Industry 4.0
Exceler8 and The Digital Supply Chain

Rafael Rapp
LATAM Supply Chain Operations
HP Today

- Fortune 100 company
- $48.2B revenue in FY16
- 250K+ channel partners
- 18K+ patents

Operations in 170 countries
- ~50,000 employees
- Fortune Most Admired #7 in technology
Print & PC leadership

HP's Personal Computing rank #1 WW
HP ships 1 printer every second

HP ships 1.7 PCs every second
HP's Printing rank #1 WW (ink + laser)

HP's Printing
Powering 430 of the Global Fortune 500 companies
Brazil - Integrated E2E Manufacturing Operation

**Top Level Mfg**
- Ink and Laser Hardware Mfg
- Personal Systems Mfg
- Reman/Reconfig

**PCBA Mfg**
- Multi Client PCBA Lines
- SMD & Wave Soldering
- Robotic & Automated Process
- In Circuit & Functional Testing
- Automated Optical Inspection
- X-Ray

**FIT**
- RFID Lab
- Customization
- Eng’g Services
- Mat'l’s Qualification

**Smart Hub**
- Flex Multi Client Model
- HP Distribution Center
- Logistics Services
- Co-Location

**Supplies PCC Ops**
- Toners & Ink Supplies

**Bonded Warehouse**

**Recycling Ops**
- Closed loop PCR Material
- Circular Economy
HP Brazil RFID Timeline

- **Start**: Pilot @ HP Brazil – Item Level tag
- **.05**: RFID CoE Live!
- **.06**: 100% printers tagged
- **.07**: RFID Data analytics
- **.08**: 100% Cartridges pkg tagged
- **.09**: Supplies E2E
- **.10**: RFID Local IC
- **.11**: SmartWaste
- **.12**: Cloud RFID
- **.13**: PCs tagged
- **.14**: Industry 4.0
- **.15**: Mobile App
- **.17**: +21M tags/year
- **Accumulated Tag Volume**: 70M
- **In Millions**: 142M

Accumulated Tag Volume

- **2005**: 10M
- **2006**: 70M
- **2007**: 142M
- **2008**: 142M
- **2009**: 142M
- **2010**: 142M
- **2011**: 142M
- **2012**: 142M
- **2013**: 142M
- **2014**: 142M
- **2015**: 142M
- **2016**: 142M
- **2017**: 142M
HP Brazil RFID in Numbers

+25M RFID tags consumed per year
+1000 SKUs tagged
+400K RFID readings per day
+150K EPCs generated per day
+1TB per day
+100 RFID readers
+200 RFID antennas
HP Brazil Awards

- The Best RFID Implementation Award - RFID Journal Awards - 2007
- RFID Green Award - RFID Journal Awards - 2012
- XIV Prêmio Automação Inovação e Capacitação em RFID - 2011
- TOP 25 Brazilian Innovation Project Award - Monitor Group / Exame Magazine
- TOP 100 Best IT Projects of 2007 - 2007 InfoWorld 100
- Technology Excellence Award - SCOR Excellence Award - 2007
- Innovation Award of Excellence - APICS 2007
- The Asset Tracking Forum Award - ID World - 2013
- 2008 PM 50 Award Winners - Progressive Manufacturing - Innovation Mastery
RFID Cost Wave Challenge

• Adoption is largely limited by tag cost
• RFID scalability is limited by asset investments (servers, readers,...)
• Needs competitive ROI to be scalable
• Solutions:
  ✓ Cloud based devices & Big Data
  ✓ Tag cost: Organic IC; Printed Electronics
  ✓ PCB/A embedded Tags
  ✓ Low Cost Cloud PoE Reader
Industry 4.0

18th Century

Industry 1.0
Mechanical production powered by water and steam

20th Century

Industry 2.0
Mass production based on the division of labour and powered by electrical energy

70s

Industry 3.0
Electronics and IT for a further automation of production

Today

Industry 4.0
Cyber physical production systems
IoT - Technology Shift

From

Hyper-Mobility
Contextual and Immersive Experiences
Internet of Things
3D Transformation/Printing
Smart Machines

To

Using technology
Type it
Many of us online
Manufacturing
Do it yourself

Becoming technology
Intuitive
Everything connected
Making
Do it for me
The number of connected devices will double every 5 years.

