



Futures of Pressure Sensitive Adhesive Technologies & Applications

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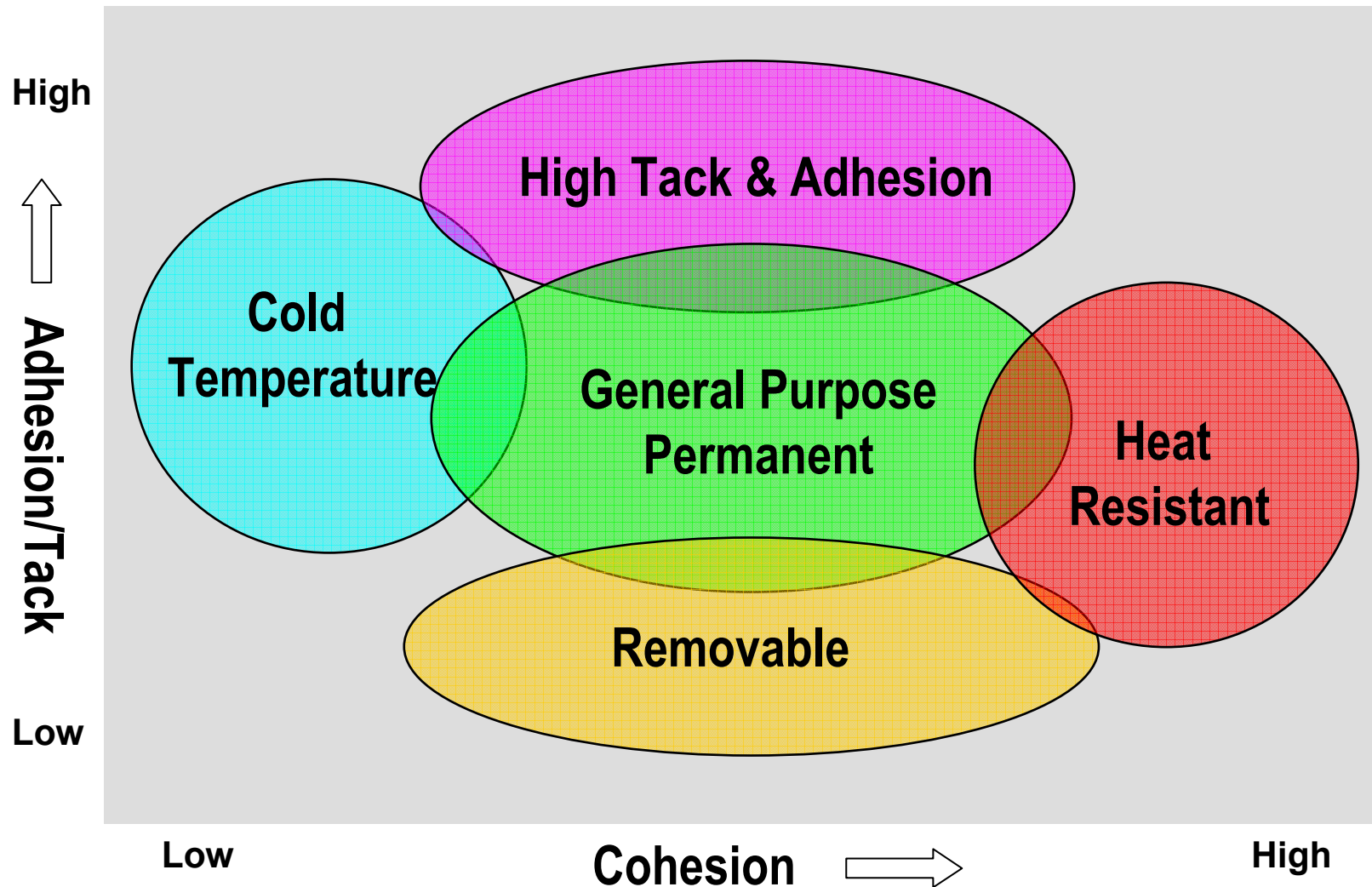
Definition of PSA

(Pressure Sensitive Adhesives)

A special class of adhesive that is:

