The Open Simulation Platform

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The United States Institute of Peace (USIP) Open Simulation Platform (OSP) is a web-based learning and instruction environment. It combines a 'simulation wizard' that will enable subject matter experts to easily author and run online simulations with an innovative library to support and encourage sharing and reuse of simulations.

This paper lays out the thinking behind the platform, explains key concepts about how the system works, and discusses future directions and opportunities.

The Challenge

The ways in which we each learn are evolving rapidly, regardless of age. The world we live in is complex and solutions to problems in that world are often not obvious. Some individuals may possess viable solutions and essential insights, or have a part of a solution in their mind, but the true answers are spread out amid a network of minds and modalities. There needs to be a better way to enable good answers become apparent, to illuminate the paths by which those answers are reached, and to disseminate such insights in a manner that encourages retention of learnings.

Current methods of conveying knowledge, such as reading, talking and role playing, are effective and proven, having been employed for generations and millenia. But such methods run up against limitations; the individual human mind is quite fallible, groups of people can be entirely susceptible to believing what they want to believe, and there is no substitute for first-hand experience. Methods are needed to compel people to consider and face real world circumstances and constraints.

As future leaders grapple with the geopolitical complexities of the modern world, new tools are needed to aid in teaching and comprehending the nuanced dynamics which impact and inform the evolution of our global society. As information becomes a central economic paradigm, learning tools must provide insight and understanding of underlying factors, and the various perspectives and values of stakeholders in our economic and political systems.

The Solution Vision

Technology and the internet are now making possible new hybrid approaches that meld traditional learning models in concert with hard numerical facts and distributed resources. As various tools make peer-to-peer communications ubiquitous, training is evolving from a one-way to a multi-way form of learning. Such developments are buttressing the meme of 'the we is smarter than the me.'

Simulations are numerical representations of the world implemented as software. Enabling people to experience simulated or virtual worlds can be a fast and effective method to convey lessons and accumulate the equivalent of real world experience. Simulation-based learning offers the additional benefit that experience is gained in a relatively risk-free environment; mistakes in a real-world hostage negotiation can lead to violence and death, while mistakes in a virtual hostage negotiation lead to nothing more than embarrassment.

The vast majority of simulation tools to date have been closed, complex systems. The barrier to entry for creating simulations is still too high; one needs a fairly large budget and

substantial engineering support to create multi-player online simulations, and the number of subject matter experts involved in creating simulations is still rather small. In addition, re-use of simulation content in such systems is typically limited at best; each tool exists as a de facto data silo for the associated simulation subject matter.

What is needed is an open, extensible simulation platform that supports direct authoring of simulations by subject matter experts, without requiring knowledge of programming languages and underlying technologies. By giving such authors direct access to put their ideas in usable and teachable forms, a far broader pool of wisdom can be tapped, and the field of simulation design can benefit and grow accordingly.

Such a learning tool also needs to allow those using it to understand all of the assumptions going into a simulation, and to be able to provide meaningful feedback. And as simulations evolve and mature over time, the aggregated knowledge and experience needs to be captured in a form that can be re-shared with others, in a library model that is easily browsed and expanded.

The optimal solution needs to be open at both the software level, in the form open source code, and at the data level, in terms of shareable and reusable simulation content. This openness allows all interested stakeholders to contribute their knowledge, whether that knowledge takes the form of enhancements to the underlying platform, or improvements and new contributions to the library of simulation resources. And open systems can be readily adapted to the needs of each community of users, while at the same time inheriting new functionality from the rich ecosystem of other open source packages.

The United States Institute of Peace is currently implementing such a platform.

The Open Simulation Platform

USIP is developing the Open Simulation Platform (OSP) to address the challenges and solution vision detailed above.

The term 'simulation' has a range of meanings in a range of contexts. For the OSP, 'simulation' refers to 'training simulation.' Each simulation is a training event designed to leave the participants changed in some meaningful way, able to view the world differently or perform better than if they had not conducted training with the simulation.

In the initial release, OSP simulations will be multi-player engagements, with humans playing the roles of all of the actors. While artificial intelligence (AI) may at some future point mature to the point where computer-driven characters can be useful participants in simulations, the multiple-players model allows for the richest experience and best set of interactions that we can provide to players at present. And because the simulations are be multi-player, a hosted online platform provides for the richest and most flexible participation framework, requiring only a standard browser window on the part of all users.

The OSP architecture is designed to serve four user audiences:

- **Simulation Authors** will design and create the training simulations. The platform will enable them to create simulations, edit all aspects of a simulation, create and administer instructors and players, and initiate and facilitate simulations.

