

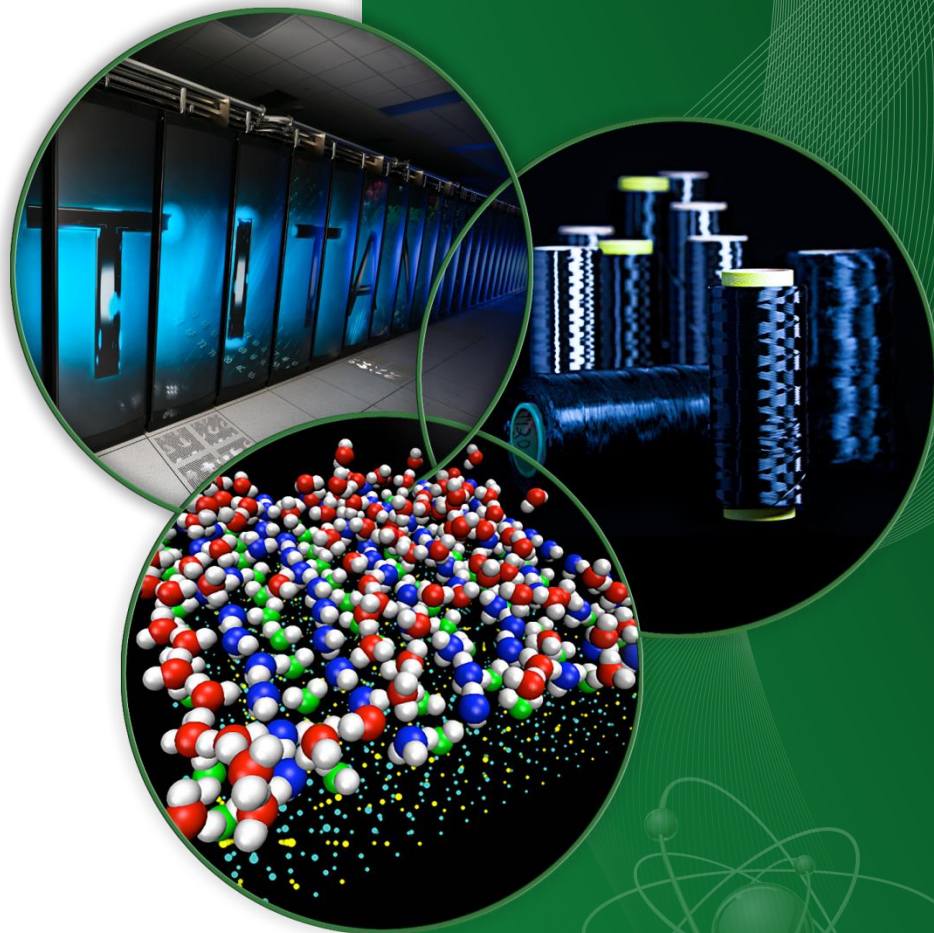
Cybersecurity Commercialization

Presented to
SPARK! 2016

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Technology Transfer
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Problem

- **40 million** cyber attacks worldwide (2014)
- **117,000** attacks each day
- **\$720,000** average cost of each data security incident
- **\$400 billion** cost to global economy from cybercrime

