

INTL 8289: The Human Factor Role in CBRN Security

SPRING 2018

Fridays, 9:05AM – 12:05PM, CITS 1st Floor Conference Room (Holmes/Hunter Academic Building)

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Holmes/Hunter Academic Building: Room 343

Office Hours: By Appointment

Overview

The course looks into the genesis of security culture as a concept emerged with the recognition of the role of the human factor in the context of security. Being a subset of organizational culture and drawing on its experience, security culture is defined to improve the performance of the human component. It has evolved from a concept to a widely recognized practice designed to make human interface with security technologies and regulations effective and sustainable. Security culture connotes not only the technical proficiency of the people but also their awareness of security risks and motivation to follow established procedures, and take the initiative when unforeseen circumstances arise. A workforce made of individuals who are vigilant, question irregularities, execute their work diligently and exhibit high standards of personal accountability is able to contribute to effective CBRN security (chemical, biological, radiological, nuclear). Further advancement of security culture makes it necessary to orient it toward multi-disciplinary application, harmonize with safety culture, closely integrate it into national culture of individual countries, and raise security culture to the level of societal value by adopting a multi-stakeholder approach.

The course will review the role of the human factor and culture in domain specific (nuclear, radiological, biological, chemical, cyber) and functional areas (strategic trade control and customs) to identify their common and specific feature as a potential foundation for strengthening a shared architecture of security culture across most domains. Each domain poses a unique challenge in terms of balancing security, safety, best practices and ethics. This subject matter, is recommended for students planning professional careers in the government and private sectors requiring knowledge and skills to safeguard weapon-usable material and dual-use technologies, devise and manage security arrangements, develop adequate human capacity, and protect sensitive information. Understanding the patterns of human behavior under stress, in emergency situations, and day-by-day normal activity as well as the stimuli for compliance and, if necessary, improvisation can be an important asset for job seekers in the current environment of continuously evolving and diverse risks.

Grading

- ***Class participation and reading (15%)*** Each student is expected to complete the required reading and be prepared to participate actively in discussion. One student will be selected for each seminar

to lead a discussion of the week's reading on a topic to be suggested by the instructor. This can be done by either preparing a PowerPoint presentation or a handout. Pop quizzes may be administered to ensure that reading assignments are being completed by all. This syllabus lists major reading material for each class. The instructor will be emailing in advance to all students assigned and additional reading sources from his own database.

- **Issue Brief (15%)** Students are expected to prepare one issue brief relevant to the course subject matter. The briefs are up to 5 pages in length (single spaced) and their choice is subject to approval by the instructor. Some briefs will be discussed at class. Alternatively, students may choose to develop an overview of several reading sources recommended for the course. Another option is involvement of select students in the CITS ongoing research projects on the human factor and security culture.
- **Research Paper (30%)** Students will have a chance to explore human factor related security issues based on the recommended reading material and presentations of visiting lecturers. The paper should have a clear hypothesis along with supporting evidence and conclusions. Each student should identify a topic and provide a general outline for the research paper by February 10. Research papers are due before April 21 and must not exceed 10 pages (single spaced).
- **Exam (40%)** There will be two exams. Both will include essays relevant to the reading material and its review in class.

Schedule (15 weeks)

Week 1 (January 5):

- **Class overview, instructions and introduction to the subject matter**

Week 2 (January 12)

- **Security Culture as a subset of organizational culture**
 - National culture is a product of numerous contributing factors and resistant to change
 - Organizational culture as a derivative of national culture is influenced by ongoing processes of globalization in economy, trade, science and education which make it susceptible to adjust it to universal management practices
 - Two prerequisites for achieving a cultural change are fighting complacency and promoting a new vision which are the key functions of leaders
 - Greet Hofstede about national culture and its dimensions
 - Power distance index
 - Individualism versus collectivism
 - Femininity versus masculinity
 - Uncertainty avoidance
 - Long-term orientation
 - Kim Cameron and Robert Quinn on the competing Values Framework for organizational culture

- Clan culture
- Adhocracy culture
- Hierarchy culture
- Market culture

(Lectures and discussion)

Reading:

- HOFSTEDE, G., HOFSTEDE, G.J, MINKOV, M. (2010), *Cultures and Organizations: Software of the Mind*. 3rd ed. Rev. New York: McGraw-Hill USA, pp. 3-276
- CAMERON, K and QUINN, R. (2006) *Diagnosing and Changing Organizational Culture*, San Francisco, CA: Jossey-Bass. Pp. 1-83
- Instructor will email to each student additional reading material from his database.