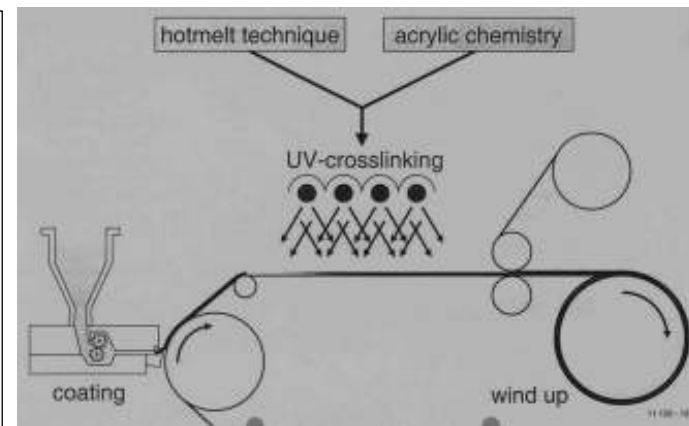
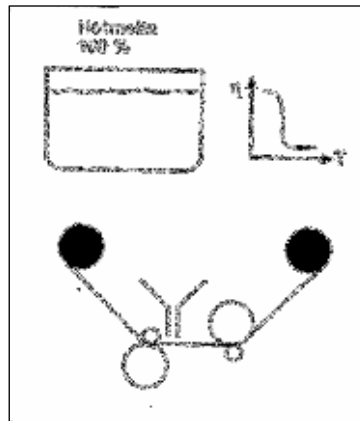
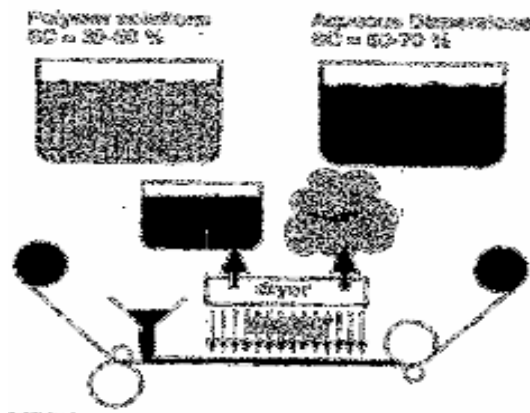
- *Permanently tacky at Room Temperature*
- *Spontaneously adhere on contact or with little pressure*
- *Require no activation by water, solvent or heat to form a strong bond*

