



2005 University  
**Biosecurity**  
Summit


# Global Biosecurity: The Vital Role of Academic Leadership

Occasional Paper Number 1  
From Virginia Tech's National Capital Region  
Fall 2005

**preparing the next generation for biosecurity**







# 2005 University Biosecurity Summit

Dear Colleague,

It is my pleasure to provide you with a copy of *Occasional Paper Number 1* from Virginia Tech's National Capital Region. This paper, entitled "*Global Biosecurity: The Vital Role of Academic Leadership*", has been authored by David R. Franz, Kansas State University, Peter A. Singer, University of Toronto and me. This paper reflects the essential outcomes from Virginia Tech's very first University Biosecurity Summit, which was held in Alexandria, Virginia on May 9–10, 2005.

Biosecurity may well be one of the foremost challenges facing our global society. Our conference was held based on the conviction of Virginia Tech that the complexity, challenges and diversity of the problem set of biosecurity require that strong consideration be given now to developing and preparing the next generation within academia to support and advance global biodefense. Virginia Tech reasoned that this will only succeed by the current generation of biosecurity performers laying down a well conceived and robust foundation in a coordinated and harmonious manner for those that will succeed us.

Virginia Tech faculty and administrators were joined by representatives from 11 U.S. and Canadian universities, two prominent non-profit institutes, the National Academy of Sciences, the Institute of Medicine, the National Institutes of Health and the President's Council on Bioethics. Representatives from a number of other institutions and were invited but could not attend due to schedule conflicts. This small, informal meeting created a forum to begin an active dialogue within academia and with its stakeholders to explore how academia nationally and globally can define for itself a leadership role and best contribute to national and global biosecurity in a productive and sustained manner. The overall goal of the conference was to produce a set of recommendations and actions items for the broader academic and stakeholder communities to consider as a basis for working through the academic community to promote the life sciences for noble and beneficial purposes, while reducing the risks of life sciences being developed and used for careless, malicious and illicit purposes.

As it turned out, the meeting participants shared many similar and complementary thoughts, observations and perspectives about the current state of biosecurity, and a firm commitment to advancing biosecurity to a much improved state. Thus, for the first time, we are able to articulate a strategic framework to advance important, complementary and overlapping dimensions of biosecurity for which the academic community should become well positioned to positively impact in the future. We are excited about future opportunities to work with academic colleagues and partners around the globe to implement as many as possible of our Summit's recommendations.

My co-authors, Virginia Tech colleagues, the meeting participants and I hope that you will take a few moments to read and reflect on this paper. Feel free to share this with interested colleagues in your professional circle.

With warm regards,



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# 2005 University Biosecurity Summit

## **Global Biosecurity: The Vital Role of Academic Leadership**

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Since 9/11, there has been a considerable increase of engagement of individual academics in biosecurity—drawn by interest and funding. However, to our knowledge, academia has no established strategy or action plan in relation to national or global biosecurity needs. An effective national, and global, response to biosecurity requires the best minds and commitment from all sectors, including academe. Without leadership from the academic community, the U.S. and global biosecurity efforts will likely flounder.

Biosecurity is one of the most pressing social issues facing our global community. The life sciences and biotechnology present potentially enormous advancements and benefits for global priorities such as health, food and environment. Many of these same advancements also present us with formidable challenges if intentionally or accidentally misused. These challenges must be confronted and successfully addressed.

Academia is an important leader in advancing solutions to these challenges. Its contributions come in areas such as knowledge discovery through science and scholarship, technology development and transfer, objective and credible policy analysis and critique, behavioral and societal understanding, communication, learning, and the development and acceptance of ethical behaviors and practices for national and global good. These are opportunities for academics not only in the US but around the world. With a greater collective emphasis, academia could do more than it is today to address these challenges.

To develop priorities and a plan of action to advance a new paradigm for biosecurity, Virginia Tech convened a small meeting on May 9-10, 2005, its first University Biosecurity Summit. Eleven U.S. and one

Canadian university, two prominent non-profit institutes, the U.S. National Academy of Sciences and Institute of Medicine, and two U.S. Federal agencies were represented.