Week 3 (January 19)

- Country reports: Austria, France, China, Germany, Japan, and the United States, (Hofstede's dimensions: look up countries' profiles on his website)
- Exercise: Building up a culture model on the basis of Cameron's and Quinn's model for UGA, SPIA, CITS
- Developing guidelines for students' issue briefs as outlined in the syllabus

(Individual presentations and exercise)

Reading:

- Same as for Week 2
- Instructor will email to each student additional reading material from his database.

Week 4 (January 26):

- **CBRN security culture as a subset of organizational culture**
 - As a subset of overall organizational culture security culture has clearly defined characteristics which can be empirically measured and changed
 - The design used for SC is based on the principles proposed by Prof. Edgar Schein (MIT, USA)
 - Culture largely encompasses taken-for-granted beliefs, values and assumptions
 - The three-level model of SC goes from tacit and invisible to tangible and observable
 - The IAEA model of nuclear security culture is described in "Nuclear Security Culture: Implementing Guide," Nuclear Security Series, No. 7, 2008.

(Lectures and discussion)

Reading:

- SCHEIN, E. (1999) *The Corporate Culture: Survival Guide*. San Francisco, CA: Jossey-Bass, pp. 15-38

- SCHEIN, E. (2004) *The Corporate Culture and Leadership*. 3rd ed. San Francisco, CA: Jossey-Bass, pp. 225-271
- International Atomic Energy Agency (2008), *Nuclear Security Culture: Implementing Guide, Nuclear Security Series No. 8*, Vienna, Austria
- Instructor will email to each student additional reading material from his database

Week 5 (February 2)

- **Human Factor and Security: Case Studies**
 - The entire security regime stands or falls because of the people involved and their attitudes toward security
 - Key to effective security is not a choice between a technology-centered or human-centered design, but rather development of a “human factor-security technology-organization” continuum
 - A major security innovation or initiative must be accompanied by carefully conceived and implemented culture change
 - The flexibility and intelligence of people are the critical ingredient in managing unforeseen circumstances
 - Case studies provide important lessons to be learned about the human factor
- **Human Factor and Security: Perspective on Performance**
 - Compared to safety, staff members have more diverse attitudes toward security
 - Security and non-security personnel may espouse different perceptions of security leading to the emergence of two or more conflicting subcultures
 - At-risk behaviors are actions that involve short-cuts, errors, violations, slips, lapses, or mistakes which are driven by malicious or non-malicious intent
 - Security education and training are designed to ensure that people are provided with knowledge specific to their scope of work in ways that promote efficacy and motivate them to achieve expected results

(Lectures and discussion)

Reading:

- VINCENTE, K. (2004) *The Human Factor*. New York: Routledge, pp 52-62
- WEICK, K.E. and SUTCLIFFE, K.M (2007) *Managing the Unexpected*. 2nd ed. San Francisco, CA: Jossey-Bass, pp. 23-64
- BUNN, M. and SAGAN, S. “A Worst Practices Guide to Insider Threat: Lessons from Past Mistakes”, Occasional Paper, American Academy of Arts and Sciences, April 4, 2014.
- BUNN, M. and HAZZELL, E. *Threat Perceptions and Drivers of Change in Nuclear Security Around the World: Results of a Survey*. Cambridge, MA: Report for Managing the Atom Project, Belfer Center March 2014.
- U.S. DEPARTMENT OF ENERGY. OFFICE OF INSPECTOR GENERAL. (AUGUST 2012). *Inquiry into the Security Breach at the National Security Administration’s Y-12 National*

Security Complex. Washington DC: DOE/IG-0868. Available from:

<http://energy.gov/ig/downloads/special-report-ig-0868>

- BIRCH, D. and SMITH, J. “*The Assault on Pelindaba*”, The Center for Public Integrity, Available from <https://www.publicintegrity.org/2015/03/14/16894/assault-pelindaba>
- INTERNATIONAL ATOMIC ENERGY AGENCY. (1998) *Developing Safety Culture in Nuclear Activities: Practical Suggestions to Assist Progress* (Safety Report Series No. 11), Vienna, Austria
- INTERNATIONAL ATOMIC ENERGY AGENCY. (2014). *Incident and Trafficking Database: 2014 Fact Sheet*. Vienna, Austria. Available from <https://www-ns.iaea.org/downloads/security/itdb-fact-sheet.pdf>
- 1540 Compass, Fall 2014, Issue 7
- Instructor will email to each student additional reading material from his database.

