CyberOps Commander: Tactical Decision Simulator

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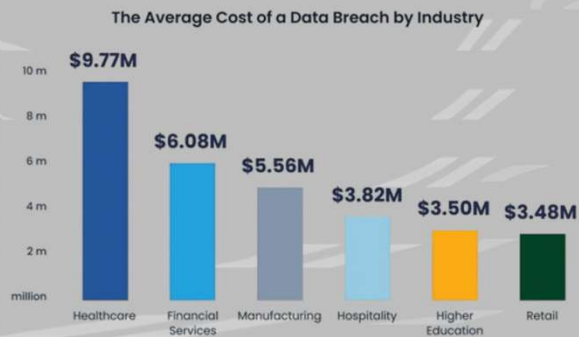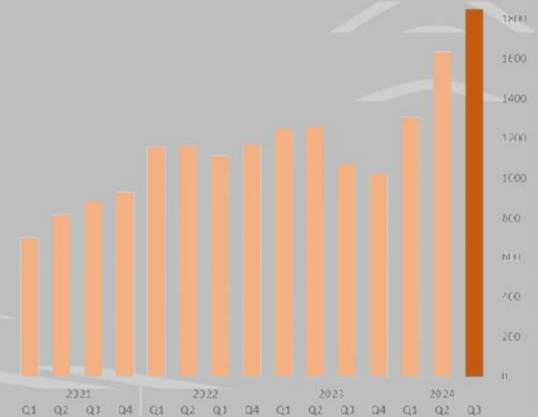
Cyber Security Training

❖ Critical to protect organizations, especially critical infrastructure

❖ Constantly evolving threats require ongoing learning

❖ Builds skills to respond effectively to cyber incidents

The Average Cost of a Data Breach by Industry

$9.77M — Healthcare
$6.08M — Financial Services
$5.56M — Manufacturing
$3.82M — Hospitality
$3.50M — Higher Education
$3.48M — Retail

Avg. Weekly Cyber Attacks per Organization
(Global 2021-2024)

Cyber Security Training - Gamification

❖ Boosts Engagement
  ❖ ~~Complex topics~~ Interactive, enjoyable experiences

❖ Improves Knowledge Retention
  ❖ Via Participation & Repeated Challenges

❖ Simulates Real-World Pressure
  ❖ Via Safe/ Controlled environments

❖ Encourages Continuous Learning

❖ Bridges Theory & Practice

❖ Collaboration & competition

Global Market Share by Industry

28.6%

- RETAIL
- BANKING
- GOVERNMENT
- HEALTHCARE
- EDUCATION & RESEARCH
- IT & TELECOM
- OTHERS
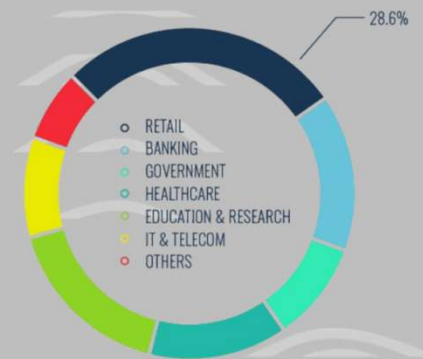
Source: Fortune Business Insights (2019)

Projected 5 Year Growth Rate of Game-based Learning Systems by Region

60%	46%	43%	40%	40%	32%	27%
Africa	North America	Eastern Europe	Western Europe	Latin America	Middle East	Asia Pacific

Cyber Security Training Groups

❖ Experts
- ❖ Hands-on technical skills
- ❖ Incident Response
- ❖ System hardening
- ❖ System Patching
- ❖ Threat analysis
- ❖ Threat Mitigation

❖ Leaders
- ❖ Strategic Decisions
- ❖ Team & Resource management
- ❖ Risk Assessment
- ❖ Policies

Lack of integrated training linking Leaders & Experts

Cyber Security Training: Experts

❖Simple Games
  ❖Simple riddles for novice users
  ❖Introduction to security fundamentals

❖Light-Weight Platforms
  ❖Self-paced
  ❖Small-scaled projects

❖Cyber Ranges
  ❖Realistic Hands-on training
  ❖Large-scale security exercises
  ❖Realistic and Complex simulation environments

Cyber Security Training: Leaders

❖Tabletop exercises
  ❖Crisis decision-making skills

❖Strategy-focused Serious Games

❖Role-playing scenarios
  ❖Team-coordination Enhancement

❖Risk Management Evaluation
  ❖Leadership Choices & Technical Outcomes linking

Solution for Experts (Current Stage)

