the gamification of immersive learning experiences

SGI
Serious Games Institute

summary

trends and developments with serious games technologies: the 'gamification' of modern life

introduction to the serious games institute: four intertwined strands of applied research

what are immersive learning experiences - and how can they constitute a paradigm shift for learning, working and playing?

future visions for game-based approaches and technologies (e.g. for: visualisation and simulation, social experiments, data modelling in futurict)

conclusions: are games and immersive experiences really changing how we work, learn and play? do these really constitute a paradigm shift?

emerging trends

beginning of 2010 the games industry posted total sales of $1.17 billion for the month of january

value of sg in 2008 was between $ 1 - 2 billion, recent reports circulating in us and europe are talking about $ 9 -11 billion

international software federation of europe (isfe, 2010):
74% of those aged 16-19 considered themselves gamers (n=3000), 60% of those 20-24, 56% 25-29 and 38% 30-44.

32% of the total uk population consider themselves gamers (n=3000). 31% of females described themselves as gamers and 34% of males.
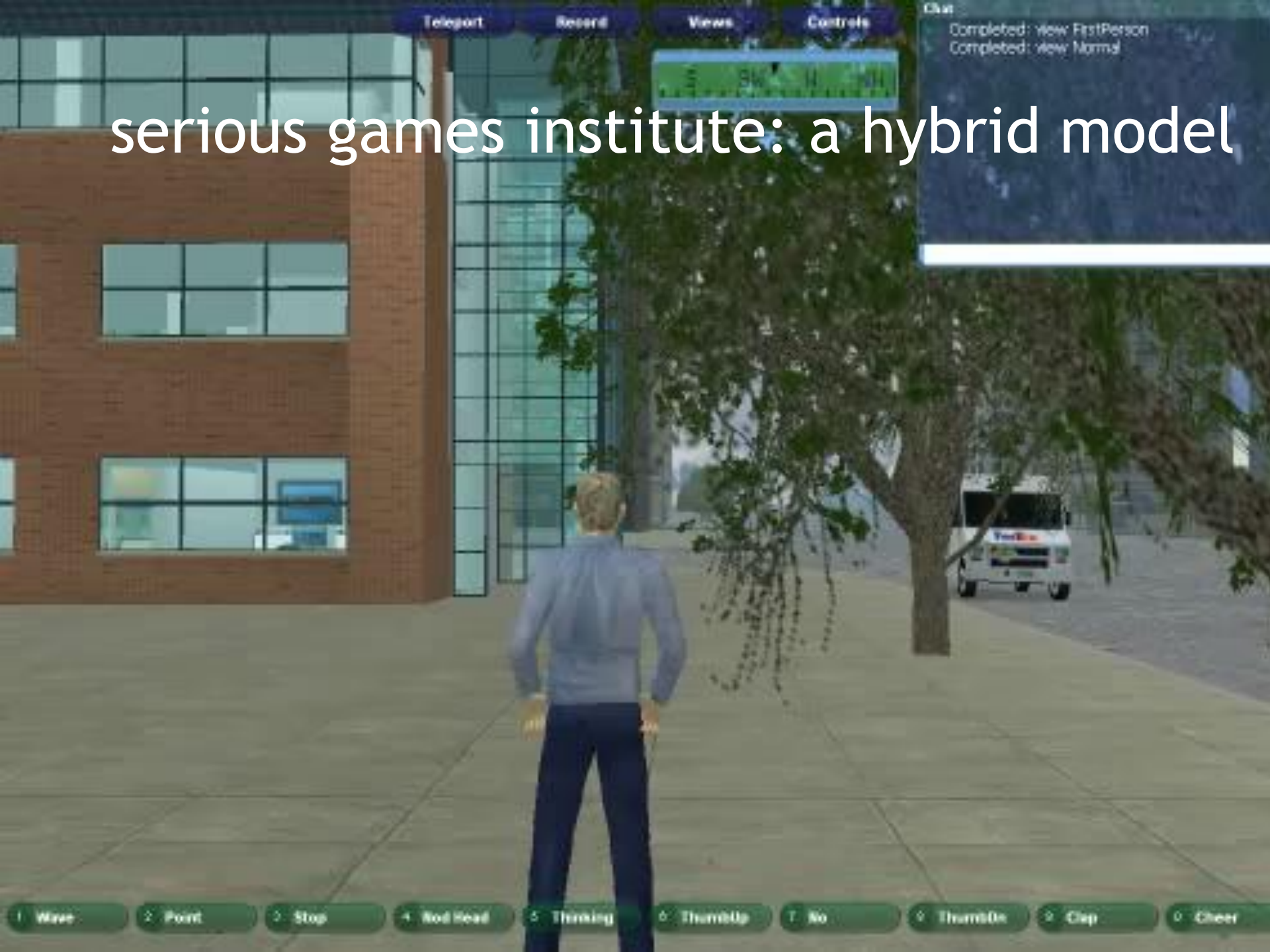
several studies demonstrating the efficacy of serious games for training in particular through behavioural change (sg-ets, hope lab's re:mission, pulse project)

