Cyber Security Awareness Education and Training

2016

technology

environment

security

COMBITECH

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OBJECTIVE / OUTLINE

- Combitech and SAAB

- Cyber Security Education and Training

Combitech and SAAB

COMBITECH
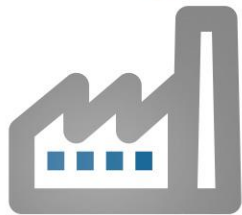
« *Cyber Security – a prerequisite for security in an increasingly connected world* »

Leading in Cyber Security

- Over 100 consultants at ten locations
- Leading-edge competence based on more than 45 years' experience
- Complete service and concept portfolio
- Leading the sector in laboratory and test resources
- Certified: EC/ITSEF, ISO/IEC 9001, 17025, 27001

Cyber Security by Combitech

Our service areas

Cyber defence

- Electronic Warfare System
- TEMPEST
- Signal control
- Signal protection

Security reviews & audits

- Penetration Tests
- Code Reviews
- Common Criteria
- Compliance Audits
- System Reviews
- Due Diligence

Incident & crisis management

- Crisis readiness
- Drills
- Incident management
- IT crime investigations
- Security monitoring

Strategy & continuity

- Risk management
- Continuity planning
- Security managment
- Security objectives
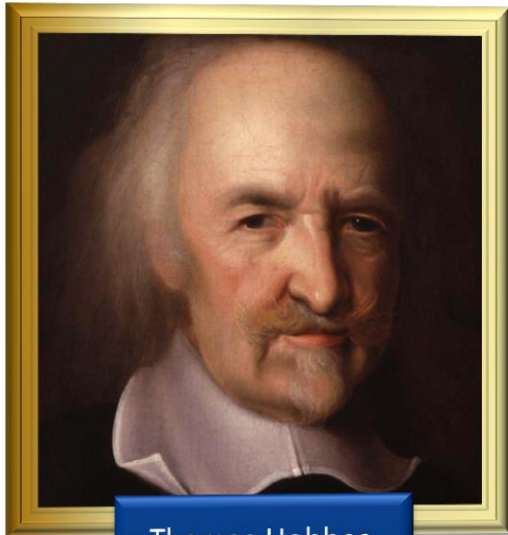- Security awareness

Secure IT solutions

- IT security architecture
- Secure development
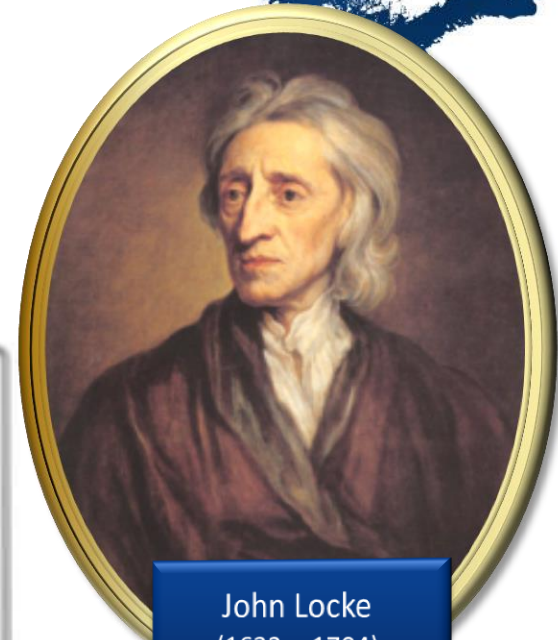- Secure solutions
- Log management

Training

- Information security
- Secure system development
- Crisis management
- Risk management
- Common Criteria