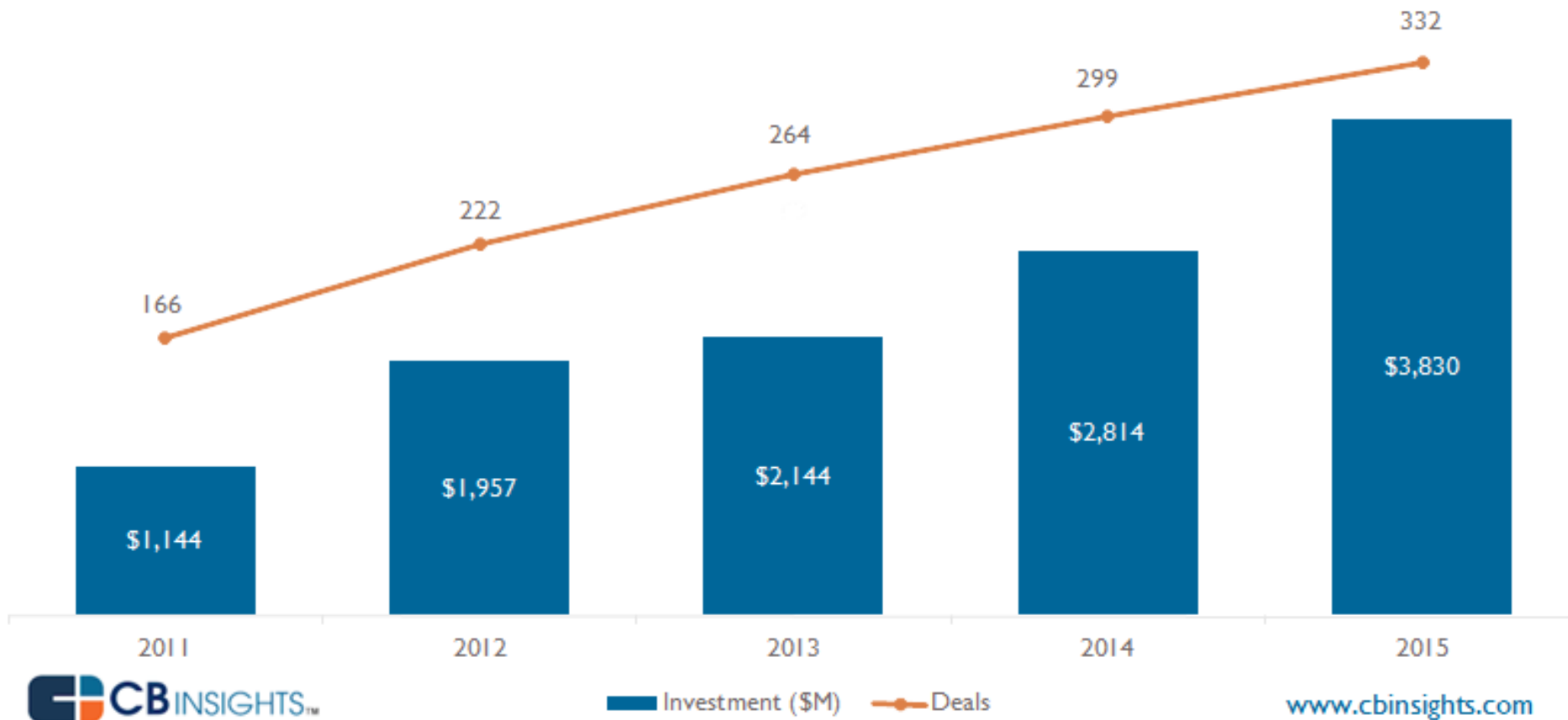
Source: <http://thehill.com/policy/cybersecurity/221936-study-cyber-attacks-up-48-percent-in-2014>

Source: <http://www.bloomberg.com/bw/articles/2014-06-09/the-global-cost-of-cybercrime-more-than-400-billion-per-year>

- **Example victims:**
 - Target: 110 million accts
 - JP Morgan Chase: 83 million accts
 - Home Depot: 56 million accts
 - Sony: movies stolen, personal information shared, millions of private emails published
 - Other cyber attack victims: Neiman Marcus, Staples

