Auto-ID Capabilities & Managing Vulnerability

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How Does it Work?

- Tags
- Readers
- Software
- Servers
- Network

Standards Based

Source: Mark Dinning, Dell Computer Corporation

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Auto-ID vs. RFID

- RFID – Radio-frequency Identification
  - Reader and tag
- Auto-ID
  - Components
    - RFID Reader and Tag
    - Savant Software
    - EPC Electronic Product Code, aka license plate
    - ONS Directory (object naming service)
    - PML Physical Markup Language
  - Benefits
    - Network data storage
    - Network data access
    - Enables lower cost tags (passive)
    - Open standards (vs. proprietary network)

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RFID Evolution

	Opportunity	Values	Examples
Substitution Effect	Inventory audit, product information	Fast checkouts & payments, inventory control, theft prevention, reduced spoilage	Exxon Speed Pass – NY MTA Gated Tolls, Port checks cargo loads, Internet replaces fax w/ email
Scale Effect	Tracking, visibility, monitoring	Inventory location & control, asset management, product recall, product origin tracking	Multiple ports check cargo loads, Savi-Tyson container tags, Internet auctions, marketplaces
Structural Effect	Intelligent supply chain and services	Security, virtual supply chain, mfg process redesign, smart product/service, U-networks	Ports of Singapore & Seattle, DoD Product Tracking Transit to Iraq, LoJack Auto Retrieval

Based on framework by Prof. H. Lee, Stanford University, 2004

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What is at stake?

- High Impact-Low Probability Disruptions
  - 9-11
  - Foot and Mouth Disease
  - SARS
  - West Coast Lockout
  - 2003 Blackouts
  - Dec 03 Nor'easter
  - Theft!
- HI-LP disruptions impact on supply networks
  - Closed borders, C-TPAT
  - Tourism, Auto OEMs
  - Supply Availability
  - $10B, no containers
  - Loss of info systems
  - Lost production, sales…
  - Service failures, lost assets

Our economic viability…..

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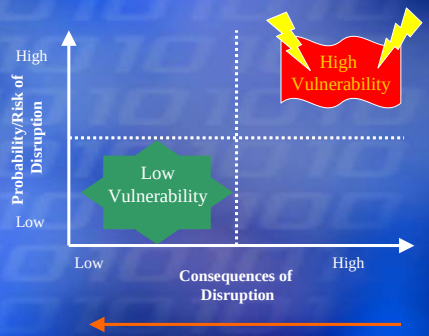
Mapping Vulnerability to Disruption

- Vulnerability
  - = f (probability & consequences) = f (network)
- Two sets of management actions to reduce vulnerability



1. Prevention, risk reduction, security

2. Response, manage consequences: resilience

Ref. – Sheffi, Rice & SC Response Project

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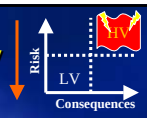
Prevention, Risk Reduction, Security



- Supply Network Operations
  - Access control, physical security, screening, red team ex., standards of care
  - Collaboration (stds of care), technology (RFID)
- Supply Network Planning and Design
  - Network Design – Location selection, # stages
  - Organization Design – Integrate logistics, risk mgt & security orgs (Lucent, Pfizer, Gillette), 'Cop eyes' culture
  - Risk Assessment – New frontier emerging
    - Risk profiling, risk portfolio, probabilistic risk analysis (Cisco)
    - Near-miss analysis
    - Map network risks – 'Staple yourself to a shipment'
    - State-of-art assessment: Aggregate risk assessment to a pattern

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Response, Managing Consequences

- Business continuity planning
  - Response planning – Emergency operating centers, formal security and response strategy, joint planning with suppliers and customers
  - Focus on Failure Mode and not Source of Disruption
    - Failure Mode Analysis – only a few failure modes
    - Plan to Fail Smartly*
- Develop resilience – "the ability to react to unexpected disruption & restore normal supply network operations"
  - Resilience culture – Education for awareness and training for response, 'Flexibility eyes'
  - Create resilience via Flexibility and/or Redundancy mix
    - Flexibility: response via infrastructure and capabilities
    - Redundancy: response via capital and capacity
  - Disruption Service Level – How much resilience?

