HONEYWELL SPS DESIGN

DESIGNING THE CONNECTED FREIGHT SOLUTION

TRUST YOUR FREIGHT. IT'S TELLING THE TRUTH.

- Is it comprised? Stolen? Destroyed?
- Where is it? Will it arrive on time?
- Are all of your shipping requirements being met?

IT'S A BIG QUESTION. JUST ASK INTEL.

- At any moment, Intel has **600k** of goods in transit.
- A single truckload of microprocessors can be worth **millions**
- A single day delay of capital equipment to the fab can result in in lost levenue

Intel’s current solutions:

INTEL'S CURRENT FREIGHT HEALTH SOLUTIONS

Visual Indicators

- Analog Tag that gives a visual indication if a shipment has gone beyond threshold.
- Multiple tags required for different measurements (Shock, Temp, Tilt, Etc)

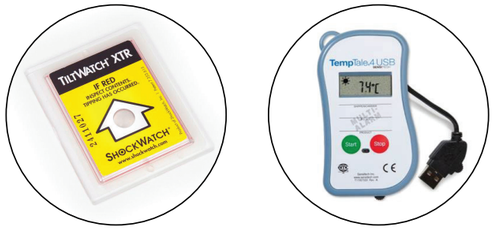
Data Loggers

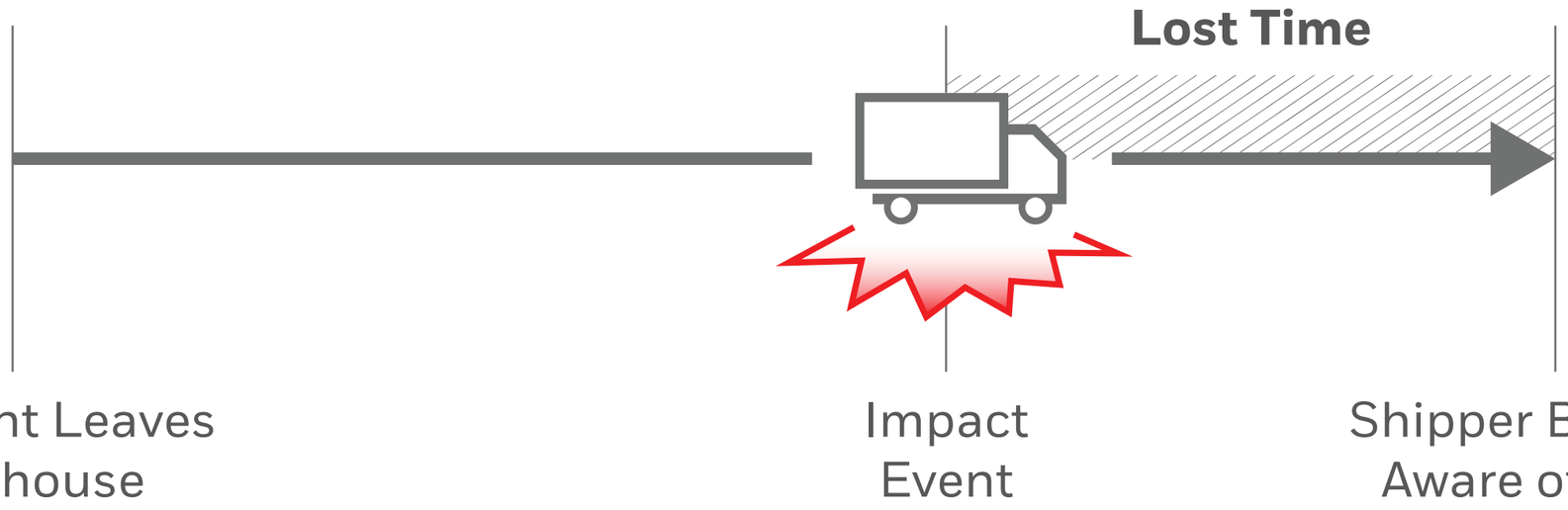
- Digital sensor cluster meausres Temp, Tilt, Shock, Light, etc with one device
- Stores data from entire shipment on local memory
- Transfers data to cloud by manually connecting USB

Communicators

- Real-time awareness
- Resolve problems faster
- Eliminate human error

VISUAL INDICATORS AND DATA LOGGERS ARE REACTIVE VS PROACTIVE

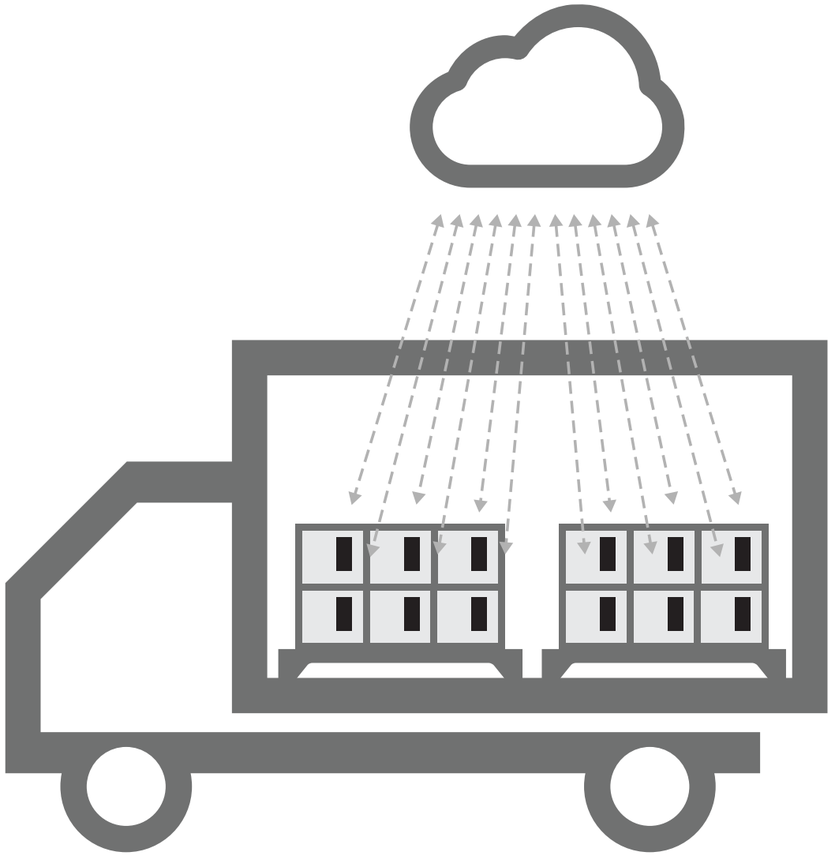




TIME IS MONEY!

- This latency accounts for billions in lost revenue to Intel
- Real time awareness could help Intel resolve problems faster and save millions of dollars

CURRENT SOLUTIONS ARE CUMBERSOME AND EXPENSIVE TO DEPLOY



- Data/Sim Card Required for Every Item Tracked
- Expensive Hardware for Every Item Tracked
- Cumbersome Process for In-Field Configuration
- Manual Reverse Logistics

Current tracking freight solutions did not meet Intel's needs so they partnered with Honeywell to create a targeted, meaningful solution.

CREATING THE RIGHT SOLUTION, THE PLAYERS.

Honeywell

Provide research and
enabling technology. Developed final HW/SW Solution

intel

Developed Silicon technology and conducted
opportunity framing research

Expeditors®

DHL

KUEHNE+NAGEL

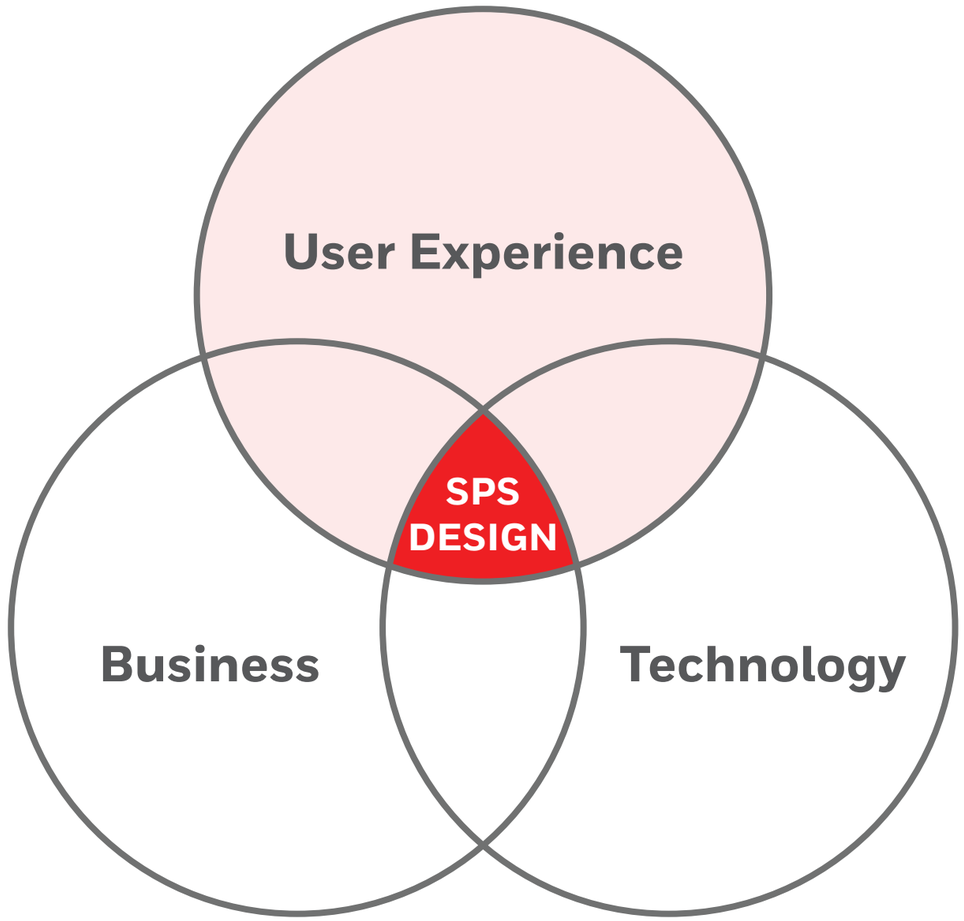
Provide feedback on requirements and
prototypes for Field Trail solution

