Interactive Storytelling Architecture for Training

Brian Magerko

Bob Wray

Additional project contributors:
Lisa Holt, Brian Stensrud

MICHIGAN STATE UNIVERSITY

Motivation

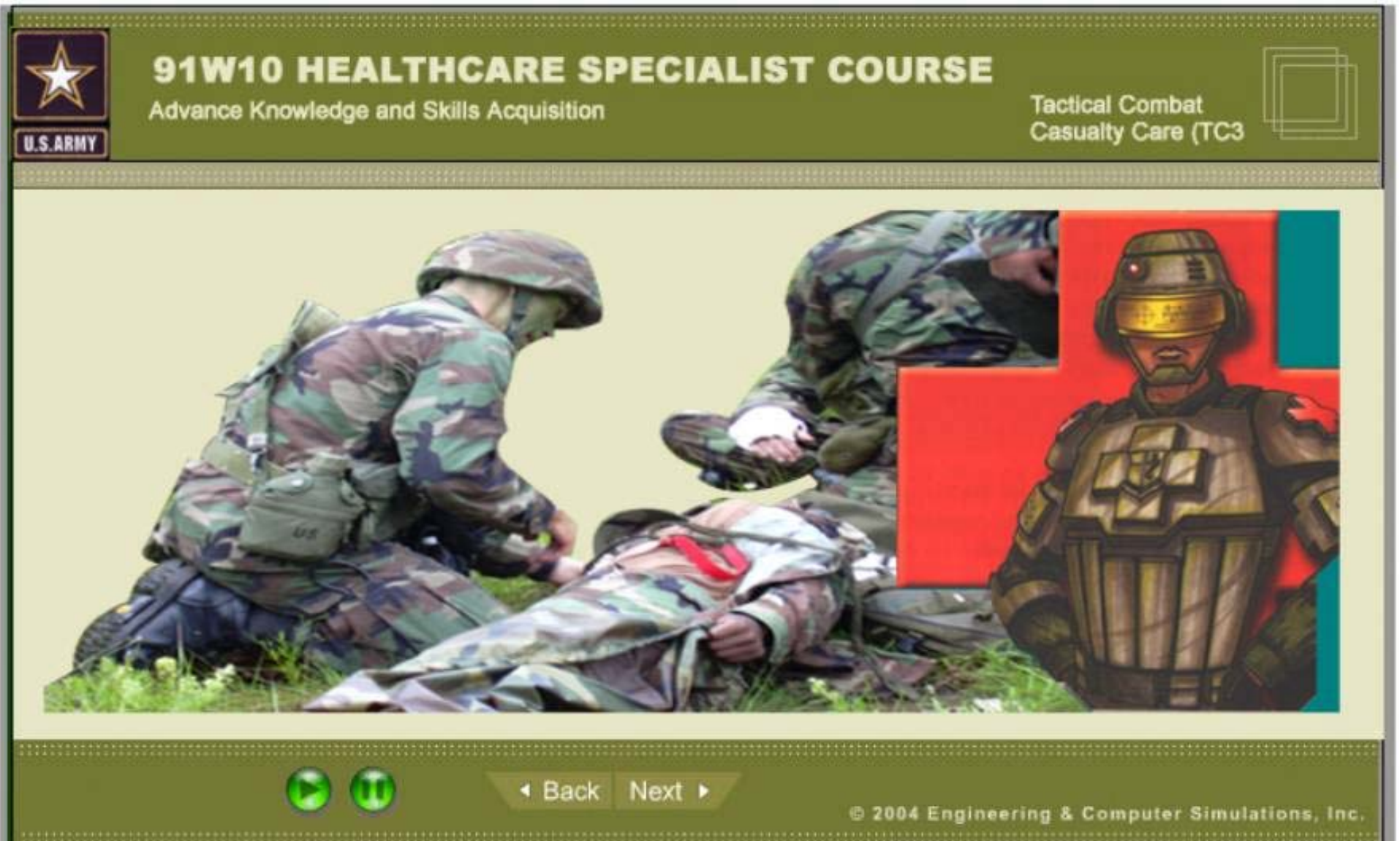
- Training systems often use “pre-canned” exercises
  - Limited interest of student (poor motivation)
  - Limited training value (slow learning curve)
- Hypothesis:
  - Improve both interest (engagement) and training effectiveness by inserting an intelligent controller (director) into virtual training systems

