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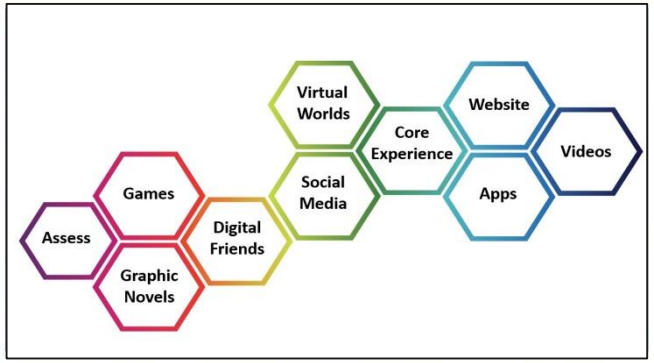

Transmedia Learning Tactics for Enhancing Hands-On Cybersecurity Training

Elaine Raybourn

U.S. DEPARTMENT OF ENERGY

NNSA

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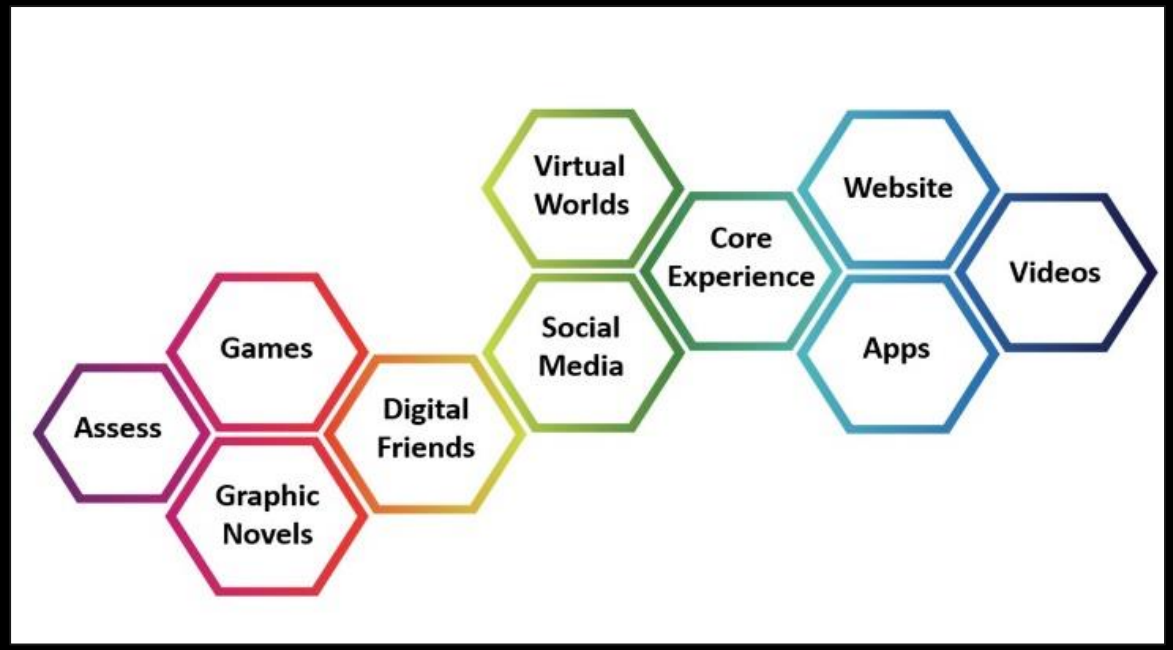
Presentation outline

- Motivation & introduction
  - What problem are we trying to solve?
  - Why transmedia learning?
- How it's been applied
  - Transmedia learning
  - Story-driven training example: USMC
- Learning experience (LX) design
  - Cybersecurity education use case inspiration: Mr. Robot
  - Simulation Experience Design Framework
- Conclusion

The challenge is **self-regulated** learning in the wild



"How do people integrate the disparate pieces of knowledge they acquire at different times and places? And how can anyone assess the overall outcome?"