wide uptake of social software (e.g. facebook, wikipedia)

learning in multimodal ways: mixed reality, augmented reality, mobile learning, haptics (more flexible approaches)

converging technologies: mobile devices, ar devices, bci/eegs, sensor networks, robotics, virtual world mashups, gps, geocoding, web technologies and services (soa)

serious games institute: a hybrid model

selected research and development projects

four themes/strands:

- *psychology and neuroimaging for understanding game-based learning*
- *visualisation and human-computer interaction*
- *semantic web, metadata and standards*
- *artificial intelligence and multiagent technologies*
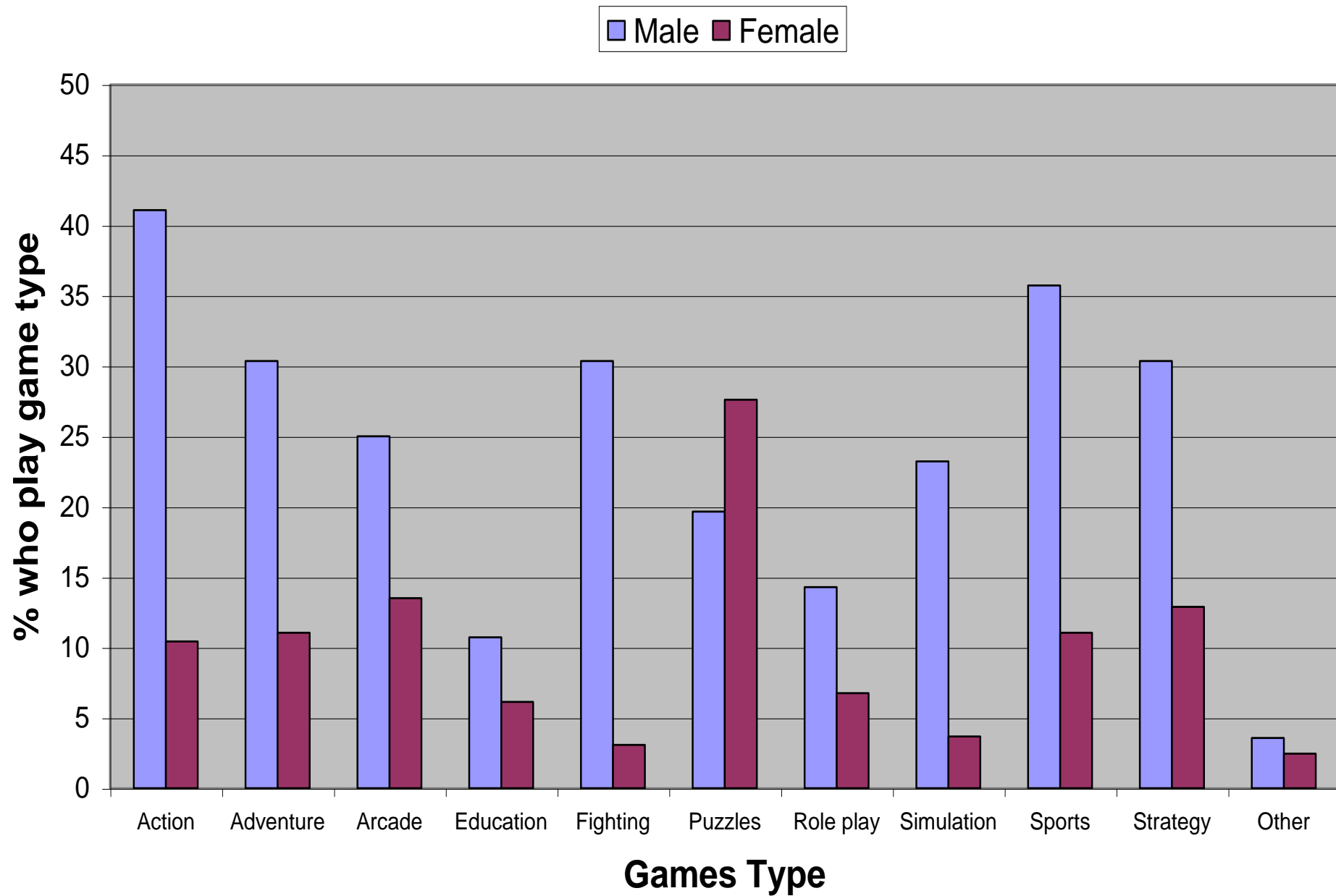
current/recent projects:

1. *serious games – engaging training solutions project (funded by tsb, selex and blitz games)*
2. *sexual health game for parents (funded by warwickshire pct)*
3. *sexual health game for children (funded by warwickshire pct)*
4. *childhood obesity game (warwick university)*
5. *modes project (funded by eu)*
6. *floodsim game evaluation (funded by coventry university)*
7. *code of everand evaluation (funded by dft)*
8. *simaula (funded by eu llp)*
9. *i-spectrum (funded by eu llp)*
10. *v-trade project (funded by erdf)*
11. *alice project (funded by eu)*
12. *roma nova project (funded by erasmus)*
13. *meducator project (funded by eu)*
14. *gala network of excellence in serious games (funded by eu)*
15. *cava project (funded by eu)*
16. *sgi singapore (mda)*
17. *edugamelab (funded by eu)*
18. *customer (funded by jisc)*
19. *shakespeare bite-sized (funded by tsb)*
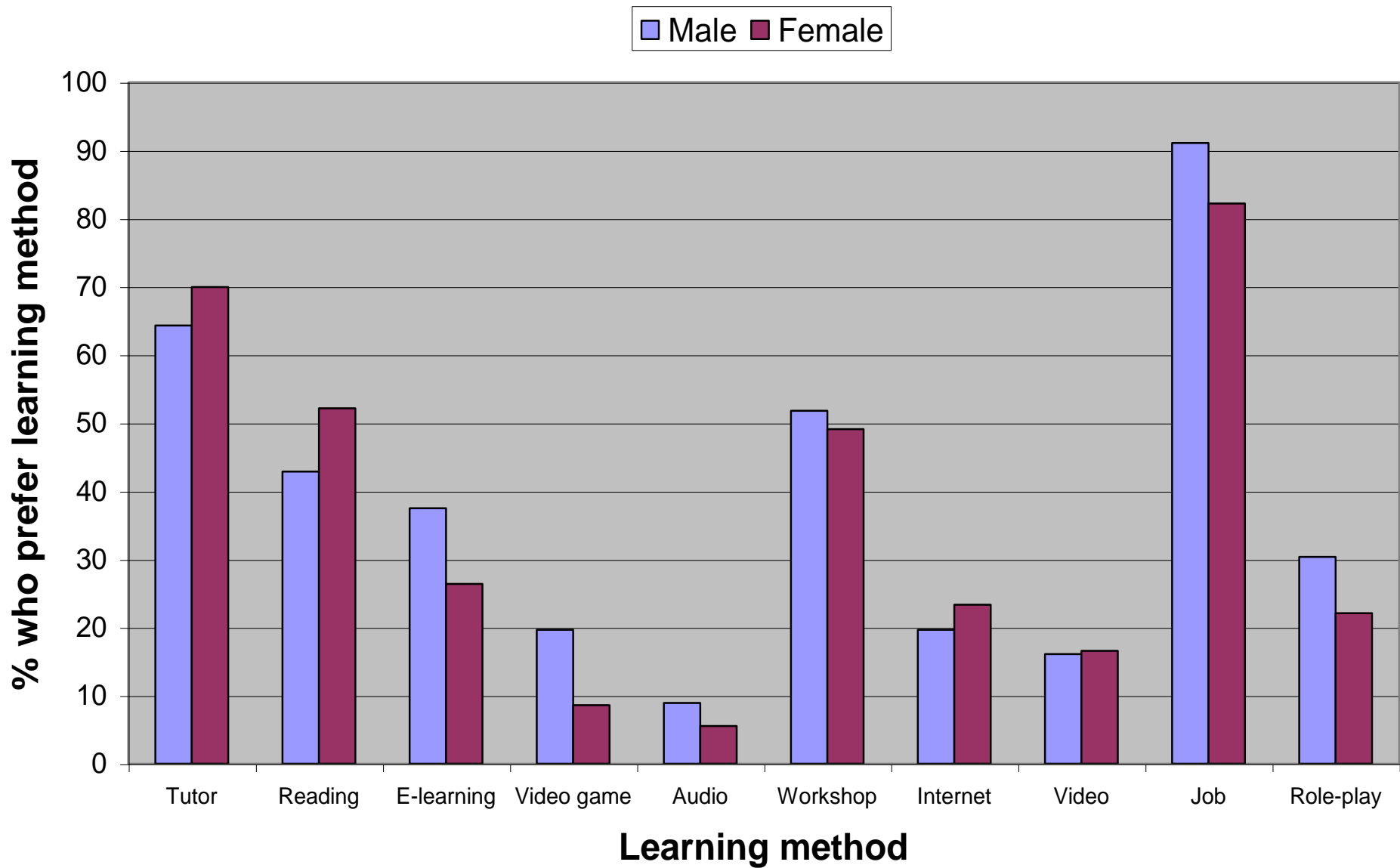20. *herbert gallery project*
21. *jaguar funded phd in hci*