Intelligent tutoring in unstructured domains

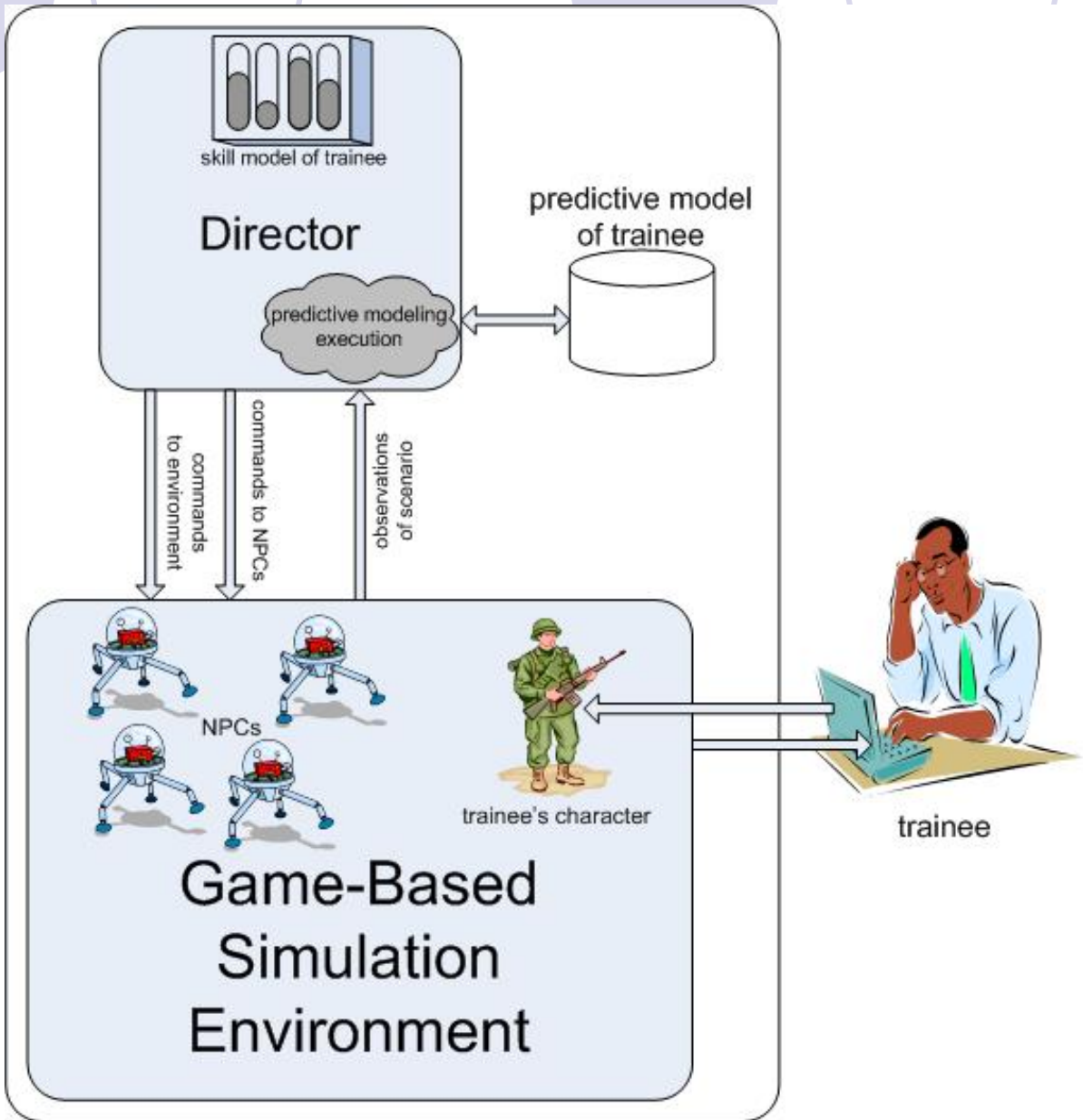
ISAT

- Based on work done with Interactive Drama Architecture (IDA)
  - Director as scenario manager
  - Author as trainer
- Provides individualized training experience
  - Trainee aptitude in skills
  - Drama
- Explores application of interactive storytelling techniques to training

Environment



Architecture



Scenario representation

- Scenario
  - Partially-ordered abstract scenes
  - Mapping between possible actions and skills F1
- Scene
  - Explicit list of skills tested
  - Abstract events

F1 ?

Fish, 6/15/2005

Director Actions

- Reactive & Predictive direction
  - Similar to IDA
  - React to trainee actions (provide feedback)
  - Anticipate trainee actions and structure events to ensure desired outcomes
- Skill-based direction
  - Take actions that allow trainee to demonstrate skills
- Heuristic scene choice & instantiation
  - Decisions motivated by skills & narrative arc