Classification of PS Adhesive by Common Functions

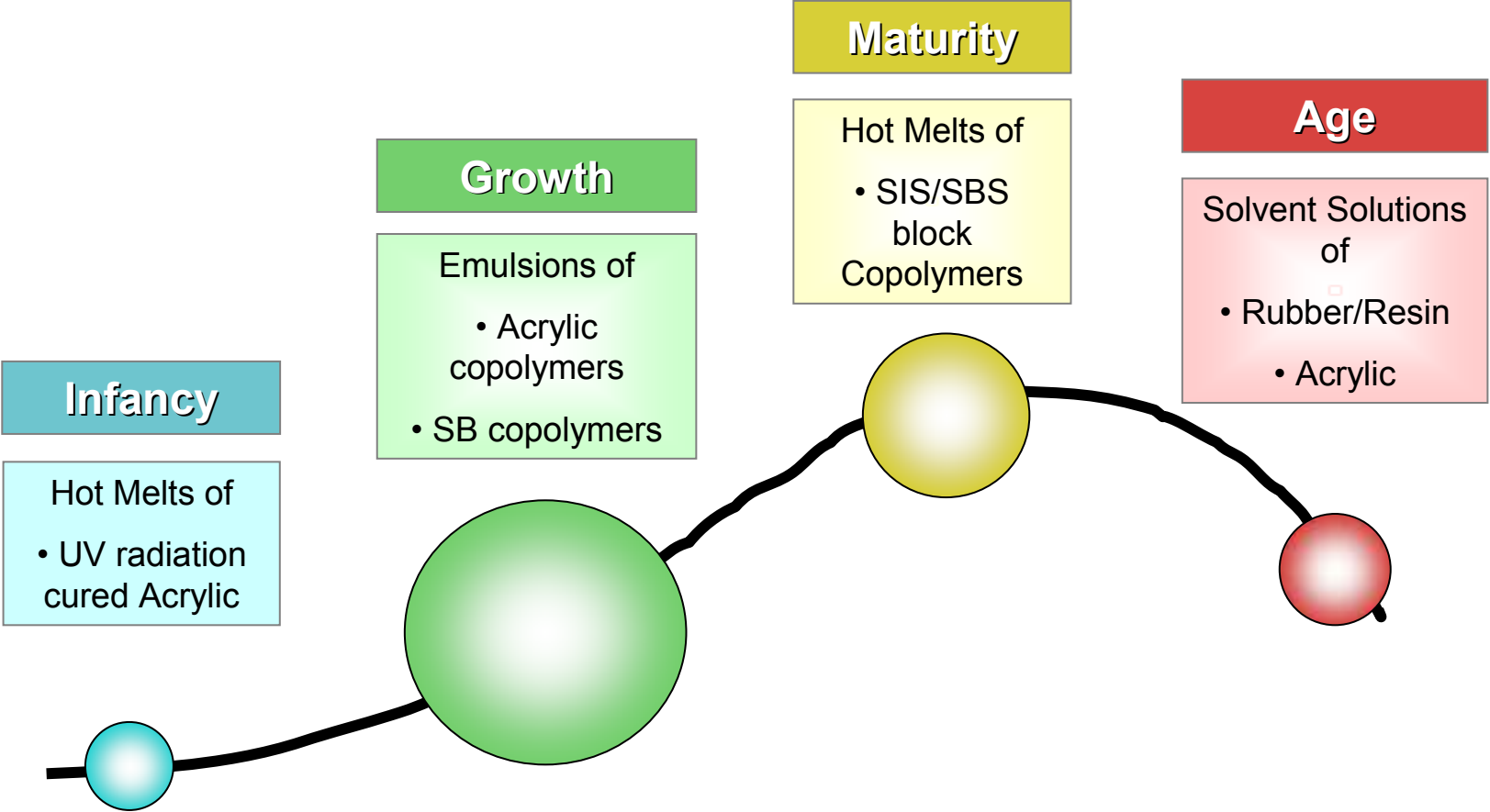


PSA Classification by Technologies

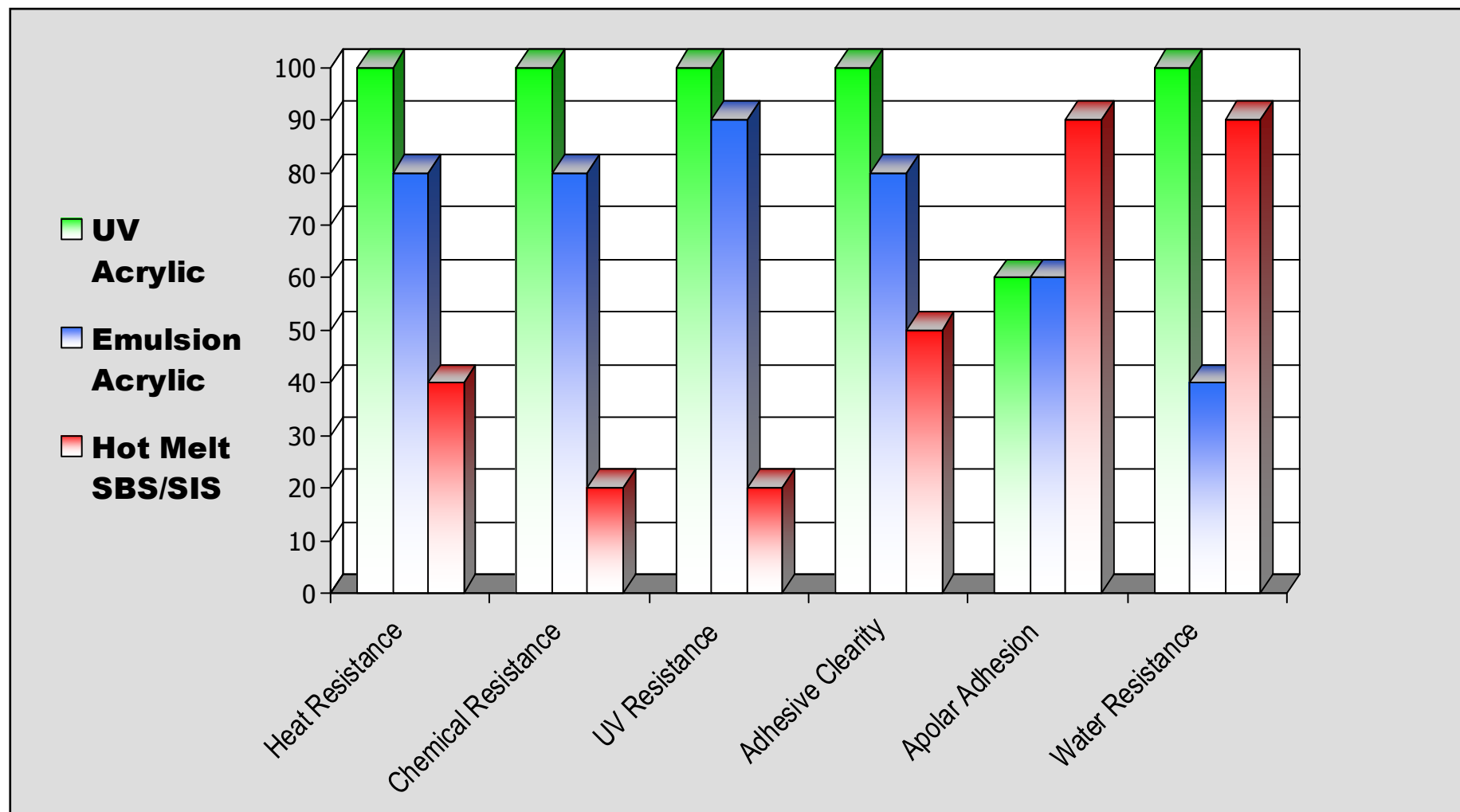
	<i>Solvent</i>	<i>Emulsion</i>	<i>Hot Melt</i>	<i>UV Hot Melt</i>
Silicone	High Temperature	None	None	None
Acrylic	Specialty	Most Common	Developmental	Emerging
Rubber	Few	Few	Common	Emerging