WHY DID INTEL CHOOSE HONEYWELL?

Our brand represents a reliable design and engineering partner.

- Launch and sustain successful hardware and software IoT offerings.
- Own the manufacture relationships to deliver right and fast.
- We get the problem. We are a major shipper, both in the US and globally.

CONNECTED FREIGHT LEADERSHIP,
“IN ORDER TO SUCCEED, SPS DESIGN NEEDS TO DRIVE THE USER EXPERIENCE.”



WHY?
OUR PROVEN FRAMEWORK: OUTCOME DRIVEN DESIGN FRAMEWORK

1. DEFINE

OPPORTUNITY FRAMEWORK →
Framing of insights into CF opportunities

OUTPUTS
Personas
Insight Reports
User Journey & XO's

XO VALIDATION
Structured interviews with key personas

OUTPUTS
Prioritized XO's

2. CONCEPT

CONCEPT DEVELOPMENT →
Cross-discplinary design sessions both internal and external with our partners: EI, K+N and DHL.

OUTPUTS
Hardware:
50 concept prototypes for both Gateway and Tags.

Software:
Information Architecture, Wireframes, prototypes, visual design.

CONCEPT AFFINITIZATION
Synthesis of all concept ideas and prototypes

OUTPUTS
Hardware:
Top five concepts for Gateway and Tags

Software:
Identified top 10 ten user tasks for both Command Control and mobile app

3. DESIGN

CONCEPT FEEDBACK →
Concept feedback sessions with key CF personas and partners

OUTPUTS
Hardware:
SPS Design-lead workshop with key stakeholders within Product marketing, engineering and design. Agree on one concept each for Tag and Gateway

Software:
Wireframes for Command Control and mobile app.

PROTOTYPE →
Prototype the top concepts and refine based on feedback

OUTPUTS
Hardware:
Engineering renderings and 3D prints

Software:
Prototype in Adobe Experience Design

VALIDATE AND ITERATE
Test prototypes with key personas and make updates based on user feedback

OUTPUTS
Hardware:
Engineering renderings and 3D prints

Software:
Prototype in Adobe Experience Design

4. IMPLEMENT

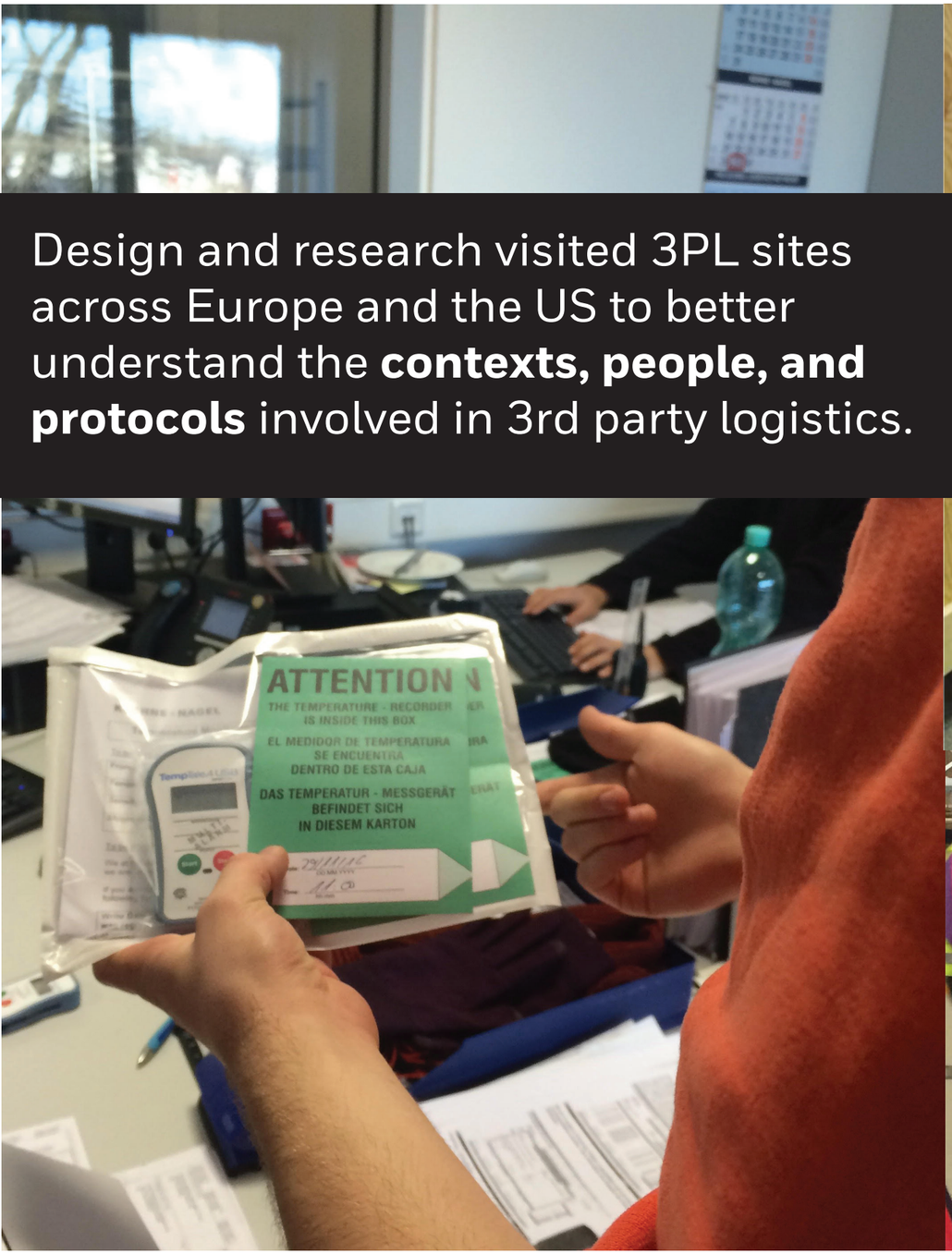
MAKE IT REAL
Build an end-to-end prototype.

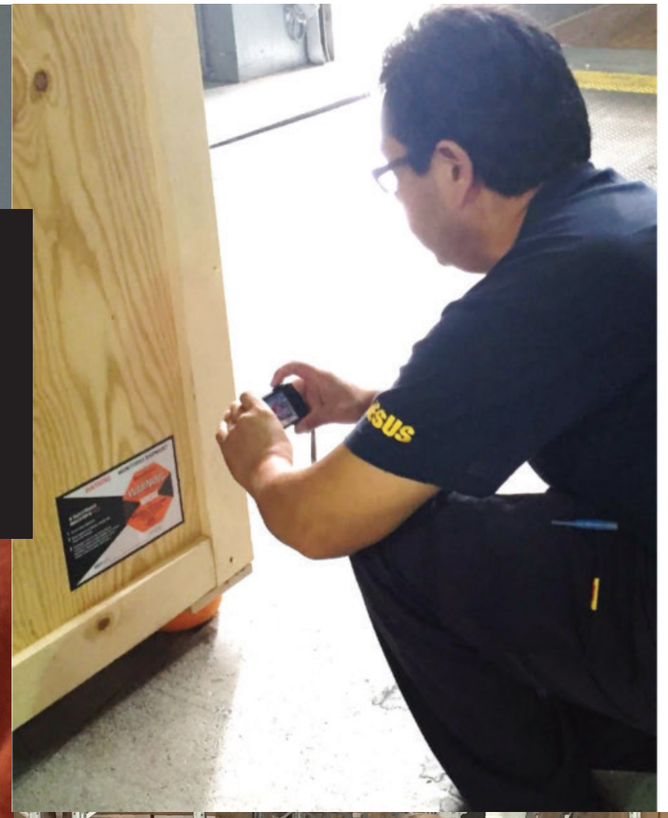
OUTPUTS
Hardware:
125 Gateways and 250 Tags produced on Prototype tools for field trails with our partners.