* "Fail smartly" was introduced in the article "Homeland Insecurity" by Charles Mann, The Atlantic, September 2002

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Sample of RFID Current Use

- Retail, Distribution Centers
  - Wal-Mart, Target, Gillette, TESCO, Metro
- DoD
  - MREs
  - Container identification
    - Avoid $2B waste in Desert Storm
    - 90% fewer containers reqd for Army in Iraq vs. Gulf War
- Security
  - Smart & Secure Tradelane initiative
    - Pilot – Hong Kong, Singapore, Seattle
    - 15 port network tracking 1000 containers
  - Location monitoring, inventory status , intrusion detection (smart seals – RFID + sensor)
- Semiconductor environment
  - iGlove

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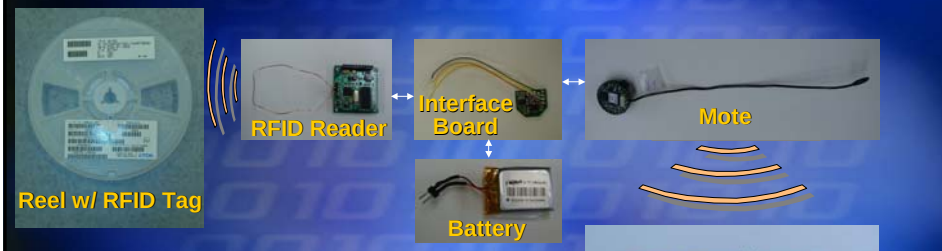
A Mobile, Wireless RFID Reader



1. Reader pulses and reads tag on reel
2. Interface board modulates power and RS232, supported by battery
3. Mote sends signal at X frequency
4. Base station receives signal, hardwire RS232 connection to laptop computer
5. Laptop displays signals being read via terminal emulator

Terminal Emulator on Dell Latitude

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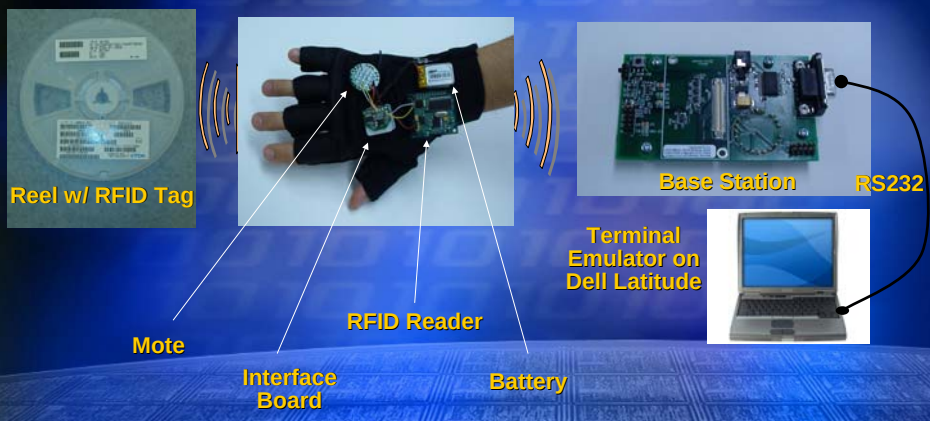
iGlove: A Mobile, Wireless, Wearable RFID Reader



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Reality of Auto-ID?

- Lack of clear business case
  - Benefits are expected in network adoption
  - Limited ROI for point solutions, est. $9M per supplier*
- Technology is not ready yet for broad open network adoption
  - Standards
    - Network operations & Information
  - Hardware
    - Readers & Tags
    - Compatibility, longevity, range, data storage, read rates
    - Solo RFID is not enough – sensors needed (conditions)
  - Environment still an obstacle: Metal, water
  - Organizational: New levels of collaboration required
- Mandates force 'slap and ship' applications
- Hype extends beyond capabilities
  - Metal in Malaysia
  - Packaging fixed until 2007
  - But its still important to explore the potential and develop the applications

Source: Forrester Research, March 2004

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Research Project Reference

- Supply Chain Response Project
  - Home Page
    - http://web.mit.edu/scresponse/
    - Downloads available of various project reports, presentations, articles
  - Research Team
    - Prof. Yossi Sheffi, Principal Investigator
    - Jim Rice, Director, CTL ISCM and APL programs
    - Broader research team including two LTs (USCG, USN)
- Smart Objects and Intelligent Supply Networks
  - Research Team
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