PSA Polymers Life Cycle



Typical PSA Polymer Performance



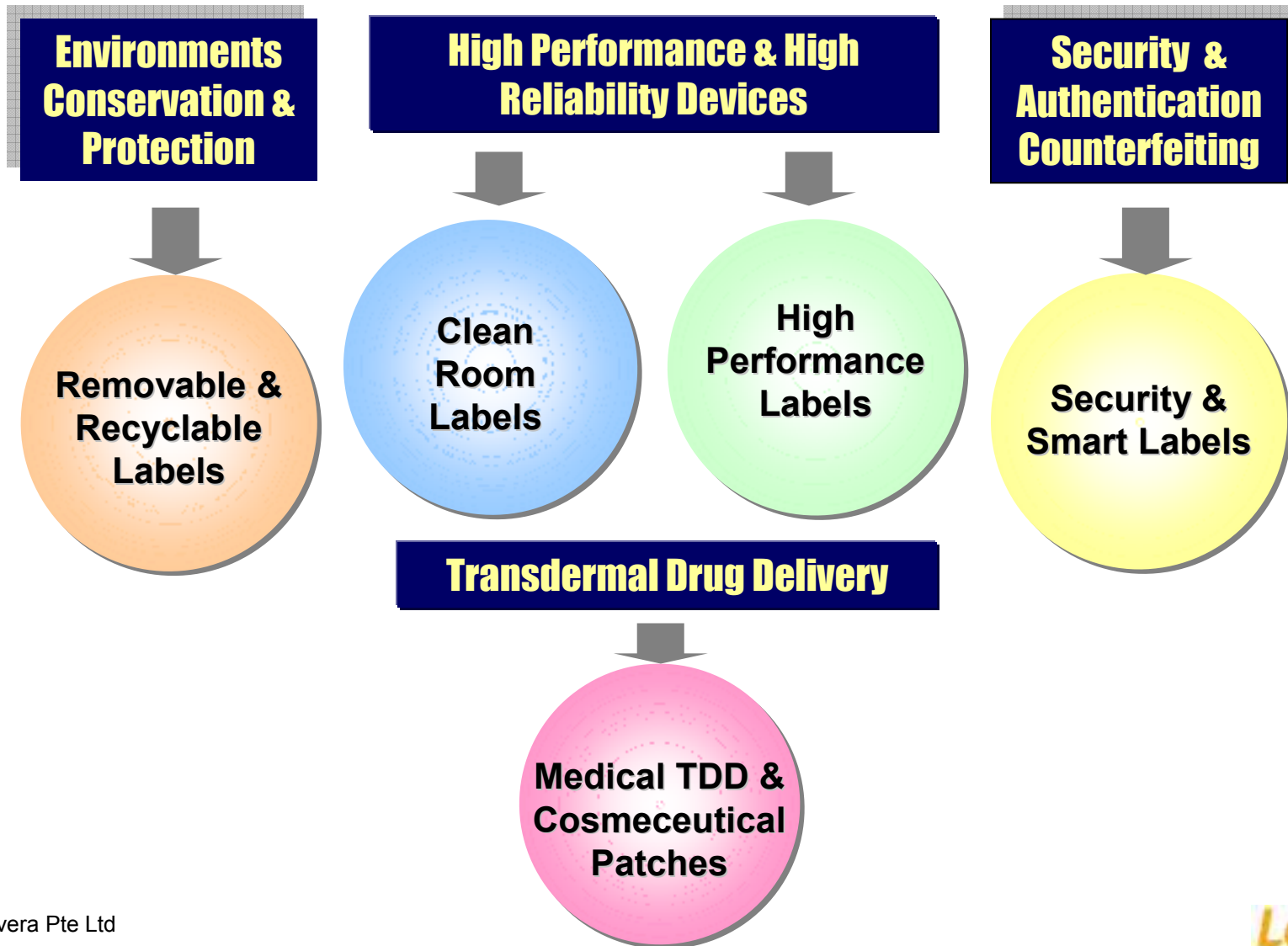
UV Acrylic PSA – The next generation PSA

