TransLumen

TransLumen's AI Driven Microsimulation Apps on Gamified Platforms

Talent acquisition and retention are increasingly critical to organizational and individual success. At the same time, training is changing in terms of how it is delivered and what media is used. The need to hire highly qualified personnel requires a *Training Transformation* in which current learning aligns with the prospective workforce's generational knowledge acquisition differences. TransLumen's experience has shown that as part of designing effective training, the student

Multidevice Communication for On Demand

needs to be consistently engaged and tactically challenged. To improve student success (i.e., individuals with high levels of expertise), more technology and the right technology are required to accommodate the user's appetite for visual content, interaction, and increased realism. Augmenting training/learning with technical microsimulation apps incorporating Artificial Intelligence (AI), residing on a development "gamified" platform, and delivered on cross-platform (including mobile) devices can drive critical applications. This game-based training promote*s* higher training scores, lower failure rates, and shorten the time to certification while reducing training costs.

On-Demand Training

As a basis for writing this article, TransLumen has leveraged its years of experience and lessons learned in the Federal Aviation Administration (FAA) Air Traffic Control (ATC) domain. TransLumen set the innovation path to design, develop, and expand serious gamification for Academy and Professional Controllers in Training at facilities with relevant part-task and sim mode scenarios for the En Route, Terminal RADAR and Tower airspace. This use case for developing microsimulation apps

applied training systems allows students to access learning tools anytime and anywhere with mobile applications (On-Demand Training).

TransLumen used serious gamification to provide engaging and motivational frameworks to help structure and assess the potential effectiveness and engagement of the gameplay design as it relates to Air Traffic Controller operational proficiencies to achieve higher-level cognitive and psychomotor skills in an increasingly complex and dynamic airspace. Increased operational understanding and retention of ATC skills through replaying gamified training scenarios build upon the repetition and complexity of common environmental cues, which allow for building decision-making and enhancing cognitive bandwidth.

Environment realism was employed to represent relevant integrated airspace geospatial aspects more in tune with 3D reality. National Airspace System (NAS) boundaries, changes of controls, geography and other relevant geospatial variables are represented in the User Experience/ User Interface (UX/UI) design for Controller roles. TransLumen has the expertise to program the required physics for AI programming and geospatial data to be incorporated into the games for realistic gameplay and to maximize learning for use in actual operations.

3D Airspace Under User Control

Technology Insertion

Using extended virtual distributed gamification through Cloud-based backend systems enables interactivity between teams to train, employ, and collaborate on prototype products. Translating TransLumen's microsimulations techniques into broad-based instructional training as part of the toolbox, provides learning vehicles to augment instructor classroom, balance large simulators available time, embed into curriculum to mitigate or eliminate knowledge decay; all of which to have an outcome for improving training quality. Also, a derivative opportunity exists to use all forms of microsimulation providing a mechanism to become an industry-specific assessment tool for identifying new recruits through public apps.

Gamified microsimulation development is most effective with multiplayer connectivity with team and multi-role interaction-based missions within different domains, simulating activities relevant to operational conditions. Such planning aims to build object behaviors and problem-solving techniques while identifying game participant/student team roles with high-level training objectives. Building in a multiplatform environment will also reach a wider audience. By leveraging AI, microsimulations can be built for random play increasing learner decision-making skills and experience with handling seldom seen critical events.

Designing, analyzing, and integrating 3D is a necessary modeling step for display on 2D form factors. This perspective prepares the microsimulation for dynamic immersive AR (Augmented Reality) / VR (Virtual Reality) / MR (Mixed Reality) / XR (Extended Reality) gameplay. This also includes UX/UI training design concepts integrated with system design specifications.

When appropriate, advanced speech recognition through live and AI input adds another interactive experience while increasing training realism to repeat and learn. Also, emulating real world is the opportunity to create an integrated "Persistent World", where the user returns to the microsimulation when the world is at a different point in time related to accurate time-of-day environmental modeling and visual realism.

The goal is to increase student throughput while reducing costs and attrition by applying microsimulation at the micro part-task appropriate stage. Additionally, the user can address specific training levels pertaining to familiarization, a focus on detail, and refresher training. Mission success is gauged for the trainee to be at their peak performance and to avoid negative training throughout the "Training Continuum".