- **Simulation Facilitators** will initiate and run simulations, either of their own creation or from the simulation library. The platform will enable them to initiate simulations, view simulation state and activity, engage in simulation play like any other player, change simulation phases, send news updates, terminate play, and author the After Action Report for each initiated simulation.
- **Players** will animate the roles in the simulation, using background information, simulation state changes, and their own intuition to navigate behavior for their role. The platform will enable them to log in to simulations and play, receive news updates, and chat with other players.
- **Administrators** will install and maintain the overall state and operation of the simulation platform. The platform will enable them to create and manage all platform user types, administrate the platform database, and perform all operations other users can perform.

While the author and facilitators roles will overlap in practice, they are separated from a platform design standpoint to emphasize the vision for simulation reuse. The subject matter experts needed to author compelling simulations come from a relatively small pool, but instructors willing to employ such simulations in their agendas represent a more substantial user audience for the platform.

The Simulation Authoring Experience

Simulation authors have a range of options and frames in which to define simulations. Simulations can be conducted:

- Purely Online
    - With all of the players online at the same time (synchronously)
    - With the players logging on whenever they find convenient (asynchronously)
- In a classroom
- Played in one session
- Played over many weeks or months

The OSP supports a generalized workflow for the authoring, execution, and sharing of simluations. For Simulation Authors, this cycle can be summarized as “Think-Create-Play-Share”. The following sections elaborate on the four components of this cycle.

Think

The OSP tool pre-supposes that the simulation authors and facilitators using it have something meaningful to teach. Before casting hand to mouse and keyboard, simulation authors will need to consider the details and dynamics of the simulation they wish to author.

The OSP platform is published with a set of Excel worksheets which can be used for planning all aspects of a simulation. These aspects include:

- The overall simulation definition, including name, objectives, audience and background.
- Definition of actors in the simulation, whose roles will be filled by players in the running simulation. These definitions include information about interaction between the actors, as well as the public, semi-public and private data about each actor.
- Specification of simulation phases, and the actors associated with each phase of the simulation.
- Addition of special features, which may include formulas and other extensions to the core simulation framework. For example, a budget can be added to a simulation as a special feature.
- Drafting essential concepts for the 'After Action Report' (AAR), which is an essential part of any simulation. The report provides feedback to participants on how they performed in their role. The actual AAR is written after the simulation is completed by the simulation facilitator.

Once the simulation has been mapped out, the author moves online to utilize the OSP in authoring their simulation.

Create

The 'Simulation Author' (SA) uses the Simulation Creation Wizard (SCW) to define all the details of the simulation. The creation process can be broken down into five steps:

1. **Enter Background Material** - Provide the background materials that the players will need to read, as well as core simulation information.
2. **Define Phases** - Here the SA will consider how he or she envisions the simulation progressing toward completion and define a phase for each stage of play. This may be as simple as defining one phase for when the simulation is in progress, and one for when the simulation is completed: 'in progress' and 'done.'
3. **Create Actors** - The SA will enter information particular to each actor involved in the simulation.
4. **Create Actions and Views** - The SA will enter in what actors can do and see.
5. **Assign Actions and Views to Actors** - The SA will then assign the actions and views available to the different actors in the different phases of the simulation.

Simulations are not ready for use until they have been published. The above creation work can be done across multiple sessions, and when the SA feels the simulation is ready, they publish it for themselves or other simulation facilitators to initiate and run.

Play

Once the simulation is published, the author or another facilitator selects it and initiates it for use with a group of players. This can be broken down into four steps.

1. **Create Running Simulation** - Give a specific name to a play session, for example 'Beta-test 1' or 'Summer 2009 Session 1.'

2. **Create Users** - Each player will need a login account to enter into a simulation.

3. **Assign Users to Actors** - Each player will need to be assigned to an actor. For example, the player 'John Doe' may be playing the actor 'The President.'

4. **Invite Players to Begin** - This enables players to login to play the roles assigned to them and can (optionally) send them an email to let them know that the simulation has begun.

This process and associated phase management is explored in greater detail below in *The Simulation Facilitation Experience*.

Share

One can stop at step three above, or alternately go from 'Play' back to 'Think', make adjustments, and play some more, but the sincere hope of the platform designers is that once authors have created good simulations they will want to share these with others. The sharing process involves three steps:

1. **Package the Simulation** - Take a publish simulation and package it for transport.

2. **Download / Upload from Web Site** - Post a simulation to a community web site where that simulation is relevant. For example, people creating simulations around environmental themes may all be posting to one site sponsored by members of the green community.

3. **Import Simulation** - Take a simulation that someone else has created and import it onto your system. You may be able to (depending an parameters set by the original simulation creator) conduct, or even change then conduct, the simulation with players of your choosing.