- Combine the best of Acrylic Chemistry with Hot melts Process performance.
- Able to replace 80% of existing solvent based PSA product applications

Key Performance Advantages:

- Excellent UV Resistance : **Out door Decal**
- Excellent Water Resistance : **Pasteurizable clear Label**
- Excellent Solvent Resistance : **Wet tissue closure label**
- Operate up to 140oC service temperature : **Automotive label**
- No skin irritation : **Skin contact adhesive**
- No cytotoxicity : **Direct food contact adhesive; Blood-bags label**

Drivers of our Future PSA base Business



Major Areas of PSA Application Development

**Security &
Authentication**

RFID embedded
PSA Materials



**Micro-
Electronics**

Clean Room
PSA Materials



**Medical
Products**

Transdermal
Drug in
Adhesive
Delivery System



Security Labels

Area of Application:

- Tamper Evident
- Product Authentication
- Anti-Counterfeit



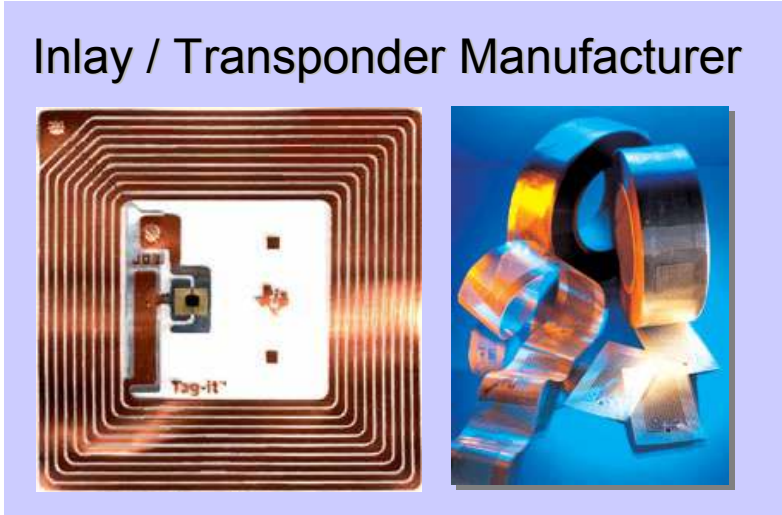
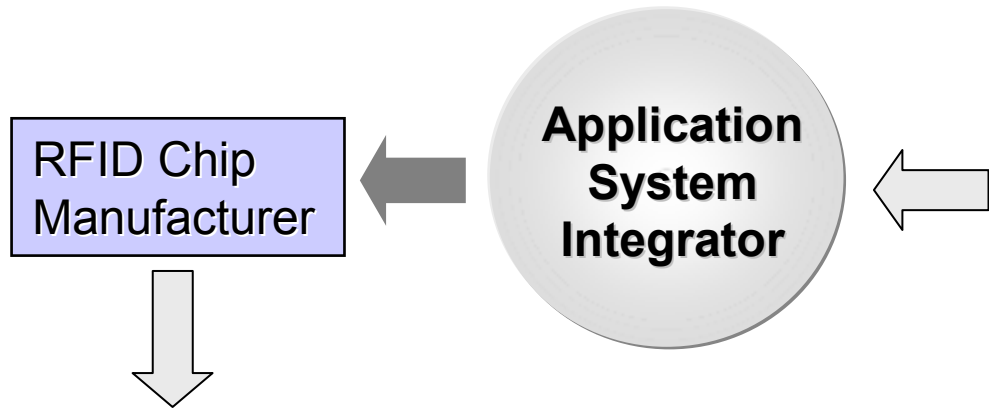
The Market

- Cosmetic
- Drugs
- Food & Beverages
- Electronics
- Automotives & Planes
- Hospitals
- Animals
- Airports, Customs



