FIND YOURS.

Doing Business on the Edge: Voice in the Warehouse Today

Presented by:
Ehrhardt Partner Group
Scott Deutsch
President, Americas
Ehrhardt Partner Group

Previous Experiences
• Honeywell - Director of Global Marketing Communications Sensing & Productivity Solutions
• Voccollect - Director of Global Marketing
• Prophet 21- Vice President, Marketing
• Primavera Systems - Director of Sales
Ehrhardt Partner Group Summary

- >1,100 Customers globally
- 500+ people Dedicated EPG logistics team
- 24-hour support ‘AlwaysOn’ customer support center
- 2nd largest WMS provider in Europe
- 2nd largest global Voice Lydia Voice
- >100 million Picks per day
- License friendly Perpetual, Subscription, SaaS and Managed Services
- >15% Improved space utilization
Voice at the edge
in a changing world
Ten Years Ago

The 20-Year Voice Moat

The Connected Castle
Ten Years in Voice. A Retrospective.

2008 - 2018
Changes in the Voice Worker Experience
Market Consolidation Has Occurred

Honeywell

October 2012

datamax-o’neil
March 2015

Intermec

October 2014

Metrologic

October 2012

Motorola
September 2013

PSION
October 2007

ZEBRA

45% Market Share

Honeywell

10% Market Share

ZEBRA

SATO

DATALOGIC

45% Market Share
Market was Under Going a Transition
Remembering 2009. The iPhone…

iPhone 3GS

ANNOUNCED: June 8, 2009
RELEASED: June 19, 2009
KEY FEATURES:
Twice as fast as the previous version; less expensive
PRICE: 8GB model, $99;
16GB version, $199;
32GB model, $299
Windows CE Embedded - Circa 2009
Microsoft Spent Billions on a Sinking Ship

Worldwide Nokia / Microsoft mobile phone sales (in million units)*

September 3, 2013
Microsoft announces the acquisition of Nokia's Devices and Services division (NDS)

July 8, 2015
Microsoft announces a $7.6 billion impairment charge related to the NDS acquisition

February 11, 2011
Microsoft and Nokia announce a broad strategic partnership

April 25, 2014
$1.2 billion acquisition completed

* includes smartphones and feature phones
Source: Gartner, Microsoft

Market shares of smartphones Platforms

Statista

AND FAILED TECHNOLOGY INVESTMENTS
### End of Support for Windows CE

<table>
<thead>
<tr>
<th>Operating System</th>
<th>End-of-Service Date</th>
<th>Sample Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows Embedded CE 6.0</td>
<td>April 2018</td>
<td>Vocollect Talkman A500</td>
</tr>
<tr>
<td>Windows Embedded Handheld 6.5</td>
<td>January 2020</td>
<td>Honeywell CK70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zebra Workabout Pro 4</td>
</tr>
<tr>
<td>Windows Embedded 8.1 Handheld</td>
<td>January 2020</td>
<td>Honeywell Dolphin 70</td>
</tr>
<tr>
<td>Windows Embedded Compact 7</td>
<td>April 2021</td>
<td>Vocollect Talkman A700</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zebra MC9200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Honeywell Thor CV31</td>
</tr>
</tbody>
</table>
2009 Business Drivers for a Voice Project

- Reduce Operating Costs
- Business Growth
- Change in Unit Mix
- Seasonal Workers
- Need for Greater Throughput
2009 Business Drivers for a Voice Project

- Reduce Operating Costs
- Business Growth
- Change in Unit Mix
- Seasonal Workers
- Need for Greater Throughput
The Business Case for Voice

- **+20%** Productivity
- **-55%** Error Rate
- **100%** Employee Satisfaction
- **100%** Customer Satisfaction
2019 Business Drivers for a Voice Project

- Reduce Operating Costs
- Business Growth
- Change in Unit Mix
- Seasonal Workers
- Need for Greater Throughput
Process Improvement

- Reliable Processes
- Higher Quality
- Short Lead Times
Increase Line Items per Hour
Achieving Perfect Order Fulfillment
Fast Enablement of Seasonal Workers
Why Voice is Growing so Rapidly Today?
WMS Systems are Aging Rapidly

Approximately how long has your WMS been active at the business?