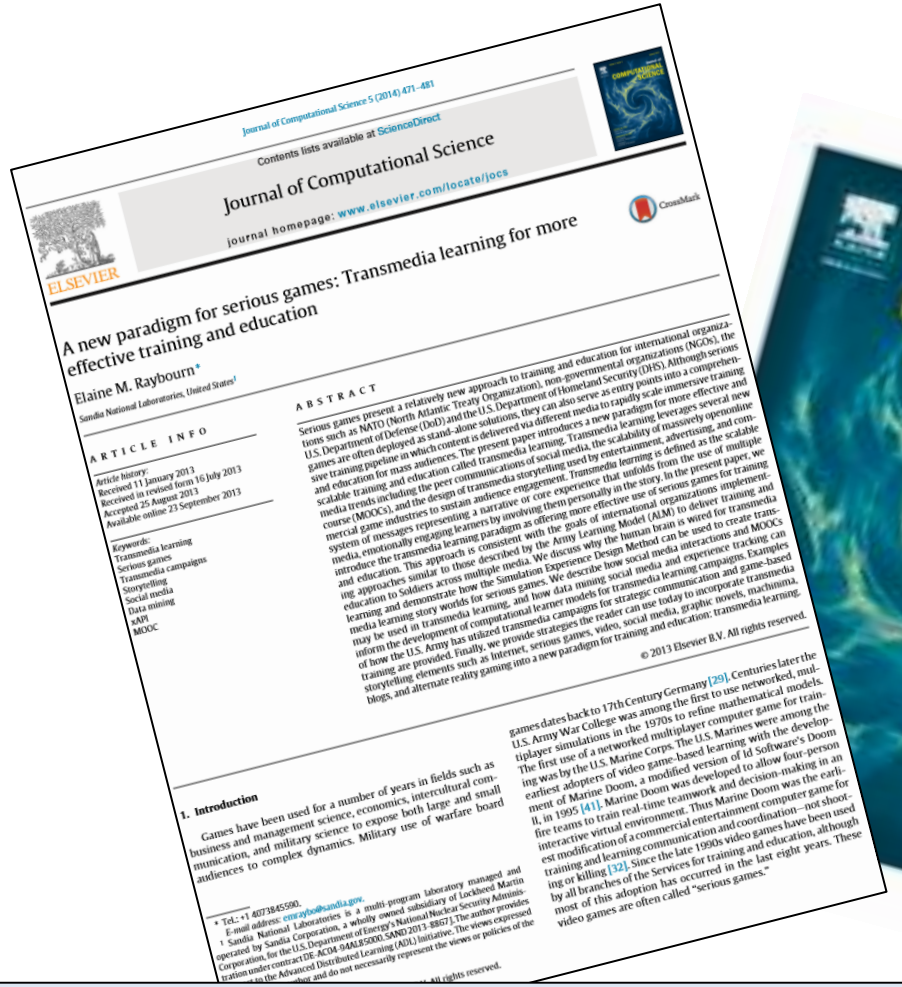
"How well have people learned to think on their feet, for example? And how good are they at weighing-up evidence and asking critical questions?"

Nature, 2010, "Learning in the wild," 464, 7290, p. 814

Our media habits are changing

- Stories with a view
  - 87% want to see events through character's lens
- Second and third screens
  - 41% use a second screen daily while watching TV
  - Most popular: earning rewards, voting, purchasing
- Innovative advertising
  - 92% agree ads can be more like stories or games they'd naturally choose to engage with
- Parallel worlds
  - 91% say narratives with "real-time" character development would motivate them to tune in more often
- Real-world products integrated with content
  - 73% interested in discovering real-world products in a story
- Multi-platform now includes the real world
  - 94% feel the "real world" should be treated as another platform for content interaction

Latitude "The Future of Storytelling, Phase 2 of 2," 2012



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A new paradigm for serious games: Transmedia learning for more effective training and education