Smart Label Supply Chain & Manufacturing Processes

RFID Materials Group



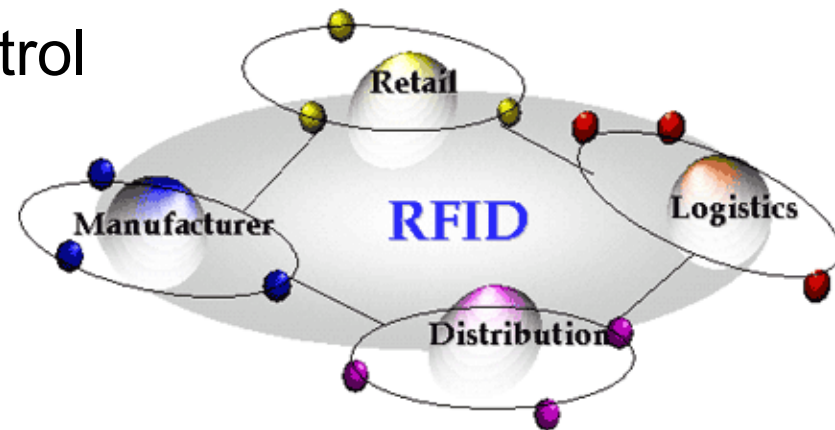
RFID Label Materials Supplier



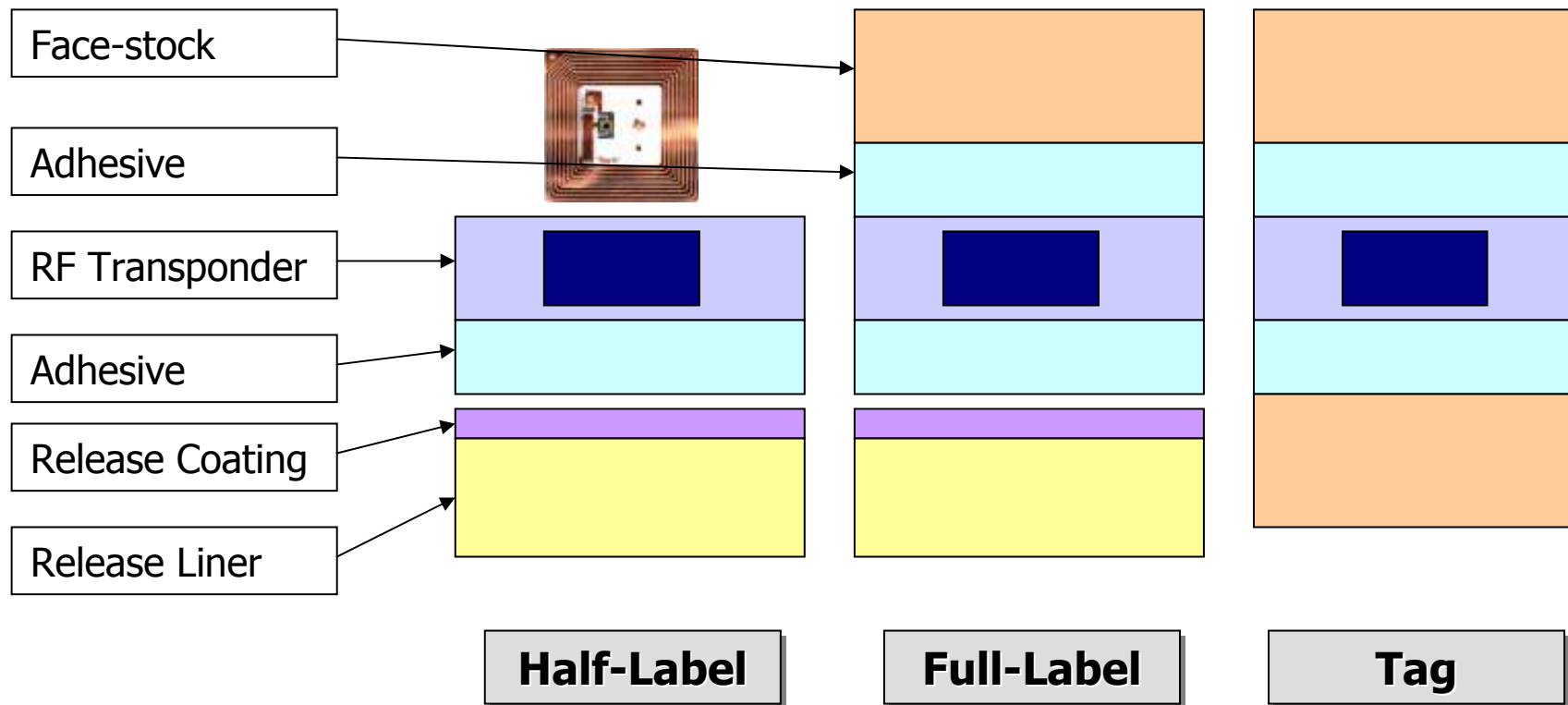
Smart Label

Applications:

