Global Trends Relevant to R2R Processing

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The pace of change will never be as slow as it is today.
How We Think About Disruption

Strategies:

1. Identify disruptive trends + relevant activities
2. Identify process to engage and achieve goals
3. Invest in internal capabilities and external ventures
4. Cluster internal + external and physical + digital
5. Leverage partners to accelerate + iterate

Where?

How?
Key Trends Driving Disruption

3 Key Consumer and Industrial Trends....

- Personalized Consumer Experience
- Industry 4.0
- Innovating to 0

...are driving us towards a more
Personalized CX v1.0
Personalized CX v2.0 = Born Digital

- Unique digital identity: Real-time data and analytics throughout the product life cycle
- Increase supply chain visibility
- Higher level of accuracy and support for brand protection and loss prevention
- The foundation for a brand owned media channel

SUPPLY CHAIN
- Integration with GT Nexus for factory workflows
- 100% automated pack validation with RFID
- UHF RFID scan/pack EPC compliance
- Reduce distribution center audit labor
- Increase operational efficiency in supply chain

IN-STORE CONSUMER EXPERIENCE
- Combine the online experience with the physical store
- Increase BOPIS success and share stock levels with consumers
- Offer a personal digital sales associate to consumers
- Track all consumer interactions to support sales and marketing teams

POST PURCHASE CONSUMER EXPERIENCE
- Continue the conversation with the consumer post purchase - increase convenience with NFC
- Provides a platform for consumer loyalty and sustainability initiatives
- Continued real-time data and analytics post purchase; e.g. location for brand protection
- Scaleable support platform for omnichannel retail
## Key Trends in Focus: Personalized CX

### Personalized Consumer Experience

<table>
<thead>
<tr>
<th>Expectations</th>
<th>Just-in-time (including near- and on-shoring), customization, personalization, unique consumer engagement (pre-, during and post-purchase), unique digital identity for physical products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opportunities for R2R Processors</strong></td>
<td>Digital or dynamic displays, components and materials enabling connected products</td>
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<tr>
<td><strong>Emerging Threats for R2R Processors</strong></td>
<td>Short runs, digital direct-to-substrate printing, forward/backward integration for near- and on-shoring</td>
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# Key Trends in Focus: Industry 4.0

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<tr>
<th>Expectations</th>
<th>Interoperability, <strong>transparency</strong>, machine assistance, and decentralized decision making</th>
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| **Opportunities for R2R Processors** | Internal: Deploying cyber-physical systems  
                                           External: Digital displays, components and materials enabling connected machinery, sensors/IloT |
| **Emerging Threats for R2R Processors** | Short runs, distributed and collaborative manufacturing |
## Key Trends in Focus: Innovating to Zero

<table>
<thead>
<tr>
<th>Expectations</th>
<th>Cradle-to-cradle circular (or closed-loop) economy, sustainable material selection, near- and on-shoring to reduce supply chain footprint</th>
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<tr>
<td>Opportunities for R2R Processors</td>
<td>Solar panel components, window and thermal insulation films, battery electrodes and fuel cell membranes, upcycling via R2R processes</td>
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<tr>
<td>Emerging Threats for R2R Processors</td>
<td>Material substitutes, regulatory changes, direct-to-substrate printing</td>
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# R2R SWOT Analysis points to Partnerships

<table>
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<th>Strengths:</th>
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<tr>
<td>● Low per-unit cost at or near capacity</td>
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<tr>
<td>● Existing infrastructure can be leveraged or at worst modified via retrofit tech</td>
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<th>Weaknesses:</th>
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<tr>
<td>● High CapEx and volume requirements for R2R to achieve low per-unit costs</td>
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<td>● <strong>Partnerships</strong> between machine manufacturers, materials suppliers, brands/end-users, other R2R processors</td>
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<tr>
<td>● <strong>New business models</strong> via backward/forward integration or direct-selling models</td>
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<tr>
<td>● <strong>New end-use products</strong> that can benefit from R2R processing</td>
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<tr>
<td>● <strong>Lower cost inputs</strong> for smart packaging</td>
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<td>● Direct-to-substrate printing</td>
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<td>● Forward/backward integration by suppliers and customers</td>
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<td>● Regulatory changes</td>
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<td>● Material substitutions/new advances</td>
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Case Study: R2R for Dynamic, Digital Displays

Flexibility on demand
Case Study: R2R for Connected Products

FLEXIC EXTENDS NFC TO EVERYDAY PRODUCTS

Total Addressable Market
- Billions

Project Volumes
- Millions

Cost per I.C.
- >2 cents

Price per Tag
- ~10 cents

Trillions
- Billions

< 1 cent
- ~2 cents

Also enables thinness, durability and flexibility not available with Silicon chips
Case Study: R2R for Sustainable Future

Heat seal
Barrier envelope formed from Hanita VIP laminates
Core material
Getter / Desiccant

solar zone

Hanita Coatings
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