Software:
Created MVP for Command Control and mobile app for Field Trails developed in Movilizer 2.4

DEFINE: FIELD RESEARCH

Design and research visited 3PL sites across Europe and the US to better understand the **contexts, people, and protocols** involved in 3rd party logistics.

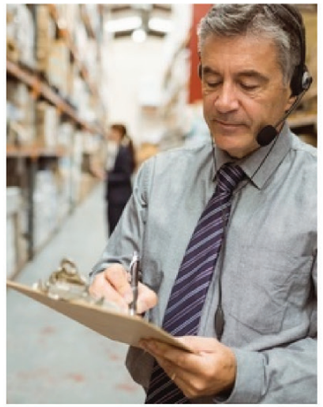




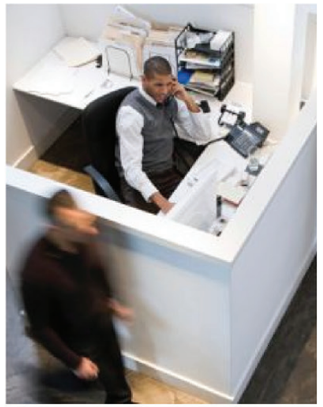
DEFINE: PERSONAS/CONTEXTS

Personas were developed to give a holistic understanding of our users and what they do currently to get their job done and to uncover new opportunities

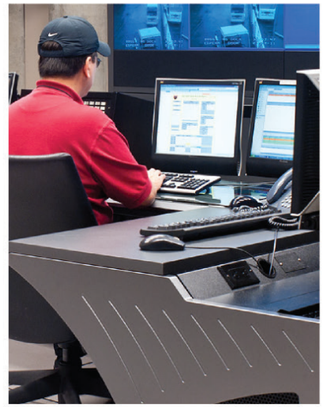
Air Counter Manager



Warehouse Manager



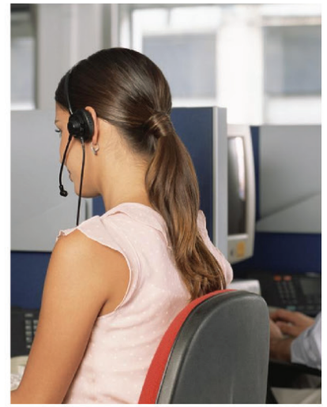
Shipping Customer



Security Analyst

Warehouse Worker

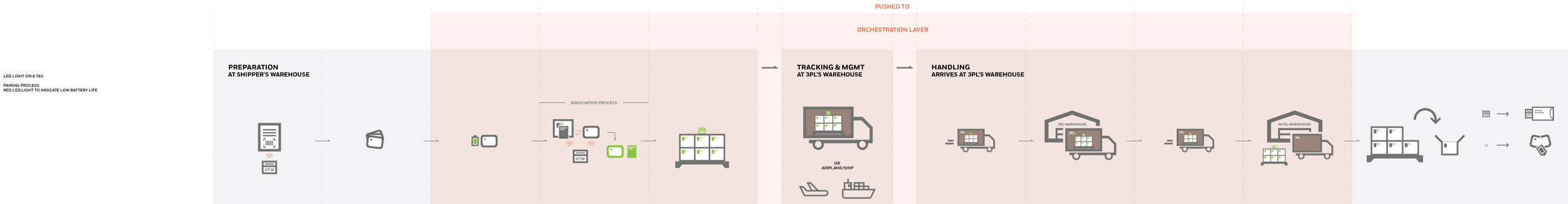
Truck Driver



Desk Agent

DEFINE: BOX JOURNEY

Careful documentation of the ‘End-to-End Box Journey’ allowed design team to develop a solution which seamlessly integrates into current workflow and is customizeable to unique SOPs.



USER ACTION

SCAN WAYBILL
(BIRTH CERTIFICATE OF SHIPMENT)

The GW is associated with its way bill/shipment ID and what number of tags are moving in that shipment.

GRAB DUMB TAGS

TURN ON TAG BATTERY

**Shipment may sit on the warehouse for a long time before it gets sent out, in this case the battery will be turned on after scanning.*

SCAN INDIVIDUAL LABEL
SCAN INDIVIDUAL TAG

TAG IS NOW PAIRED AND READY TO SEND DATA TO GTW. GTW + TAG IS ATTACHED. READY TO SHIP.

SHIPMENT IN ROUTE TO THE DESTINATION VIA TRUCK, PLANE, OR SHIP.

SHIPMENT COMES TO 3PL'S WAREHOUSE

3PL TRUCK DELIVERS CARGO WITH GTW + TAGS TO INTEL WAREHOUSE

3PL TRUCK ARRIVES AT INTEL'S WAREHOUSE UNLOADS CARGO

SHIPMENT OPENED. GTW + TAG DETACHED FROM THE BOX
GTW IS WIPED AND SENT BACK TO 3PL'S WAREHOUSE.
TAG IS NO LONGER PAIRED TO GTW. BATTERY IS REMOVED FROM THE TAG.

PROBLEM TRYING SOLVE (PTS)

GLOBAL

How do we design a form factor that is:

- Compliant with all global customs requirements?
- Blends in with shipment packaging so as not to attract unwanted attention?
- Dicrete but still visible to the user who must remove it at the shipment destination or check status of device?
- The right size to meet the customer shipping type and need (Capital vs. Cold Chain)
- Easy to add to any shipment requirements (e-cycle processes)

How does the system detect the current level of battery charge and communicate that to the user?

How do we design a form factor that enables re-use for another shipment? As the gateway is a reusable asset for G1, how do we design the best recharging path fo the device? If the tag is a single use asset for G1, how do we best enable responsible recycling processes for both the batteries and devices? If the tag is a reusable device for G1 (based on BOM cost) how do we design the best assessment of battery health for reuse of device for an additional shipment?

How does the system (gateway) locally communicate how many packages or shipping units it is monitoring?

How can the system streamline the customs clearance process?

- For every country
- What information is needed to be recorded on the device for customs approval? (Country of manufacture,serial #/device ID, model number, manufacurer name, volume of lithium in battery- confirm this is all that is required)
- If tags are one time use for G1, do they need to be declared?

Assumption:
The GW is associated to the shipment through the process of scanning the Waybill. This scan transfers all relevant shipment details from the business logic cloud layer such as the number of tags that are required to support that shipment

How does the user connect a tag to a single box or pallet?

How can we best associate a particular tag with a specific box (Tag 1= Box 1)?

How can we be certain that we are collecting data specific to that tag/box and not other tags on a pallet with multiple tags/boxes?

How does the user understand the battery level of the tag and GTW before instumenting the shipment?

How does the user understand that the system has breached a threshold during the physical inspection of the shipment?

Does the user need to have feedback from the system (tags and gateway)?

What are the indicators that are needed for the user to intervene?

How do we receive confirmation from the system locally that the shipment is complete, the data has been wiped and the device(s) are ready for either reuse or reverse logistics?

How do we design the gateway non-volatile memory for optimum data retention? So even if the the battery dies, once the gateways power is restored (recharged, plug-in) the data can be recovered.

‘Experience Outcomes’ are a clear set of of user value statements that act as a foundation for the project team throughout the product cycle.

01

Respond to unexpected changes and events more quickly and reliably.

Real-time data from our Gateway and Sensors allows you to react quickly to protect the integrity of your freight.

02

Integrate the solution into my current setup.

With Connected Freight’s seamless and flexible set of API’s, customers can quickly integrate our software solutions into their own.

03

Customize who and how can get to content and actions.

Connected Freight’s software solution makes it easy to customize who and when customers and users can see and interact with the data.

04

Transform sensor data into a usable form that makes it actionable and understandable.

