



# Argonne Vulnerability Assessment Team

*Internationally recognized expertise in tags, seals, access control, anti-counterfeiting, cargo security, nuclear safeguards, & physical tamper/intrusion detection.*

## Adversarial Vulnerability Assessments

The Vulnerability Assessment Team (VAT) at Argonne National Laboratory (<http://www.ne.anl.gov/capabilities/vat>) has conducted vulnerability assessments on well over 1000 different physical security and nuclear safeguards devices, systems, and programs. This includes analyzing locks, anti-counterfeiting tags, tamper-indicating seals, RFIDs, GPS, microprocessor-based devices, nuclear safeguards equipment, electronic voting machines, medical devices, biometrics, and other access control devices. The VAT has demonstrated how all these technologies can be easily defeated using widely available tools, materials, and supplies, but has also devised numerous practical countermeasures.



The Argonne Vulnerability Assessment Team

## Other Work in Physical Security

The VAT has provided security consulting, training, R&D, vulnerability reduction, specialty field tools, and novel security/safeguards devices and strategies for 50+ different companies, NGOs, and government organizations, including DoD, NNSA, DHS, U.S. Department of State, the International Atomic Energy Agency (IAEA), and intelligence agencies.

## Research Areas

- biometrics
- tags & seals
- cargo security
- product tampering
- $\mu$ processor security
- GPS & RFID spoofing
- wireless technology
- nuclear safeguards
- human factors in security
- tamper/intrusion detection
- access control
- election security
- counter-intelligence
- product authenticity
- reverse engineering
- sticky bomb detection
- $\mu$ processor applications
- insider threat mitigation
- security culture & climate
- illicit drug testing security

## VAT Resources

- One-of-a-kind Vulnerability Assessment Laboratory
- 35+ person-years experience with security, safeguards, and vulnerability assessments
- High-Level security clearances
- Access to multiple SCIFs and limited access areas
- 1850 square feet of office and laboratory space solely for VAT projects
- 700 square foot VTR classified laboratory
- Access to 2000+ square feet of shared office & laboratory space, plus a high bay
- Unique microprocessor rapid prototyping shop
- Experience with the successful completion of \$28 million of classified & unclassified projects

## Recognized Expertise

Multiple awards, 10 U.S. patents, and 160+ technical publications. VAT personnel have given over 90 invited talks (including 6 Keynote Addresses) at national and international conferences.

The VAT is frequently interviewed by journalists and security bloggers about its work and its views on security. See, for example:

“Most Security Measures Easy to Breach”,  
<http://www.youtube.com/watch?v=frBGGjgkz9E>

Victoria Collier, “How to Rig an Election”, *Harper’s Magazine* 325, 33-41 (November 2012),  
<http://harpers.org/print/?pid=225772>

“How Your Vote Can Be Hacked”,  
[http://money.cnn.com/video/technology/2012/10/31/ts-voting-machine-hack.cnnmoney/index.html?iid=HP\\_River](http://money.cnn.com/video/technology/2012/10/31/ts-voting-machine-hack.cnnmoney/index.html?iid=HP_River)

Laura Spadanuta, “Machine Politics”, *Security Management* 56(10) 50-57 (September 2012),  
<http://securitymanagement.com/article/machine-politics-0010437?page=0%2C0>

“How Reliable is Electronic Voting in the US Election”, BBC Click Radio Program,  
<http://www.bbc.co.uk/programmes/p0104hxr>

“Researcher Details Findings on Spoofing GPS, Malicious Insiders”,  
<http://searchsecurity.techtarget.com/video/Researcher-details-findings-on-spoofing-GPS-malicious-insiders>

“Vulnerability Researcher on Layered Security Plan Mistakes”,  
<http://searchsecurity.techtarget.com/video/Vulnerability-researcher-on-layered-security-plan-mistakes>

