TOWARDS AN INTEROPERABLE ADAPTIVE TUTORING AGENT FOR SIMULATIONS & SERIOUS GAMES

4th International Conference on Theory and Practice in Modern Computing
22 – 24 July 2015, Las Palmas de Gran Canaria

Alexander.Streicher@iosb.fraunhofer.de
AGENDA

- Simulators & Serious Games for Image Interpretation
- Application example
- Interoperable Tutoring Agent
  - Ideas, Concepts
  - Models & Schemas
  - Prototype
- Summary
Image Interpretation – Radar

Optical Image – Source: Google

TerraSAR-X Image – Source: Infoterra

Optical

Radar (SAR)
Simulators & Serious Games for Image Interpretation

ViSAR

INSIGHT

VBS3

Serious Game A

Lost Earth

Lost Earth

...
Adaptivity Scenario, Application

Game

- Linear game
- Difficulty adjustment solely on internal user model
- No externally guided recommendations

Adaptivity → Flow → Immersion
Adaptivity Scenario, Application

Game

- Linear game
- Difficulty adjustment solely on internal user model
- No externally guided recommendations

Dynamically adjusted game mechanics & content
Architecture Interoperable external Tutoring Agent

Evidence, Clicks, Statistics, ...

Comm. Layer
(HLA, xAPI)

Virtual Assistance, States, Objects, ...

Interpretation Engine
Influence Engine

Controller

Adaptation

Engines

Unity
HAVOK
VBS3

Serious Simulation & Games
Towards an Interoperable Adaptive Tutoring Agent for Simulations and Serious Games.

**Architecture Interoperable external Tutoring Agent**

- **xAPI, Activity Streams**
  - “User1 selected console1.”
  - “MaxMustermann started scene power plant 3 minutes ago.”

- **Comm. Layer** (HLA, xAPI)

- **Evidence, Clicks, Statistics, ...**

- **Virtual Assistance, States, Objects, ...**

- **Controller**
  - **Interpretation Engine**
  - **Influence Engine**

---

Architecture Interoperable external Tutoring Agent

xAPI, Activity Streams
„User1 selected console1.“
„MaxMustermann started scene power plant 3 minutes ago.“

Comm. Layer (HLA, xAPI)

Evidence, Clicks, Statistics, ...

Virtual Assistance, States, Objects, ...

Controller

Interpretation Engine

Influence Engine

Interpretation Engine

Content
(RDF) Storyboards
SG-LOM Metadata ...

static

Models
Constraints/Patterns
Didactic Factors

static

User Data
xAPI LRS
Learner States
History

dynamic

Adapter
Models & Schemas

- Ideas & concepts from ITS
- IEEE Learning Object Model (LOM) content container format
  - SG-LOM  [ElBorj2014]
- RDF-Storyboards
  - Storyboards  [Fujima2013]
  - Logic reasoning, inference
  - Semantic interoperability
- Aspects from Web-Didactics  [Swertz2004]
Unity Prototype for Seek&Find Game (Work in Progress)

HLA, SOAP
User Model Storage (xAPI)
Assistant Injection
Semantic Analysis (Cyc)

3D In-Game Assistant
(→ “Tutor”)

Congratulation!
You have finished the task!

New mission: Find the hidden tank in the environment, and determine its type and abilities. In order to assist you, I will accompany you.
Summary

- Exploitation of multi-usage data of simulators/games for adaptivity
- Interoperability architecture using standards
- Transfer of ITS principles to simulations/games
- WIP prototype with Unity

Outlook:
Adaptive Simulations & SG, Evaluation

© www.9gag.com
Thanks for your attention! Questions? Comments?

Dipl.-Inf. Alexander Streicher
Telefon: +49 721 6091 277
alexander.streicher@iosb.fraunhofer.de

Fraunhofer Institute for Optronics, System Technologies and Image Exploitation (IOSB)
Dep. Interoperability and Assistance Systems (IAS)
Fraunhoferstr. 1, 76131 Karlsruhe, Germany
www.iosb.fraunhofer.de
References