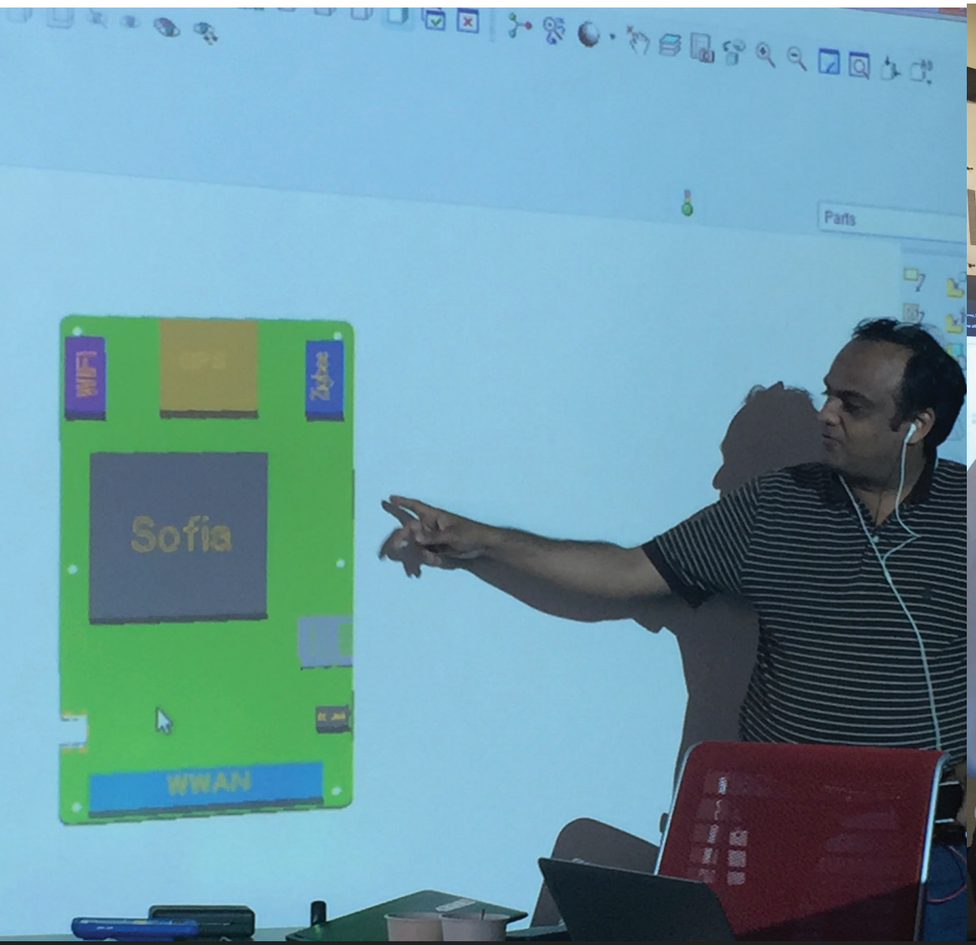
Real-time Sensor data is translanted into relevant visuals, notifications and reports that enable quick responses and long-term visibility for future planning.

05

Go between concurrent activities quickly and simultaneously.

The Connected Freight solution allows users to monitor and action upon multiple shipments, easily and quickly.

CONCEPT



Integrating engineering, marketing and business in the design process.

DESIGN: PROTOTYPING

By creating hand-made prototypes we were able to define and iterate on workflows, hardware features, and form factor concurrently.

DESIGN: VIDEO PROTOTYPING

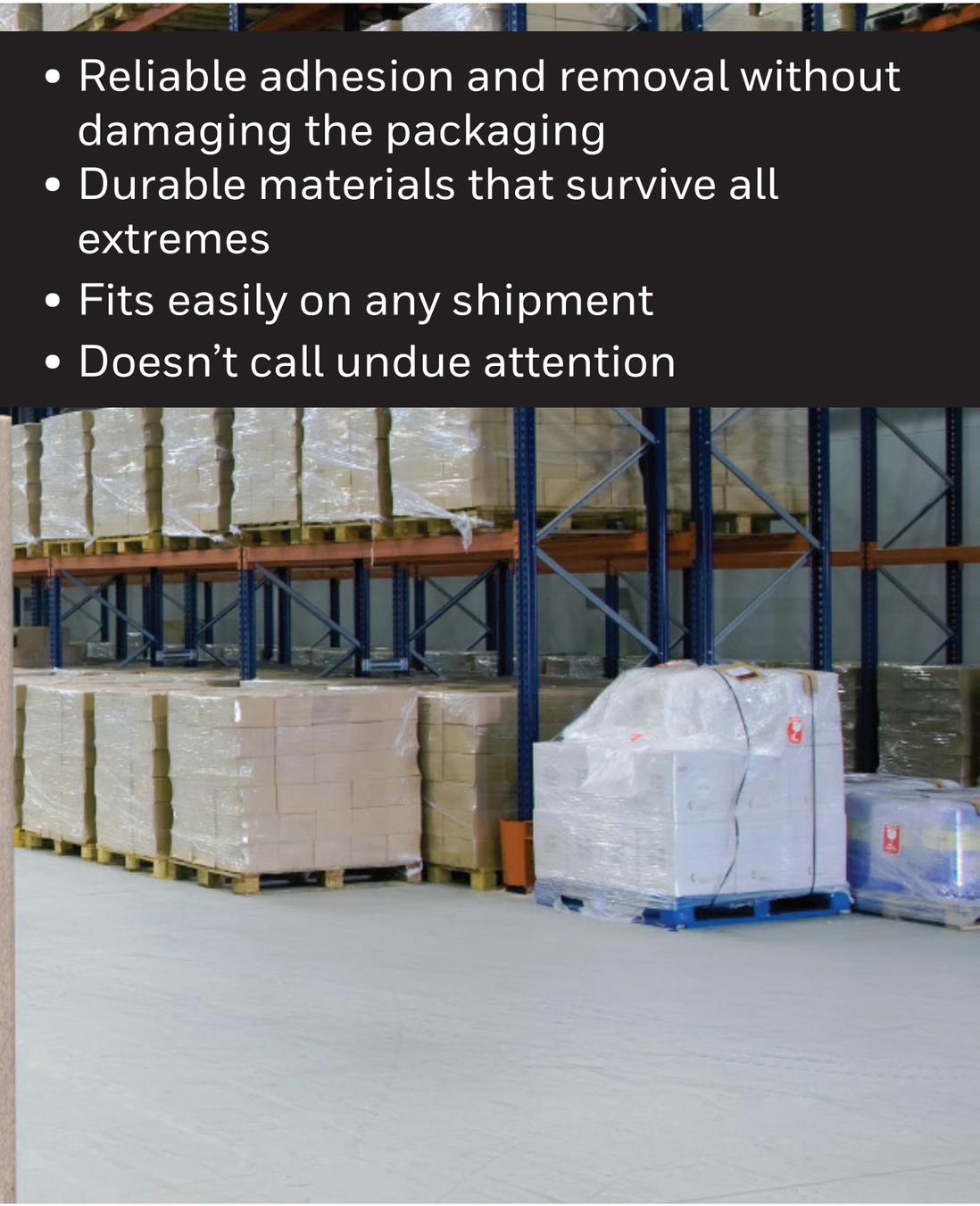
The UX team used body storming and prototype videos to document workflows, identify gaps, and communicate design solutions proposals both internally and externally.

UX Connected Freight Video Goes Here

Key insights informed by the Connected Freight Outcome Driven Design Process

DURABLE AND COVERT HARDWARE

- Reliable adhesion and removal without damaging the packaging
- Durable materials that survive all extremes
- Fits easily on any shipment
- Doesn’t call undue attention

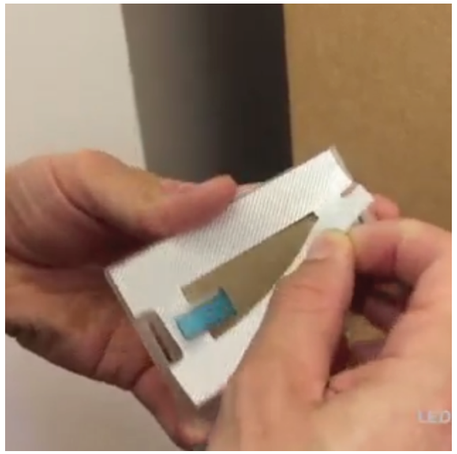


ADAPT TO MULTIPLE WORKFLOWS:
INSTALLS EASILY TO ANY FREIGHT

GATEWAY

POUCH MOUNT

TAG



PEEL & STICK

STRAP

SCREW / STAPLE

INSTANT POWER USER: EASY AND INTUITIVE

- Low Training Cost for New Users
- Customizeable UI Adapts to Specific User Needs and SOPs

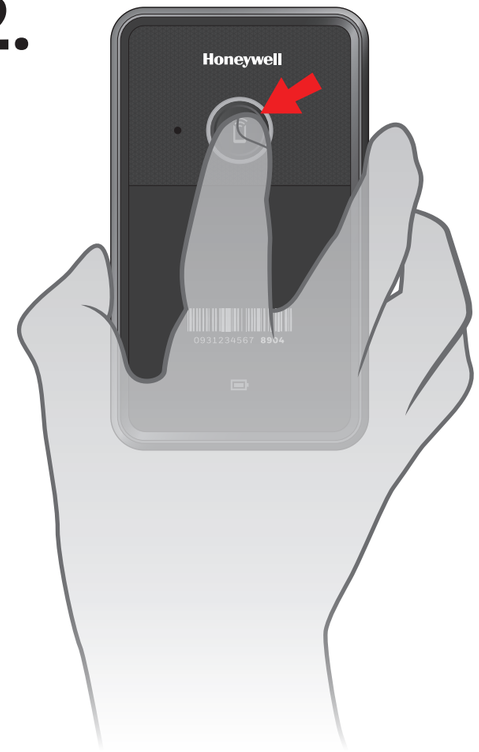
INSTANT POWER USER:
SIMPLE TO PAIR GATEWAY AND TAGS

1.