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ABSTRACT

Serious games present a relatively new approach to training and education for international organizations such as NATO (North Atlantic Treaty Organization), non-governmental organizations (NGOs), the U.S. Department of Defense (DoD) and the U.S. Department of Homeland Security (DHS). Although serious games are often deployed as stand-alone solutions, they can also serve as entry points into a comprehensive training pipeline in which content is delivered via different media to rapidly scale immersive training and education for mass audiences. The present paper introduces a new paradigm for more effective training and education called transmedia learning. Transmedia learning leverages several new scalable trends including the peer communications of social media, the scalability of massively open online media trends including the design of transmedia storytelling used by entertainment, advertising, and commercial game industries to sustain audience engagement. Transmedia learning is defined as the scalable course (MOOCs), and the design communications of social media, the scalability of massively open online system of messages representing a narrative or core experience that unfolds from the use of multiple media, emotionally engaging learners by involving them personally in the story. In the present paper, we introduce the transmedia learning paradigm as offering more effective use of serious games for training and education. This approach is consistent with the goals of international organizations implementing approaches similar to those described by the Army Learning Model (ALM) to deliver training and education to Soldiers across multiple media. We discuss why the human brain is wired for transmedia learning and demonstrate how the Simulation Experience Design Method can be used to create transmedia learning story worlds for serious games. We describe how social media and experience tracking can may be used in transmedia learning, and how data mining social media interactions and MOOCs inform the development of computational learner models for strategic communication and game-based of how the U.S. Army has utilized transmedia campaigns for transmedia learning. Examples training are provided. Finally, we provide strategies the reader can use today to incorporate transmedia storytelling elements such as Internet, serious games, video, social media, graphic novels, machinima, blogs, and alternate reality gaming into a new paradigm for training and education: transmedia learning.

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1. Introduction

Games have been used for a number of years in fields such as business and management science, economics, intercultural communication, and military science to expose both large and small audiences to complex dynamics. Military use of warfare board games dates back to 17th Century Germany [29]. Centuries later the U.S. Army War College was among the first to use networked, multiplayer simulations in the 1970s to refine mathematical models. The first use of a networked multiplayer computer game for training was by the U.S. Marine Corps. The U.S. Marines were among the earliest adopters of video game-based learning with the development of Marine Doom, a modified version of Id Software's Doom II, in 1995 [41]. Marine Doom was developed to allow four-person fire teams to train real-time teamwork and decision-making in an interactive virtual environment. Thus Marine Doom was the earliest modification of a commercial entertainment computer game for training and learning communication and coordination—not shooting or killing [32]. Since the late 1990s video games have been used by all branches of the Services for training and education, although most of this adoption has occurred in the last eight years. These video games are often called "serious games."

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Transmedia learning is the scalable system of messages representing a core experience that unfolds from the use of multiple media and emotionally engages learners by involving them personally in the story.

