

# Always On: HP Supply Chain Risk Management Processes & Analytics

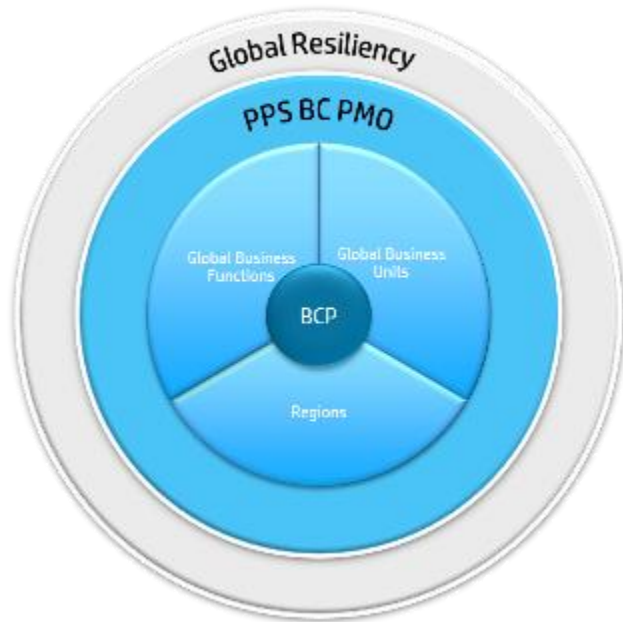
**HP Business Continuity  
Planning**  
September 2018

Travis Parker &  
Trace White



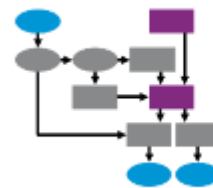
# Collaborating To Create Value For HP

## Business Continuity Planning Team

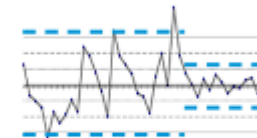


## Process Engineering Team

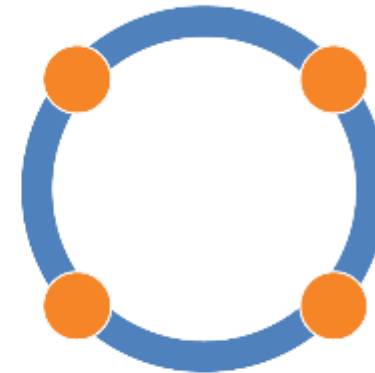
### Process Domain Expertise



### Process Analytics



### Leverage, Retention, Support



### Project Management



# We Are Where You Are

**110**

Manufacturing Sites

**145**

Distribution Centers





# Print & PC leadership



HP's Commercial PCs  
**rank #1 or #2**  
in 44 of the top  
48 countries



HP ships 1.7 PCs  
**every second**



HP's Printing  
**ranks #1 or #2**  
in 51 of the top 55  
countries (ink + laser)



HP ships 1 printer  
**every second**



Powering **430**  
of the Global Fortune  
500 companies



# Supply Chain Operations

Never break the chain

HP Business Continuity Roadmap



# SC Visualization Program

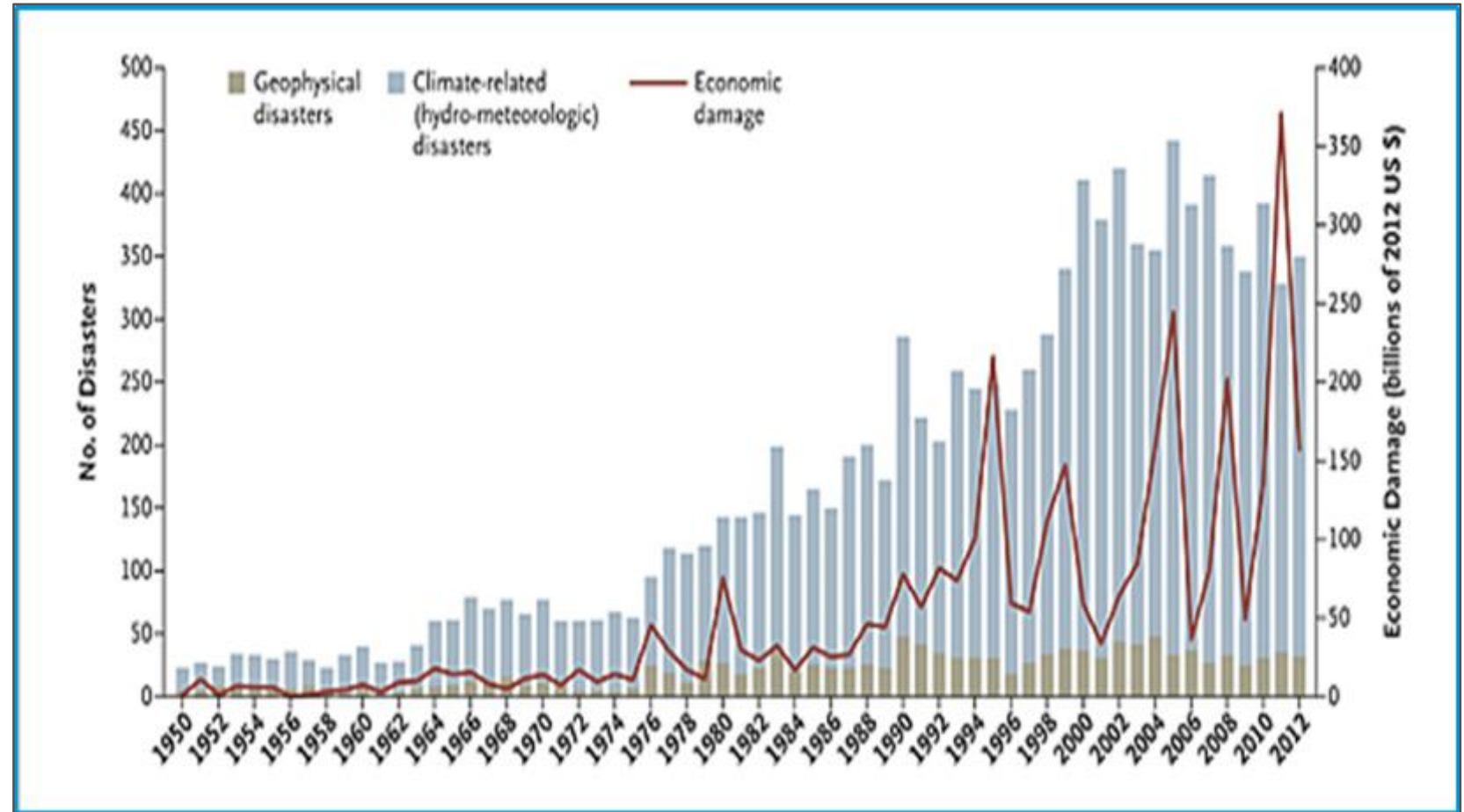
Why did we start this journey?