“Getting Paid to Break Into Things: How Vulnerability Assessors Work at Argonne National Lab”,  
[http://www.techrepublic.com/blog/security/getting-paid-to-break-into-things-how-vulnerability-assessors-work-at-argonne-national-lab/5072?tag=mantle\\_skin;content](http://www.techrepublic.com/blog/security/getting-paid-to-break-into-things-how-vulnerability-assessors-work-at-argonne-national-lab/5072?tag=mantle_skin;content)

“Closing the Curtains on ‘Security Theater’”,  
<http://www.smartplanet.com/technology/blog/science-scope/at-argonne-national-lab-closing-the-curtains-on-security-theater/5167/>

“U.S. Lab Says Electronic Voting Machines Easy to Hack”,  
<http://www.voanews.com/english/news/usa/US-Lab-Says-Electronic-Voting-Machines-Easy-to-Hack-132016698.html>

“Diebold voting machines can be hacked by remote control”,  
<http://www.salon.com/news/politics/elections/2011/09/27/votinghack>

Digital Privacy: Are You Ever Alone?”,  
<http://news.medill.northwestern.edu/chicago/news.aspx?id=187163>

“Six Rising Threats from CyberCriminals”,  
[http://www.computerworld.com/s/article/9216603/Six\\_rising\\_threats\\_from\\_cybercriminals](http://www.computerworld.com/s/article/9216603/Six_rising_threats_from_cybercriminals)

“Aerial Drones May Be Vulnerable to Sabotage Because of GPS”,  
<http://www.thedailybeast.com/articles/2011/12/17/aerial-drones-may-be-vulnerable-to-sabotage-because-of-gps.html>

“Roger Johnston on Security Vulnerabilities of Electronic Voting”,  
<http://blog.verifiedvoting.org/2010/10/15/1131>

“Phishing Attacks: Training Tips To Keep Your Users Vigilant”,  
<http://www.techrepublic.com/blog/security/phishing-attacks-training-tips-to-keep-your-users-vigilant/5402>

“IT Security: Maxims for the Ages”,  
<http://blogs.techrepublic.com.com/security/?p=2435>

“Security Maxims”, *Security Now!* Podcast #215,  
<http://www.grc.com/sn/sn-215.htm>

“Vulnerability Assessment’s Big Picture”, *CSO Magazine*,  
[http://www.csoonline.com/read/060107/fea\\_qa.html](http://www.csoonline.com/read/060107/fea_qa.html)



Reverse engineering

## Some Recent Invited Talks

IAEA Regional Training Course on Physical Protection Against Sabotage, Beijing, China, 2012

DHS/CPB Workshop on Product Counterfeiting, Washington, D.C., 2012

IAEA Course on Essential Elements of Nuclear Security, Argonne National Laboratory, 2012 & 2011

Security in Government Conference (**Keynote Address**),  
Canberra, Australia, 2011

White House Working Group on Product Counterfeiting,  
Washington, D.C., 2011

Nuclear Regulatory Commission (NRC) Security Conference,  
Lisle, IL, 2011

Election Verification Network Conference, Chicago, IL, 2011  
Carnegie Mellon University, 2011

Microsoft Headquarters, Redmond, WA, 2010

19<sup>th</sup> Annual USENIX Security Symposium (**Keynote  
Address**), Washington, D.C., 2010

U.S. Coast Guard Facility Inspector Workshop, Santa Barbara,  
CA, 2010

Sandia National Laboratories, Albuquerque, NM, 2010

Pharmaceutical Security Institute General Assembly, Mclean,  
VA, 2009

Princeton University, 2009

SecureWorld Expo (**Keynote Addresses**), Atlanta, GA, 2008  
and San Francisco, CA, 2007

Technical Meeting on Sealing Systems and Containment  
Verification Methods, Vienna, Austria, 2007

Technology Surprise Symposium, Washington, D.C., 2007

## Sample Publications

RG Johnston and JS Warner, "How to Choose and Use Seals", *Army Sustainment* **44**, 54-58 (2012).

