Workforce Training and Innovation Fund Showcase

Advanced Interactive Rail Learning

08 August 2019

An MTR, John Holland and UGL Company

Workforce Training Innovation Fund

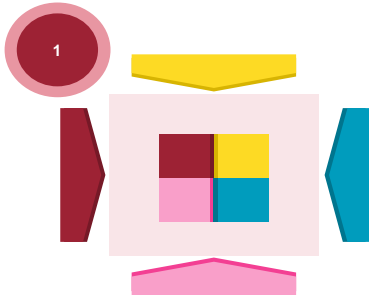**Why MTA received funding for the Advanced Interactive Rail Learning**

- Highly qualified and skilled drivers are essential for the Victorian Rail industry transport strategy

- The introduction of Virtual Reality will change the way driver training is delivered, increase engagement, accelerate learning and save costs

- It is an innovative training solution to address future skill shortages and training needs in the rail

- The focus is to connect training to real jobs, so trainees are job ready on completion
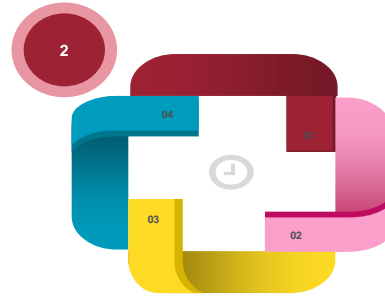
MTA's WTIF Project Approach

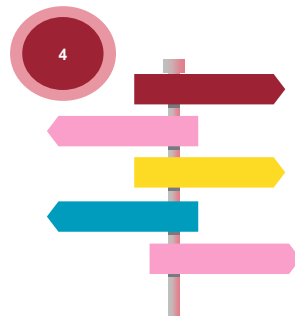**A consultative approach where we partner and engage to:**
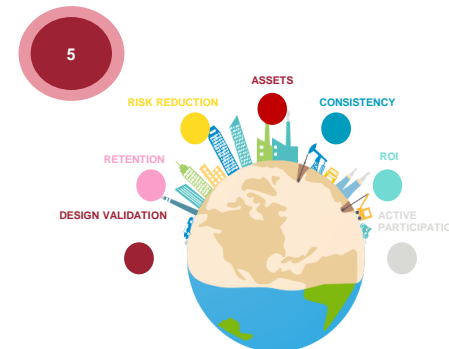

Define your vision and strategy

Create a roadmap to align the digital transformation to strategy

Plan delivery and develop an implementation plan with milestone triggers
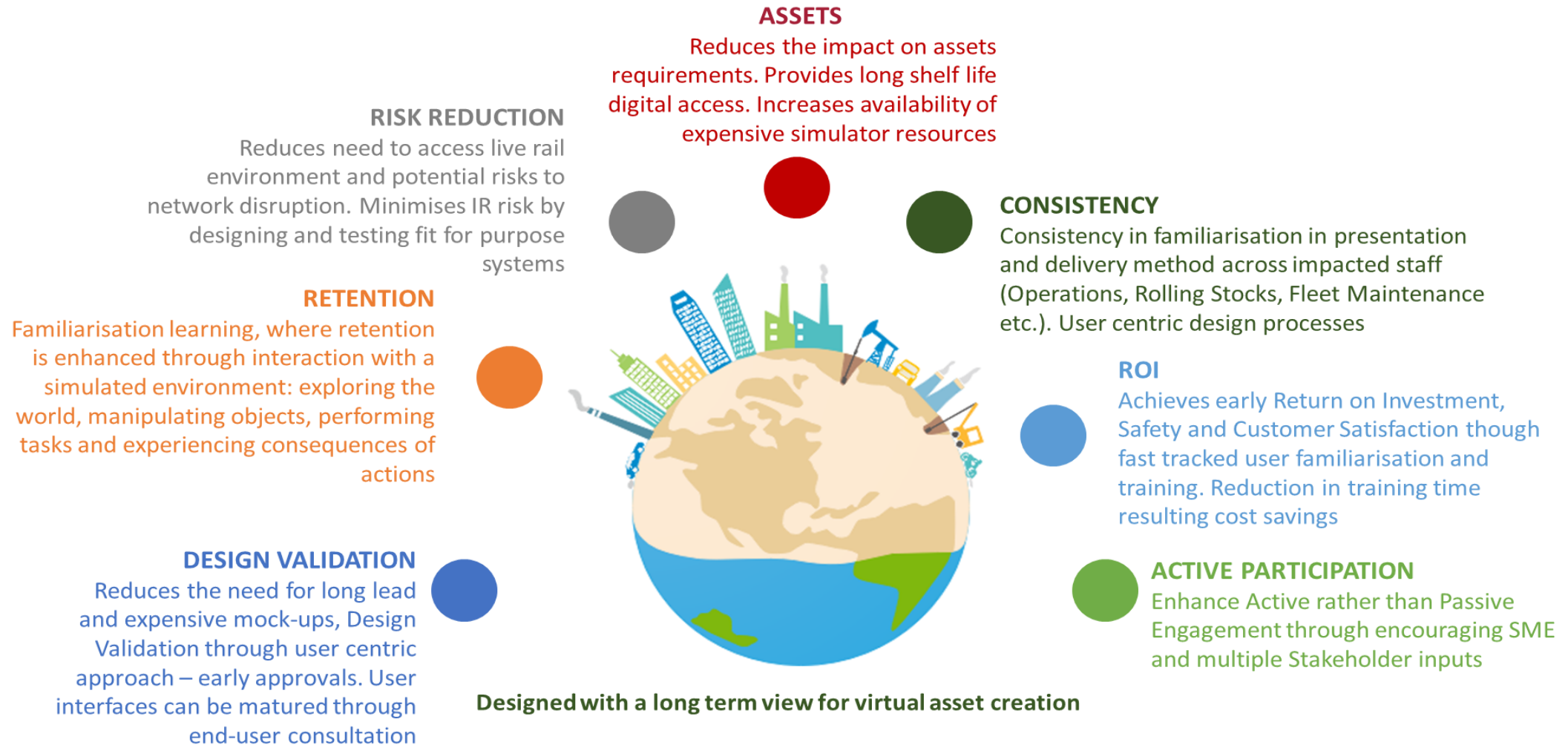