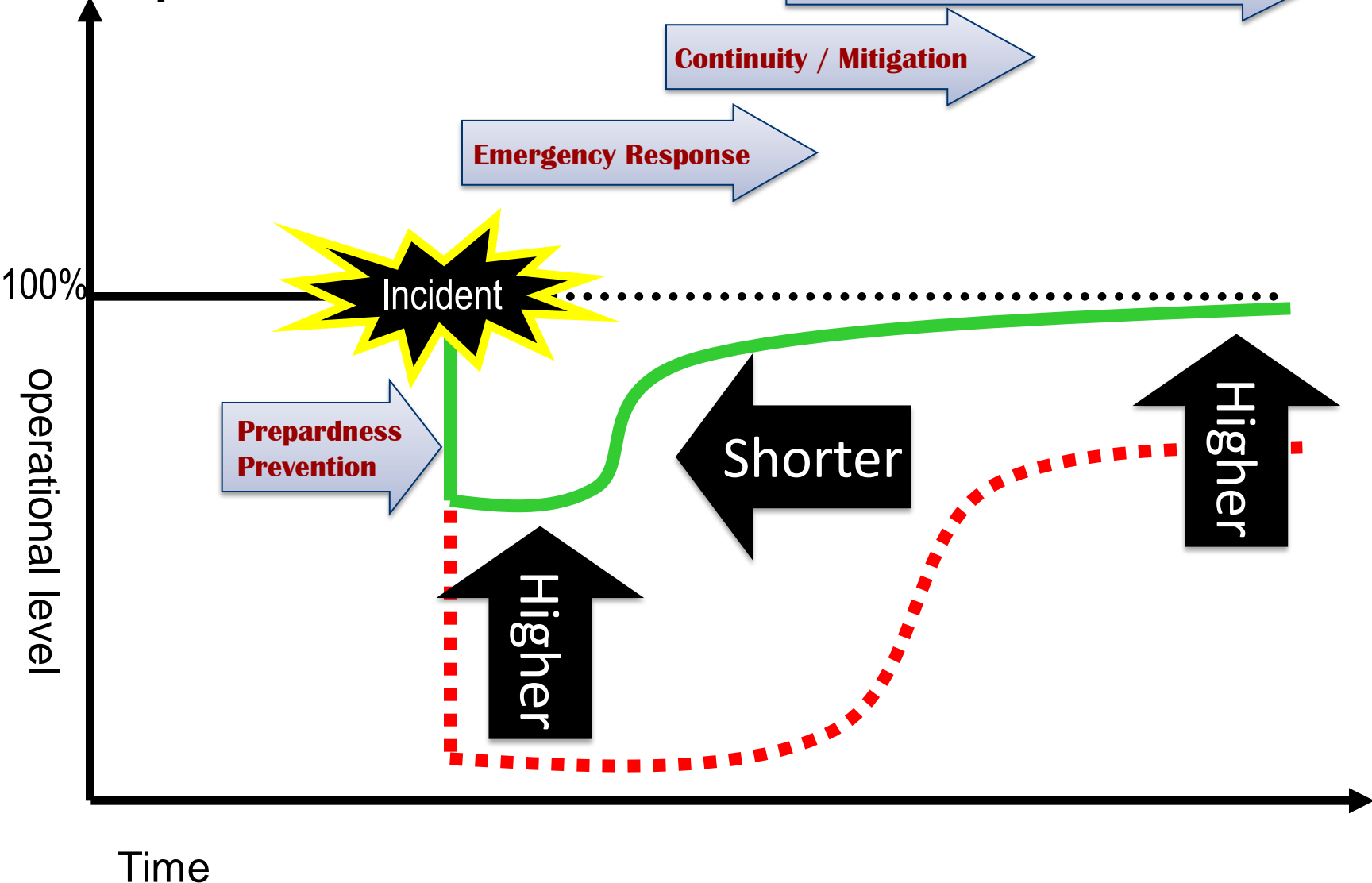# WHY DO WE TRAIN?

