

Developing a simulation-based training model involves designing a realistic and interactive environment where learners can acquire and practice skills without risks to real patients or systems. This is widely used in fields like medicine, aviation, military, and engineering. Here's a high-level overview of the steps to develop such a model:

□ 1. Define Training Goals Start by identifying:

What specific skills or competencies you want to train.

The target audience (e.g., residents, pilots, students).

The expected outcomes (e.g., proficiency in surgical technique, decision-making in emergencies).

□ 2. Conduct a Task Analysis Break down the skill into:

Cognitive components (e.g., decision-making, knowledge recall).

Psychomotor skills (e.g., hand-eye coordination, dexterity).

Affective components (e.g., stress management, teamwork).

□ 3. Design the Simulation Environment Choose the appropriate level of fidelity:

Low-fidelity: desktop software, mannequins, simple role-playing.

Medium-fidelity: partial task trainers, screen-based interactive scenarios.

High-fidelity: immersive VR/AR, full procedural simulators with haptic feedback.

Decide on:

Real-time vs. scenario-based simulation.

Individual vs. team-based training.

□ 4. Develop the Simulation Scenarios Each scenario should include:

Initial conditions (baseline settings, patient or system state).

Events and triggers (changes based on learner actions).

Learning objectives.

Performance metrics (automated or observer-based).

□ 5. Incorporate Feedback and Debriefing Critical for learning:

Real-time feedback: haptic cues, system messages.

Post-simulation debrief: facilitated sessions using performance data, reflection, video review.

□ 6. Build the Technical Platform Depending on complexity, this may involve:

Programming with game engines (Unity, Unreal).

Using simulation software (Simulab, Laerdal, CAE).

Hardware integration (mannequins, VR headsets, motion tracking).

□ 7. Pilot Testing Test the simulation with a small group.

Gather feedback on realism, usability, learning effectiveness.

Refine accordingly.

□ 8. Implementation and Evaluation Deploy the simulation:

Integrate into a curriculum or training program.

Evaluate its effectiveness through pre/post tests, surveys, and long-term outcomes.

□ 9. Iterative Improvement Use learner data and facilitator feedback for ongoing refinement.

Update scenarios to reflect latest guidelines or tech.

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