RG Johnston, "Vulnerability Assessment", in *Critical Infrastructure Security: Assessment, Prevention, Detection, Response*, WIT Press, 2011.

JS Warner and RG Johnston, "Why RFID Tags Offer Poor Security", *Proceedings of the 51<sup>st</sup> INMM Meeting*, Baltimore, MD, July 11-15, 2010.

RG Johnston, J Vetrone, and JS Warner, "Sticky Bomb Detection with Other Implications for Vehicle Security", *Journal of Physical Security* **4**, 36-46 (2010).

RG Johnston and JS Warner, "Unconventional Approaches to Chain of Custody and Verification", *Proceedings of the 51<sup>st</sup> INMM Meeting*, Baltimore, MD, July 11-15, 2010.

RG Johnston, "Lessons for Layering", *Security Management* **54**, 64-69, (2010).

JS Warner and RG Johnston, "Chirping Tag and Seal", *Proceedings of the 51<sup>st</sup> INMM Meeting*, Baltimore, MD, July 11-15, 2010.

RG Johnston, EC Michaud, and JS Warner, "The Security of Urine Drug Testing", *Journal of Drug Issues*, **39**, 1015-1028 (2009).

EG Bitzer, PY Chen, and RG Johnston, "Security in Organizations: Expanding the Frontiers of Industrial-Organizational Psychology", *International Review of Industrial and Organizational Psychology* **24**, 131-150 (2009).

JS Warner and RG Johnston, "Contact Memory Buttons and Nuclear Safeguards", *Journal of Nuclear Materials Management* **37**, 11-15 (2009).

RG Johnston, M Bremer Maerli, EG Bitzer, and JD Ballard, "Two Simple Models of Nuclear Transparency", *International Journal of Social Inquiry* **1**, 201-237 (2008).

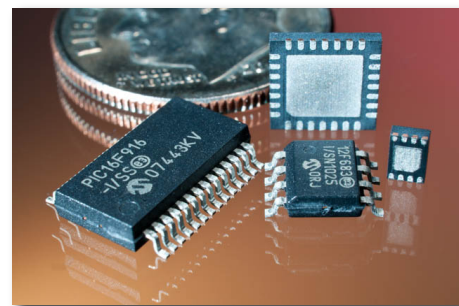
RG Johnston, "Tamper-Indicating Seals", *American Scientist* **94**, 515-523 (2006).

RG Johnston and JS Warner, "The Dr. Who Conundrum: Why Placing Too Much Faith in Technology Leads to Failure", *Security Management* **49**, 112-121 (2005).

RG Johnston, "The 'Anti-Evidence' Approach to Tamper-Detection", *Packaging, Transport, Storage & Security of Radioactive Material* **16**, 135-143 (2005).

JS Warner and RG Johnston, "GPS Spoofing Countermeasures", *Homeland Security Journal*, December 12, 2003.

JS Warner and RG Johnston, "A Simple Demonstration that the Global Positioning System (GPS) is Vulnerable to Spoofing", *Journal of Security Administration* **25**, 19-28 (2002).



Expertise in microprocessors & electronics





## Journal of Physical Security

The VAT hosts and edits the Journal of Physical Security (<http://jps.anl.gov>), the only peer-reviewed journal devoted to physical security. Both technical and social science aspects are covered, including R&D, theory, modeling, and analysis.



Unconventional approaches to nuclear safeguards



## About Argonne National Laboratory

Argonne National Laboratory, the nation's first national laboratory, is one of the U.S. Department of Energy's largest national laboratories for science and engineering research. It is located 25 miles from downtown Chicago. Argonne is managed by UChicago, LLC, for the United States Department of Energy.

Argonne has approximately 3,400 employees, including 1,100 scientists and engineers, three-quarters of whom hold doctoral degrees. Argonne's annual operating budget is approximately \$800 million.

Since 1990, Argonne has worked with more than 700 different companies, government agencies, and NGOs.



Some of the novel VAT security prototypes