From this process, the authors derived a draft **Statement for the Future Engagement of Academia for Biosecurity**, as follows:

*Biosecurity should be recognized as a new interdisciplinary field of study which is intended to prevent or reduce the threat, use and impacts of new and emerging disease to humans, animals and plants through natural, accidental and intentional means.*

*There is a need for a global biosecurity strategy and process of acceptance and implementation, which is guided by the following principles:*

- *Biosecurity is a global problem that must be addressed with the mindset of a global challenge*
- *Biosecurity is a multi-disciplinary challenge that requires cross-disciplinary solutions*
- *Biosecurity must be based upon common definitions, language and terms of reference to facilitate communication and progress among an integrated biosecurity community and its stakeholders*
- *A global strategy for biosecurity should be developed with the primary goal of the reduction of the severity and likelihood of biological catastrophes through anticipation, prevention, preparedness, intervention and recovery, whether they are intentional, accidental or natural in origin*
- *Academia, government, non-profits and industry are important stakeholders in the solution of this critically important global challenge*
- *All sectors must work together to foster a culture of advocacy, research, education and policy formulation to reduce threats and increase opportunities that come from new life science knowledge and technology*
- *Academia should not simply be reactive, by “admiring or critiquing the problem”, but should position itself to be proactive and visionary to contribute to effective solutions*
- *The pursuit of truth and excellence in science, scholarship and learning must be paramount*

*The challenges of biosecurity, both now and in the future, require academic leaders at all levels to become more engaged. Academia has important contributions to make and an obligation to contribute to the*

*advancement of biosecurity and the public good through many areas of scholarship, research, learning and outreach. In these pursuits, an environment that fosters free thought and the continual pursuit of new knowledge against the most difficult problems will enable best outcomes.*

The Summit participants also proposed a set of priority “next steps” which academia and its partners should pursue towards an improved future state of global biosecurity:

**Adapt the University Mission and Improve Capacity.** Without undermining their commitment to academic freedom and fundamental research and discovery, universities and colleges should strive to improve their ability and capacity of academic institutions in the following areas:

*Problem responsiveness:* Enhance and focus to effectively address opportunities and the most difficult problems. Provide new ideas, concepts, knowledge and technology to stakeholders and users in a manner or form that most effectively enables benefit to be derived. Establish capacities and structures to address “the big biosecurity problems” using multi- and cross disciplinary approaches.

*Incentives and Structure:* Ensure that incentives are appropriately aligned to mission. Adapt the current reward system, which is based on papers and grants, to current and future needs through new criteria which rewards other types of contributions. Create enterprises that span departments and colleges to foster interdisciplinary explorations and solutions sets for biosecurity problems, complexities, interfaces and interdependencies.

*University Outreach:* Establish regular, relevant and credible engagement with the public to communicate, inform, educate and act as “social critic” on government and private plans, programs and intentions. Incentivize faculty to do more and better public education. Clarify, normalize and formalize rights and protections for performers who contribute to biosecurity.

*Systemically Engage Key Stakeholders such as Intelligence and Law Enforcement:* At least two U.S. National Academy of Sciences studies have recognized the criticality of effective intelligence and law enforcement for robust biosecurity, just as it is with public health. Develop mechanisms to overcome perceptions and realities of

the disparate cultures, missions and priorities within academia and these other universes. Find ways to bridge across and close existing chasms.

*Workforce development:* Establish relevant intellectual and practical foundations to produce future generations of experts in all dimensions of biosecurity through appropriate disciplinary and interdisciplinary education and training. The “workforce study” mentioned below could serve as the basis for resource and program development for the academic community.

**Beginning now, help prepare the next generation in biosecurity.** First, establish common definitions and terms of reference for biosecurity. Begin this process with a small group of blended expertise from relevant, yet complementary, disciplines. Publish the results and communicate and reinforce these definitions and terms to key policy, professional and scientific organizations worldwide. Second, seek the commissioning of a comprehensive and objective, national-level “workforce development study” which will describe and define what exists, what is required and how to achieve it in order to best prepare the next generation of biosecurity experts. Third, and concomitant with the second, pursue a comprehensive cataloguing of what is underway in biosecurity. Fourth, advocate a study to develop a benchmarking system for previous, ongoing and future biosecurity initiatives. Fifth, develop and provide training and standards for rising practitioners in all disciplines and levels so that biosecurity issues are accurately and effectively communicated and work to make it required. Sixth, establish a clearing house for highest quality subject matter expertise, rather than a ‘system’ based on personal access or political proximity.