<table>
<thead>
<tr>
<th>Duration</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2 years</td>
<td>11%</td>
</tr>
<tr>
<td>2-5 years</td>
<td>30%</td>
</tr>
<tr>
<td>5-10 years</td>
<td>27%</td>
</tr>
<tr>
<td>10+ years</td>
<td>32%</td>
</tr>
</tbody>
</table>

On what platform do you run your WMS?

- Windows: 30%
- iSeries (AS/400): 27%
- Unix: 15%
- Linux: 7%
- Hosted: 12%
- Other: 9%
Biggest Changes in Voice Since 2009?
The ERP/WMS Market Changed
SAP Changed the Voice Landscape with its OPEN Voice Platform Support...
The Need to Engage Millennial Workers
Ten Years Ago

The 20-Year Voice Moat

The Connected Castle
The Voice Data Integration Moat
Fear & Control
Make It Easy to Get Started

No thanks!

We're too busy!
Not Really That Hard: Make Them Prove It!

Validate voice recognition performance within customer operating environment

Increasing productivity by 15% - 20%
No voice template training required (This is big change for older voice users)

Evaluate various hardware options: device options, headsets (wireless or wired) and voice wear alternatives

Increase in efficiency due to optimized voice directed workflows

Reducing error rates by 25%-50% by focusing workers in a hands-free, eyes-free working environment

Integration with your WMS/ERP
Eliminate project integration risks enables project commitment
Some of the WMS/ERP Integration Possibilities

- Direct Interface for SAP eWM
- Direct Interface for SAP WM
- Lydia Voice PickManager Middleware
- Direct Interface for HTML
- Microsoft.Net Object Library
- Microsoft.Net for Tecsys
- Real-Time Interface - Web Services/HTTP
- Real-Time Interface - Telegram Client
- Real-Time Interface - Aptean Catalyst
- Real-Time Interface - Epicor
- Real-Time Interface - Epicor Prophet21
- Real-Time Interface - HighJump
- Real-Time Interface - HighJump Accellos
- Real-Time Interface - Infor A+
- Real-Time Interface - Infor MAPICS
- Real-Time Interface - JDA Red Prairie
- Real-Time Interface - Manhattan pKms
- Real-Time Interface - Manhattan WMoS
- Real-Time Interface - Microsoft Dynamics
- Real-Time Interface - Microsoft Navision
- Real-Time Interface - Netsuite
- Real-Time Interface - Oracle Apps
- Real-Time Interface - Oracle JDE
- Real-Time Interface - Retailix
- Real-Time Interface - Retailix Triceps
- Real-Time Interface - SAGE
The conventions of executives having, at the time of adopting the Constitution, expressed a desire, in order to prevent misconstruction or abuse of its powers, that further declaratory and restrictive clauses should be added, to extend the public's confidence in using, will best insure the benefits of its implementation. Resolved by the North American Board of Directors, that the following articles be proposed to the decision makers who choose to implement into their businesses, as amendments to the Constitution of all or any of which amendments, when ratified by three-fourths of the said Board of Directors, to be valid to all intents and purposes as part of the Constitution, namely:

AMENDMENT I:

North America shall extend a Lifetime Integration Guarantee to customers with active support agreements that establishes the ongoing maintenance of the integration between and the customer's WMS system, whatever it may be. This amendment ensures the customer is protected from ERP/WMS providers from establishing fear and uncertainty or denying the customer's freedom to choose a voice solution. This amendment enables a customer's right to confidently choose and to petition North America for a redress of future voice enhancements to support newly added WMS functionality.

Giving Customers the Power
You’re not stupid, you just have bad luck when thinking.
Ten Years Ago

The 20-Year Voice Moat

The Connected Castle
The Customer is Now Familiar with Voice
The Automobile Experience
Having to Repeat Too Many Commands
The Accent Gap

Optimized for “Broadcast English” Speaker

Source: Washington Post
Overall accuracy rate for the nonnative Chinese, Indian and Spanish accents was about 80 percent.