Integrate and embed solutions

Evaluate metrics related to different stakeholders

MTA Anchors to VR Key Design Principles

ASSETS
Reduces the impact on assets requirements. Provides long shelf life digital access. Increases availability of expensive simulator resources

RISK REDUCTION
Reduces need to access live rail environment and potential risks to network disruption. Minimises IR risk by designing and testing fit for purpose systems

CONSISTENCY
Consistency in familiarisation in presentation and delivery method across impacted staff (Operations, Rolling Stocks, Fleet Maintenance etc.). User centric design processes

RETENTION
Familiarisation learning, where retention is enhanced through interaction with a simulated environment: exploring the world, manipulating objects, performing tasks and experiencing consequences of actions

ROI
Achieves early Return on Investment, Safety and Customer Satisfaction though fast tracked user familiarisation and training. Reduction in training time resulting cost savings

DESIGN VALIDATION
Reduces the need for long lead and expensive mock-ups, Design Validation through user centric approach – early approvals. User interfaces can be matured through end-user consultation

ACTIVE PARTICIPATION
Enhance Active rather than Passive Engagement through encouraging SME and multiple Stakeholder inputs

Designed with a long term view for virtual asset creation

Consortium Partners

Combining talents of content experts, 3D visualization developers senior engineering experience and academia

MTA | ❈	real SERIOUS games	exnergroup
a. Rail Operator	a. Simulated Virtual Worlds	a. Project Delivery & Management
b. Training Content Expert	b. Advanced Interactive Learning	b. Online Learning
c. Training Academy & Delivery	c. Tablet App. Development	c. Registered Training Organisation

Chisholm

Mapping of learning and telemetry against CERT IV Training & Driving Qualification and integration plan

SWIN BUR NE — SWINBURNE UNIVERSITY OF TECHNOLOGY

Evaluation of learning metrics, virtual reality decision making assessment and validation study

VR WTIF Project Scenarios

Rule 1 Section 3

Issuing a CAN

Hitting a Shopping Trolley

Platform Overshoots

Fault Rectification

Defective Doors

Public Announcements

Communications Interference with Situation

Decision Making and Consequences

Departure Sequence

WH&S

Weather Conditions & Gradients

Safety Critical Communications

Braking

Distraction Management

Platform Train Interface

1. High Consequence Situations with Low Frequency

2. Infrequent Events Causing Degraded Position

3. Driver Management in High Pressure Situations

4. Problem Solving

5. Decision Making

6. Reasoning

7. Attention

8. Retaining Information

Scenario A – Rule 1 Section 3
CONTENT BACKGROUND DOCUMENT

DOCUMENT No.
TD-SA-0400

Scenario B – Issuing a CAN
CONTENT BACKGROUND DOCUMENT

DOCUMENT No.
TD-SB-0400

Scenario C – Hitting a Shopping Trolley
CONTENT BACKGROUND DOCUMENT

DOCUMENT No.
TD-SC-0400

Evaluation Metric Summary

METRICS

1. Knowledge retention

2. Transferability of learning

3. Repeatability

4. Speed of learning

5. Ratio of theory to practice

6. Acceptance as a learning medium

7. Improved test results

8. Improved safety outcome

9. Improved performance outcomes

CERT IV Train Driving Mapping Summary

Preliminary findings from mapping

- 10 units from the CERT IV in Train Driving Qualification can be trained using the three VR simulations