Tap Together

(Gateway sends configuration data via NFC)

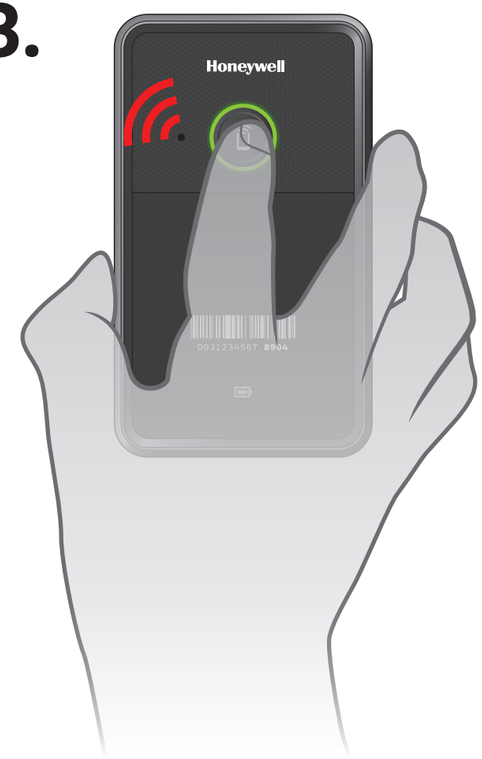
2.



Press + Hold

(This begins the data transfer)

3.



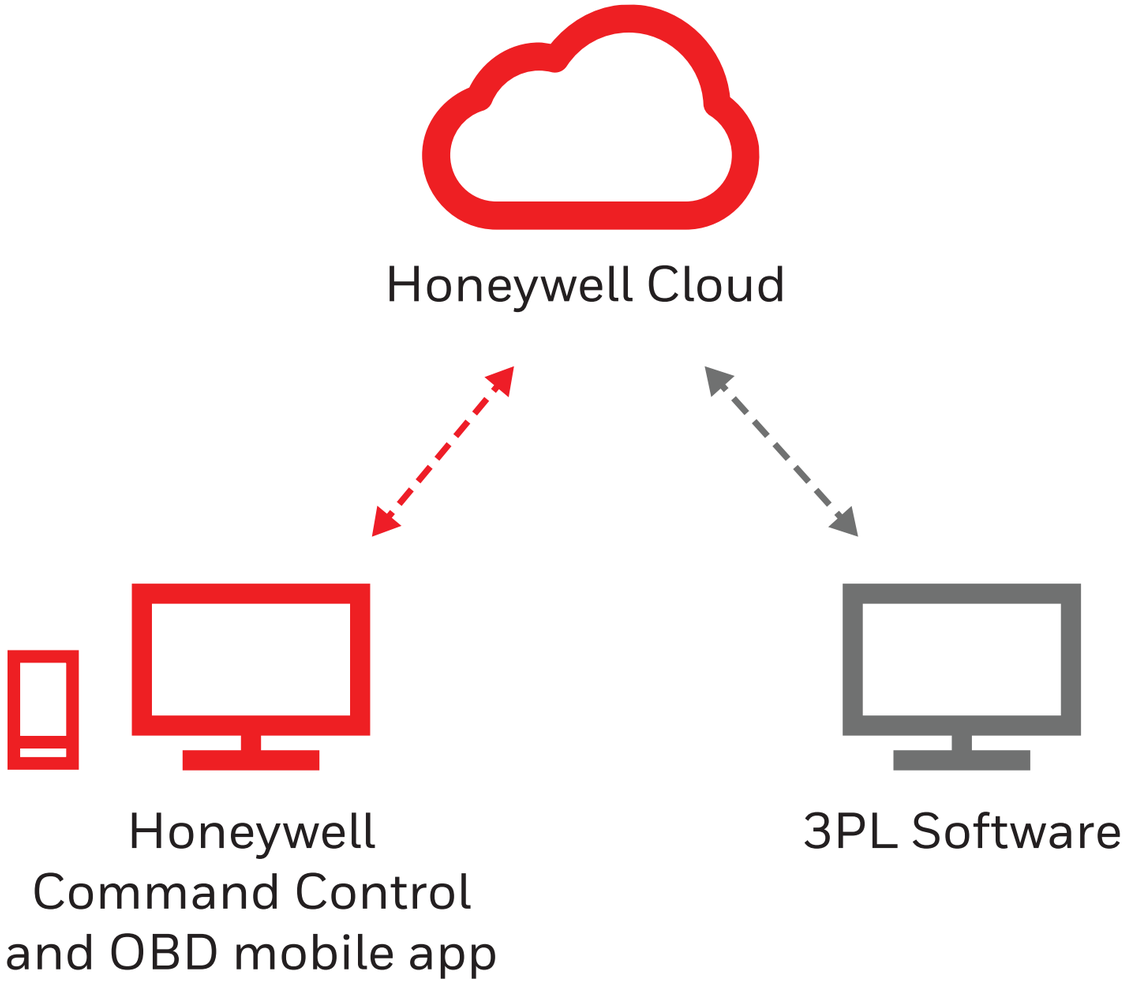
Wait for Beep

(Confirming the sucessful configuration)

LOW COST OPERATION AND LOGISTICS

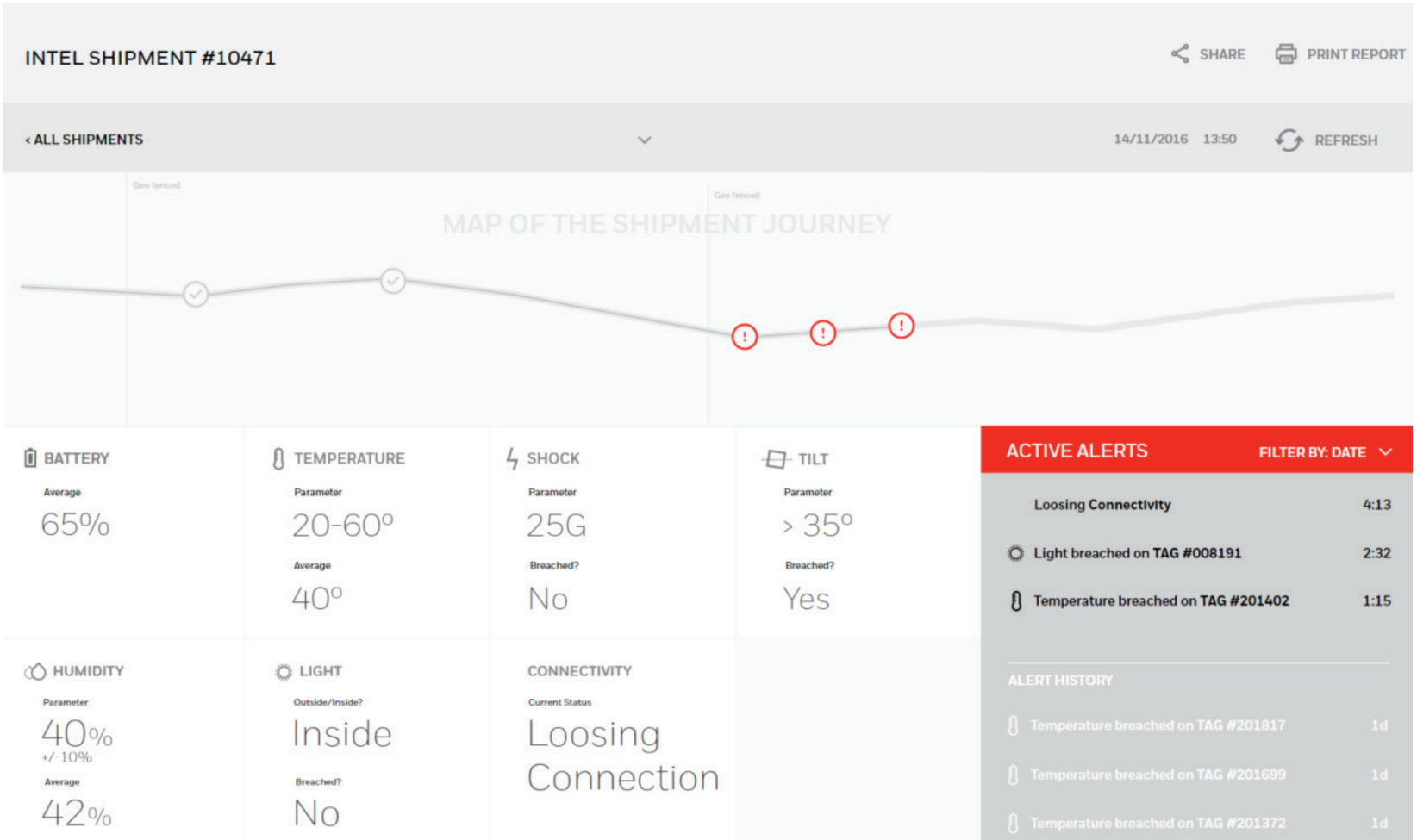
- Basic DC Power Supply for Gateway (No Expensive Charging Infrastructure)
- No Return Logistics for Tags (One Time Use)
- Recycling Program for Tag Batteries

INTEGRATE INTO CURRENT WORKFLOWS: USE OUR SOFTWARE OR YOURS



- Use honeywell command control, OBD mobile app **or** continue using your current front end solution
- Easy integration of connected freight hardware data through HON API's.