SOCIAL CONTRACT

Thomas Hobbes
(1588-1679)

Citizens give up a little bit of thier freedom in return for protection

John Locke
(1632 – 1704)

From Wikipedia

Cognitive Domain

Information Domain

Physical Domain

Awareness
Comprehend better and quicker

Planning
Decide better and quicker

Knowledge Superiority

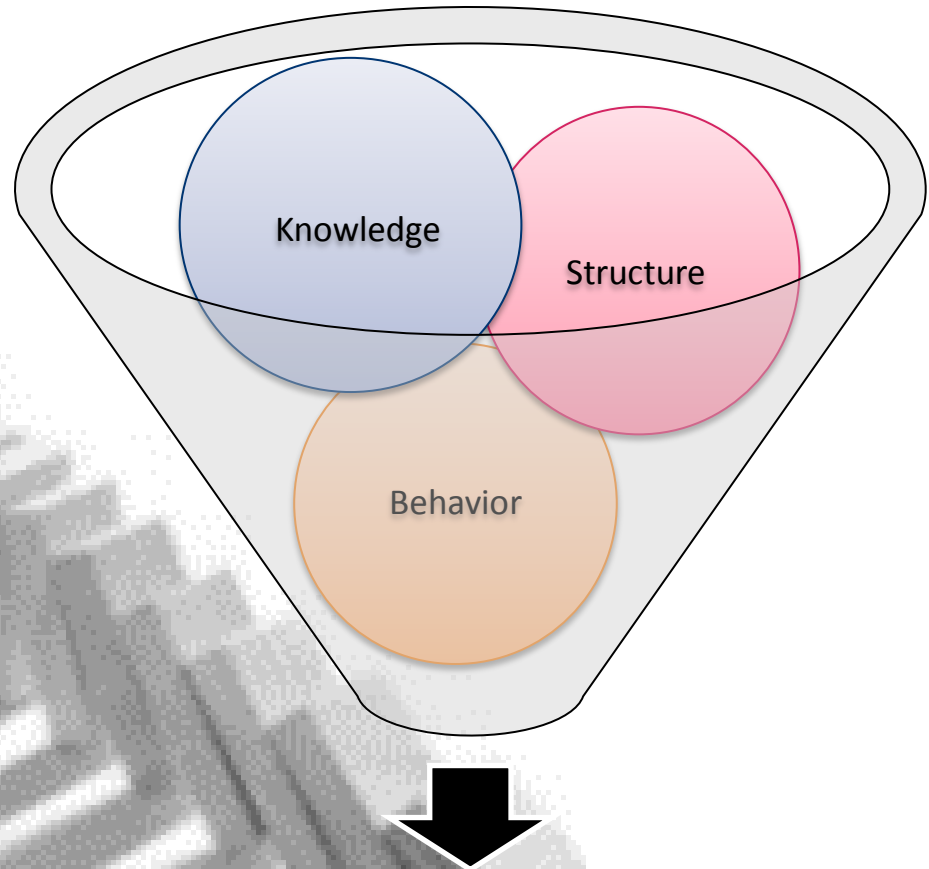Decision Superiority

AGILITY

Information Superiority

Effect Superiority

See first and more

Execution
Act Decisively

After Ruud van Dam 04

WHAT TO TRAIN?

Effective crisis management

HOW TO TRAIN?

CYBER TRAINING
SECURITY OPERATIONS CENTER NETWORK OPERATORS

Polices

Decision Making

Cognitive Domain

SOC

Monitoring

Fusion/ Mining

Logs and Alarms

Automatic Actions Dispatch System

Manual Actions Dispatch System

Cyber Training

Applications (servers, databases ...)