- The VR simulations can be used to train 73% of the Performance Criteria mapped

- The VR simulations are suited to assessing most of the Performance Evidence and significant amounts of Knowledge Evidence listed in the Assessment Requirements of each unit mapped. Further Knowledge Evidence could be assessed by adding more supplementary questions to the assessment instruments or creating further case studies

Preliminary findings from the VR telemetry assessment

- Specific, timely, clear, in a concise format, easily interpreted by the use of the VR telemetry in CERT IV Train Driving

- The tracking of actions and statistics provides proof to support an assessor's observations and evidence of completion

Project Hardware

Hardware costs have dramatically reduced as the technology becomes more commercially available; interactive VR is now achievable with less equipment and a much smaller space footprint
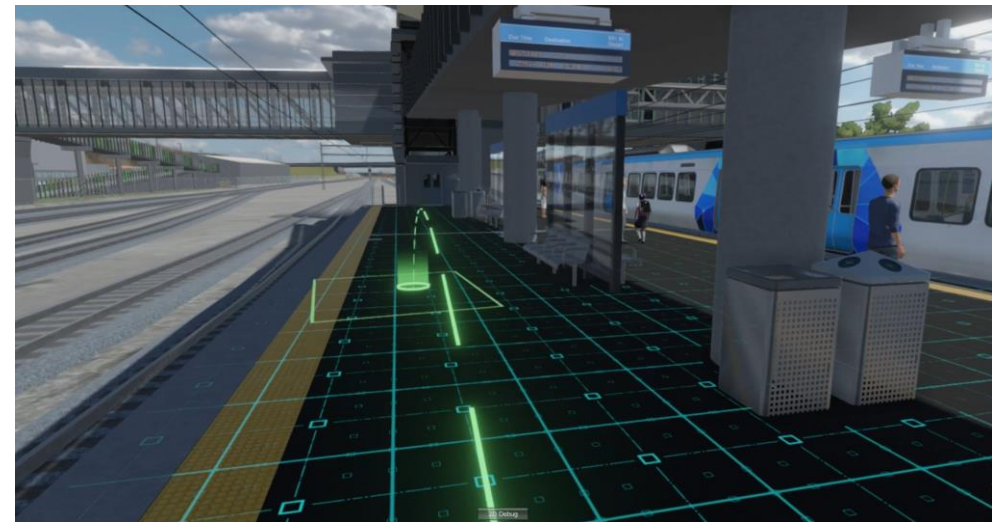
Summary of Project Outcomes So Far

- Virtual reality training experiences have been developed, involving high consequence low frequency driving scenarios

- These have been aligned to key training competencies

- Easily adaptable program catering for the organisation's future deployment

- The learning methodology focusses on improved train driver proficiency and skill acquisition

- The VR localised environment and props provide a flexible learning environment

- Swinburne University research team evaluating learning metrics for different stakeholder groups

- Strong CERT IV Train Driving qualification alignment through specific product based assessment evidence (automated analytics recording formative assessment results and trainee data)

What has MTA Done Differently?

- It is about the integration of best practice training principles into VR

- Detailed scenario development with unequivocal policy and procedure alignment

- Clever and assimilated modules, mechanics and telemetry design

- Applied cognitive neuroscience principled design

- Detailed realistic environments, eliminating the need for access to assets and rail corridor

- Extensive stakeholder engagement

- Focus remained on project scope

- Business integration and measurement concentration

- Long term digital asset and secondary product concentration

Lessons Learnt for Learning Technology Design and Integration

- Design and development must be targeted to a specific competence need, with early identification of operational activity-based risk and ensuring the deliverable matches the available VR technology

- VR is all about real world problems; accessing the people and documentation to tell these stories is critical

- Access to varied SME's and content experts that have real world experiences increases the authenticity of the content and its effectiveness

- Staying focused on the project deliverables and providing high-touch assistance in VR implementation stage; once stakeholders see the VR potential its application can be deployed more broadly and more deeply

Questions