Real-Time Notification of Events

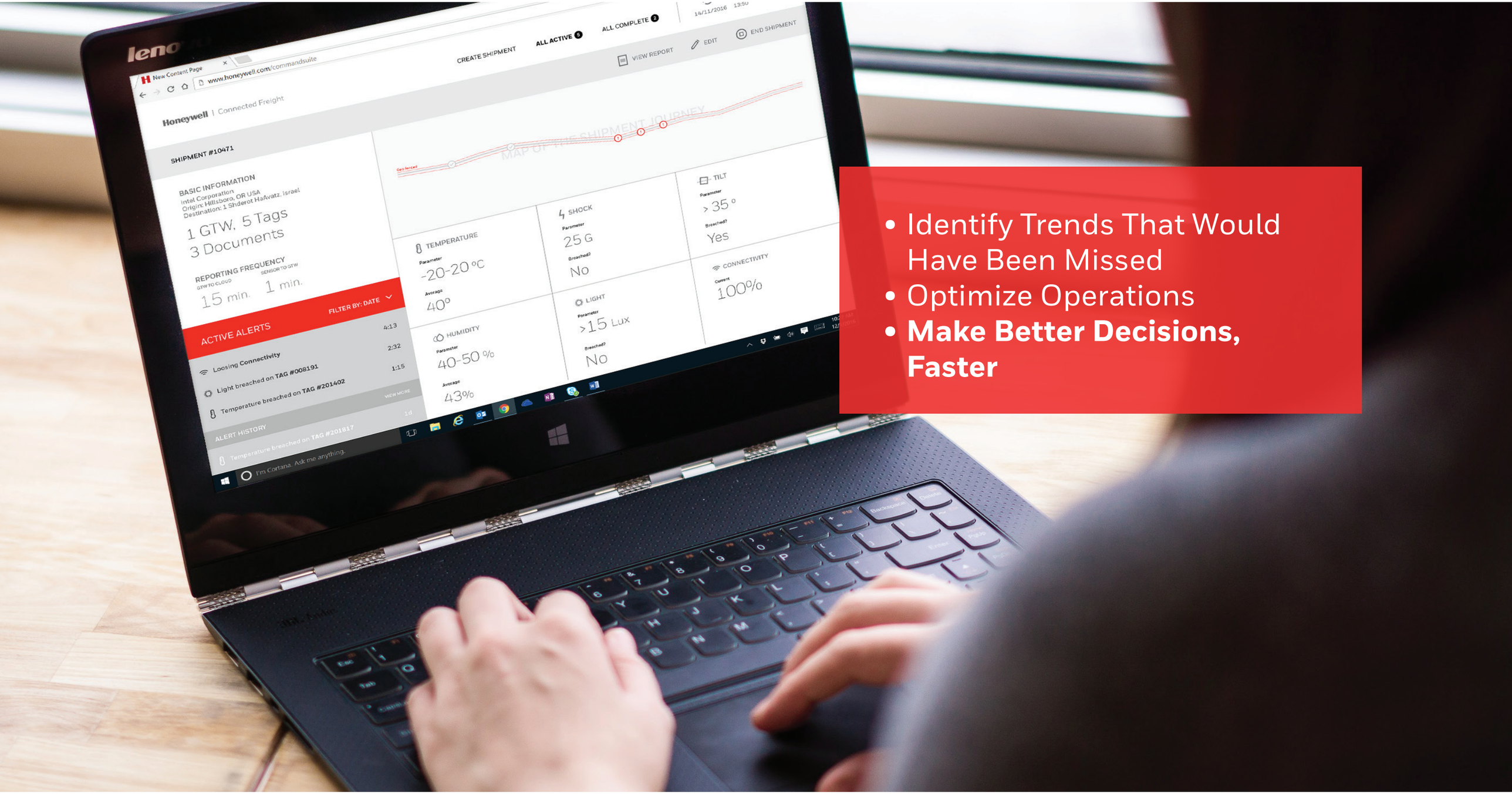


- Near Real-Time Alerts Sent to Command Center
- 1-Click for 3PL to Notify Shipper, Carrier, or Jurisdiction of an Event
- 3PL Can Resolve Issues Almost Immedately

Automation Reduces Labor Costs

- Automate Actions That Are Currently Done in the Field Manually
- Reduced Possibility for Human Error
- Create Custom Actions for Unique SOPs

Deep Machine Learning for Additional Optimization

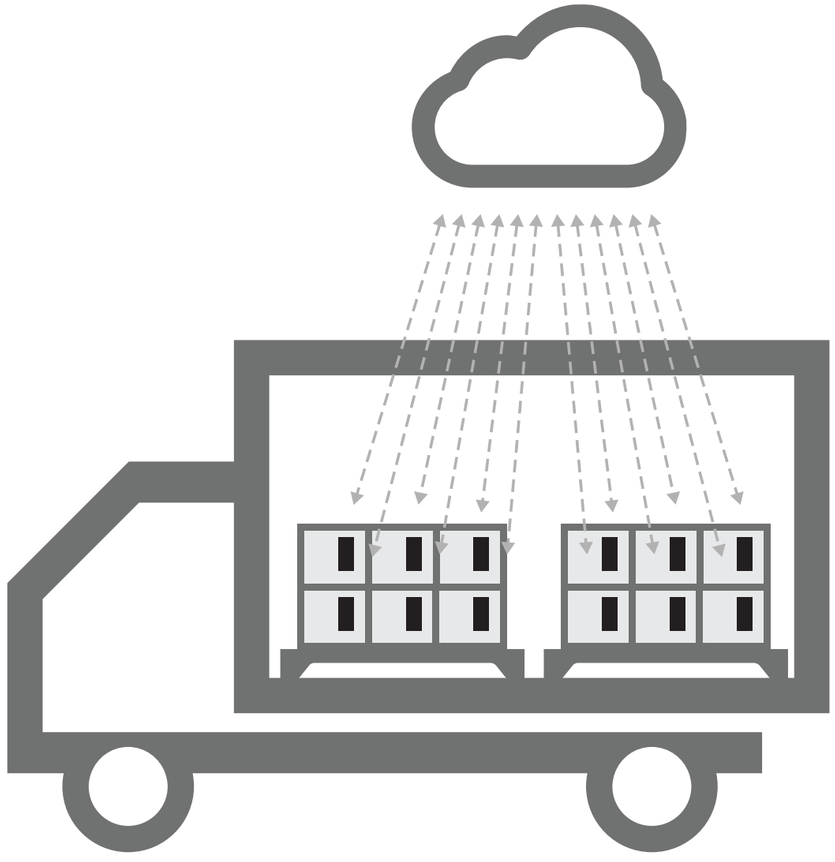


- Identify Trends That Would Have Been Missed
- Optimize Operations
- **Make Better Decisions, Faster**

[Scenario]