Protocol

Network

Information Domain

Physical HW Domain

CRANE HAWK

USA
George Mason University — C4I Center
- ATC
- NetSIM
- VR-Forces

Skövde, Sweden — SAAB
- CyberSAFE
- CS-AAR
- SAFE
- WebSIM
- 9LandBMS
- PLCs
- CyberSAFE
- BattleTEK

Brazil
- ATC
- NetSIM
- VR-Forces
- LAB-C2

South Africa — SAAB

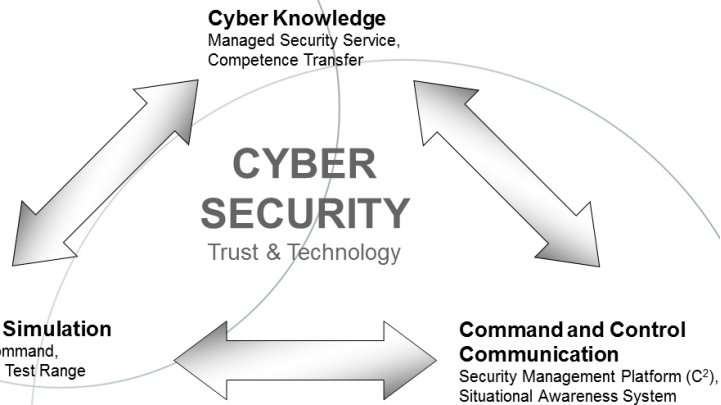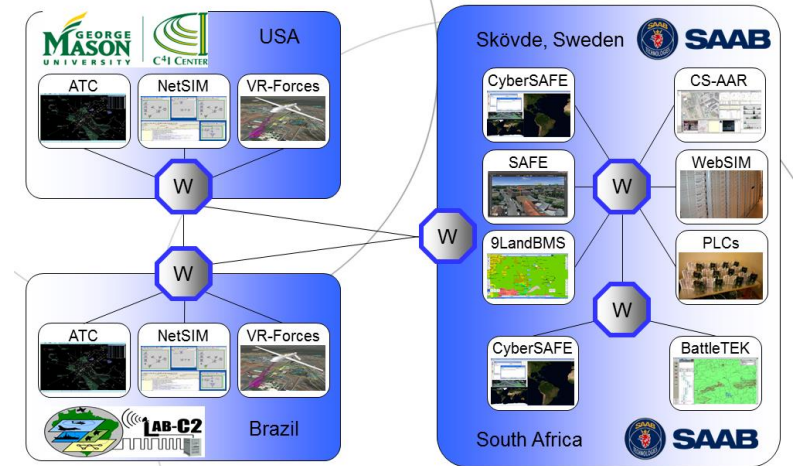### Focus
- Basic aircraft knowledge
- Covers complete aircraft

Specific
- In pace with Aircraft type (C/D)
- Based on ~ 50,000 media files
- Unclassified information
- Two-screen solution
- Synthetic speech
- ~ 350 Lessons Ground Crew
- ~ 150 Lessons for Aircrew

CYBER SECURITY
Trust & Technology

Cyber Knowledge
Managed Security Service,
Competence Transfer

Training & Simulation
C² Chain of Command,
Cyber Security Test Range

Command and Control Communication
Security Management Platform (C²),
Situational Awareness System

Saab provides management / command and control training in the Cyber Security domain.
Saab Cyber Security training offers an organization to educate and train the staff to be prepared to resilient respond, mitigate and recover from Cyber threats and attacks.

Cyber Security Domain Diagram

Domain		
Intent	Polices / Decision Making	Cognitive Domain
Effects	SOC: Intelligence, Social Media, Monitoring, Fusion/ Mining, Logs and Alarms, Applications servers, databases	Information Domain
Actions	Protocol, Network	Physical HW Domain

Automatic Actions Dispatch System · Manual Actions Dispatch System · Cyber Training

Legend: Operational (yellow) · Soft (green) · Hard (black)

AND ...

- Context aware Cyber security training - Online fraud

Marcus Nohlberg
PhD ISM - Social
engineering, Fraud

"Once you get the hang of it, crisis management is fairly straightforward."

