



GRYPHON
SCIENTIFIC *Science. Security. Strategy.*

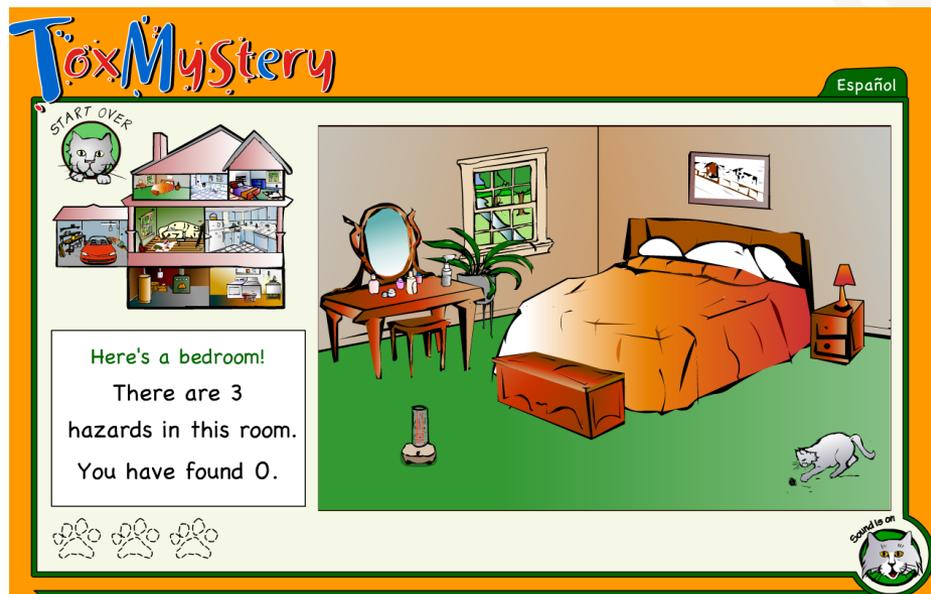
Game-based learning

Development, prototyping, and evaluation

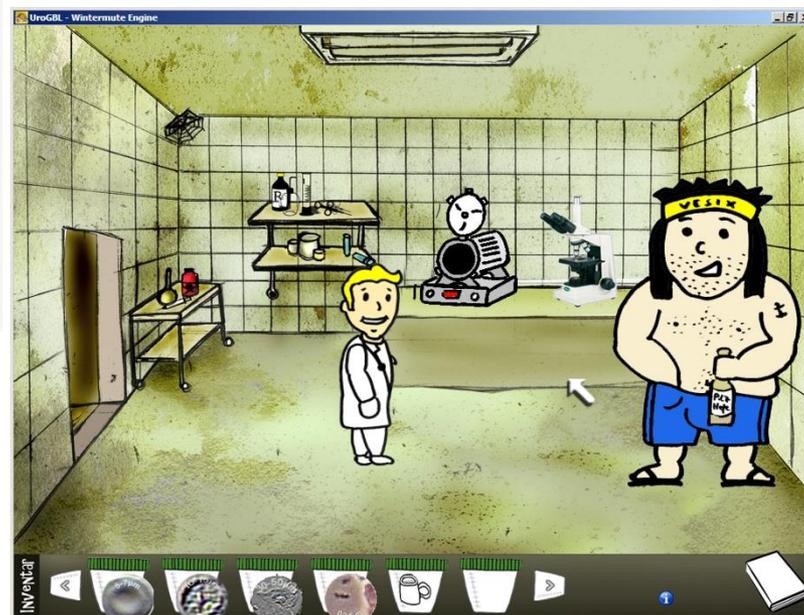
Gautham Venugopalan, PhD

Games with defined learning objectives

NLM ToxMystery



Uro-Island



Game-based vs. conventional learning

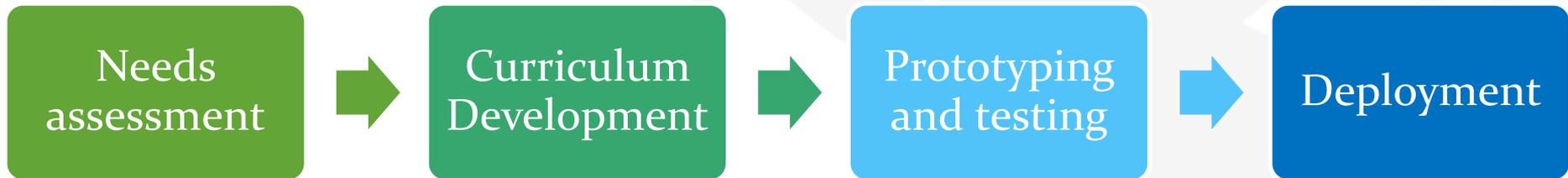
Game-Based eLearning

- Experiential learning
- Intrinsic motivation
- Low deployment cost
- Progressively lower barriers to entry