evidence for efficacy of game-based learning –behavioural change

neuro-psychological approaches to game-based learning: case studies: ward off infection, triage trainer

Survey responses to frequency of computer game play

Chart showing "% who play game type" by "Games Type" for Male and Female players.

Legend: Male, Female

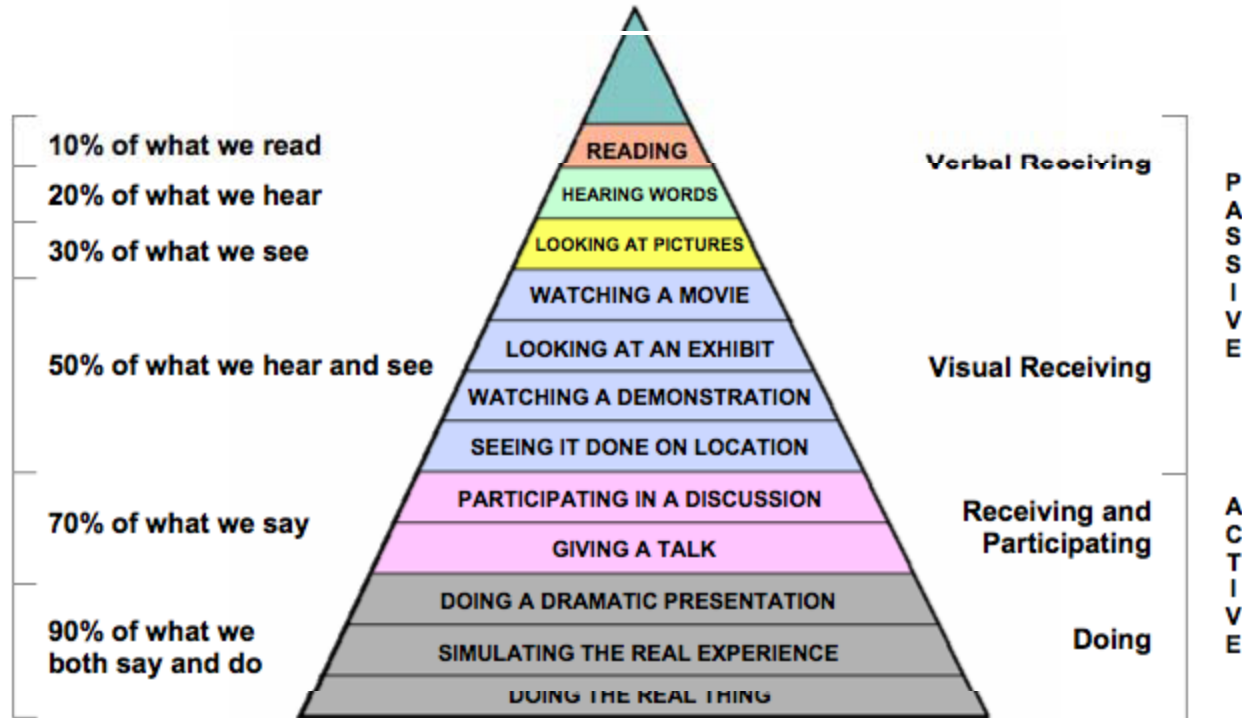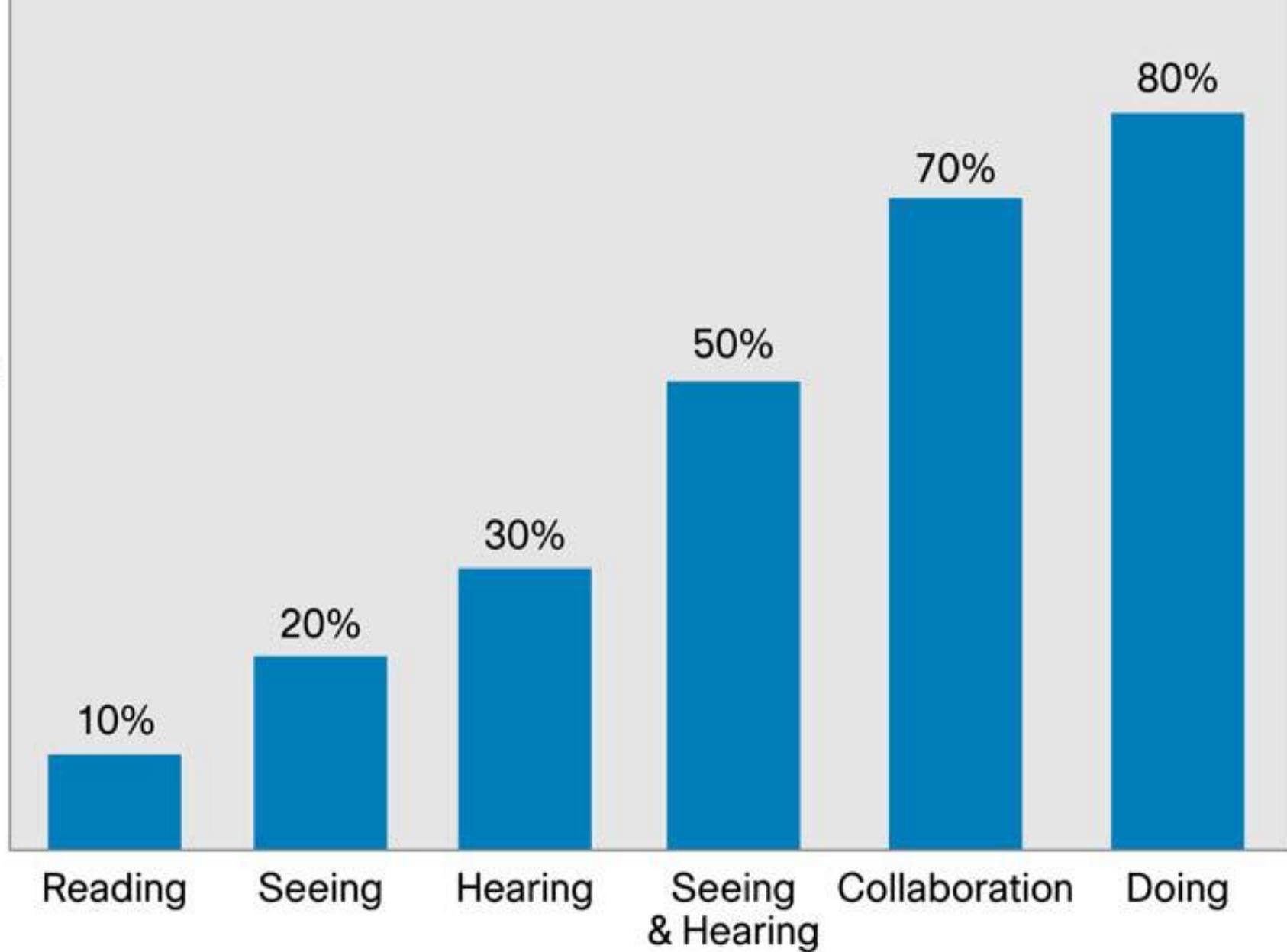| Games Type	Male	Female
Action	41	10.5
Adventure	30.5	11
Arcade	25	13.5
Education	10.8	6.2
Fighting	30.5	3
Puzzles	19.7	27.7
Role play	14.3	6.8
Simulation	23.2	3.7
Sports	35.7	11
Strategy	30.5	13
Other	3.5	2.5