Raybourn, 2014, *Journal of Computational Science*

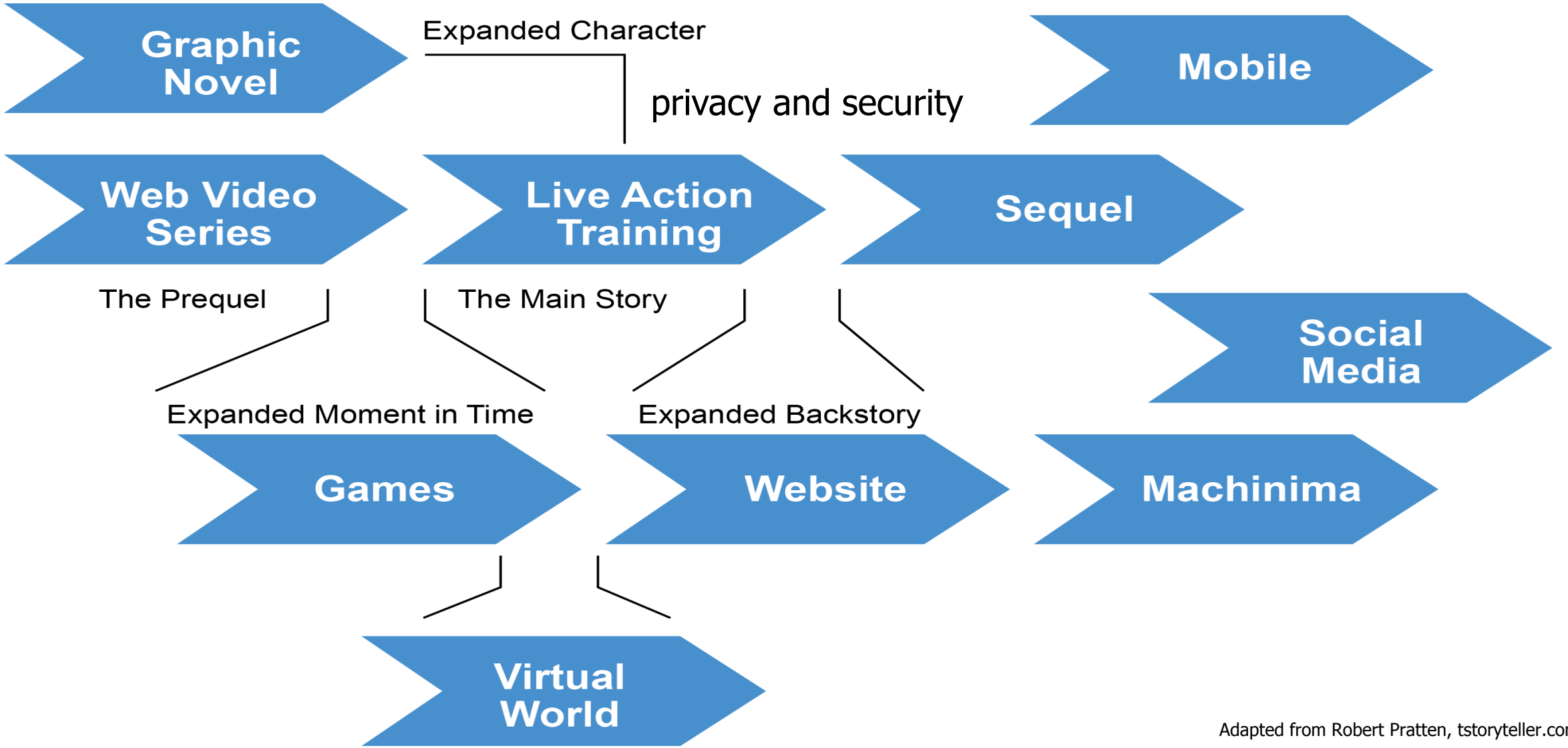
Raybourn, E.M. (2014). A new paradigm for serious games: Transmedia learning for more effective training & education. Journal of Computational Science, (5) 3, Elsevier, 471–481.

What are the goals of transmedia learning?

- Transmedia learning is the sustained experience that results in measurable behavior change
- Behavior change can be physical and overt, intellectual, attitudinal, or a combination
- The goal is to synthesize information across multiple media channels, to create more agile thinkers
- And scale training so thousands of learners can hone their abilities

Single package vs. multiple platforms	Multimedia	Transmedia Storytelling	Transmedia Learning	Blended Learning
Involves several different media, can be a single package				
Story uses multi-media delivered **across** multiple platforms in various formats				
Each media element makes distinctive contribution to story				
Intent is to **engage audience emotionally**				
User actions affect the experience of content across multiple platforms				
Leverages **user-generated content** (social media channels)				
May be included in formal learning program				
Learning may be informal				
Instructor-led focus with supplemental online or digital media				

Developing the transmedia learning ecosystem



Adapted from Robert Pratten, tstoryteller.com

Your brain reading
bullet points

Your brain reading
A story

Short story

For sale: baby shoes, never worn.

Storytelling approaches for training

- Case-based
  - Problem and solution are fixed, learner is positioned as outside observer
- Narrative-based
  - Problem and solution are fixed, learner is positioned within author's context and control
- Scenario-based
  - Problem and solution criteria are fixed, learner is positioned in interactive, real-time experience allowing for variety of fixed solution paths
- Problem-based
  - Problem is ill-structured with no preformed solution criteria or parameters, ***learner is positioned as director of learning activities***

(Andrews et al., 2009)

Game-based training mission / crucible experience design

Scenario	Difficulty	Crucible	Objective	Friction Point	Emotional Intelligence
1. Understand Area	Familiarize	None	Listening	None	Appraising emotions
2. Convoy Planning	Familiarize	None	Planning Cultural awareness	No advance notice of link up	Use emotions to facilitate thinking
3. Link up with Iraqi Police	Crawl	Communication difficulty BOLO	Language	Iraqi Police actions and link up location not communicated	Regulating own emotions
4. VIP Pickup	Walk	Communication breakdown	Language World view Time	Lead vehicle stops, VIP location ambiguous	Regulating own emotions
5. VIP Escort	Walk/Run	Civilian Accident	Language Time	Civilians need medical attention	Regulating others emotions
6. Police Meeting	Run	Security Advising Communication breakdown	Language Cultural awareness	Iraqi Police execute site security incorrectly	Managing emotions to attain specific goals

cru·ci·ble
ˈkro͞osəb(ə)l/
Noun

"…a defining moment that unleashes abilities, forces crucial choices, and sharpens focus. It teaches a person who he or she is."