**Establish common standards of ethics and codes of conduct and performance for practitioners across all relevant biosecurity disciplines.** Initiate a consensus building process to create and perfuse a set of standards and codes that are adaptable to academic biosecurity practitioners in all disciplines, not just life scientists. Design, validate and disseminate a suite of effective training materials which can be understood and used by all leaders, practitioners, trainers and students. Establish rigorous guidelines or standards for peer review and publication. Work to leverage outcomes and recommendations regarding “dual use” in life sciences and biosecurity from rigorous, peer-reviewed studies and develop effective means of implementation.



**Create a Global Academic Biosecurity Network.** Develop and formalize an active global network of interested academicians and home institutions, including those from the developing world and emerging economies, and seek those who have not yet stepped on the biosecurity stage. Establish new collaborations to focus on such initiatives as a position paper on biosecurity from the global academic community; enabling new collaborations for novel and innovative science, scholarship, education and outreach; publishing a comprehensive global biosecurity strategy and developing a pool and succession of leaders who are well suited and prepared to articulate and argue an academic message on biosecurity in deep, visionary and proactive ways; developing and sharing curricula and best practices in biosecurity and related fields; establishing formal relationships with and between national academies of science and national, regional and international organizations in new and more coherent ways for advancements in science, policy and resource identification and application.

Societies will face significant biosecurity challenges, from nature, bungling, proliferation or bioterrorism. Working together, across the globe, academe can do more to address the many challenges of biosecurity. The authors urge academic leaders to reflect on the strategies outlined here and act in concert to leverage the unique strengths of academia to contribute solutions to one of the greatest challenges of our time.

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# Presentation Slides

*prepared by*

Randall Murch, PhD

*presented at the*

2005 University Biosecurity Summit

# University Biosecurity Summit

*“Seeking to Prepare the  
Next Generation”*

May 9-10, 2005



Welcome....

*“The Experiment”  
is about to  
begin....*



## Why are We Here?

“This summit is based on the conviction that the challenges and diversity of the problem set of biosecurity require that strong consideration be given *now* to developing and preparing the next generation to effectively *create, innovate, support and lead* national and global biosecurity.”



## Working Definition

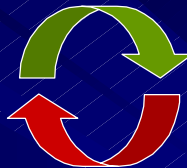
- Biosecurity, n. to prevent, reduce or eliminate the threats, applications and effects of intentional and unintentional misuse of life sciences and technology, while promoting and pursuing beneficial pursuits and uses

**The life sciences present mankind with potentially both enormous benefits as well as devastating effects on health, well-being, sustenance, societal stability and security.**



# Foci of Biosecurity

- Defense Against Intentional Acquisition, Development and Use of Biological Threat Agents (Organisms, Natural Products)
  - Biowarfare
  - Bioterrorism
  - Biocrime
- Intentional or Unintentional Misuse of Life Science and Technology
- Unintended Consequences of Current and Future Science and Technology



Current and Emerging Infectious Diseases & Non-infectious Diseases

Molecular, Cellular & Organism Biology

Host – Pathogen Systems

Microbial & Disease Ecology

Biological Diversity



**Bioterrorism-Biowarfare-Biocrime-Misuse**

Prevention, Mitigation & Recovery from Disease

Improving Natural Systems

Bioprospecting

Engineering Technologies

Creating Synthetic Systems



# A Biosecurity Matrix

## ■ Threats and Challenges

- People
- Motivation
- Situations
  - Deliberate
  - Accidental
- Strategies, Plans
- Knowledge
- Technology & Materials
- Resources
- Vulnerabilities

## ■ Opportunities & Solutions

- People
- Deep and Broad Knowledge of Threats & Challenges
- Scholarship, Analysis, Planning
- Education, Training & Communication
- Science & Technology
- Creativity & Innovation
- System Integration
- Leadership
- Vision, Strategies, Plans
- Motivated, Interactive Community
- Access
- Resources
- "Tool Kit" of Options
- Applications

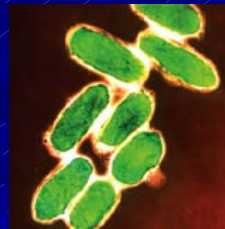
**How and Where do Universities  
Best Fit, Contribute, Induce Change  
and Advancement?**



# Bioweapons, Bioterrorism & Biowarfare

- Defense against BW and the misuse of life sciences is a very high priority and a difficult problem set for many communities:

- *Medicine & Public Health*
- *Law Enforcement*
- *Homeland Security*
- *Agriculture*
- *Military*
- *Counterproliferation*
- *Intelligence*
- *Nonproliferation, Arms Control*
- *Diplomacy*
- *Policy and National Decision Makers*