Source: Washington Post
The Accuracy Challenge Still Exists

...Voice-Based Platform Back-Ends = Voice Recognition Accuracy Continues to Improve

Google Machine Learning
Achieving Higher Word Accuracy, 2013-2017

Word Accuracy Rate [%]

70% 2013 2014 2015 2016 2017

90%

95%

Source: Google (2017)
Note: Data as of 9/1/17 and refers to recognition accuracy for English language. Word error rate is evaluated using real world search data which is extremely diverse and more error prone than typical human dialogue.
The Core “Noise” Challenge Continues

<table>
<thead>
<tr>
<th>Speech In Noise (SIN) Results</th>
<th>Babble Average</th>
<th>Pink Noise Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google Max Assistant</td>
<td>-1.5</td>
<td>-1.5</td>
</tr>
<tr>
<td>Google Mini Assistant</td>
<td>-0.5</td>
<td>0</td>
</tr>
<tr>
<td>Google Home Assistant</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Insignia Voice Assistant</td>
<td>2.5</td>
<td>-0.5</td>
</tr>
<tr>
<td>Apple HomePod Siri</td>
<td>4.5</td>
<td>6</td>
</tr>
<tr>
<td>Amazon Echo Alexa</td>
<td>7.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Amazon Echo Dot Alexa</td>
<td>14</td>
<td>6.5</td>
</tr>
<tr>
<td>Eufy Genie Alexa</td>
<td>16</td>
<td>9.5</td>
</tr>
<tr>
<td>Sonos One Alexa</td>
<td>17.5</td>
<td>19.5</td>
</tr>
</tbody>
</table>

**SNR Loss:**
- 0 to 3 dB: Normal / near normal
- 3 to 7 dB: Mild loss
- 7 to 15 dB: Moderate loss
- >15 dB: Severe loss
Computing Power is Changing What is Possible.
Computing Power Enables Data Creativity
New Data Computing Models
Deep Neural Networks for Logistics Market

Now Optimized for the Noisy Environments…

Amazon Echo
Powered by Amazon Alexa

Google Home
Powered by Google Assistant
Deep Neural Network Computing for Voice Recognition in Logistics

- Usage of Deep Neural Networks (DNN)
- Better results for “weak speakers“ and “bad signals” due to dialects
- Increased Confidence +25%
Deep Neural Network Computing

Increased Voice Recognition and Improved Support for Difficult Dialects

Pre-Neural Networks
- Good Signal

Pre-Neural Networks
- Bad Signal

With Neural Network Computing

Source: Ehrhardt Partner Group (epg.com)
No More Voice Template Training
The Future of Warehousing and Fulfillment

- Fulfillment adaptability (ability to handle a wide range of order profiles): 67%
- Fulfillment responsiveness (time from order receipt to delivery): 63%
- Fulfillment throughput (daily throughput): 55%
- Fulfillment accuracy (correct items and documentation): 54%

Source: ARC Advisory Group
Order Patterns are Driving MORE Each Picking
Customer Service Expectations Challenge Everyone
And Some Really Creative Possibilities…
The Move to the City
Solving Transportation Challenges
Do You Know What This is?
2025: THE TIPPING POINT
WITHIN A DECADE, THE GLOBAL MEDIA INDUSTRY STANDS TO GAIN $1.3 TRILLION FROM 5G

5G WILL BE:

- **0.2%**  
  $47 BN
- **18.5%**  
  $183 BN
- **57%**  
  $335 BN

TOTAL WIRELESS MEDIA REVENUES.

FIND YOUR WOW
Ten Years Ago

The 20-Year Voice Moat

The Connected Castle
WHITE PAPER: Voice in the Warehouse Today vs. 2009
Questions?

Scott Deutsch
President, Americas, Ehrhardt Partner Group
scott.deutsch@epg.com
+ 1.610.203.8475
www.epg.com

Visit EPG at Booth # S4170

Please send me an email to request a copy of this presentation or whitepaper