## Situation

- Global SC disruptions are on the rise
- We continue to consolidate & run a leaner supply chain
- Regional concentration
- These facts lead to increased probability & impact of SC Disruptions in the future

## Solution

- Centralized SC node database with graphing & visualization
- Real time visibility of disruptions and potential impacts



\* Source: "Steady Increase in Climate Related Natural Disasters" November 15, 2013

# HP Business Continuity Planning (BCP) Roadmap

## Centralize & Visualize

- Develop common node database
- Develop common global processes
- Develop capability to visualization nodes

## Awareness & Response

- Develop threat alert architecture and processing
- Overlay threat alerts onto visualization interface
- Enable rapid organizational response & resolution

## Predict & Prevent

- Utilize predictive analytics to characterize network impact
- Develop risk assessment scorecard & processes
- Integrate BCP intelligence into supply design

# Supply Chain Operations

Never break the chain

Conclusions



# Concluding Thoughts On Business Continuity Planning

- BCP is a process discipline
- Often neglected/off radar until things break
- Three step maturity model is benefiting HP
- Increasingly important for new business deals



# Supply Chain Operations

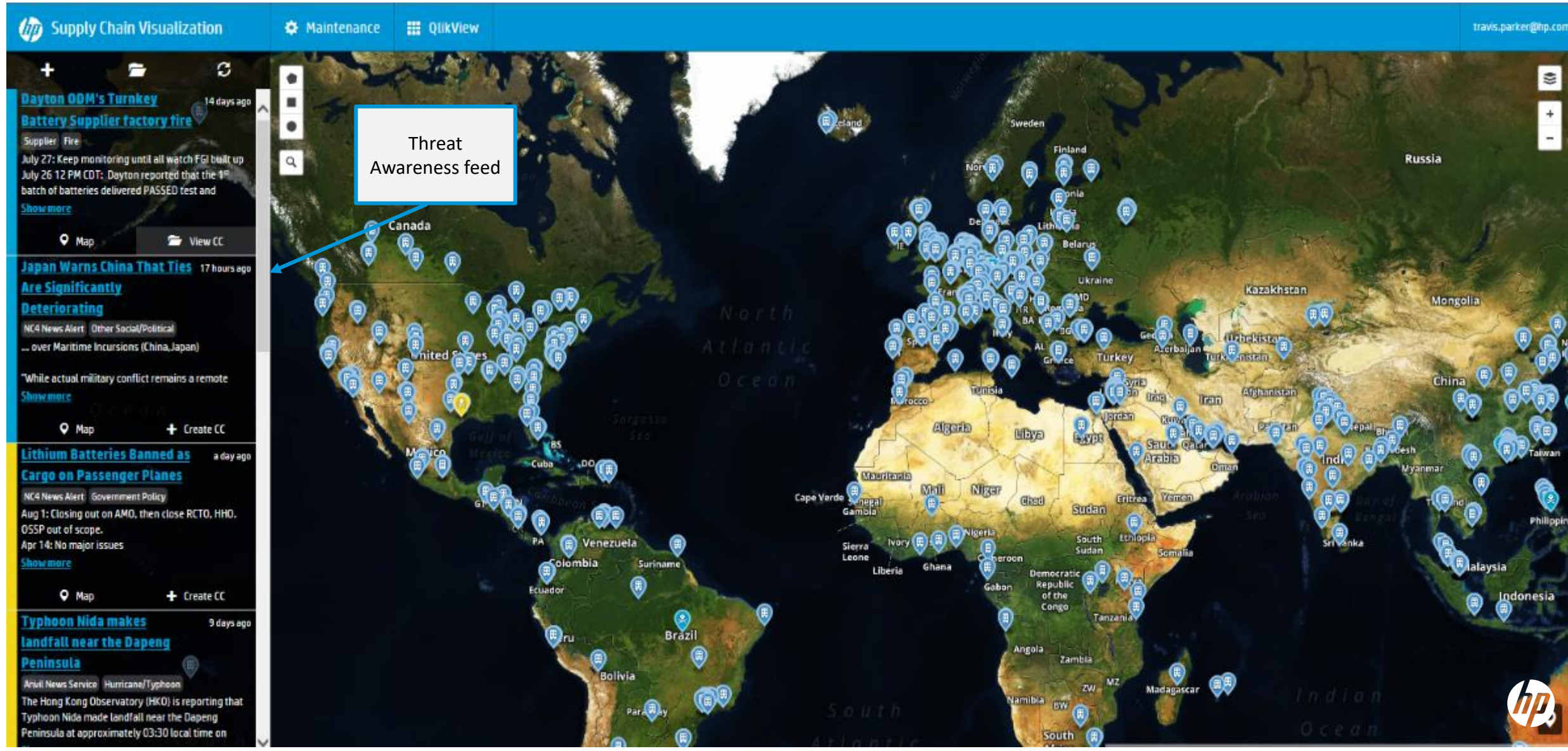
Never break the chain

Supply Chain Awareness & Response



# Visualizing Global Risks In A Single Interface

Enabling Advanced Awareness & Rapid Respond



# Rapid Escalation And Mobilization

Enabling Advanced Awareness & Rapid Respond

The dashboard features a top navigation bar with the HP logo, 'Supply Chain Visualization', 'Maintenance', and 'QlikView' menus, and a user profile 'travis.parker@hp.com'. The main area is a satellite map of southern China, with a circular callout highlighting the Hong Kong region. A table titled 'Equipment View' is overlaid on the right side of the map.

**Geo Mapping of threat**

**Contacts at impacted nodes**

ID	SERVICE	SN	COUNTRY	STATUS	ADDRESS	CITY	COUNTRY	DATE	DATE	DATE	DATE	DATE	DATE
1	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000
2	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000
3	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000
4	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000
5	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000
6	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000
7	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000
8	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000
9	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000
10	DELL				20-21-11-11-11-11	San Francisco	USA	20200000	20200000	20200000	20200000	20200000	20200000



# Coordinating Actions To Ensure Rapid Resolution

Enabling Advanced Awareness & Rapid Respond

The screenshot displays the HP Supply Chain Visualization Command Center Monitor. A blue callout box labeled "Command Center Management" points to the interface. The main content area shows a table with incident details and a detailed description of the event.

Title	Dayton ODM's Turnkey Battery Supplier factory fire	Initiator	<a href="mailto:larry.wang@hp.com">larry.wang@hp.com</a>	Event Logged	07/19/2016 15:31 UTC
Incident ID	5026	Phase	Notification	Command Center Created	07/19/2016 16:04 UTC
SC Impact	MINOR	Responsible Leads	Ruth Adriano-Domingo, Ketul Patel	Event Occurred	07/19/2016 06:00 UTC
Regions Impacted	WW	Status	●	Last Updated	08/10/2016 08:36 UTC

**Description** | Event Log | Domain Impact | Supplier Response

**Current Situation**

July 27: Keep monitoring until all watch FGI built up

July 26 12 PM CDT: [redacted] reported that the 1<sup>st</sup> batch of batteries delivered PASSED test and inspection processes. Battery supply vs. demand plan released showing no material shortages. Will continue to flag as low risk to build schedule until all batteries are delivered end Aug.

July 19 5 AM CDT: Dayton notified HP of their turnkey battery supplier had factory fire. Currently assessing the situation. Meeting tonight to get updates on fire situation (11 hours).

[redacted] Watch project battery supplier reported a fire incident in their factory which may interrupt our delivery schedule to Dayton (ODM). Dayton ODM and HP to discuss the contingency plan to reduce the impact on product delivery.

**Actions Taken**

HP BCP template and parts impact template leverage for July 19 Tuesday evening status meeting with Dayton and HP Management to determine if there are any schedule impacts.