Acquisition for Learning Objectives

The roadmap for the player to accumulate knowledge, skills, and abilities (KSA's) depends on the overarching storyboard simulation design and the instructional material accuracy. Evident in most microsimulations are attributes to enhance scanning & observational skill using the OODA Loop *(observe, orient, decide, and act).* Such design reinforces specific training roles and combines gamer theory capabilities with technical requirements. Detailed planning should always precede programming which will go through agile iterations. The framework then moves into the phase to
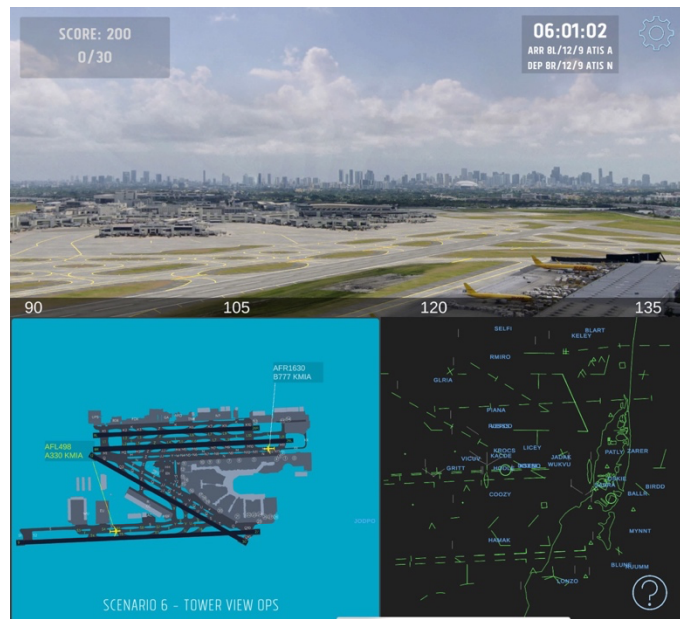
Control and Scan for Daytime View

integrate the images, code, and compilation of logic into the gaming engine, which will also go through agile development.

With engaging gameplay punctuated by awards for achievement, learning is inevitable. Building confidence through repeatable gamification with Artificial Intelligence (AI) and player problem solving allows users to personalize their learning objectives and establish proficiencies that are targeted for improvement. Game methodology and game design translate these goals into engaging, personalized learning sessions with customizable training experiences targeting skill enhancement and longer-term retention. Microsimulations can be created with growing levels of complexity based upon accomplishing micro part-tasks and mini micro tasks learning activities. Passing through gates of increasing learning growth will prepare the student for higher fidelity simulations.

To stay true to distributed learning, microsimulations on mobile devices require embedded learning systems that offer immediate gameplay feedback on operational performance. TransLumen's approach to embedded learning enable the user access to help systems designed to be as visually compelling as possible with searchable topics. In addition, short and long-form instructions are created to adapt to the individual learning process. For those that do not want to use embedded instruction and prefer to go right into the gameplay, reinforced learning can be achieved through intuitive guidance throughout the simulations and scenarios.

Additionally, micro/mini-micro part-task gaming exercises can be inserted into the digital curriculum. These micro/mini-micro tasks can be deployed through online e-learning with links to each learning lesson. Basically, the microsimulation should have all the required resources to assist the learner to have a successful training experience.

Data / Information / Scoring Analysis
Microsimulation is an excellent tool for accumulating data needed for tagging performance in games that export data to be collected, analyzed, and visualized for correlating information to identify areas that require more training and to measure overall effectiveness.

In advance of gameplay, users should understand benchmarks for success through a scoring mechanism. With microsimulation algorithms, time and accuracy will determine the level of success and whether personal achievement allows for advancement. It is incumbent on the developer and subject matter experts to establish scoring metrics and benchmarks that measure the game's effect on the trainees' skills. TransLumen's skillset provides Leader boards with the competitive framework needed to challenge the student to improve and achieve awards. Feedback through metrics captures the activities that identify strengths and weaknesses.

Added Benefit to Microsimulation – Virtual Rapid Prototyping and Productization Modeling

Another derivative benefit of using microsimulation apps is to serve as testbeds for product development that involves building model/tooling products. This lays the groundwork for rapid prototyping with human factors testing before integration into the original equipment manufacturing assembly.

Multiple operational microsimulation scenarios that are agile and co-developed with the system(s) will culminate with high technical readiness levels (TRLs). This methodology will accelerate productization through virtual rapid prototyping, reducing errors and costs.

Resources Needed to Succeed

To build microsimulation apps for mobile devices, the correct expertise is required. Traditional thoughts and know-how will be anchors to stay grounded, but visionaries are imperative. Subject matter experts in the technical areas need to learn how such microsimulation serious games are developed and ensure accurate rules and procedures. Human factors expertise is necessary to test efficiencies, and non-traditional software teams must have the ability to understand technical operations while using the latest gaming mindset to build best-case next-generation tools. Mobile apps require knowledgeability and connectivity to the Cloud with a standard protocol for cybersecurity. Technical prowess to work data collections and manage projects on time and within budget are additional capabilities necessary while delivering robust products.

In Summary

TransLumen's microsimulation apps employ AI logic and are gamified using the latest technology. Applied to critical technical operations, it offers the user mobile On-Demand Training. Using personalized and modifiable scenarios, learners will have many more hours of unique random scenarios with Micro and Sim operations. As a result, they will hone their knowledge, skills, and abilities while building confidence and gaining excitement for the subject matter.

Following such innovative microsimulation app approaches reduces development risks and costs, increases student throughput, and decreases talent attrition while expanding user cognitive bandwidth.