More business opportunities:

- 73% of global CIOs believe Mobility will impact their business more than the Internet\(^2\)
- Mobile retail purchases to exceed $707bn\(^3\) by 2018.

Fundamentally, the products somehow remained similar, however the overall experience of shopping, delivery and usage by the customer has transformed the industry.
The Age of Customer

Customer Journeys that enable ease of doing business is shaping new business models and shaping next gen companies to dominate the marketplace.

Industry 1.0
- Cottage Industry
  - Mechanical production introduced

Industry 2.0
- Mass Production
  - Significant use of electric energy

Industry 3.0
- Digital Supply Chain
  - Extensive use of electronics and IT to automate production and fulfillment

Industry 4.0
- Smart Supply Chain
  - Fusion of Physical and Digital assets to create a Phygital experience for the customer

Age of Customer Operations 4.0
HP - Industry 4.0 Outcome

- Advanced Robotics
- Additive Manufacturing (3D printing)
- Augmented Reality
- Mass customizations
- Smaller factories, fast and agile
- Local/Regional Factories
- Productivity, Productivity!!

Drop in Average cost of Sensors over last 10 years¹

60x Reduction in cost of processing over last 10 years¹

40x Reduction in cost of bandwidth over last 10 years¹

Big Data is doubling every 18 months²

1.87 billion Global Shipments of smartphones by 2018³
# The Supply Chain at the Center of the Digital Enterprise

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<th>Digital Workplace</th>
<th>Digital Manufacturing</th>
<th>Digital Supply Chain</th>
<th>Digital Products and Services</th>
<th>Digital Customer and Channel</th>
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<td>Integrated planning and execution</td>
<td>Digitally enhanced products</td>
<td>B2B2C customer interaction</td>
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<td>Digital HR</td>
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<td>Intelligent and connected products and solutions</td>
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<td>Integrated digital engineering</td>
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<td>Digital factory</td>
<td>Prescriptive supply chain analytics</td>
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</tbody>
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Digital Enablers: Technology, Processes, Organization

Sources: PwC - Strategy& analysis - Industry 4.0 How digitization makes the supply chain more efficient, agile, and customer-focused
## Business Opportunity

- **Back and Front end seamless integration**
  - Orders Prioritization
  - Increase response time

- **Increase Productivity & Speed**
  - Business Collaboration
  - Efficiency & Real time Visibility

- **Faster Business Decision Making**
  - Improve business performance
  - Increase Revenue and margins

## Exceler8 Solution

- **Cloud & Big Data**
  - Capture data from legacy systems

- **“One-stop-shop” platform**
  - Industry 4.0 operation benchmark

- **Engagement apps**
  - Mobile interactions, faster engagement

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**Brazil E2E Ecosystem**

- LATAM supply chain Operation manages E2E Brazil Ecosystem.
- All supply chain nodes in one place. Perfect test ground for new supply chain developments
Digital Supply Chain
Best Customer Experience and Optimized E2E Inventory
Exceler8 – PC/Web Platform

EXCELER8. The first step to industry 4.0, an integrated system end to end.

LIVE TRACKING
Track different operations in real time.

BUSINESS REPORTS
Charts and reports to many areas.

- Clevercheck
  Smart planning based on stock and production.

- Distribution Center
  Comming or going, check all the inventory.

- HP Maker
  Smart sales based on stock and production.

- Sincronics
  New products with old materials.

Material Availability by SKU. Live!

- PCs
  – Production Orders done. Live!

- Printers
  – in progress

- Supplies
  – Production Orders done. Metrics in progress

Metrics done. Live!
Factory Cycle Time
POs Aging
Inventory
Exceler8 – PC/Web Platform
Exceler8 – PC/Web Platform
Exceler8 - Mobile app

Portfolio Offering
Easy search and visibility about what we have

Orders tracking
Live Tracking and notifications @favorites

Execution Reports
Executive Metrics for Latin America HQ
Summary

What we have today

• E2E Ecosystem visibility (back and front end)
• Mobile app for front end data
• Users across 3 different companies
• Live tracking System powered by RFID
• Industry 4.0 with Dynamic Demand Planning based on inventory

Next Steps

• Mobile app LA deployment
• Distribution Center outbound with SNs tracking and Geo location
• Daily Inventory Control across all regions
• Smart machines – Availability!!
keep reinventing