July 19: Meeting with Dayton ODM and team

Tests/inspections on Dayton ODM TK battery supplier (Newsun)

**Impact Summary**

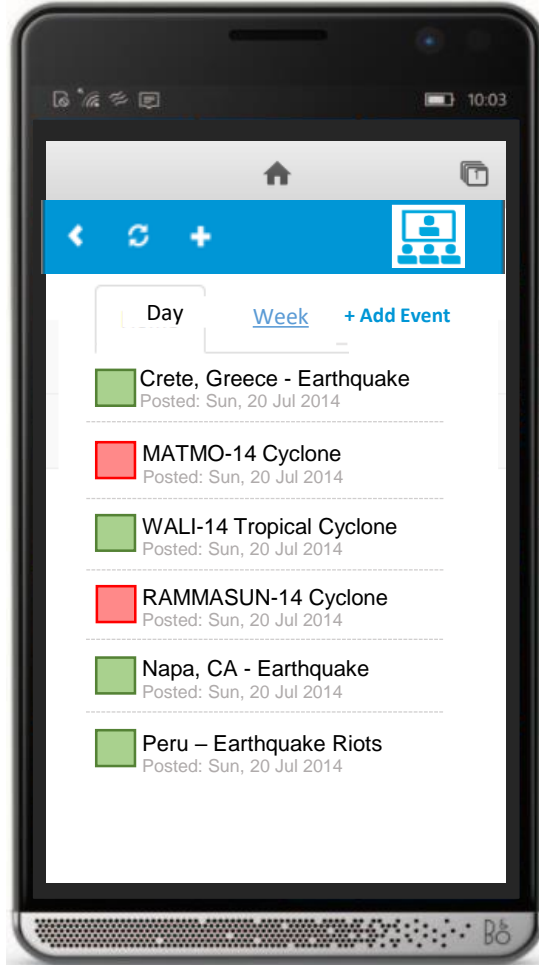
Assessed as low risk currently

Refresh Close

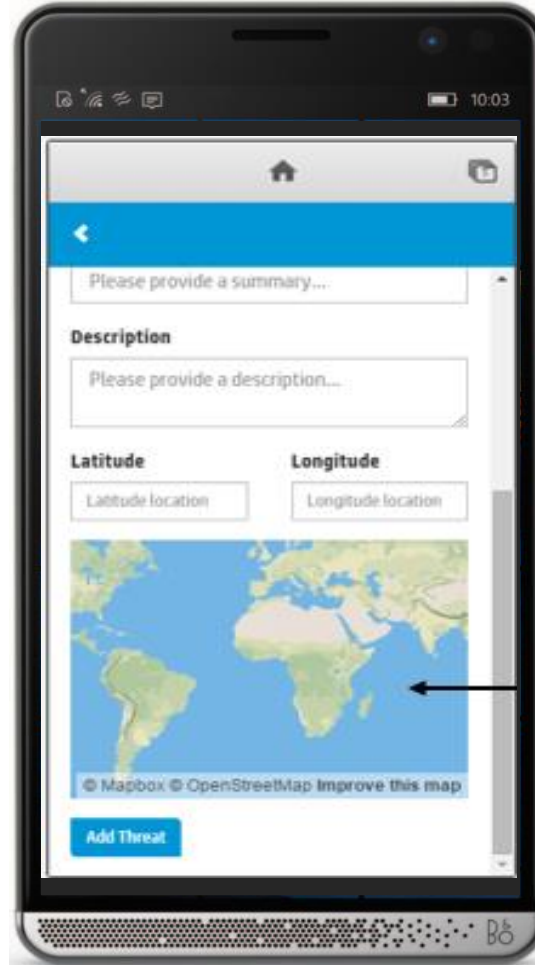
# Mobile App Enabling Response Optimization