Sociala medier

f facebook.com/combitech

🐦 twitter.com/combitech

▶ youtube.com/combitechab

in linkedin.com/company/combitech-ab

Sosiale medier

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![in] linkedin.com/company/combitech-as

professional

personal

security

environment

technology

COMBITECH

www.combitech.com

SYNTHETIC LEARNING ENVIRONMENTS
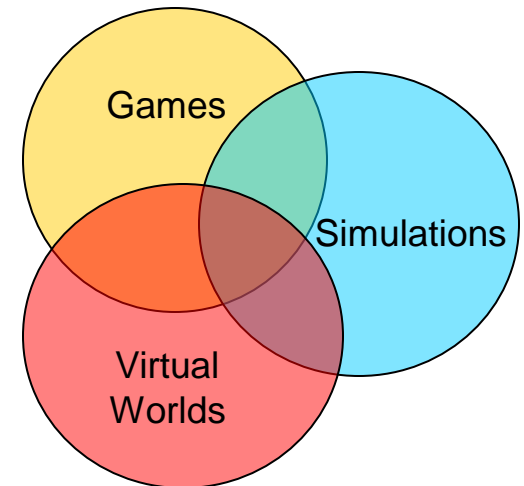
Includes Games, Simulations & Virtual Worlds

Overlapping Characteristics

Research Leveraging Opportunity

MOTIVATION
(Deci & Ryan, 1985; Garris, Ahlers, & Driskell, 2002; Malone, 1981)

Increased Motivation

Increases Time on Task

Is related to Self-Efficacy

Increases Learning

Does Motivation to play *this* game impact learning?

Can Motivation be sustained?
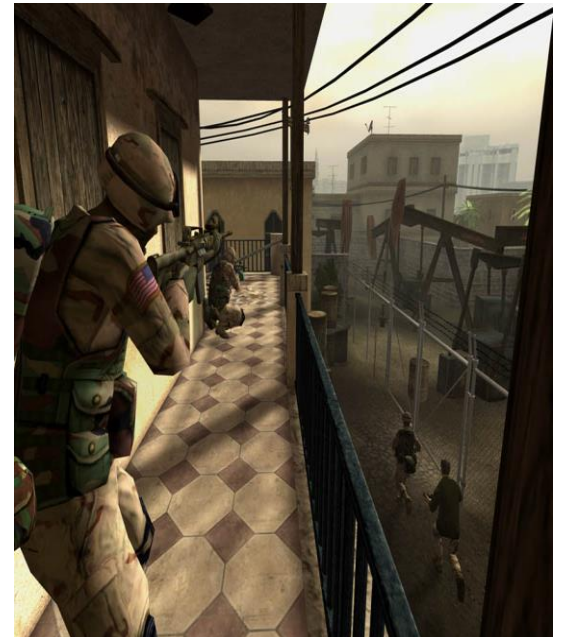
America's Army

SELF-EFFICACY
(Bandura, 1982; 1989; Gist et al., 1989; 1991)

Support constant accomplishments

People like to do things they're good at

Small tasks embodied in larger achievements

Parallel achievements feed into a goal

Multiple goals negotiated to enable overall objectives

How must serious games be designed to accommodate learners with varying levels of self-efficacy?

How can serious games be designed to foster development of self-efficacy?

Tiger Woods Golf

METACOGNITION & SELF-REGULATION
(Bransford, Brown & Cocking, 1999; Schunk & Zimmerman, 2003)

Increase metacognition

Players know what they know

Players know what they need to know

Increase self-regulation Players intrinsically motivated to accomplish next challenge

Players know where they stand in relation to the game

What mechanisms can be used to elicit metacognition in serious games?

Can automated techniques be incorporated into serious games to support self-regulation?

Call of Duty 2

ACTIVE PARTICIPATION
(Chi, 2000)

Increase interaction for learners

Compare mental models

Requires decisions and inputs several times per minute

Active Participation

How can serious games be designed to ensure high degrees of active participation in learners?

Monkey Wrench Conspiracy

ANCHORED INSTRUCTION & SITUATED LEARNING
(Bransford, Sherwood, Hasselbring, Kinzer & Williams, 1990; CTGV, 1990; 1993)

EXPERIENTIAL LEARNING
(Kolb, 1984)

- Provide context for content
  - - Authentic Experience
  - - Relevance

- What degree of authenticity in the synthetic experience is required to provide a sufficiently meaningful context within which learning can occur?