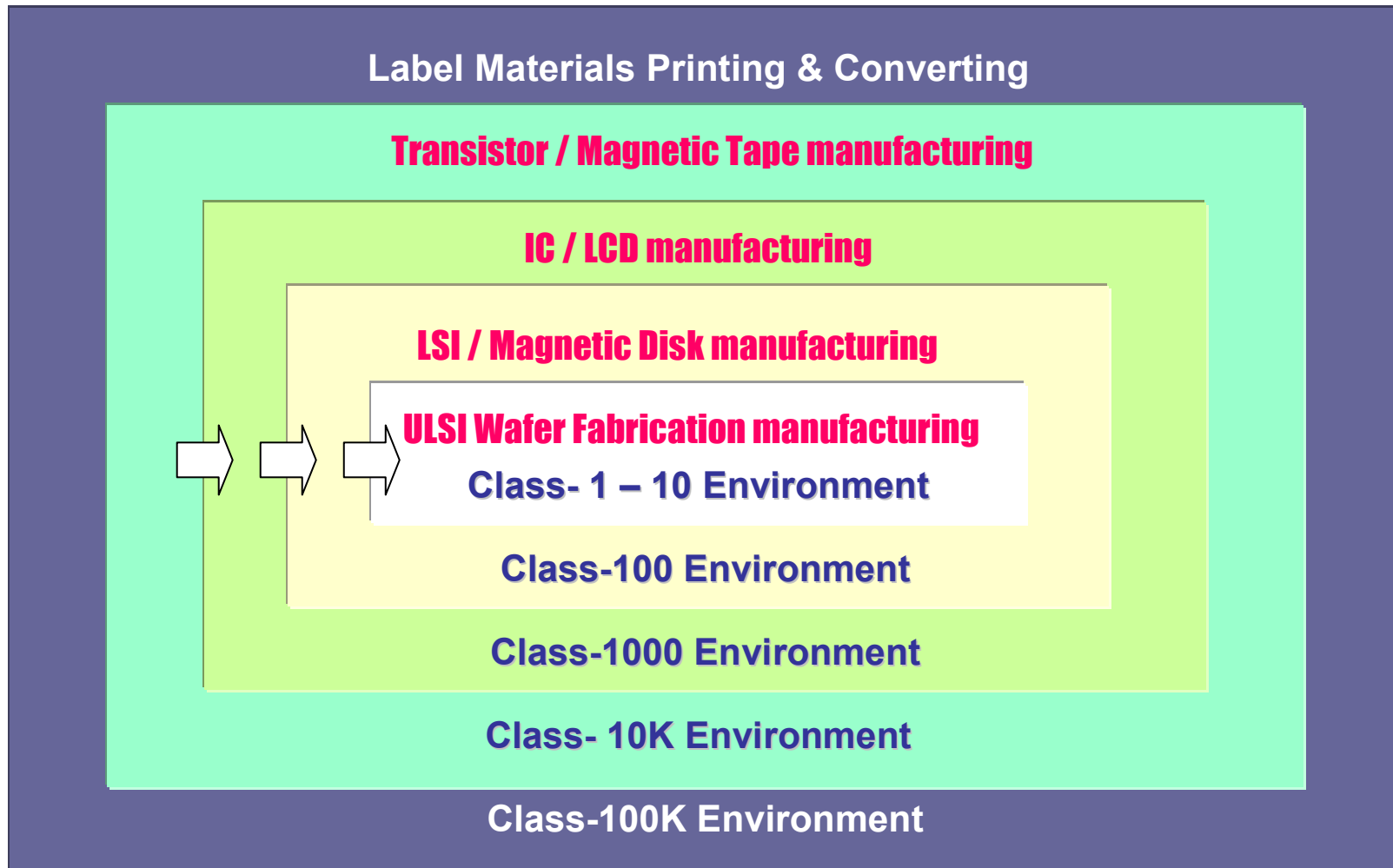
- Transportation/Distribution
- Industrial
 - Direct product identification
 - Carrier identification
- Security and Access Control
- Animal Identification
- Retail



Typical Smart Label/Tag constructions



Micro-electronic Clean-room Hierarchy



Current Technical Challenge :