Enabling Advanced Awareness & Rapid Respond

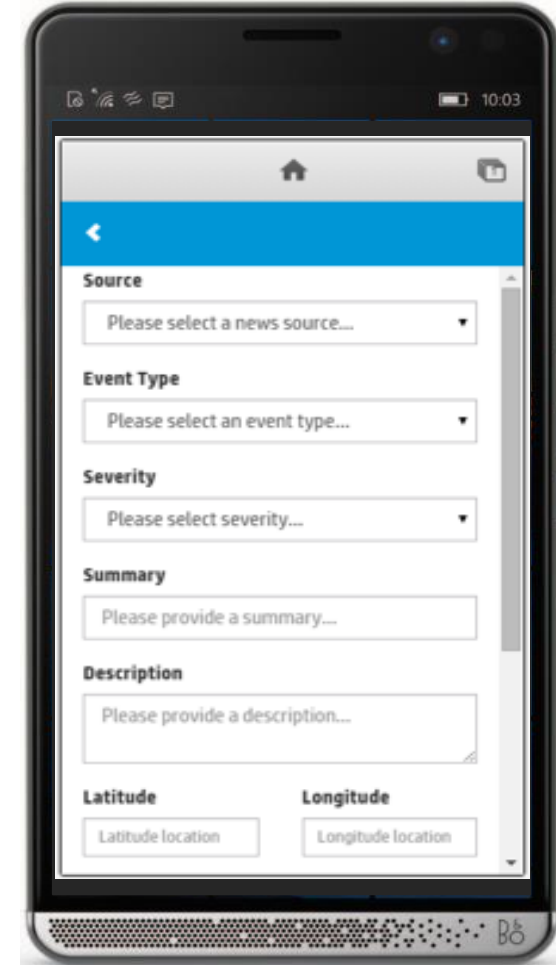
## Monitor Threat Status



## Add or Update threats



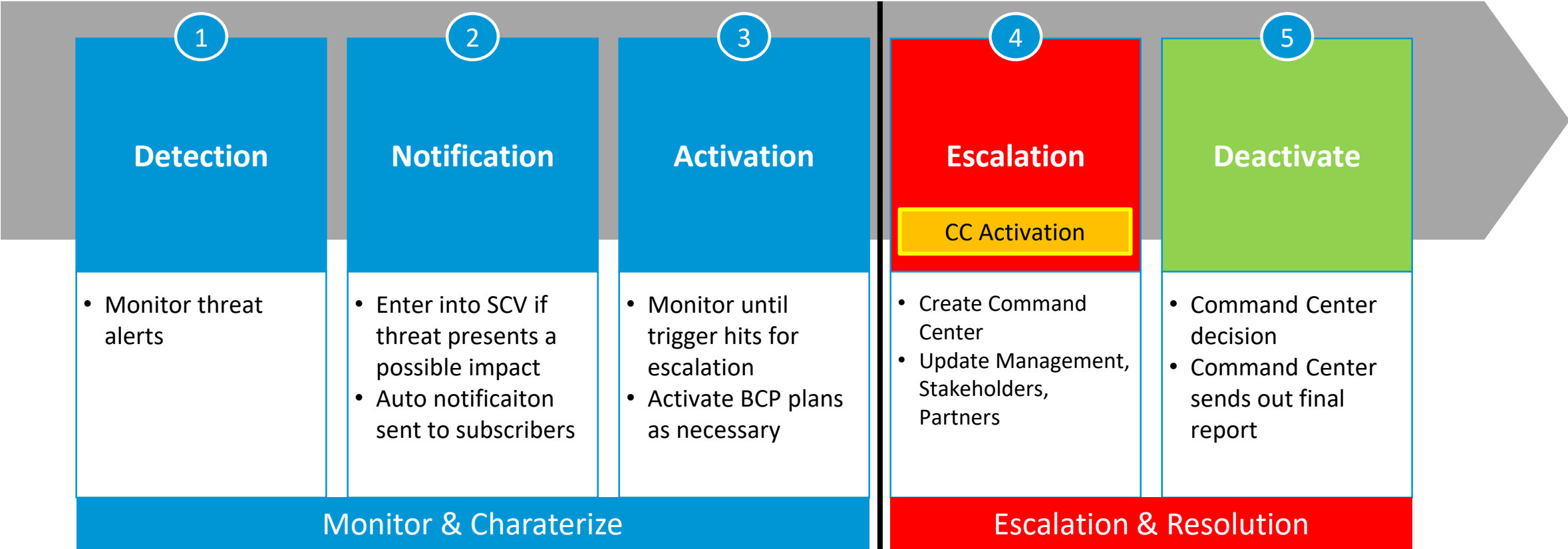
## Manage communications



# Defined Process Steps Drive System Effectiveness



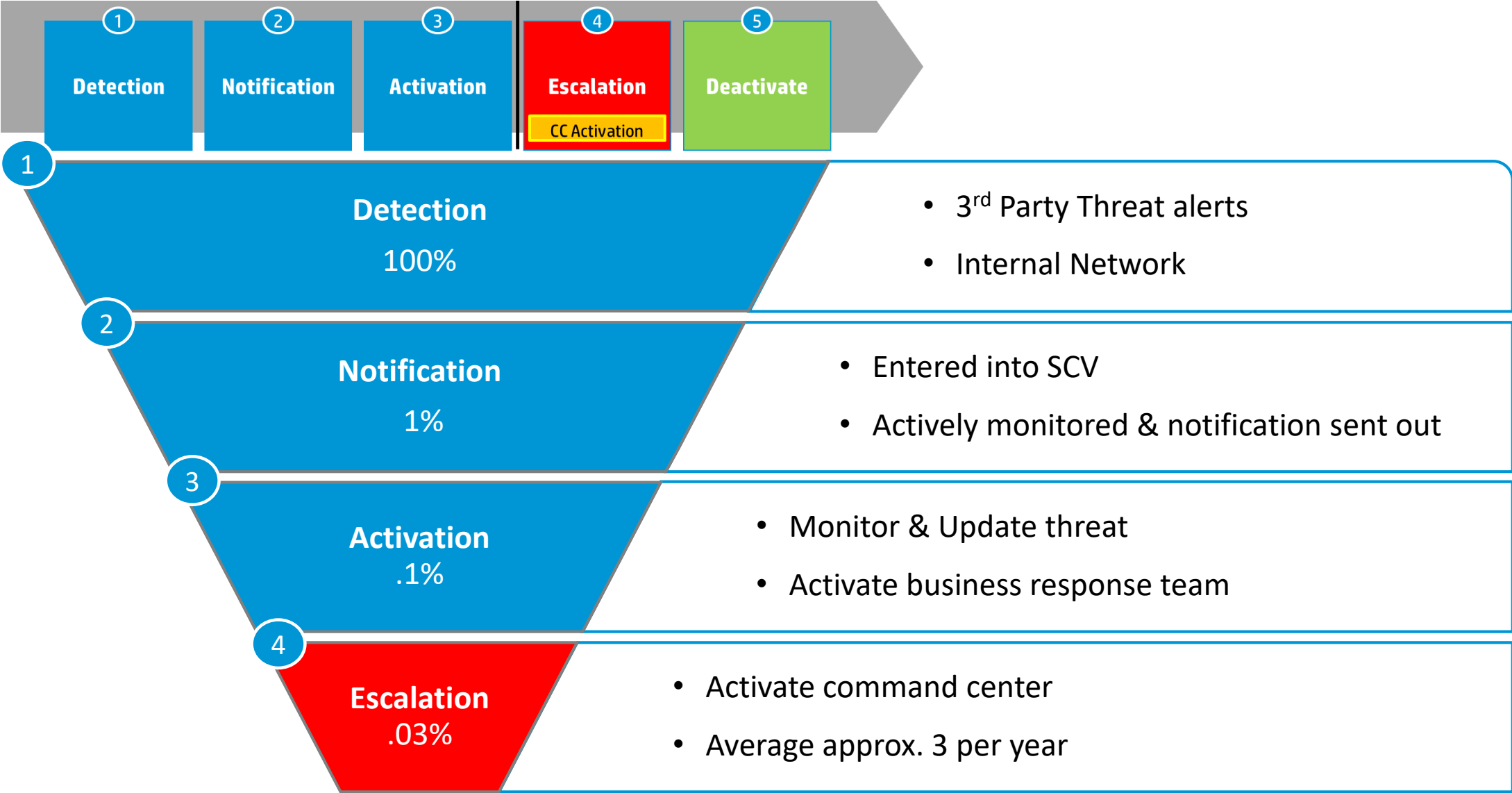
Alert management phases



# Not Every Alert Is A Concern To Business Continuity



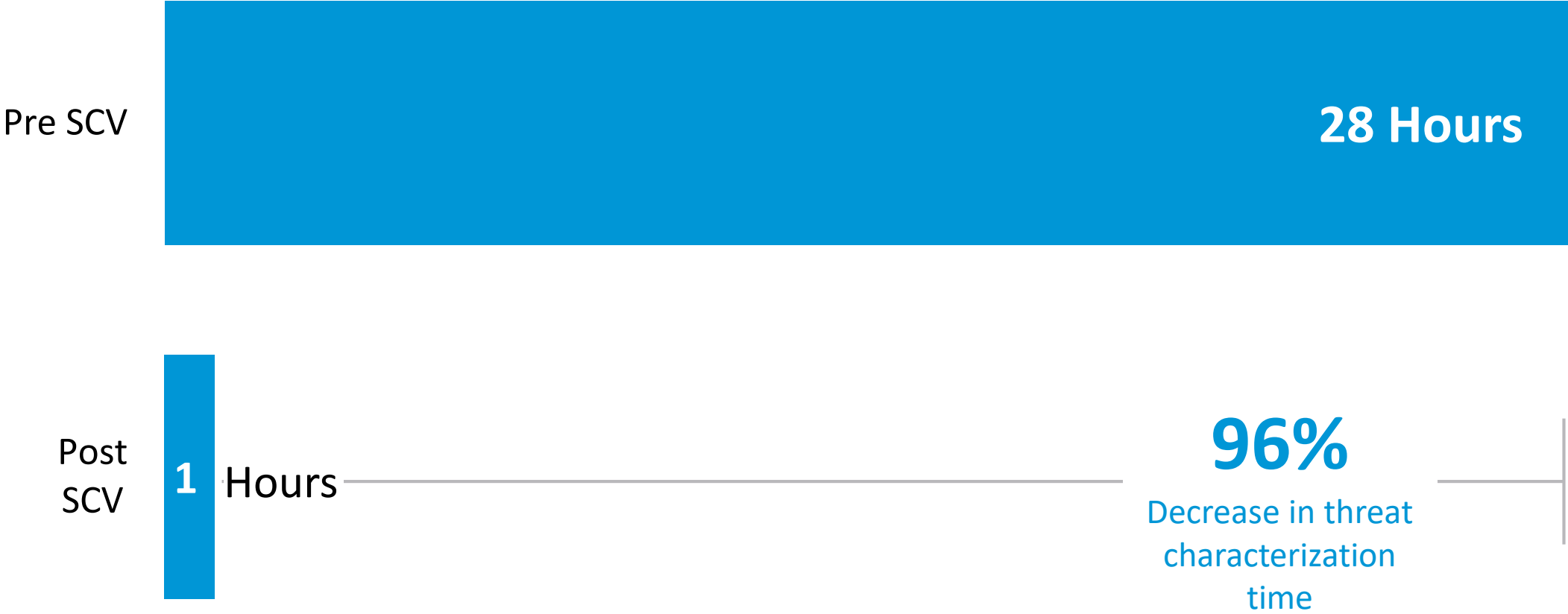
Threat funnel narrows global issues down to critical network focuses for HP