Investment in Cybersecurity

Cybersecurity Global Yearly Funding History 2011 - 2015



Source: <https://www.cbinsights.com/blog/cybersecurity-funding-2015/>

Cybersecurity R&D

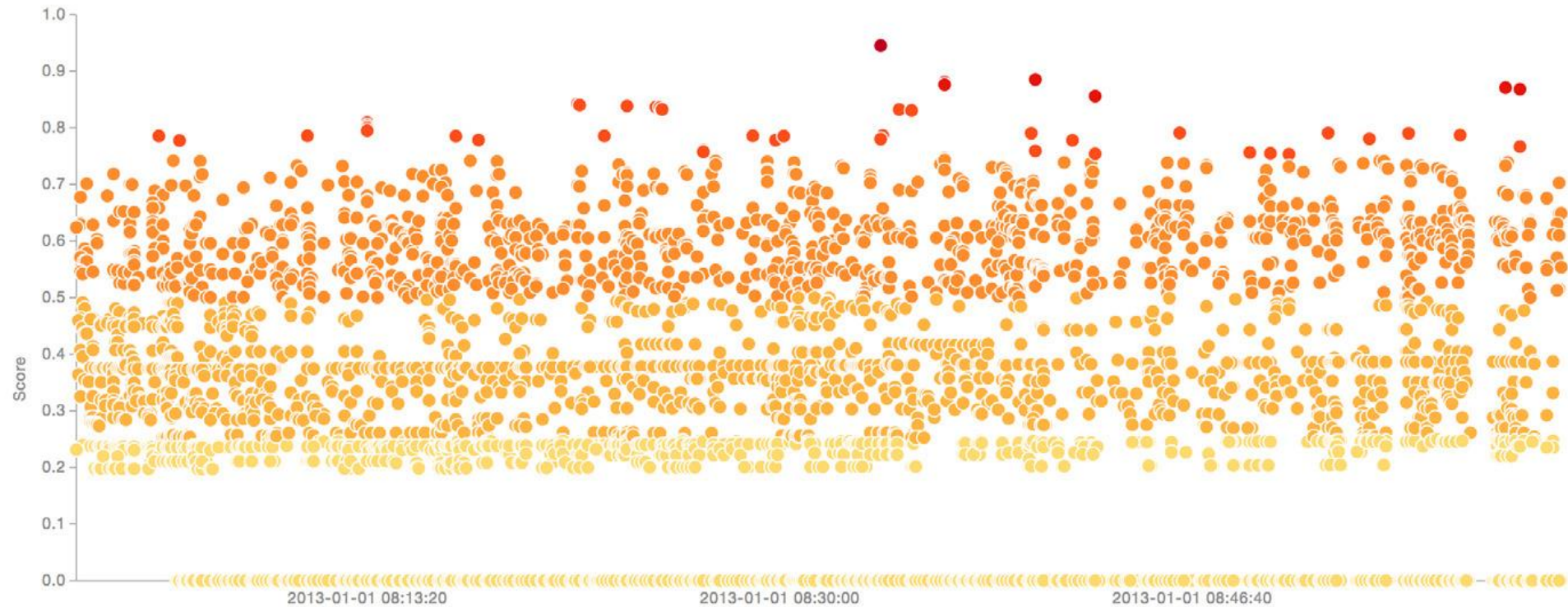
- Cyber Warfare Research Team
- Situation Awareness & Visual Analytics Team
- Secured Communications
- Vehicle Security Lab

Developed Technologies

- **Data Diode** – reduces data-exfiltration threats
- **USB-ARM** – screens removable media
- **Choreographer** – routes attackers to fake network addresses; segregates from other resources
- **Hyperion** – determines software's functions without use of the software's source code
- **Situ** – discovers and explains suspicious network behavior



Situ – Network Intrusion Detection



Emerging Technologies

- **1 SR Shadow Network** – enables evaluation of experimental technologies to be deployed on network
- **Jitterbug** – automated system for SCADA deployments; combines intrusion detection, moving target defense, and machine learning to detect intrusions, remove threats, and re-configure itself to resist future intrusion attempts.
- **Prometheus** – near real-time automated malware impact analysis and recovery system
- **Quantum Key Distribution**
 - Increase of clients on a QKD system at minimal cost
 - Continuous-Variable QKD system
 - Wireless QKD system