Bennis & Thomas, 2002, p. 16

32 International Journal of Game-Based Learning, 1(1), 32-44, January-March 2011

Honing Emotional Intelligence with Game-Based Crucible Experiences

Elaine M. Raybourn, Sandia National Laboratories, USA

ABSTRACT

Raybourn, E. M. (2010). Designing games as social-process simulation crucible experiences: Toward developing and assessing intercultural adaptability. To be presented at 3rd Applied Human Factors and Ergonomics (AHFE) International Conference 2010, Miami, Fl, USA, July 2010.

Designing Games as Social-Process Simulation Crucible Experiences: Toward Developing and Assessing Intercultural Adaptability

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ABSTRACT

The focus of the present chapter is intercultural social-process simulation design for crucible experiences in computer games and virtual worlds. Social-process simulation is a methodology used to create emotionally challenging multi-player experiences that can exercise intercultural adaptability and self-awareness. The present chapter introduces the social-process simulation and the Reflective Observer/Evaluator role employed to create engaging game-based or virtual world crucible experiences for teaching individuals and teams to interact and communicate more purposefully in intercultural contexts, and exercise metacognitive agility toward the development of intercultural adaptability.

Keywords: Crucible Experience, Reflection, Intercultural Adaptability, Games, Social-Process Simulations, Metacognitive Agility, Peer, Evaluations, Emotions

So, what if we support training with story?

Your mission: transport local VIP. . . safely.

Story-driven non-kinetic training with USMC transition teams

Exercise Director Cell

IP veer off road, why?