# Speed Is Critical In Protecting Our Supply Chain

Significant improvements in our threat characterization cycle



# Supply Chain Operations

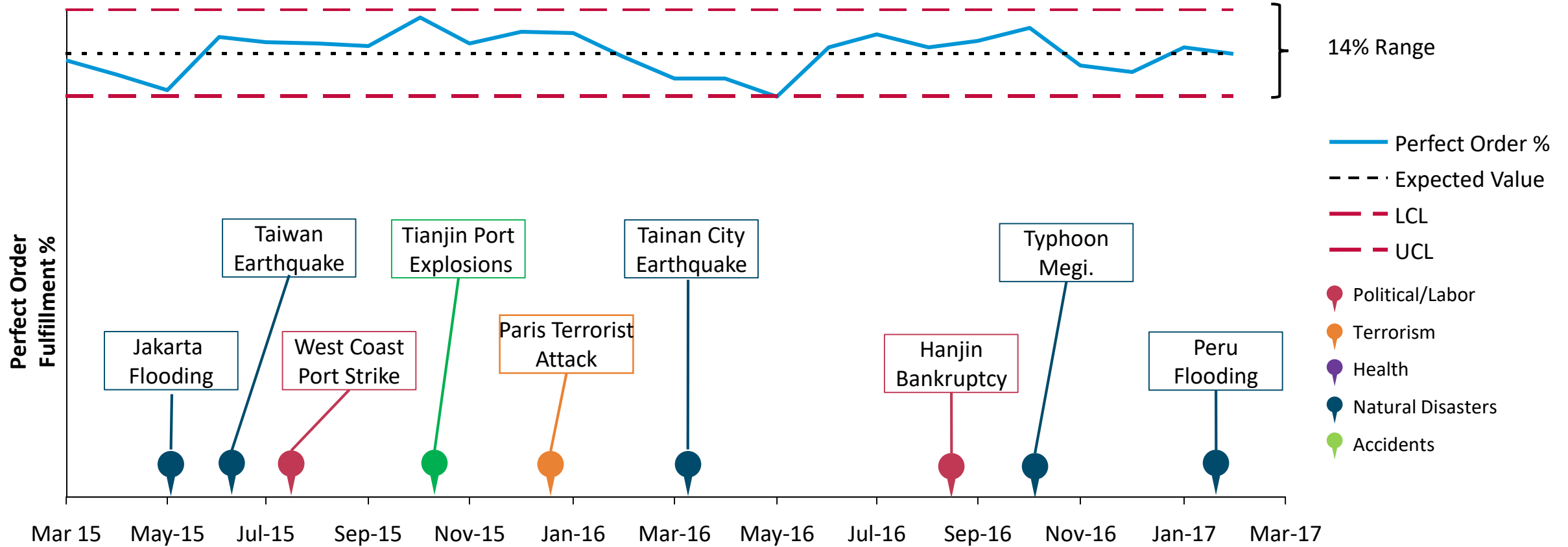
Never break the chain

In a global company, it's not a question of "if" but "when"...

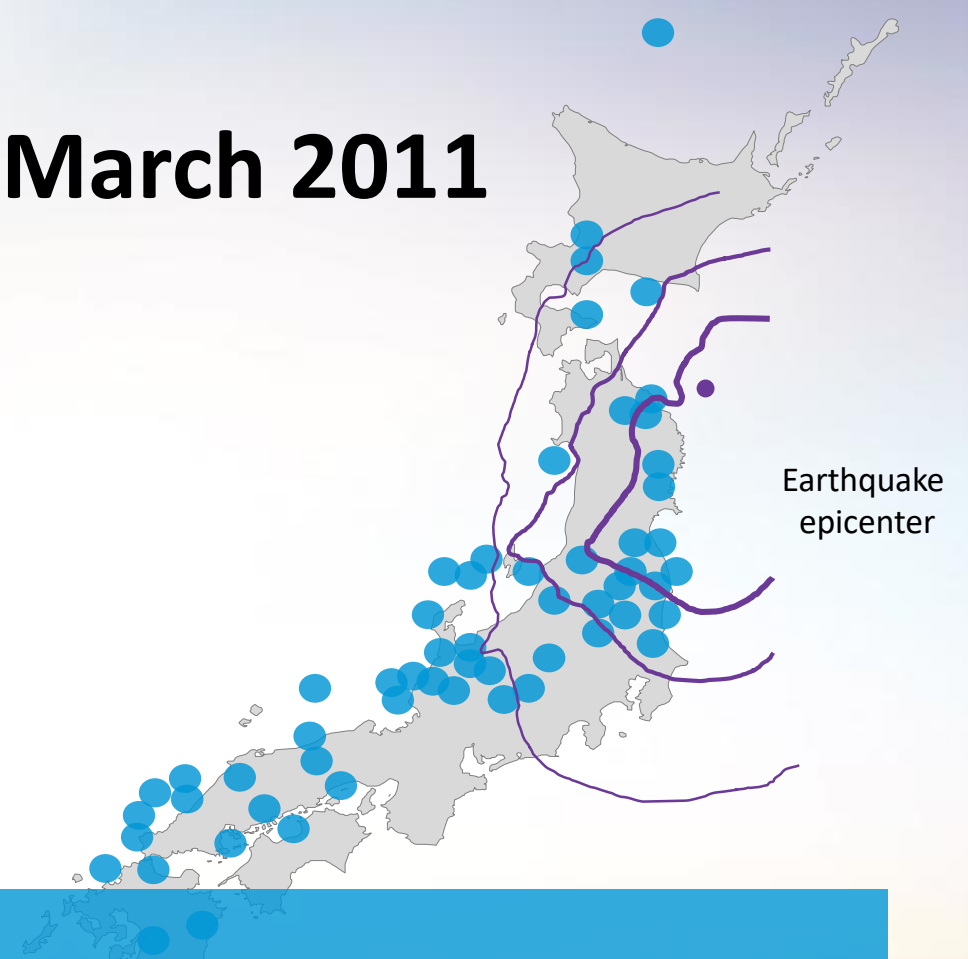


# Global Events ≠ HP Network Disruptions

BCP Processes & Capabilities Ensure Customer Commitments are fulfilled



# Japan Earthquake and Tsunami – March 2011



Earthquake epicenter



Largest earthquake in Japan's recent history



Deadly tsunami and power grid failures



Infrastructure damage including roads, rail and sea

# How We Responded

## • Immediately

Immediate engagement between HP Operations, Suppliers, and Procurement via SCV

Laser focus on high risk suppliers and components

Immediate pull from Inventory

Daily calls with all at-risk suppliers

90 mins after earthquake

## • Short/Mid-Term

Executed on alternative supply options

Identified and implemented qualification plans for additional suppliers, similar components