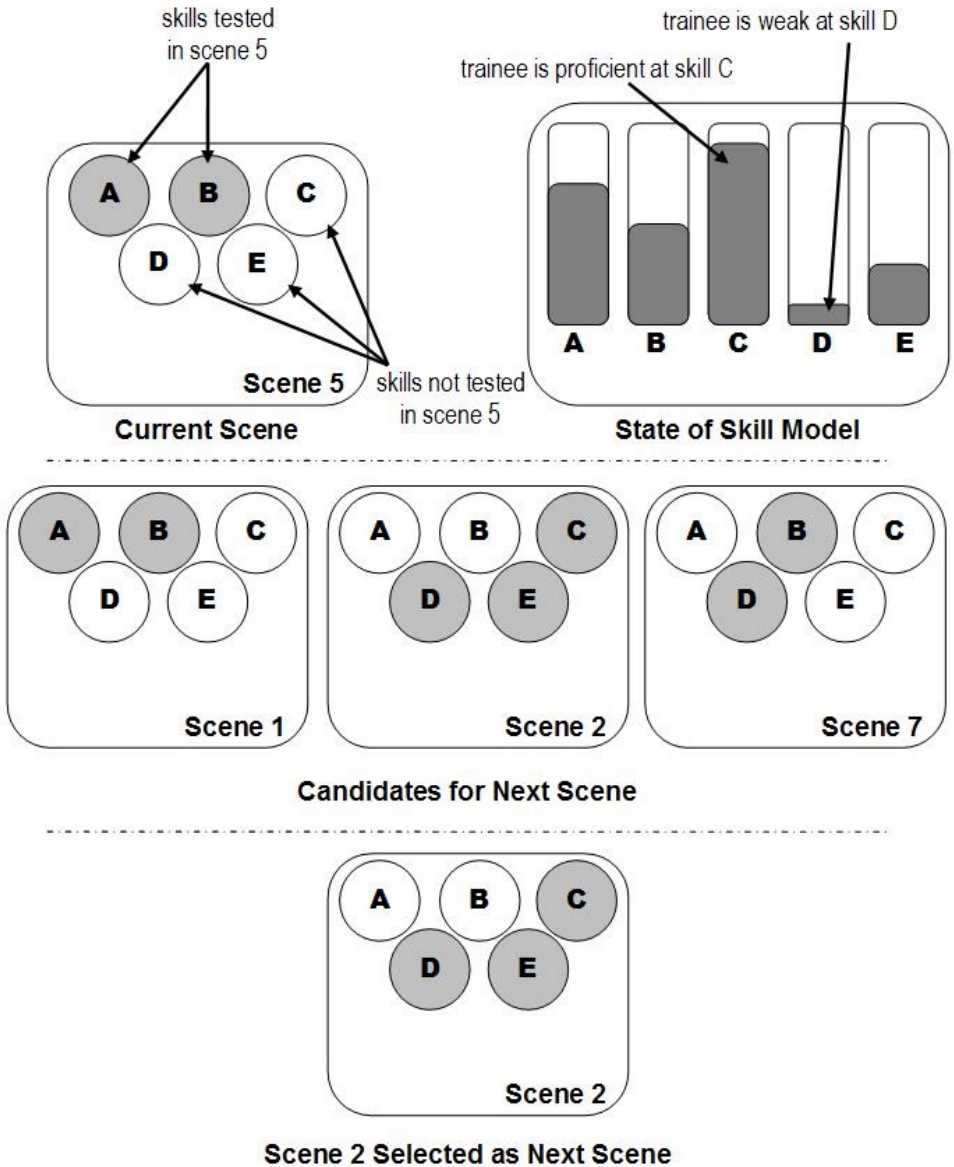
Skill-based direction

- Provide indirect environment feedback to trainee during task performance
  - Constraints
    - Maintain engagement: No “instructor popups”
    - Provide guidance (scaffolding) but don’t make it a crutch (fading)
    - Need multiple levels of intercession for the same trainee actions
  - Direction based on f^n of recency, strength, decay, & ?? of skill
- Example
  - Trainee fails to check civilian casualty for booby traps
  - Possible director actions:
    - Blow up trainee, roll out dud grenade, CO yells, NOP

Skills in 91W TC3

Skills	Description
Care Under Fire	In a hot zone situation, return fire and help secure the area before attempting treatment or extraction.
Find Temporary Fighting positions	Minimize exposure to fire by staying low to ground and using objects in the environment.
Prioritize casualties	Decide the order in which patients should receive care.
Secure casualty	Make sure the casualty poses/can pose no threat.
Check vitals	Check casualty's breathing, heart beat, and skin color.
Apply tourniquet	Decide when a casualty/situation requires a tourniquet and apply the tourniquet.
Manage airway	Open airway if the patient's breathing is labored.
Manage chest wound	Take correct steps to treat a casualty with a chest wound.
Monitor	Monitor casualty until evacuation
Extraction	Properly extract a casualty from a hot zone.

Heuristic Scene Choice



Scene instantiation

- Skill model for content selection & refinement
  - Instantiate scene to test specific skills
  - Transition f^n from skills & content to complete scene
- E.g. in “the ambush scene:”
  - Trainee is untested in tourniquet skills

    → spawn an enemy on top of building with RPG

Next steps

- Full implementation in 91W TC3
- Research in robust predictive models
- Diagrammatic authoring & debugging tool
- Evaluation of approach & tools
- Implementation in other environments

Nuggets and Coal

- Nuggets
  - Extended IDA to training domain
  - New approach to teaching in unstructured, real-time domain
  - Working prototype in 91W TC3 trainer
  - Lots of interest (potential funders/customers!)
- Coal
  - Skill model is immature
  - Scene representation & instantiation is immature
  - Lack of other environments to show generalizability

Questions?

brian@magerko.org

wray@soartech.com