- Rising Tide of Capabilities and Intent
- Individual, Societal and Systems Interdependent Vulnerabilities
- Dual Use Concerns Cut Across Many Stakeholders: Advancement and Availability of Knowledge, Expertise, Economic Infrastructure and Technology
- Even Small Events Can Have Catastrophic, Cascading and Enduring Effects





## Biological Weapons: Targets & Context



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## “The Bioterrorism Problem”

- Explosion in Life Science Knowledge, Technology and Applications Has Extensive “Dual Use” Implications
- Pace of Discovery in Life Sciences Will Continue for Foreseeable Future
- Knowledge and Technology is Freely Available and Accessible
- Cannot Control Availability of Knowledge and Technology
- Highly Specialized Expertise Not Necessarily Required
- Options v. Vulnerabilities are Numerous and Varied
- “Poor Man’s Nuke”
- Bad Guys Don’t Play by the Same Rules We Do
- World is a More Dangerous, Uncertain Place
- Illicit Activity Easy to Conceal by Denial & Deception
- Scales of Risk and Effects Have Changed
- No Consistent Global Perspective nor Enforceable Global Legal and Regulatory Conventions
- Very Complex and Dynamic (Worrisome) “Systems Problem”

*Weapon and Delivery Options x Vulnerabilities x Objectives x Knowledge Availability x Technology Access x Expertise Available x Effectiveness of Warning, Protection, Response and Recovery x Denial and Deception Options*

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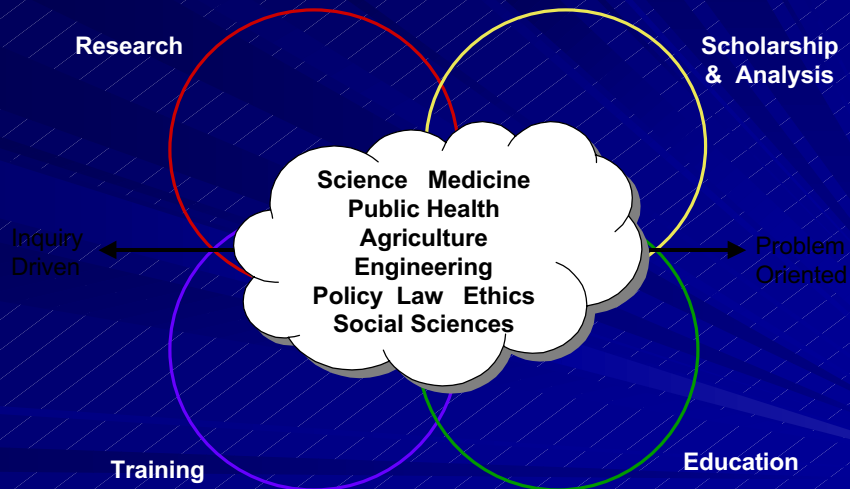
## BW-BT MetaSystems: "Business Cycles" of Bad Guys & Good Guys

- |                               |   |
|-------------------------------|---|
| ■ Concepts & Intentions       | ■ Anticipation, Prevention & Deterrence |
| ■ Designs                     | ■ Detection                             |
| ■ Plans                       | ■ Analysis - Characterization           |
| ■ Acquisitions and Logistics  | ■ Interdiction                          |
| ■ Experimentation             | ■ Disruption                            |
| ■ Production & Testing        | ■ Mitigation                            |
| ■ Training & Preparation      | ■ Defeat                                |
| ■ Operations & Attack         | ■ Response & Investigation              |
| ■ Evasion & Escape            | ■ Attribution & Prosecution             |
| ■ Denial & Deception          | ■ Restoration - Recovery                |
| ■ Lessons Learned & Evolution | ■ Lessons Identified & Evolution        |

"Bad Guys" v "Good Guys"



## Academia ↔ Biosecurity



## Broadly Consider.....

- What is “biosecurity” at present? What should or can it be?
- Is biosecurity a set of complementary strategic systems solutions or a gaggle of point solutions?
- What are and should be the roles, responsibilities and contributions for universities in biosecurity?
  - What do universities do well and not so well?
  - What should they do better if they want to really contribute?
- Can principles, processes or platforms be developed upon which biosecurity as a discipline or practice can or should be established and advanced?