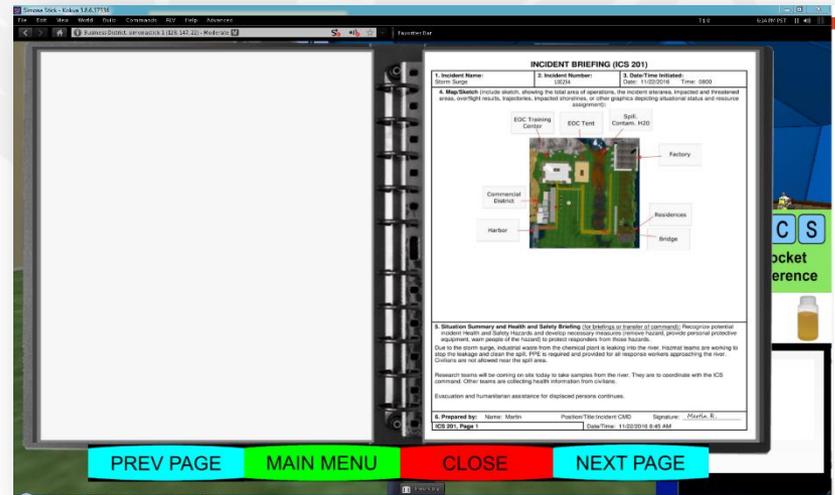
Conventional

- Passive learning
- Faster/cheaper development
- Low barrier to entry

Building a game-based learning product



Case Study: Training Research Responders in Emergency Operations



Needs Assessment

- Work with all stakeholders to identify training needs
 - Is there a gap in existing training resources?
 - Is a game-based solution a good fit to address the gap?

NIEHS DR₂



Responders



Researchers



Curriculum Development

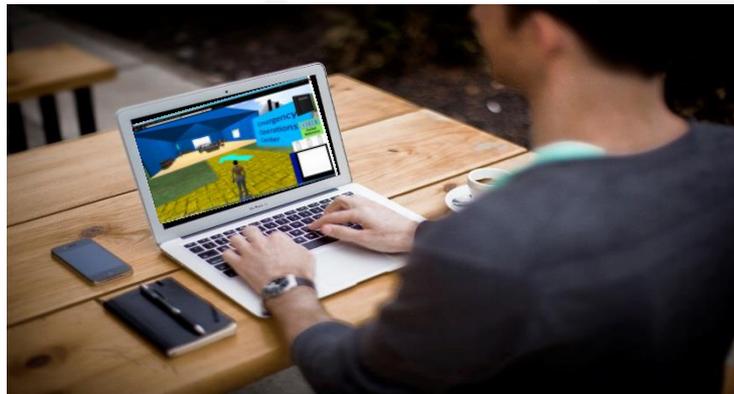
- Federal, state, and local emergency management practitioners contributed subject-matter expertise
- Deployment scenario based on real-world issues faced by experienced Research Responders

Decision: Go straight to incident or report in?



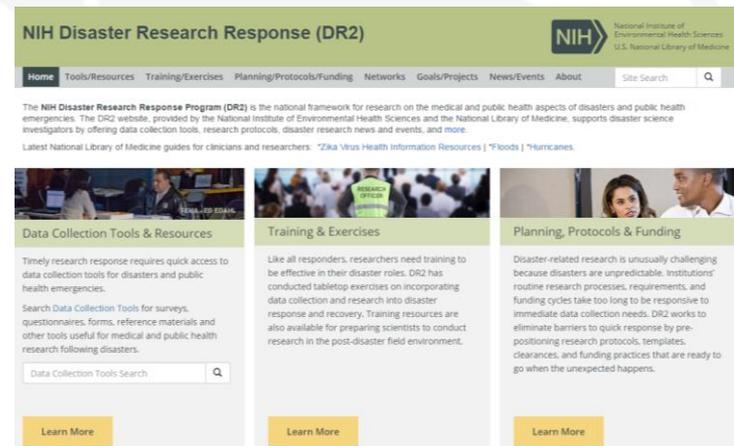
Prototyping and Testing

- Prototyped in the OpenSim environment ([Video](#))
- Beta tested by disaster research experts and novices to ensure both curriculum quality and teaching effectiveness (total of 9 testers)
- Revised prototype based on training feedback
- Pre-training, post-training, and 3-month assessments, and qualitative feedback to improve usability



Reinforcement Via Continued Engagement

- Just-in-time training
- Online resources
- Spaced Repetition



Deployment

- Think about deployment during needs assessment and curriculum development
- User needs inform deployment strategy
 - Engage trusted and respected partners
 - Mobile apps/VR
 - Doesn't have to be electronic!



Game-Based Learning Summary

- Take chances, get messy, make (harmless) mistakes!
- Engage stakeholders and SMEs early and often
- Consider the needs of the user throughout the design process
- Can be low or high tech

Acknowledgements

NIH

- NLM
- DR₂
- WTP
- SBIR

SMEs

- Emergency Managers
- Researchers
- Testers