Week 6 (February 9)

- **Nuclear Security Culture: Concept, Model, Characteristics**
 - “Nuclear Security Culture: Implementing Guide (Nuclear Security Series No. 7, 2008) is the first IAEA publication on this subject which defines the concept, model and characteristics
 - The development of nuclear security culture involves a multitude of players including the state, organization’s managers, personnel, the public, and international community
 - Security content of each NSC characteristic is determined by specific sets of associated culture indicators, serving as benchmarks
 - NSC characteristics in the observable management systems and behavior segments are driven by beliefs and assumptions of personnel
 - Culture indicators can be modified, if necessary, and made consistent with security needs of each organization

(Lectures and discussion)

Reading:

- INTERNATIONAL ATOMIC ENERGY AGENCY (2008), *Nuclear Security Culture: Implementing Guide*, Nuclear Security Series No. 8, Vienna, Austria
- INTERNATIONAL ATOMIC ENERGY AGENCY (2013), *Objectives and Essential Elements of a State’s Nuclear Security Regime*, Nuclear Security Series No 20, Vienna, Austria
- VOLDERS, B and SAUER, T, eds. (2016) *Nuclear Terrorism: Countering the Threat*, New York, NY: Routledge, pp. 197-214, pp. 249-256
- WEICK, K.E. and SUTCLIFFE, K.M. (2007) *Managing the Unexpected*, 2nd Edition, San Francisco, CA: Jossey- Bass, pp. 109-138, pp. 83-108
- 1540 Compass, Fall 2014, Issue 7
- Instructor will email to each student additional reading material from his database.

Week 7 (February 16)

- **Interface of Safety and Security**

- Though safety and security perform different functions and use different tools, they have common objectives: protect human lives, society, and the environment.
- The safety-security culture interface must be continuously integrated into the core operations of facilities and all their phases, from concept, design and construction to decommissioning and dismantlement
- Despite obvious synergies, there are contradictions between elements of safety and security which make such integration difficult to achieve

(Lectures and discussion)

Reading:

- INTERNATIONAL ATOMIC ENERGY AGENCY (2010), *The Interface Between Safety and Security at Nuclear Power Plants*, INSAG-24, Vienna, Austria
- INTERNATIONAL ATOMIC ENERGY AGENCY (2002), *Safety Culture in Nuclear Installation: Guidance for Use in the Enhancement of Safety Culture*, TECDOC-1329, Vienna, Austria
- World Health Organization (2010), *Responsible Life Sciences Research for Global Health Security: A Guidance Document*, Geneva, Switzerland
- World Health Organization (September 2006), *Laboratory Biosecurity Guidance*, Geneva, Switzerland
- Organization for the Prohibition of Chemical Weapons (25 November 2016), *Needs and Best Practices on Chemical Safety and Security Management*, The Hague, The Netherlands
- Instructor will email to each student additional reading material from his database.

Week 8 (February 23)

- **The human factor in the context of safe and secure operations of nuclear facilities** (Guest lecturer: CITS visiting fellow Paul Ebel)
 - For many years, the International Atomic Energy Agency used the word “Security Culture” in their 12 Fundamental Principles of Physical Protection (2001) and in INFCIRC 225 (1972) but not until 2007 with the issuing of NSS#7 was this term actually defined.
 - Once the term was defined, there was pressure to create an evaluation tool of Security Culture, and CITS was a major global player in this process. The tool was tested in Indonesia (Research Reactors) and Bulgaria (Power Reactors), and is about to be approved for all IAEA use.
 - The IAEA Physical Protection “System” has been a standard for over 40 years, involving what is called the DEPO (Design and Evaluation Process Outline). Only recently has this Risk Based Design and Evaluation Process considered the human factors.