## High Level Questions

- What are the enduring and future biosecurity imperatives for basic and applied research, study, education and training for the various stakeholder communities?
- What strategies and approaches will equip the security, health, agriculture, legal and policy communities to make the best use of and benefit from the capabilities and capacities of universities?
- How should universities assess (establish) the content, approaches and effectiveness of their biosecurity programs and initiatives now and in the future?
  - Is biosecurity a fluency or field?
  - What content and pedagogy are best suited to this area of study and pursuit?
  - Can “metrics” be developed for university biosecurity programs?
  - What are the “deliverables” for university-based biosecurity programs?
- Can universities effectively integrate or leverage disciplines to study and advance biosecurity from “systems” perspectives?
- How can collaboration and communication be best fostered within academia nationally and globally to advance biosecurity as a discipline, and more broadly global security against biological weapons?



## Provocations

- There is no national or global grand strategy for biosecurity
- The US and the rest of the world do not see the “bio problem” the same way
- There is no common base for the “practice” of biosecurity
- US biosecurity is founded on many disconnected or poorly connected government and private initiatives--largely US-centric
- Except certain specific initiatives, global biosecurity is immature/uncertain
- Many biosecurity programs and projects are not initiated, conducted or delivered on with a full understanding of “the question” or “the problem”, nor based on a systems approach
- Little in biosecurity based on “scientific method”, nor has it been pursued with rigor
- Though US academics are involved in projects, programs or studies, generally academia as a whole is not viewed as a major or responsive player in biosecurity
- Though recognized by some as important for the success of biosecurity, there is no common view, set of principles or community to drive academic involvement and leadership in biosecurity in the US or globally
- There are no standards of excellence (conduct) for biosecurity (not code of ethics for life scientists)
- Though the problem will long be with us, there is no “next generation” in biosecurity as yet, or foundation from which to develop and prepare one

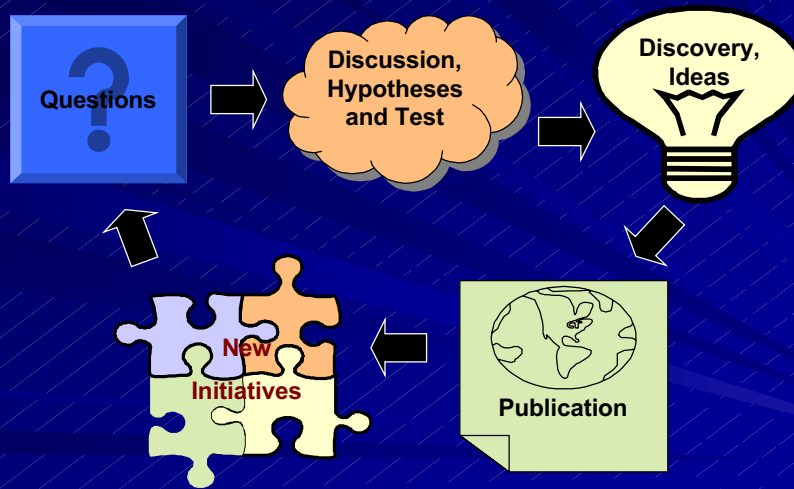


## “Targets of Opportunity” for the Summit

- **Define:** Role of universities in the context of the broader biosecurity - biodefense enterprise
  - Balance academic freedom with recognized needs and gaps
  - Improved coupling of perspectives and requirements of stakeholders
  - Focus on areas for which academia can add value or provides advantage
  - “Business models” to improve responsiveness and quality
- **Project:** “Requirements”, challenges, demands and opportunities in biosecurity over next 10 years, particularly for academia
- **Explore:** Common vision, charter or strategy for national and global academic leadership in biosecurity
- **Imagine:** Academic network, cross-disciplinary, interactive, global
- **Envision:** Principles or standards of conduct and performance
- **Lean Forward:** Conceptualize a base and path to go forward prepare the “next generation”
- **Propose:** Five to ten strategic initiatives to “get there” with high impact, likelihood of success, sustainability



## UBS Process



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## Small Group “Rules of Engagement”

- Follow the lead of group chair
- Consider all or choose those sets of questions which most interest the group
- Free think, discussion, debate, “argument”, test
- Come to consensus or majority and minority positions on all or selected questions
- Organize thoughts, points, ideas and recommendations → communicate summary
- Question: Should “The Summit” be continued, if so how should it be evolved?

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Questions,  
Comments?

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