Connected Freight v. Sendum

THINK ABOUT INSTRUMENTING EVERY BOX ON A TRUCK WITH SENDUM…



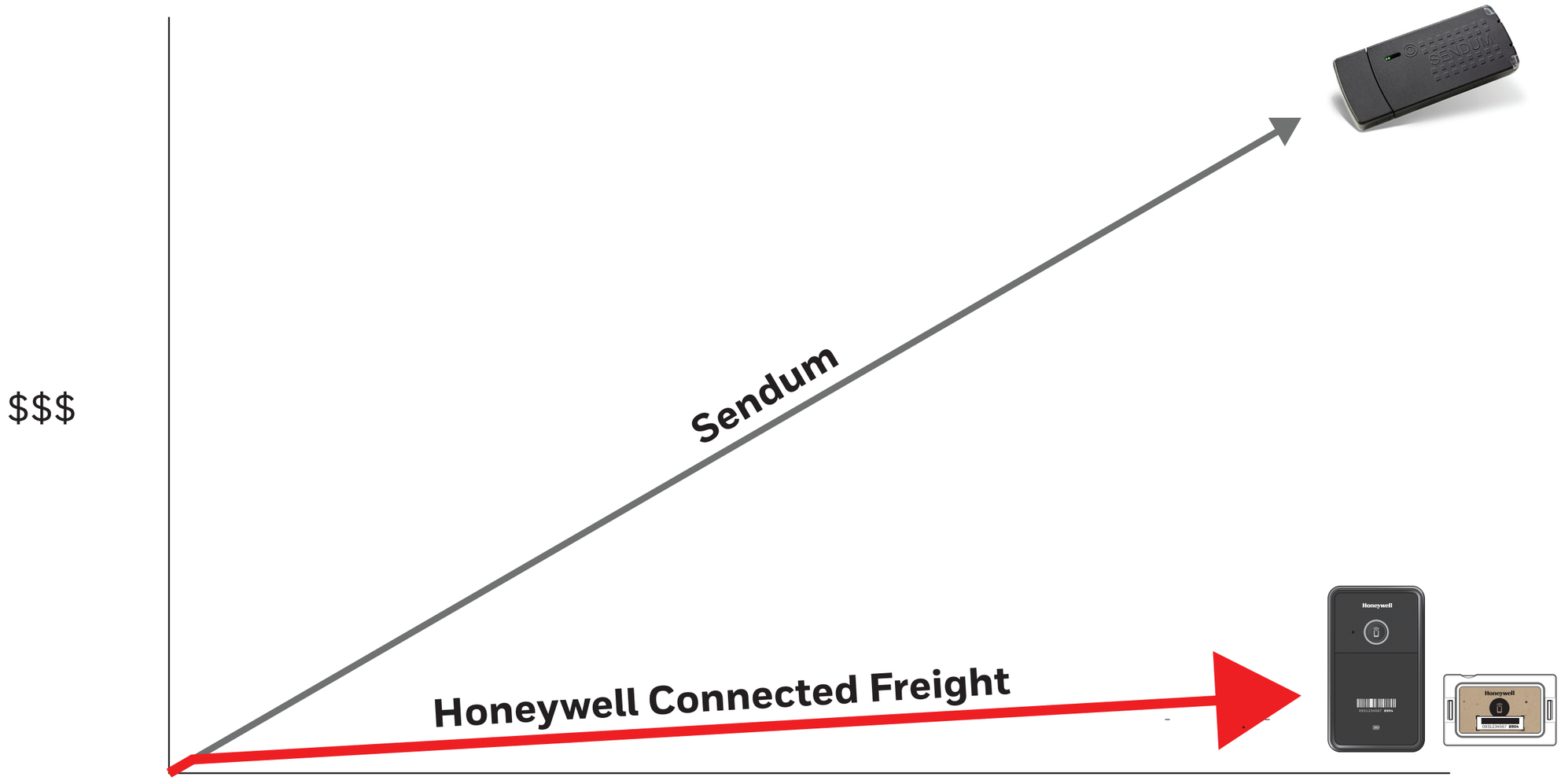
- LOTS of expensive hardware
- Each one needs a sim card and costs $$ for data
- Cumbersome process for in-field configuration
- Manual reverse logistics
- Management done through Sendum software (No integration to 3PL software)

$$$$

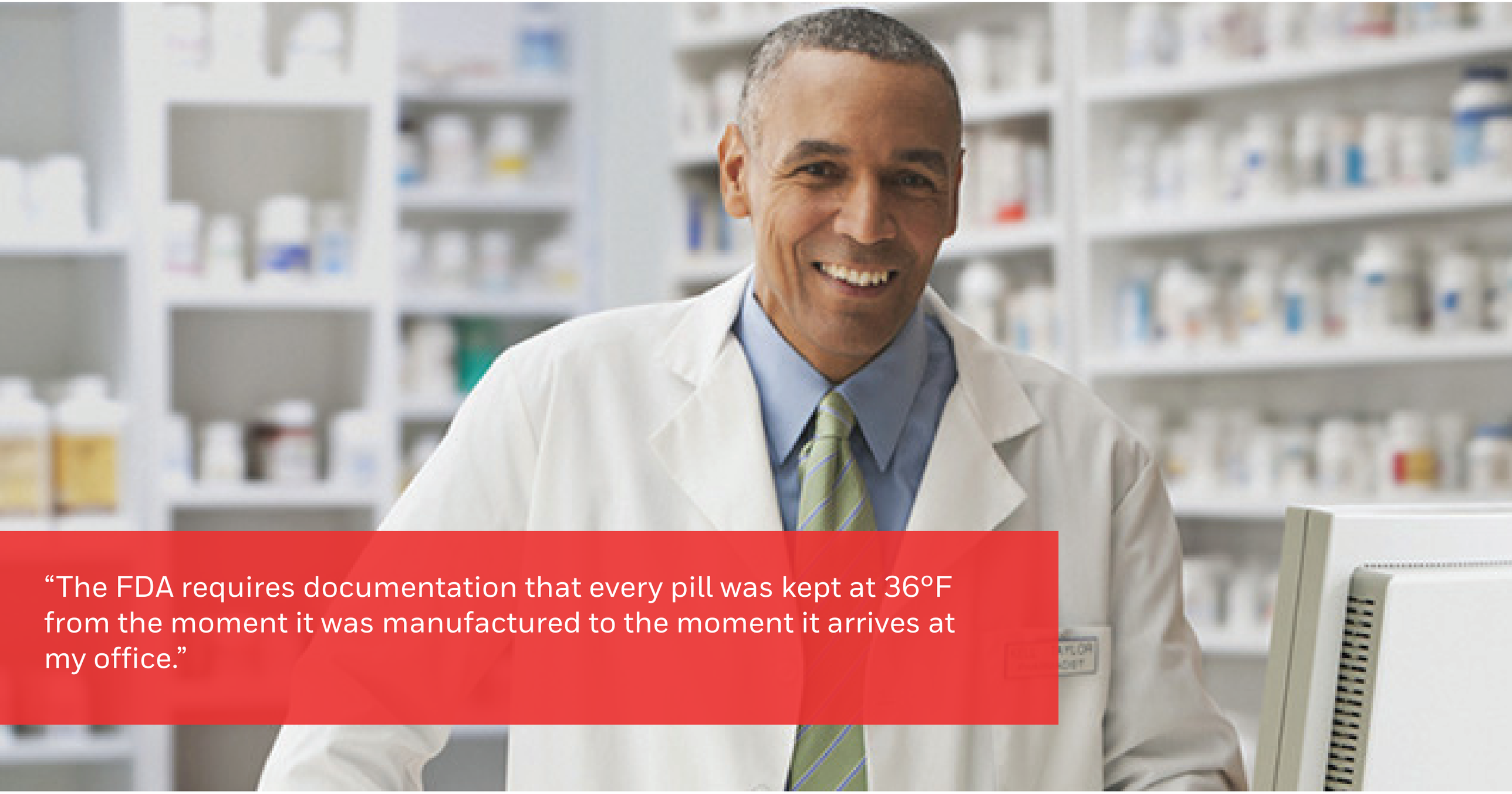
WITH HONEYWELL'S CONNECTED FREIGHT SOLUTION...

- 1 Gateway; Tags on the rest (up to 50)
- Low-cost for total hardware required
- Single data steam to cloud (Lower data cost)
- No reverse logistics on tags
- Integrate data into exisiting software systems through API

MORE DATA / LOWER COST



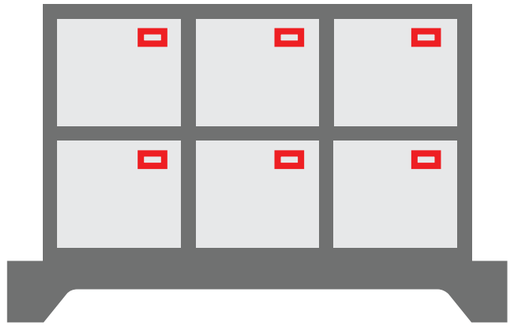
EXAMPLE - PHARMACEUTICALS



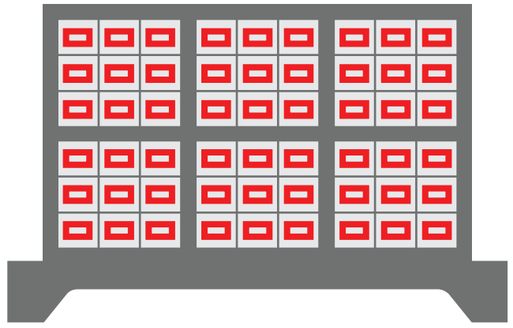
"The FDA requires documentation that every pill was kept at 36°F from the moment it was manufactured to the moment it arrives at my office."