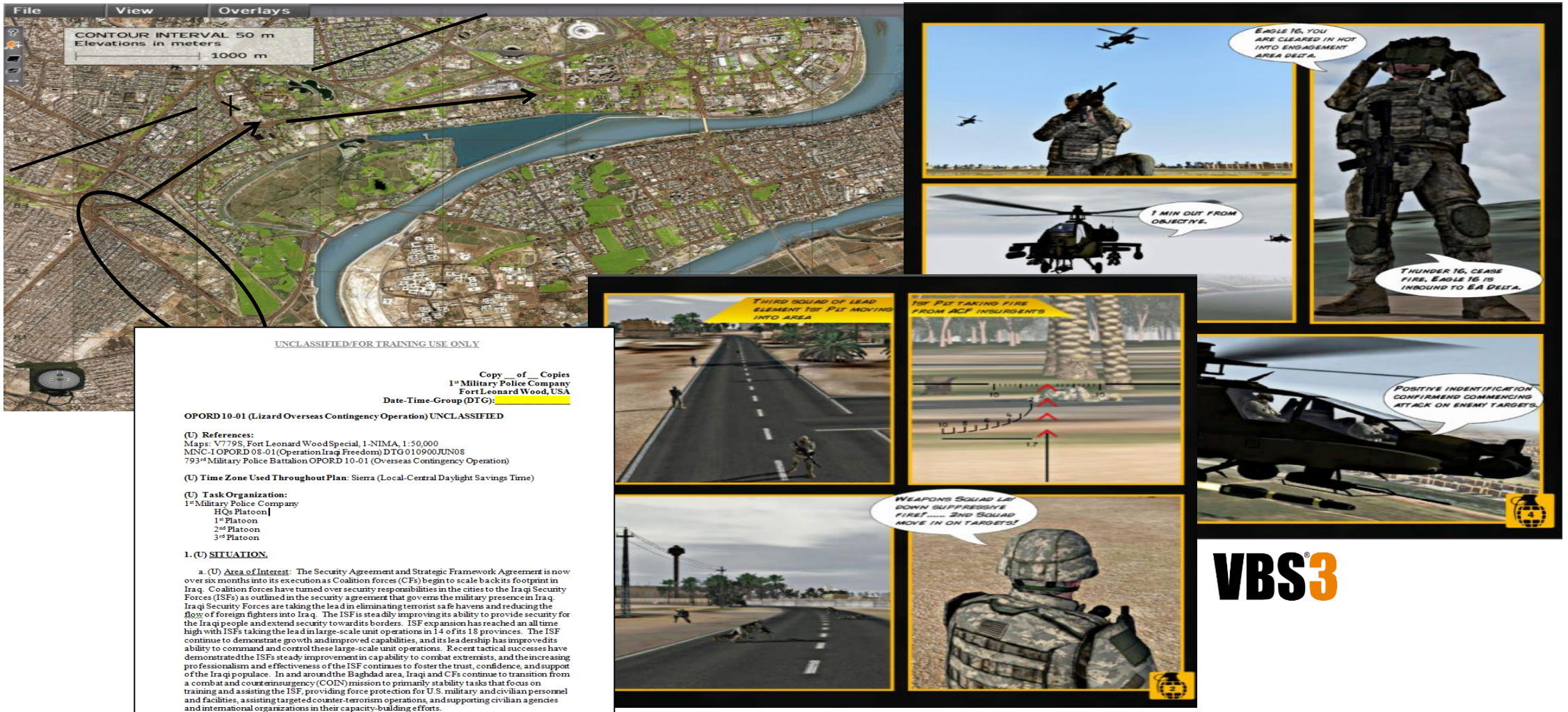
Combined convoy

MiTT Vehicle AAR

Practicing language skills

After Action Review

How can we support story with transmedia learning?



Courtesy of PEOSTRI, Army Games for Training

Storytelling arc

Image courtesy of Toontastic

Social-Process simulations

Characteristics of Social-Process Simulations

Task	Focus	Role of Problem	Participant Actions	Feedback
To interact with others to address a particular challenge	Actions executed by others and the effects on one's own assumptions, goals, strategies	Implicit: it arises from conflicting participant goals or actions	Use of social communication such as negotiation, persuasion, confrontation, writing, etc.	Reactions of other participants

Setup Conflict Challenge Climax Resolution

follow a storytelling arc

Raybourn, E.M. (2011). Honing Emotional Intelligence with Game-based Crucible Experiences. *International Journal of Game-Based Learning*, 1(1), 32-44.

….What are the goals, learning objectives? Is there source of inspiration?

What is my storytelling approach? What informs my design?

Will I allow the learner to direct her/his own experience?

What transmedia conversations do I want to support, when, with what device?

Simulation Experience Design Framework, Raybourn (2007)

Raybourn, E. M., (2007). Applying simulation experience design methods to creating serious game-based adaptive training systems. *Interacting with Computers*, 19, Elsevier, 207-14.

Story arc for cybersecurity use case

- Set up—real world inspiration
  - Use all source information for ideas—make the story feel real and relevant to learning objectives
- Conflict—work with learner's cognitive dissonance
  - Learner understands why assumptions won't work, and what skill sets are now needed to solve problems
- Challenge—to win
  - Help learner to perceive unexpected adversaries—notice when "winning the battle and losing the war"
- Climax—facing the greatest enemy of all—you lose
  - Close to achieving goals, an unanticipated event threatens progress and requires the learner to face their weaknesses
- Resolution—making peace with failure, redemption
  - Fail again and again. Finding the solution the first time is what the adversary wants the learner to do
- Audience reward—transformation
  - Learner uses training as own mental fitness gym, grit and tenacity creates ability to win personal battles

Example self-regulated learning experience

Watch videos - explore

- Review social engineering mitigation techniques
- Watch mini-interviews with cyber “Jedis”

Website actions – study

- Read security blogs
- Practice identifying phishing attacks
- Upload progress to unlock new information