Implemented risk purchases pending qualification

24 hours to one week

## • Long Term

Evaluating possible changes to circuit design  
1. BCP

Established watch list, plan for high risk suppliers and materials

Rebalanced requirements and purchase orders with manufacturing partners

One week later

**35 Days**



# AMS West Coast Port Strike – January 2015



29 ports threatened by potential labor strike



70% of APJ imports enter from effected area



44% of all containers to the U.S. enter from West Coast ports

# How We Responded

## • Immediately

Pulled together a WW team

Prioritized containers

Alternative routes and modes

## • Short/Mid-Term

Internal communications:  
tops down, bottoms up

High engagement with  
external partners & customers

## • Long Term

Future action plans with  
preventative action and  
stable alternatives

# Supply Chain Operations

Never break the chain

## Predictive Analytics Overview



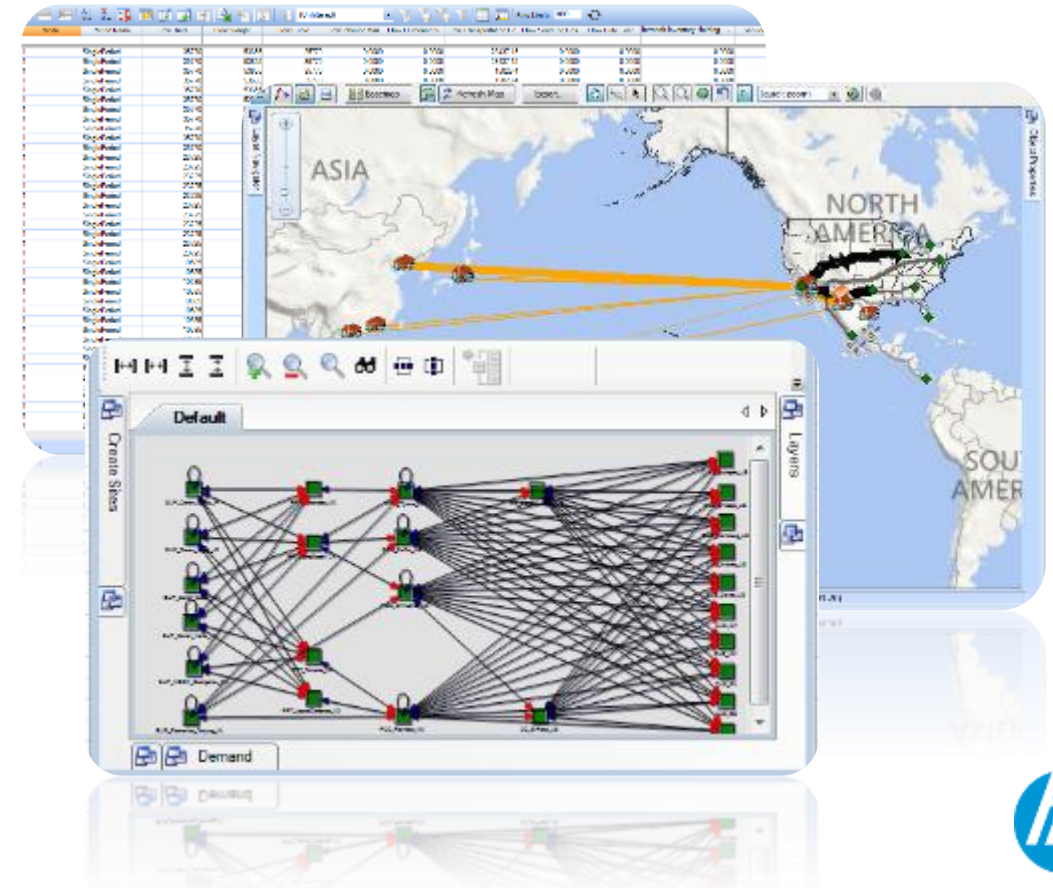


# From Mobilization To Characterization

From event visualization and awareness...



... to network impact assessment and decision support.



# Analytics For Network Assessment

## Optimization Engines

- Quickly narrow alternatives
- Fast
- Ranks options based upon objectives and constraints

Narrow and Size

## Predictive Business Continuity Modeling

## Simulation Engines

- Study behavior over time
- Robust
- Provides insight into probable outcomes

Test and Refine



# A Case Example Of Predictive Risk Modeling

## Deploying Predictive Capabilities



### Lithium Batteries as Cargo in 2016 Update III

#### Additional Changes for Lithium Ion Batteries

On 22 February the ICAO Council adopted the recommendations of the ICAO Air Navigation Commission (ANC) that lithium ion batteries, UN 3480, Packing Instruction 965 only, be forbidden, on an interim basis, as cargo on passenger aircraft. The prohibition does not apply to lithium ion batteries packed with equipment or lithium ion batteries contained in equipment, UN 3481, Packing Instruction 966 and Packing

The prohibition becomes effective 1 April 2016, as applied to lithium ion batteries, UN 3480, PI 965, to be shipped at a state of