AFFORDABLE TRACKING AT ANY LEVEL

Pallet



Box

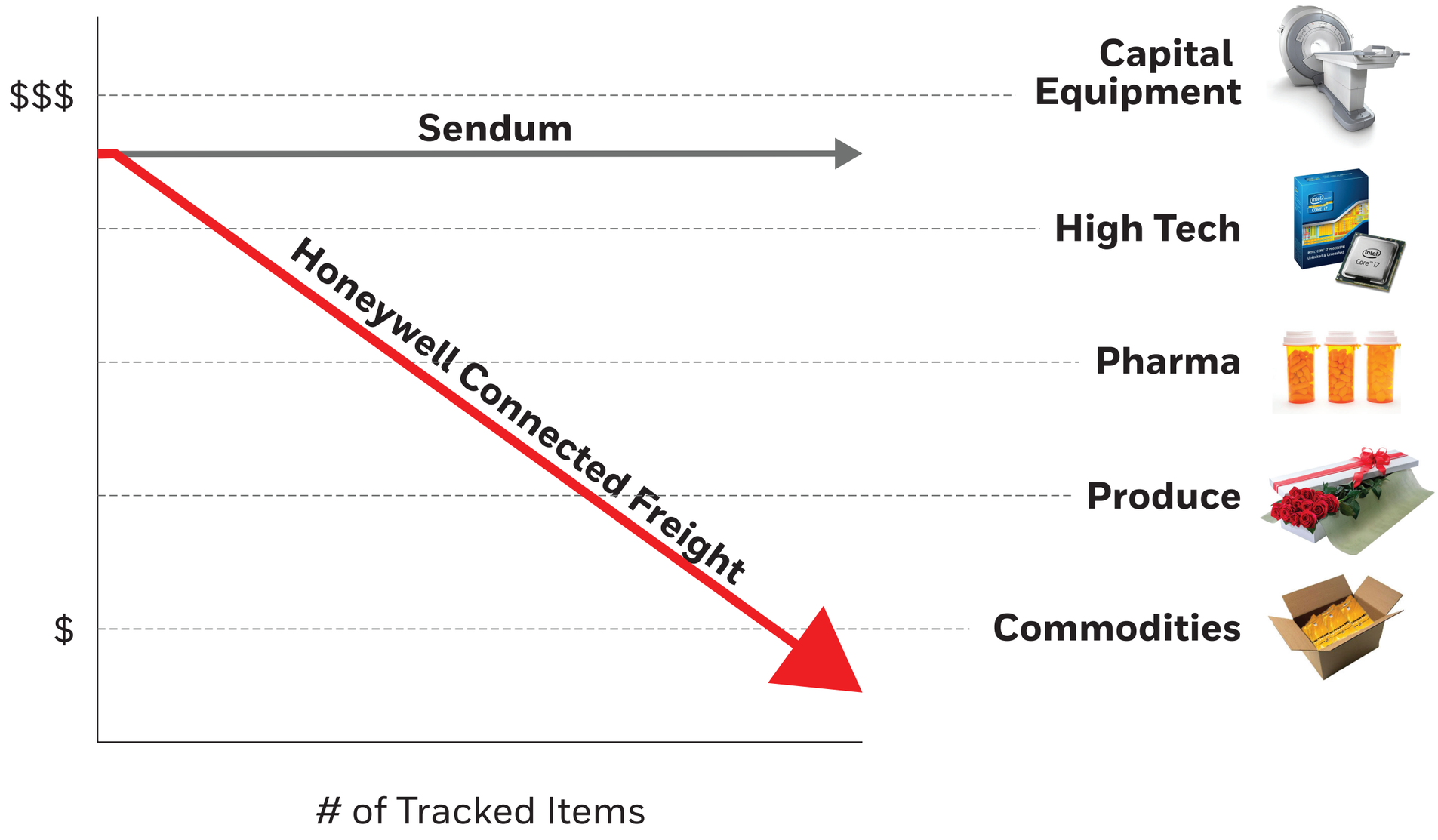


Carton

EXAMPLE - TOYS

"These toys have to be in stores by Black Friday, but real-time freight tracking is **just too expensive**."

COST STRUCTURE ALLOWS FOR SERVICE OF LOWER MARGIN MARKETS



What about soft costs?

This section is specific to the audience.

DON’T SHOW BROADLY!

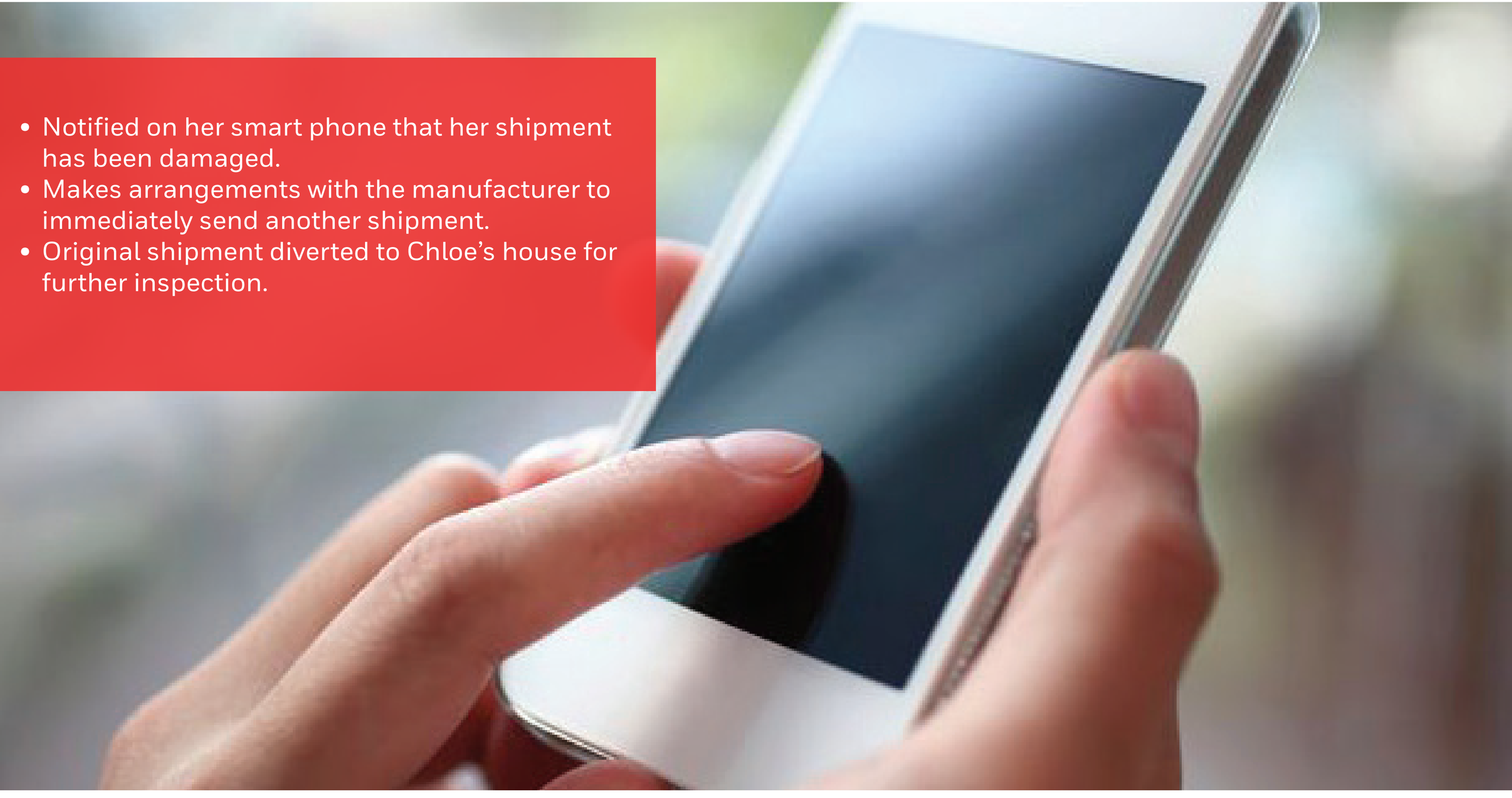
APPLICATION

Chloe

- Recently started reselling dish towels on Amazon.com
- Manages fulfillment through FBA
- Sources product through a manufacturer in Shenzen

EASY ALERTS

- Notified on her smart phone that her shipment has been damaged.
- Makes arrangements with the manufacturer to immediately send another shipment.
- Original shipment diverted to Chloe’s house for further inspection.



SECURE DELIVERY

- Chloe receives shipment at home.
- Tag auto recognizes router inside home and continues tracking until Chloe gets back home to accept POD.

Trust Your Freight; It's Telling the Truth

DESIGN TEAM

HONEYWELL

Nicole Coddington **UX**

Drew Pusey **Industrial Design**

Jane Park **Interaction/Visual**

INTEL

Laura Rumbel **UX**

Kanchan Jahagirdar **UX**

Juliana Knopf **UX**

SPS
DESIGN
| Seattle