Transmedia Learning Tactics for Enhancing Hands-On Cybersecurity Training

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

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

“...
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
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.

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

Adapted from Robert Pratten, tstoryteller.com

- Graphic Novel
  - Expanded Character
    - privacy and security
  - The Prequel
    - Expanded Moment in Time
  - The Main Story
    - Expanded Backstory
- Web Video Series
- Live Action Training
- Sequel
- Mobile
- Social Media
- Games
- Website
- Machinima
- Virtual World

Adapted from Robert Pratten, tstoryteller.com
It was a dark and stormy night.
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

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

**cru·ci·ble**

ˈkrōsəbəl/  
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*
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**

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**OPORD 10-01 (Lines of Operations Contingency/Operation NAMIFIED)**

(1) References:
- **Title**: OFTFCR, Unit Level Training and Operations Planning
- **Location**: [NAMIFIED]
- **Date**: [NAMIFIED]

(2) Time Zone Used Throughout Plan: [NAMIFIED]

(3) Task Organization:
- [NAMIFIED]

(4) 1-3 MSEATRIN:

a. A CA-21 Area of Interest: The Security Agreement and Strategic Framework Agreement now serves as a foundation for operations in Central North Pole (P). Operations include [

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Despite a difficult security environment, the long-term success of the U.S. strategy has enjoyed stability during the past 10 years. Although the International Organization for Migration (IOM) continues to observe more than 2,500 migrants and asylum seekers on the border between the United States and Mexico, the United States continues to provide humanitarian aid and support to those affected by the humanitarian crisis.

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**VBS3**

**Courtesy of PEOSTRI, Army Games for Training**
Storytelling arc
Social-Process simulations

### Characteristics of Social-Process Simulations

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

Setup  Conflict  Challenge  Climax  Resolution

follow a storytelling arc

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

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

What is my storytelling approach? What informs my design?

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


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
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](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

Share your story

Sandia National Labs

Center for Computing Research

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