The platform designers are currently engaging prospective simulation authors and facilitators to refine and enhance the “Think-Create-Play-Share” workflow. Curious readers are encouraged to visit the demo platform, play around for themselves, and offer any and all feedback.

The Simulation Facilitation Experience

Facilitating a simulation involves initiating and then moving the simulation through phases.

A simulation phase represents a large external constant set of conditions that can affects what the players can see and do at any given stage during a simulation. Operationally it determines the simulation sections that the players will experience, in which order and under what circumstances. A simulation will automatically go through some phases when it is being played. Below is the simplest possible lifecycle of a simulation:

Initialized	→	Started	→	Completed	→	Terminated

Where:

- **Initialized** is the phase where players can log in and read information, but cannot take any actions. Time is not yet moving.
- **Started** is the phase where players can first act and interact.
- **Completed** is the phase where players can log in to see how things went.
- **Terminated** is the phase where players can no longer log in.

The simulation author (SA) can add any number of phases between ‘Started’ and ‘Completed.’ Simulation phases may change automatically. For example ‘Summer’ moving automatically into ‘Fall’, moving automatically into ‘Winter’. Or they may change during things that happen into a simulation. For example, due to players' actions the simulation phase may move from ‘War’ to ‘Peace’.

Some example simulation paths are given below.

- Initialized → Started → Summer → Fall → Winter → Completed → Terminated
- Initialized → Started → Tense → Peaceful → Tense → WAR → Tense → Completed → Terminated
- Initalized → Started → Disaster → Triage → Intensive Care → Long-Term Care → Completed → Terminated

One highly recommended phase is “Reflection”, which should come just before the phase ‘Completed.’ This phase is a time for players to write down their reactions to a simulation and perform self-evaluation before the final simulation is over. From an instructional point of view, this can be the moment for students when actual learning occurs – when they are no longer ‘in the thick of it’ but can reflect on their own reactions and strategies.

The Simulation Playing Experience

While each simulation author and facilitator will have control to specify the roles, situations and contributing factors for each player in each simulation, there is a general process through which any player will proceed, and capabilities each player will utilize during role play.

At the outset of any simulation, the simulation facilitator will make sure players are presented with background information on:

1. The world in which they exist.
2. The role of the actor they play in that world.

In addition, as they act out their role, players will be able:

1. Communicate with each other.
2. Make decisions.
3. Access data pertinent to the actor they are playing.
4. View updated state information for the simulation as the underlying platform applies

author-specified formulas to recalculate simulation parameters.

The information and simulation status visible and available to each player may change as the simulation progresses through different phases. For example, if the simulation is in the stage 'summer' then it might be possible for the actors to do and see a different set of things than if the stage is 'winter.'

Players are notified of changes in phases by the simulation facilitator, including the end of the simulation. Upon completion of the simulation, each player receives their After Action Report (AAR), which provides them with feedback on how they executed their role.

The Simulation Library

One of the primary goals of the OSP is to increase sharing and use of training simulations. This is being implemented as the OSP Library, where simulation authors can contribute their simulations for use by other facilitators and authors. Over time OSP libraries will grow to provide rich and diverse simulation resources, enabling more facilitators to experiment with simulations in their teaching, and more learners to experience the immersive learning that such simulations can engender.

The Library feature is also envisioned as a catalyst for the larger OSP community. Shareable knowledge resources with serve as both fuel and glue in connecting different practitioner communities. The open source nature of the underlying software will enable the community to steer and contribute to the direction of the platform, but the Library will host the rich aggregated knowledge which will truly move training simulation technology forward.

Project Status and Future Direction

The USIP OSP is well along in its initial development cycle. A demo version of the platform is online by visiting www.opensimplatform.org, and the code base is published in the code.google.com repository.

As the platform matures, future directions envisioned include:

Platform hosting: While OSP will always be available as an open source download available to anyone who wants to install and run the platform on their own server, its greatest potential likely lies in deployment as a hosted platform, where simulation creators and facilitators can leave the hosting and administration work to others, and focus on authoring and running training simulations. While details of how such a model

Better packaging for shared simulations: The ability to publish, share, and reuse simulations is a unique and powerful feature of the OSP environment. As the sharing model grows, simulation packaging will be enhanced to provide more control and value for both authors and facilitators of simulations.

Growth in sharing community: With a hosted environment and powerful sharing features, the project will focus on bringing in more subject matter experts to create simulations, and encourage them to share those works with other members of the OSP community. While the platform represents compelling technology, the ultimate value of the project will lie in the richness and diversity of simulations which are created, shared, and reused on the platform.

OSP is a community-driven project, and we welcome inquiries, involvement, and contributions from all interested parties.