- Development of **Functional Pressure Sensitive Adhesive**
 - Low Out-Gassing,
 - Low Bleachable Ions
- Development of **Controllable Release Coating for Synthetic Liner**
 - Silicone free
 - Low Bleachable Ions



Examples of Contaminants Limits (ug/cm²)

Anion –

• Chloride (Cl)	0.1
• Fluoride (F)	0.001
• Nitrite (NO ₂)	0.001
• Bromide (Br)	ND
• Nitrate (NO ₃)	0.01
• Phosphate (PO ₄)	ND
• Sulfate (SO ₄)	0.1

Cation –

• Lithium (Li)	ND
• Sodium (Na)	0.5
• Ammonium (NH ₄)	ND
• Potassium (K)	0.1
• Magnesium (Mg)	0.03
• Calcium (Ca)	0.5

NVR_H₂O (ug/cm²) < 2

NVR_IPA (ug/cm²) < 10

Particles (>0.5um)

Wet Test (pt/cm²) LPC <30

Helmke Drum @ ≥0.5µm (pt./ft³/sheet) <10

Microelectronic Clean Room Label Silicone Contaminants Limits:



	Seagate #30825-001 Spec Limit	Read-Rite #15-50043-00 Spec Limit	KOMAG Spec Limit
Facestock – Print side			< 7% Atomic
Release Liner – Backing side			< 1%* Atomic
Release Liner – Adhesive side	< 390 ng/cm ²	< 40 ng/cm ²	< 1%* Atomic

Pharmaceutical Label Product

- Two Category:
 - Ethical (Prescriptive Drug)
 - Over The Counter (OTC)
- Common Considerations:
 - High Speed Label Dispensing Process
 - High Mandrel Holding Requirement
 - Date, Batch Number variable imprinting



OTC (Over The Counter) Label Product

- Product Considerations:
 - Adhesive compliance for food labelling
 - FDA(21CFR175.105)
 - BgVV Direct & Indirect food contacts
 - Graphical & Consumer Appeal
 - Temper Evident



Ethical Label Product

- Products considerations:
 - Withstand Sterilization processes
 - Adhesive compliance for food labelling
 - FDA(21CFR175.125)
 - BgVV Direct & Indirect food contacts
 - Adhesive should be migration inert
 - For Bloodbags,
 - Plastic bags for infusion liquids



Range of Pharmaceutical Adhesives

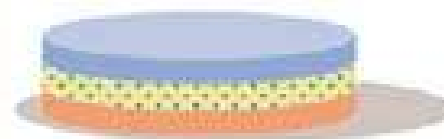
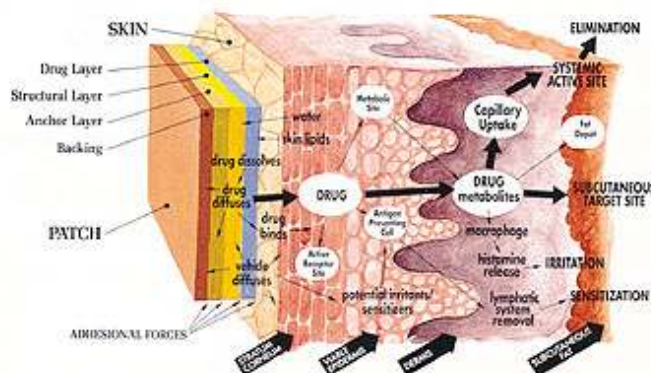
	Emulsion Acrylic	UV Acrylic	PVP
Indirect Food Contact	Yes	Yes	Yes
Direct Food Contact	No	Yes	Yes
Gamma Radiation	Yes	No	Yes
E Tox	Yes	Yes	Yes
Autoclaving	No	Yes	No
Skin Contact	No	Yes	Yes



Transdermal Drug Delivery Offers the Best of IV and Oral Administration

	<u>IV</u>	<u>Oral</u>	<u>TDD</u>
Reduced liver first-pass effects	Yes	No	Yes
Constant drug levels	Yes	No*	Yes
Self-administration	No	Yes	Yes
Unrestricted patient activity	No	Yes	Yes
Non-invasive	No	Yes	Yes

*Sometimes can be achieved with controlled release.



- Backing
- Drug-in-Adhesive
- Liner

Emulsion PS Adhesive Technologies

provides a high ecological safety platform suitable for Transdermal Drug Delivery Application



- Adhesive compliance for skin contact:
 - FDA(16CFR1500.41)
- No skin irritation according
 - OECD-test 404
- No cytotoxicity according
 - ISO 10993-5
 - EN 30993-5