Wireless QKD – R&D Project Team



**Sandia
National
Laboratories**



Vehicle Security Laboratory

- 2015: researchers hack into a Jeep Cherokee

National Transportation Research Center

PEEM
Power Electronics and
Electric Machinery

FEERC
Fuels, Engines, and
Emissions Research Center

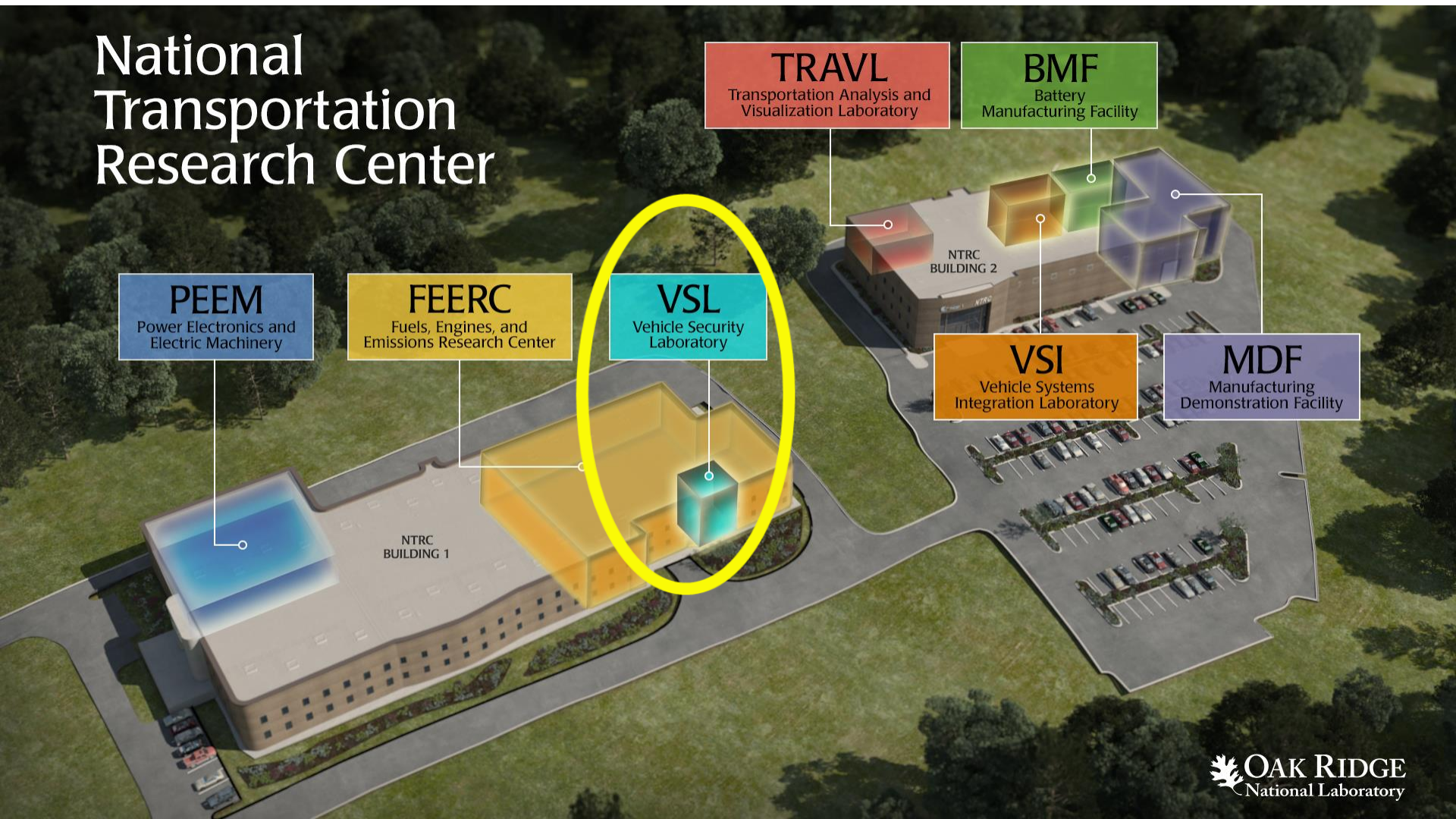
VSL
Vehicle Security
Laboratory

TRAVL
Transportation Analysis and
Visualization Laboratory

BMF
Battery
Manufacturing Facility

VSI
Vehicle Systems
Integration Laboratory

MDF
Manufacturing
Demonstration Facility



Vehicle Security Laboratory



Recent Licenses

- **R&K Cyber Solutions** (licensed *Hyperion*)
- **Lock Data** (licensed *Data Diode*)
- **SynaptiCAD** (licensed *Situ*)

Thank You!

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<https://www.ornl.gov/partnerships/partnerships>



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