- The subjects of Deter, Detect, Delay, Respond, and Mitigate (Key ingredients of INFCIRC 225 and key subsets of Physical Protection in the INMM Global Best Practices for Physical Protection) will be discussed with particular attention to the human factor influence.
- Safety of Nuclear Facilities is a more mature discipline in the IAEA Member States, so the interface and actually the 90% congruence between Security and Safety Culture will be investigated.
- Finally, the Physical Protection System Evaluation Process (Risk Analysis) will be featured, but again the human factors influence will be highlighted.

(Lectures and discussion)

Reading:

- INTERNATIONAL ATOMIC ENERGY AGENCY (2011), *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)*, Nuclear Security Series No. 13, Vienna, Austria
- INMM (2004), *Global Best Practices for Physical Protection*, Institute of Nuclear Materials Management, <http://www.inmm.org/Physical.Protection.htm>
- MANNA, G. (2007), *Human and Organizational Factors in Nuclear Installations: Analysis of Available Models and Identification of R & D Issues*, JRC Scientific and Technical Reports, Joint Research Center, Institute for Energy, Petten, The Netherlands
- Instructor will email to each student additional reading materials from his database.

Week 9 (March 2)

- **Assessment of Security Culture**
 - The benefits of regularly held self-assessments go beyond the traditional definition of security and potentially include improvements in general management practice, recruitment, lines of communication and other areas
 - Culture indicators are key to successful implementation of self-assessment and enhancement
 - While most employees take ownership of nuclear safety, security may give rise to divergent views among the workforce
 - The six-stage process of self-assessment requires careful preparation, special skills and involvement of senior management
 - The self-assessment methodology uses both interactive and non-interactive tools (survey, interview, focus group, document review and observation)

- The process of self-assessment requires special skills to merge quantitative and qualitative data
- Non-observable belief and attitudes as drivers of people's behavior are the focus of self-assessment
- The final self-assessment report serves as a basis for management to develop a follow-up action plan designed to enhance security culture

(Lectures, exercises, discussion)

Reading:

- INTERNATIONAL ATOMIC ENERGY AGENCY (2008), *Nuclear Security Culture: Implementing Guide*, Nuclear Security Series No. 8, Vienna, Austria
- INTERNATIONAL ATOMIC ENERGY AGENCY (2016), *Performing Safety Culture Self-Assessments*, Safety Reports Series No. 83, Vienna, Austria
- WEICK, K.E. and SUTCLIFFE K.M., (2007) *Managing the Unexpected*, 2nd Edition, San Francisco, CA: Jossey-Bass, pp.83-108
- SCHEIN, E. (2004), *The Corporate Culture and Leadership*, 3rd Edition, San Francisco, CA: Jossey-Bass, pp. 337-363
- INTERNATIONAL ATOMIC ENERGY AGENCY (2017) *Technical Guidance for Self-Assessment of Nuclear Security Culture in Facilities and Activities*, Nuclear Security Series No.28-T, Vienna, Austria
- Instructor will email to each student additional reading material from his database.

Week 10 (March 9)

- Mid-Term Exam

Week 11 (March 16)

- Spring Break

Week 12 (March 23)

- **CBRN Security and Culture as a joint sustainable architecture**
 - Adopted in 1957, the IAEA mission did not include nuclear security as one of the agency's major functions
 - The expanding nuclear infrastructure worldwide and emerging security risks made it necessary for member states to develop for the agency a nuclear security focused programmatic activity and organizational structure
 - Nuclear security culture is now a visible functional component based on several international legal instruments and the series of Nuclear Security Summits.

- Security culture in other silos - both domain specific (e.g. chemical and biological) and functional (e.g. cyber, strategic trade and customs)- are subsets or organizational culture and have many common elements
- As in the nuclear field, security culture in other domains is a response to the rapidly evolving threat environment

(Lectures and discussion)

Reading:

- THOMPSON, J. AND GAHLAUT, S. (2015), *CBRN Security Culture in Practice*, NATO Science for Peace and Security Series, Amsterdam, The Netherlands: IOS Press
- United Nations Inter-Regional Crime and Justice Research Institute (UNICRI), *CBRN Security Governance*: <http://www.unicri.it/topics/CBRN/security-governance>
- World Health Organization (2010), *Responsible Life Sciences Research for Global Health Security: A Guidance Document*, Geneva, Switzerland
- Organization for the Prohibition of Chemical Weapons (25 November 2016), *Needs and Best Practices on Chemical Safety and Security Management*, The Hague, The Netherlands
- 1540 Compass, Fall 2014, Issue 7
- 1540 Compass, Winter 2015, Issue 8
- Instructor will email to each student additional reading material from his database.