Europa Universalis II (Paradox)

MODEL-BASED REASONING & FIDELITY
(Cartier & Stewart, 2000; Jonasssen, 2000; Honebein et al., 1993;
Duffy & Savery, 1996; Petraglia, 1998)

Provide a model-based environment

Manipulate variables

Multiple perspectives

Observe system behavior over time

Draw & test hypotheses

Fidelity

Does cognitive fidelity have a greater impact than physical fidelity in serious games?

For which learning objectives is physical fidelity important?

Black Hawk Down

ENGAGEMENT/EMOTIONAL CONTROL & FLOW
(Csikszentmihalyi, 1990; Gerhard et al., 2004)
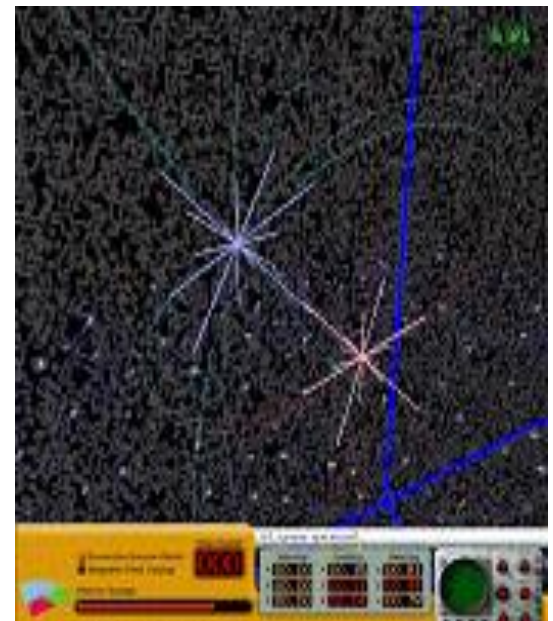
Increase time on task

> Players spend hours a day playing

> May interact with a single game for years

> Engagement/Flow

Which characteristics influence the learner's level of engagement in serious games?

How can serious games be designed to increase engagement?

Supercharged

EMBODIMENT, PERSONALIZATION & ENGAGEMENT
(Baylor, 2001; Gerhard et al. 2004; Moreno & Mayer, 2004; Slater et al. 2000)

Enhance engagement

    Players embodied in story

    Increased sense of connection with game

    Embodiment/Personalization/Engagement

How does the degree to which learners experience feelings of immersion influence training effectiveness in serious games?

How does emotional intensity contribute to learning?

Does embodiment contribute to engagement in the serious games?

Full Spectrum Warrior

GOAL SETTING/ACCEPTANCE
(Locke & Latham, 1990; Locke et al., 1981; Schunk & Ertmer, 1999)

Deviate from linear instruction

    Goals are networked

    Knowledge accessed through many routes

Allow progress towards immediate, concrete goals

    Objects & concepts always used to progress

    Goals not abstract or long term

    Goal Setting

How does goal orientation interact with serious game design?

How can serious games be designed to trigger mastery orientation in learners?