Problem-solve in simulation – sharpen skills

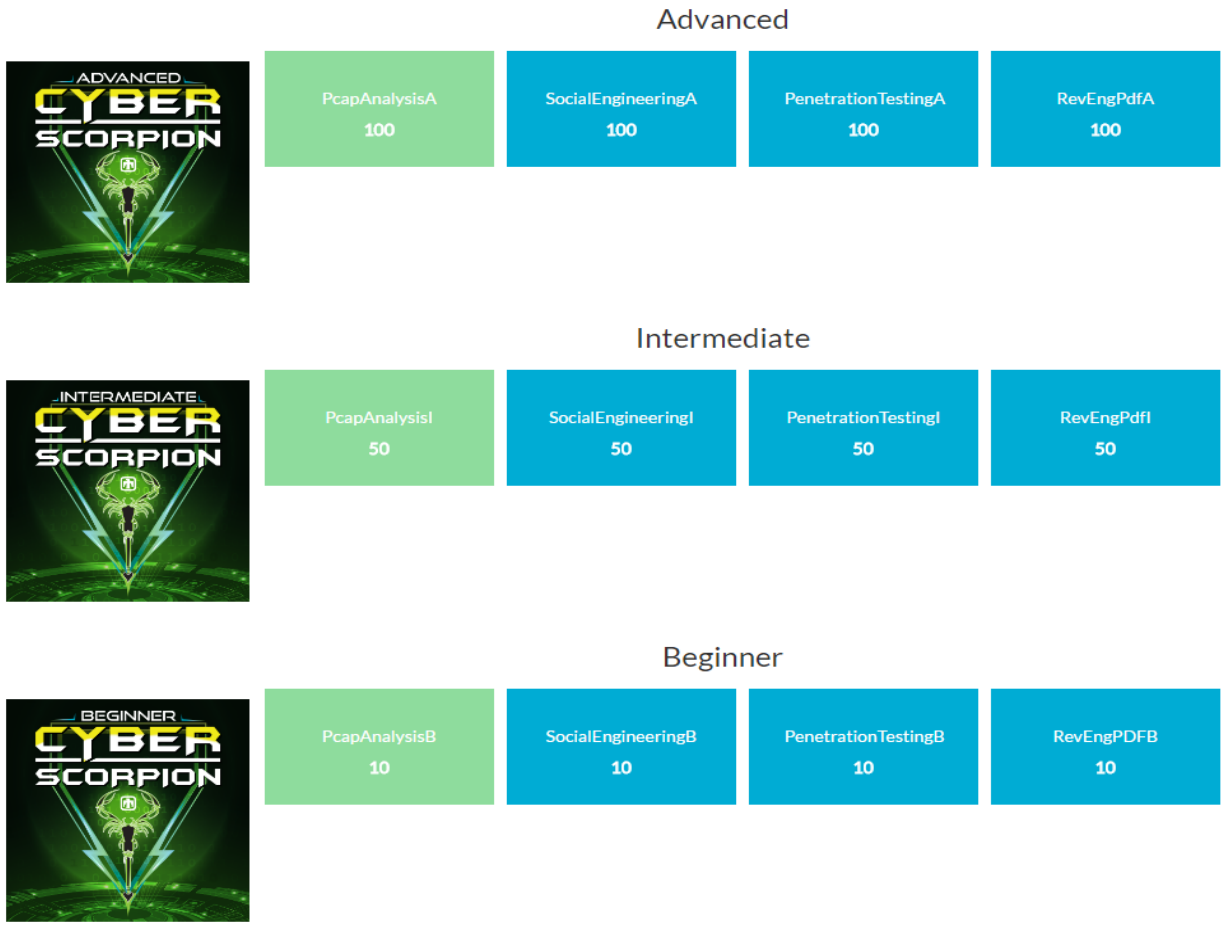
- Hands-on experience in Cyber Scorpion

Social media …master…

- Follow security experts, gurus
- Share ideas or comments (user generated content)

Sandia Cyber Scorpion

- Zero-entry CTF lab environment for learner level setting via hands-on interaction, and...
- Scalable
- Rapidly reconfigurable
- Addresses learning objectives
- Individuals and teams
- Open source VM management tool, **minimega.org**



CYBER SCORPION

Tracking learner experiences

- Engineer transmedia learning systems and use media based on social science and theories of learning as well as validated measures to determine most effective learning campaign
- Utilize a host of human-guided algorithms, technology products, methods, pedagogy, and assessment techniques to meet your unique training needs
- Explore Experience API (xAPI) that enables flexible tracking of learning experiences across devices (records, scores, completions, and learner actions) http://xapi.adlnet.gov
- Evaluate ROI to include feedback from learner-generated content
- Address user tailored privacy and cybersecurity
- Apply to cyber physical security education

Resources

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Share your story

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