Week 13 (March 30)

- **Security Culture for Radioactive Sources**
 - Originally developed for safety purposes, the IAEA categorization of radioactive sources break them down into five groups depending on the extent to which each category poses danger to human beings
 - Such categorization is currently applicable to the security of radioactive sources
 - Special features of security culture for radioactive sources include: emphasis on safety, transportation vulnerabilities, diverse applications, mobile and portable modes of operation and disposal challenges
 - There are three evaluation methods for security awareness and culture of radioactive sources: basic, intermediate, and comprehensive

(Lectures and discussion)

Reading:

- INTERNATIONAL ATOMIC ENERGY AGENCY (2004) *Code of Conduct on the Safety and Security of Radioactive Sources*
- INTERNATIONAL ATOMIC ENERGY AGENCY (2008), *Security of Radioactive Sources: Implementing Guide*, Nuclear Security Series No. 11, Vienna, Austria

- INTERNATIONAL ATOMIC ENERGY AGENCY (2005), *Categorization of Radioactive Sources: Safety Guide*, Safety Standards Series No RS-G-1.9, Vienna, Austria
- BIENIAWSKI, A.J., ILIOPULOS, I. NALABANDIAN, M. (2016), *Radiological Security Progress Report*, Nuclear Threat Initiative, Washington D.C., USA
- KHRIPUNOV, I. et al. (2017) *Nuclear Security Culture for Users of Radioactive Sources: Model, Self-assessment, Enhancement*, CITS/IAEA
- Instructor will email to each student additional reading material from his database.

Week 14 (April 6)

- **CBRN security culture as a tool to address insider threat**
 - Insider adversaries possess a unique set of attributes that give them important advantages for committing malicious acts (physical access, authority to conduct operations, and expert knowledge of the facility)
 - There are several known cases providing evidence that insider threat is real
 - Nuclear security culture can create a work environment which would discourage an insider from committing malicious acts and help to identify a potential perpetrator
 - Specific features of security culture implementation designed to address insider threat include: determination of trustworthiness, mitigation occupational strain, enhancing adherence to procedures, and strengthening vigilance

(Lectures and discussion)

Reading:

- INTERNATIONAL ATOMIC ENERGY AGENCY (2008), *Preventative and Protective Measures Against Insider Threats: Implementing Guide*, Nuclear Security Series No. 8, Vienna, Austria
- SIMON, J. (2013) *Lone Wolf Terrorism: Understanding the Growing Threat*, New York, NY: Prometheus Books, pp23-112
- BUNN, M. AND SAGAN, S. eds (2017) *Insider Threat*, Ithaca, N.Y.: Cornell University Press, available in January 2017
- Instructor will email to each student additional reading material from his database.

Week 15 (April 13)

- **Societal and Psychological Impact of CBRN Terrorism**
 - Catastrophic terrorism has roots in the Cold War legacy associated primarily with nuclear weapons
 - Uncertainty worsens the psychological injury done to the public giving rise to fears driven by ambiguity, fragmented information, hype and miscommunication
 - Vulnerabilities widely range depending on a number of factors including age, ethnicity, prior traumatic experience, socio-economic status. Hence addressing them requires a differentiated approach.

- Resilience culture is an interactive product of beliefs, attitudes and behavior that can play a major role in handling disruptive challenges in emergency situations
- General public is a major stakeholder for CBRN security

(Lectures and discussion)

Reading:

- KHRIPUNOV, I., BOLSHOV, L., NIKONOV, D. (2007) *Societal and Psychological Effects of Radiological Terrorism*, Amsterdam, The Netherlands: IOS Press
- POSNER, R. (2004) *Catastrophes: Risk and Response*, New York, N.Y.: Oxford University Press, pp 21-138
- CLARKE, L. (2006), *Worst Cases: Terror and Catastrophe in Popular Imagination*, London, UK: University of Chicago Press, pp 111-188
- SLOVIC, P. (2004) *The Perception of Risk*, London, UK: Earthscan Publications, pp 182-198. 220-231, 264-274
- Instructor will email to each student additional reading material from his database.

Week 16 (April 20)

- Overview of the course and interactive discussion: “A Way Forward with CBRN Security Culture.”

Week 17 (April 27)

- Final Exam