The Political Machine

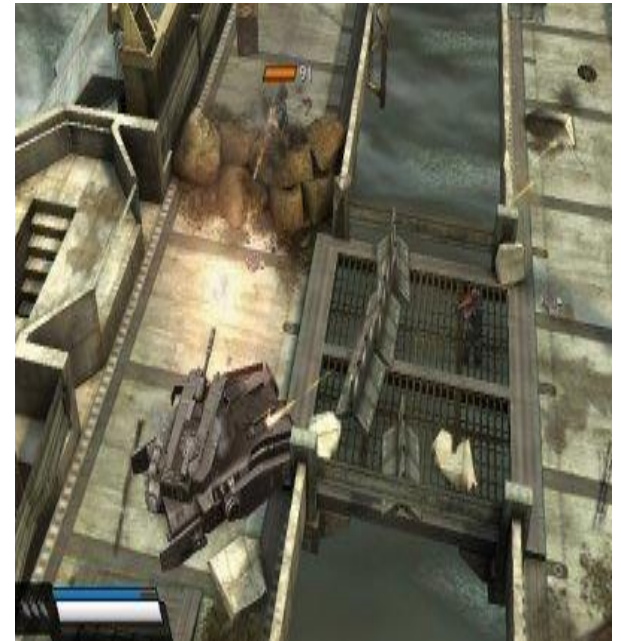# FEEDBACK
(Bransford, Brown & Cocking, 1999)

Continuous Feedback

    Immediate

    Process and Outcome based

Which types of feedback are most effective, process, outcome, combo?

Under what conditions is immediate or delayed feedback more effective?

Killzone Liberation

COLLABORATIVE/SOCIAL LEARNING
(CTGV, 2000; Clark & Wittrock, 2000; Johnson, 1981; Nelson, 2000)

- Increase peer-to-peer learning
  - Groupings of players share insights
- Collaborate Learning
  - Support communities of practice
  - Social phenomena
  - Unique language, practices, norms & culture
  - Social Learning

- How can automated tools be best designed to support collaborative (multi-player) serious game environments?
- How is collaborative learning altered when learners are distributed?


Virtual U

REWARD/SOCIAL STATUS
(Deci et al., 1999; Reeve & Deci, 1996; Ryan & Deci, 2000)

- Increase motivation to achieve
    - Public rewards
    - Increased sense of competence & challenge
    - Reward Social Status

- How can serious games be designed to maximize intrinsic motivation in trainees?
- When should rewards and competition be used to motivate learning?
- How important is public recognition or social status to motivation in a serious game?
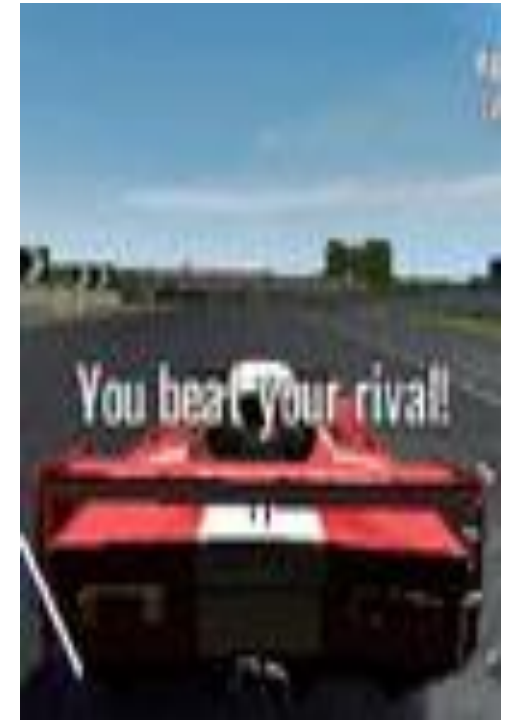
Race Driver 2006

EXPECTATIONS
(Tannenbaum, Mathieu, Salas, & Cannon-Bowers, 1991)

Can have impact on learning

    Moderate training experiences

    Could influence game impact

        Fidelity

        Appearance

        Game?

How do expectations regarding gaming affect the success of serious games?

Do trainees' incoming expectations for training affect their reactions to the serious game?

DYNAMIC ASSESSMENT

- How is learning measured within a game?
    - Score doesn't give complete picture
    - If there are multiple paths, its impossible to gauge effectiveness
    - Process must be tracked
    - Diagnostic expert models should be created
    - Intelligent tutoring systems should drive learning applications
- What Dynamic Assessment tools can be incorporated into games assessment?
- How can expert models be used to provide meaningful real time feedback and assist in creation of learning opportunities?

Close Combat: First to Fight