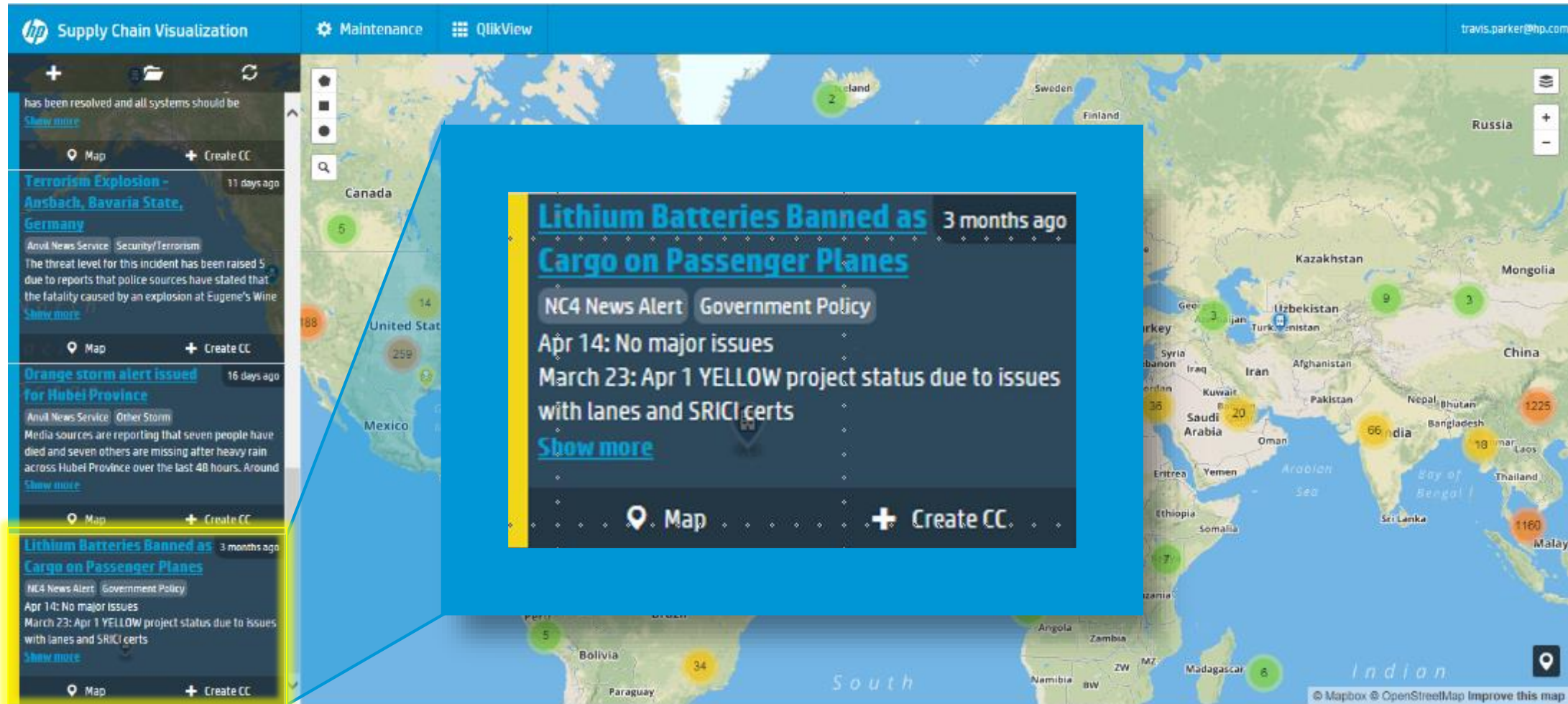
# April 1<sup>st</sup>, 2016



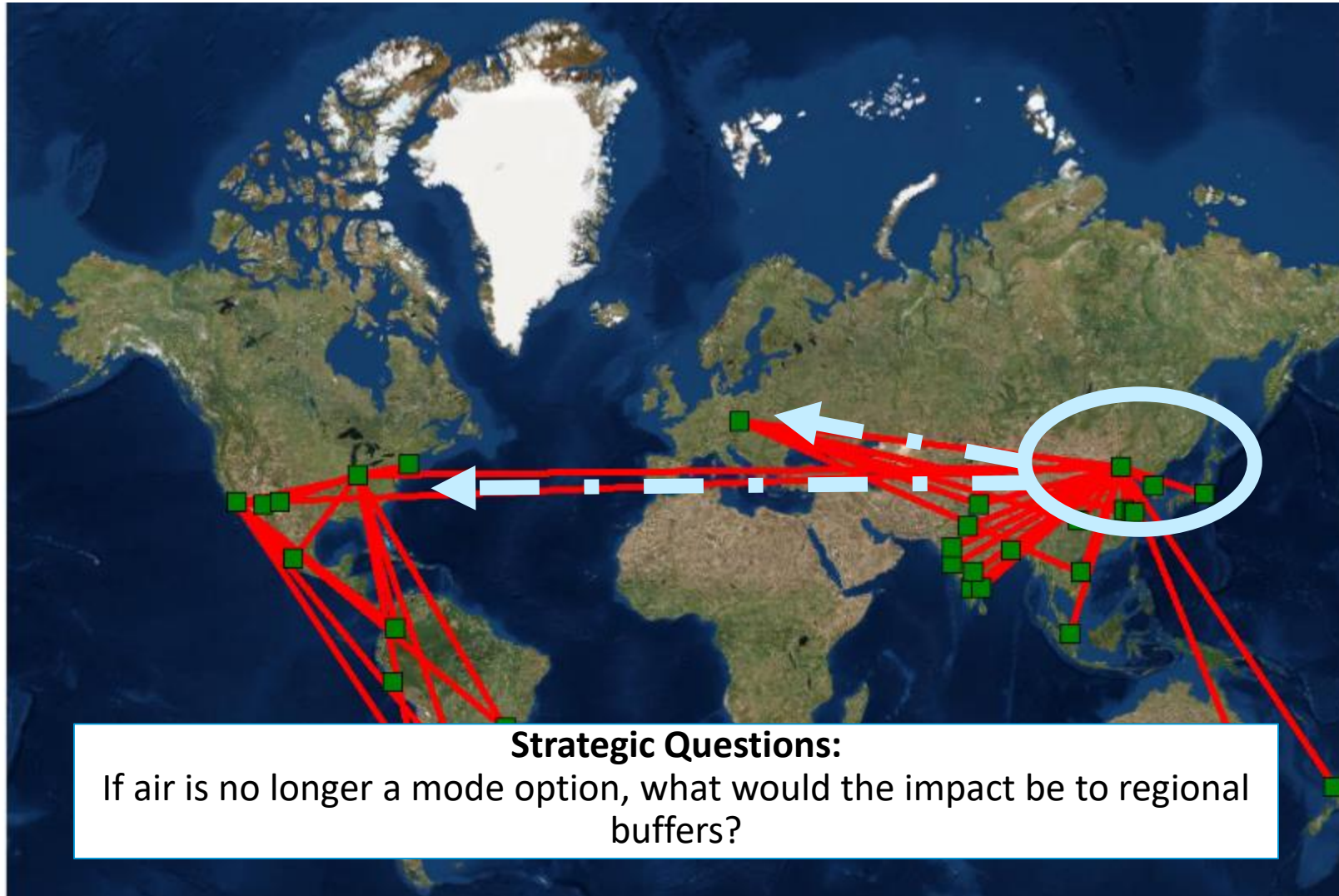
- **Passenger aircraft ban for lithium ion batteries:** All international shipments of lithium batteries without equipment are prohibited as cargo on passenger aircraft. (ICAO indicates this is a temporary measure until controls are in place to mitigate transport risks to an acceptable level.) This limitation does not affect lithium ion batteries packed with or contained in equipment. All shipments of lithium ion batteries outside equipment must now carry a [Cargo Aircraft Label](#) (pictured above).
- **State of charge limits:** A 30 percent state of charge (SOC) limit on lithium-ion cells and batteries, including Section II cells and batteries, will now apply. This does not apply to batteries packed with or contained in equipment.
- **Restrictions on package quantity:** A shipper is not allowed to offer more than one Section II package (batteries only) per air consignment.
- **Restrictions on overpacks:** Overpacks may contain no more than one Section II package (batteries only) – 8 cells or 2 batteries.
- **Battery package separation:** A shipper must offer lithium battery shipments (batteries only) separately from other cargo.