❖Universal Scoring Algorithm
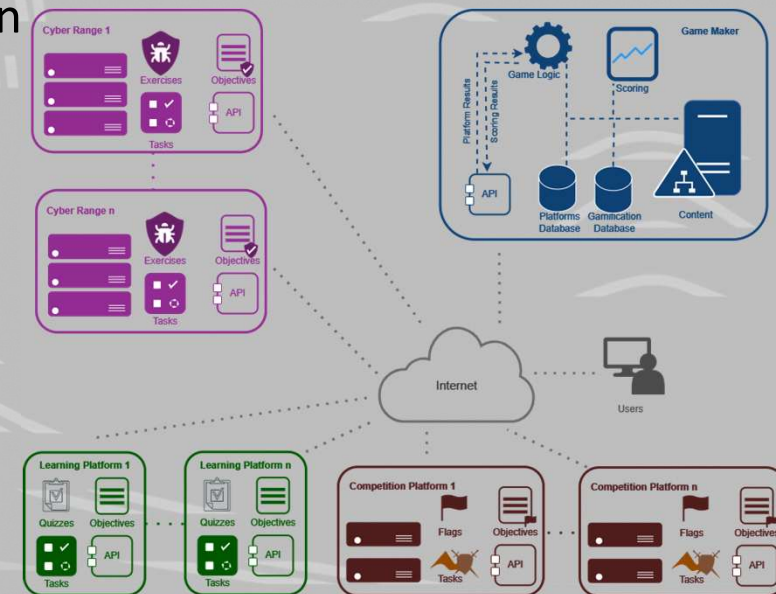 ❖Unifies scoring across multiple heterogeneous training platforms

  ❖Consistent, Normalized performance evaluation

  ❖Mutual evaluation between
    ❖Hands-on trainees
    ❖Strategic players

  ❖Supports progression tracking

HCI·VR LAB

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Solution for Leaders: CyberOps Commander

❖ Single player, Turn-based Strategic Card Game
  ❖ Simulates a company's network topology,
  ❖ Simulate Vulnerabilities & cyber events
  ❖ Player manages personnel & budget
  ❖ Assess & refine of crisis management strategies

❖ Orchestration Engine
  ❖ Vulnerability spreading & system Responses
  ❖ Evaluation of player's actions & scenario progression influencing

