of stocks & lost sales and have more accurate MOQ
 - Inventory reduction – important with higher value medicines



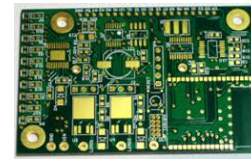
Smart Distribution / Smart labels (Remedies)



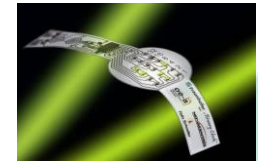
Technology opportunity to use labels that monitor:

- Temperature
- Humidity
- Shock
- Location.....etc

From this:



To this:

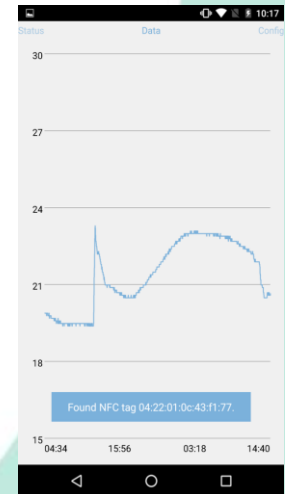
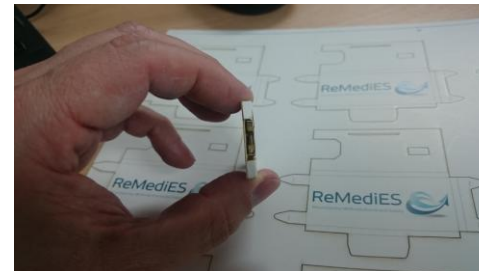


Measure product throughout supply chain - challenges:

- Cost of Goods
- Accuracy
- Battery life

Opportunities:

- 'All seeing eye' in the supply chain
- Inventory management
- Quality maintained
- Security
- etc



Distribution - Challenging the existing supply chain model



- **Standard packs** that are easy to pick and place in more automated supply chain pharmacies
- **Robotic Pharmacies** are going to be enabled by technologies like Serialization
- **Simplification and standardisation** (reduce error/simpler for patients & HCPS)
- More **home delivery?** – Flat bottles
- **Personalised Medicines** - New Pack Standards

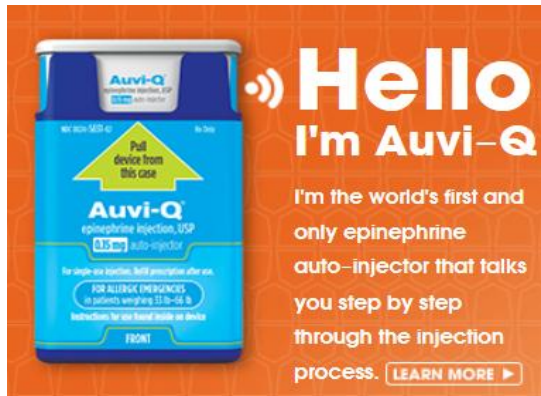


Technology Direction - Vision



With any new innovation training may be required (especially with devices)

- Packs should be intuitive – test this
- Training ensures a more successful launch
- The more novel the innovation the more training may be needed
- Don't underestimate the importance of effective training –opportunity to innovate





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Thank you
(join us on LinkedIn)

Q&As

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