# Threat Alert Mobilizes Organization To Action



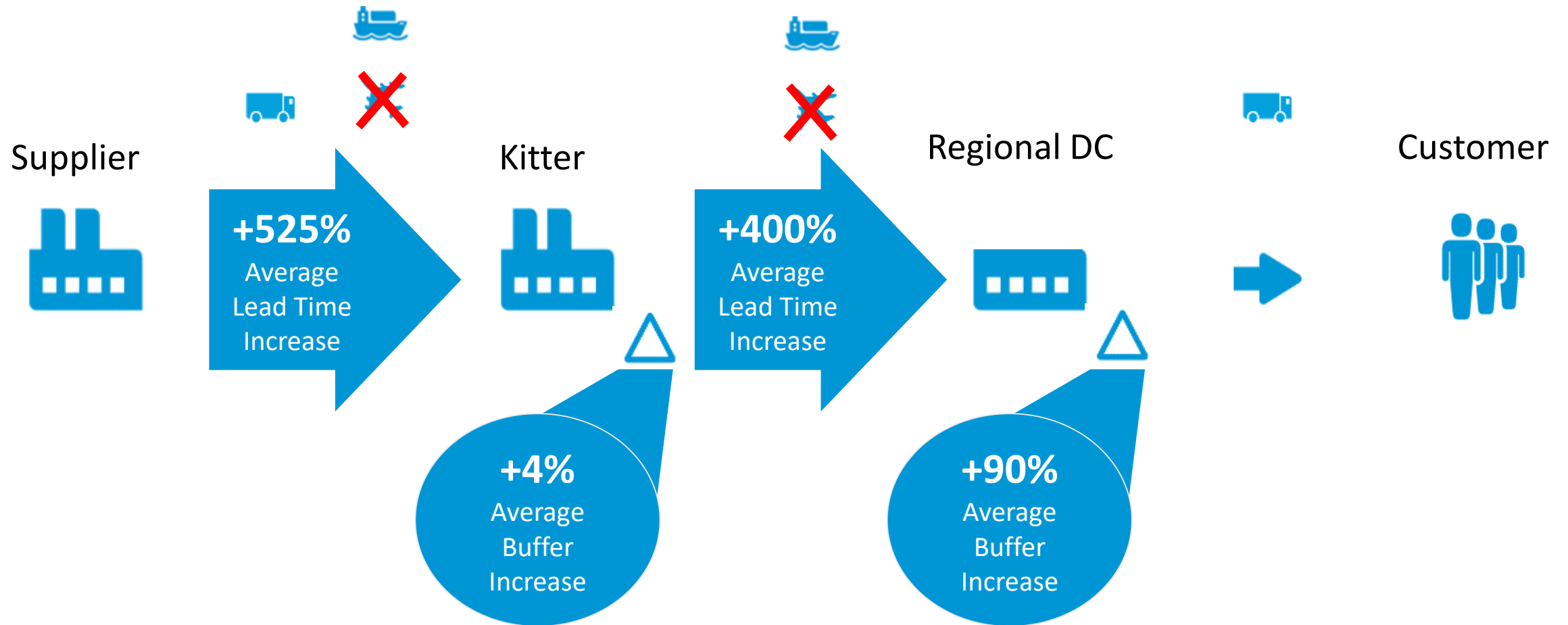
# Characterizing Issue Impact On A System



One of four HP business networks that would be impacted by battery freight restrictions.

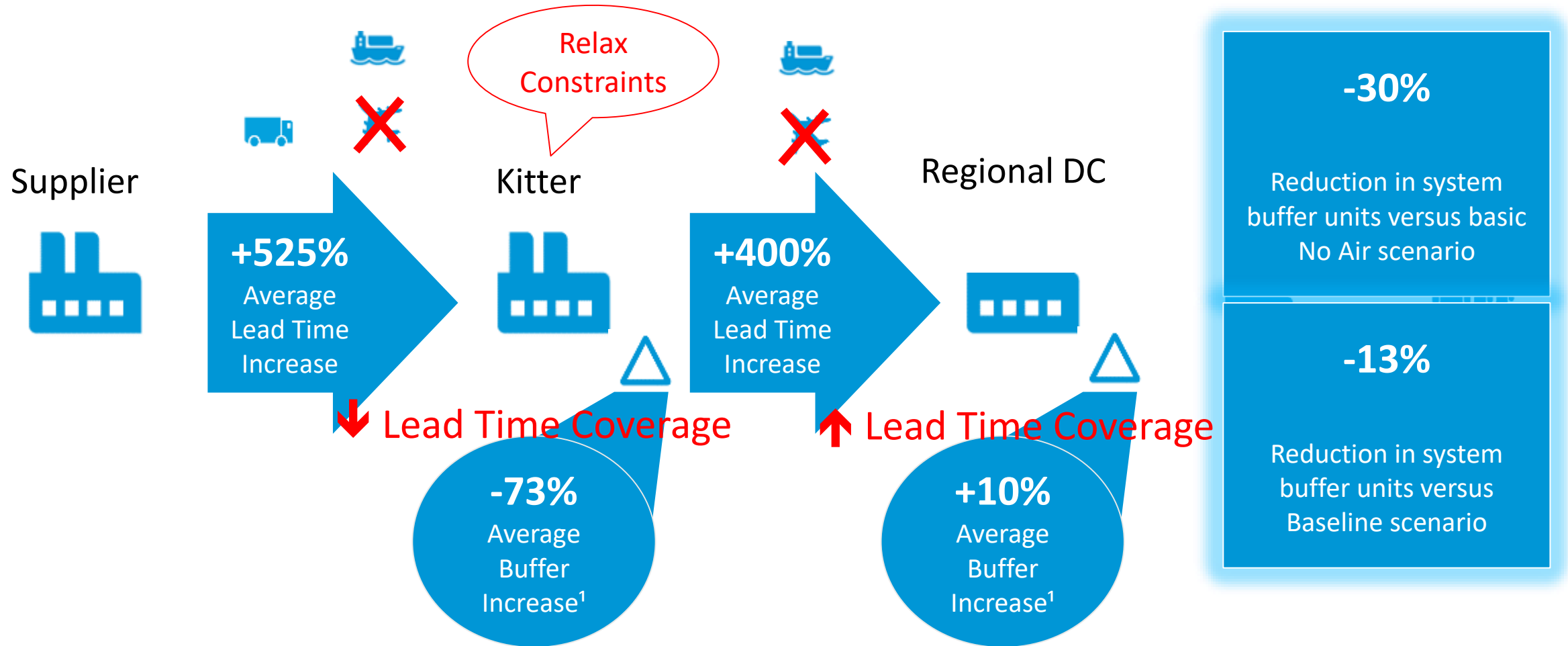
# Modeling Step 1: Evaluate The Impact

What Does Losing Air Transit Modes Mean To Inventory Performance





# Modeling Step 2: Mitigate The Risk

Predictive Modeling Tools Help Create Better Solutions For Disruptive Events



<sup>1</sup>Compared to no-air scenario with kitter constrained to offer immediate availability.

# Tuning Modeling Capabilities For Risk Management

Immediate Play Forward (Crisis Management)	Design Network (Strategic)
<ul style="list-style-type: none"><li>• “What is immediate system impact?”</li><li>• Critical Success Factor: Time to insight</li></ul> 	<ul style="list-style-type: none"><li>• “How do we minimize risk now and in the future?”</li><li>• Critical Success Factor: Scenario characterization</li></ul> 



Poke Yoka: **Detection Solutions**

Poke Yoka: **Prevention Solutions**



# HP Development Focuses For Predictive Modeling



Replace projects with online models



Develop data architecture to support rapid analysis



Risk assessments drive scenario development

# Supply Chain Operations

Never break the chain

Working Ahead – Preventative BCP



# Pilot Risk Assessment Categories

## BCP Score Card

- BCP Maturity score
- Single source
- Time to interrupt
- Time to recovery
- Revenue at risk
- Legal & Regulatory
- Geo political
- Recent trend of threats
- Financial & organizational stability