❖ TOSCA-based Generator
  ❖ Replayable & Realistic technical scenarios

CyberOps Commander
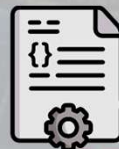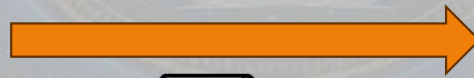
Integrated Framework
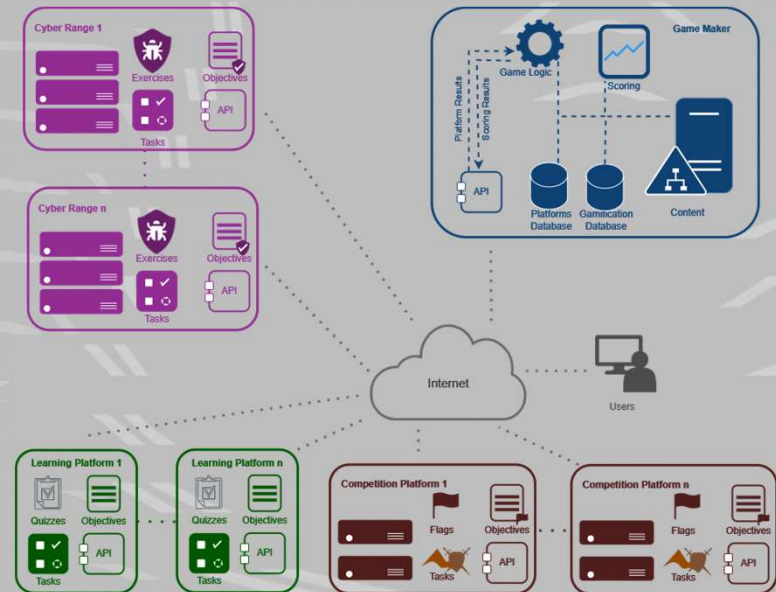
Integrated Framework
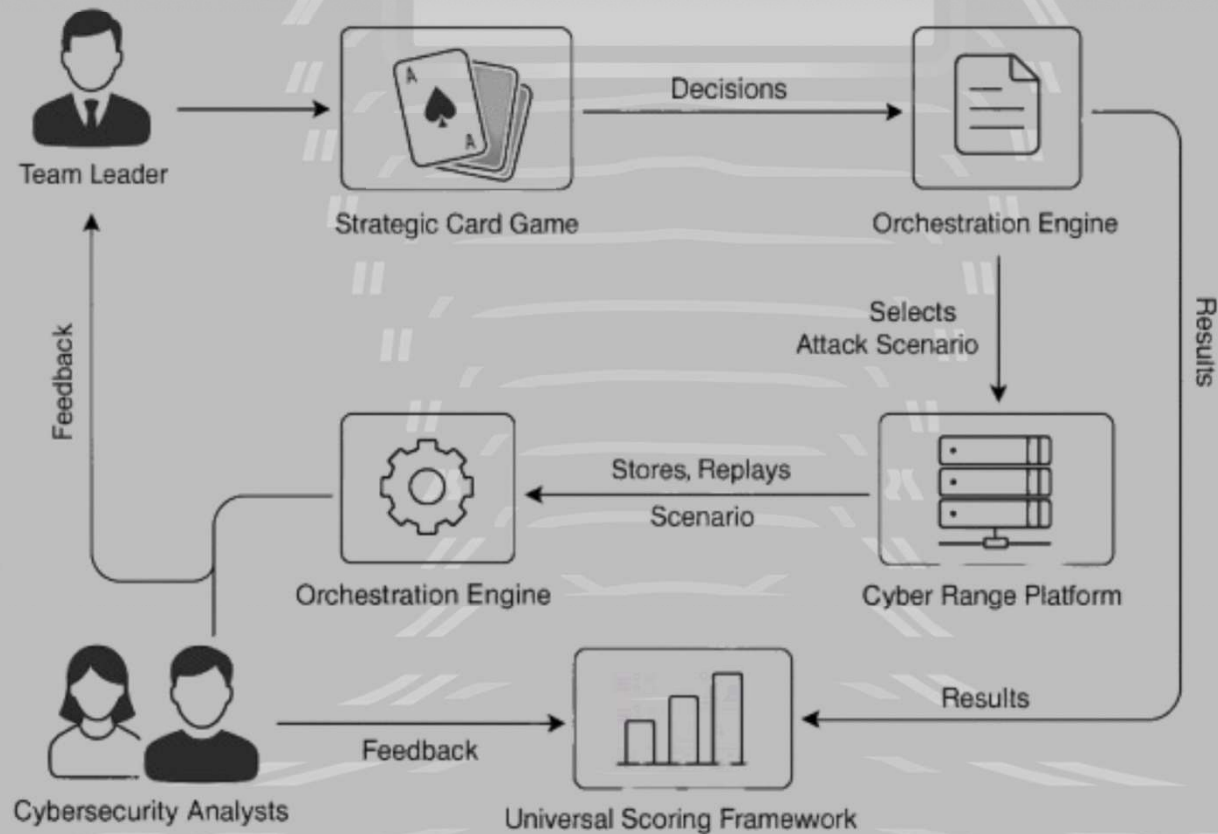
Integrated Framework

❖Standardized Scoring Algorithm
  - ❖Adjustable scoring weights for tailored educational outcomes
  - ❖Consistent & fair evaluation framework across platforms
  - ❖Enables cross-platform comparison
  - ❖Tracks learner progression

❖CyberOps Commander
  - ❖In-depth analysis of gamification strategies in cybersecurity training
  - ❖Enhances leadership decision-making in simulated cyber crisis environments
  - ❖Generates relevant, technical TOSCA-based playable scenarios aligned with leadership choices

Bridges the training gap between
Experts & Team Leaders

Future Work

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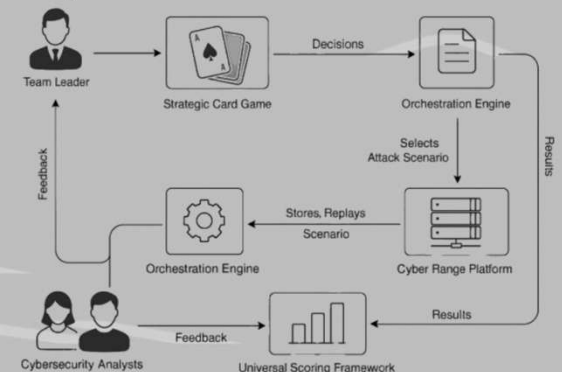
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❖Implement MVP
- ❖Finalize game mechanics
- ❖Evaluate Game Visuals & user Experience

❖Refine TOSCA-based scenario generator & Orchestration engine

❖Evaluation Studies with real users
- ❖Educational Effectiveness
- ❖Realism

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