CONE OF LEARNING
WE TEND TO REMEMBER OUR LEVEL OF INVOLVEMENT

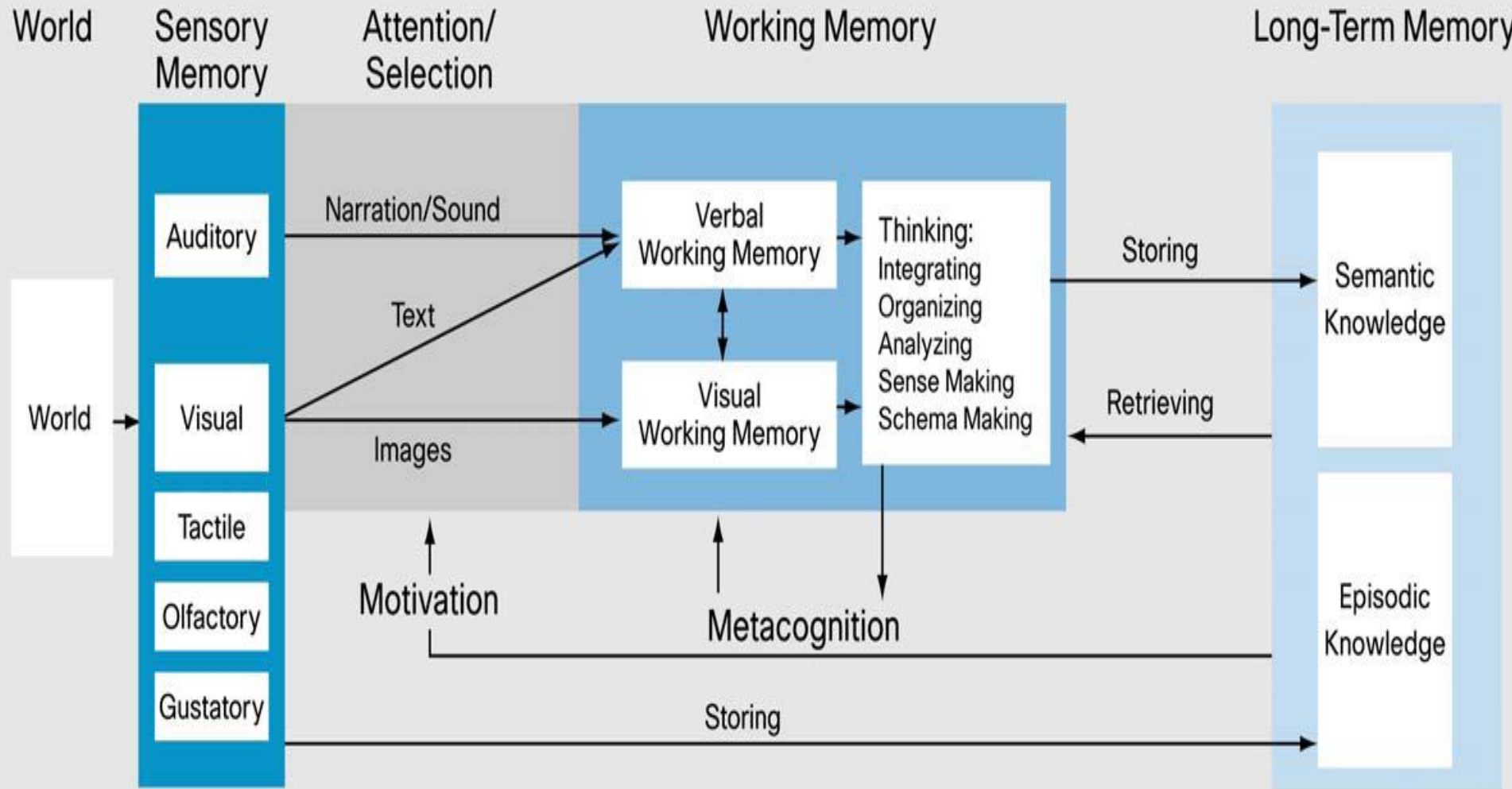(developed and revised by Bruce Hyland from material by Edgar Dale)

10% of what we read — READING — Verbal Receiving

20% of what we hear — HEARING WORDS

30% of what we see — LOOKING AT PICTURES

50% of what we hear and see — WATCHING A MOVIE / LOOKING AT AN EXHIBIT / WATCHING A DEMONSTRATION / SEEING IT DONE ON LOCATION — Visual Receiving

70% of what we say — PARTICIPATING IN A DISCUSSION / GIVING A TALK — Receiving and Participating

90% of what we both say and do — DOING A DRAMATIC PRESENTATION / SIMULATING THE REAL EXPERIENCE / DOING THE REAL THING — Doing

PASSIVE

ACTIVE

Edgar Dale, *Audio-Visual Methods in Teaching* (3rd Edition). Holt, Rinehart, and Winston (1969).

Retention Rates

Reading	Seeing	Hearing	Seeing & Hearing	Collaboration	Doing
10%	20%	30%	50%	70%	80%

Chi, M. T. H., Bassok, M., Lewis, M. W., Reimann, P., & Glaser, R. (1989). Self-explanations: How students study and use examples in learning to solve problems. *Cognitive Sciences*, 13, 145-185

Thinking: Physiological and Cognitive Functions

World

Sensory Memory
- Auditory
- Visual
- Tactile
- Olfactory
- Gustatory

Attention/ Selection

Working Memory
- Verbal Working Memory
- Visual Working Memory
- Thinking: Integrating Organizing Analyzing Sense Making Schema Making

Long-Term Memory
- Semantic Knowledge
- Episodic Knowledge

World

Narration/Sound

Text

Images

Motivation

Metacognition

Storing

Retrieving

Storing

Based on Mayer (2003); Moreno & Mayer (2007); Marois (2005); and Miyake, et al (1999).

or to Move

Select

triage trainer – preliminary trial results

triage trainer (tt) trial summary:
  5 trials: september 2007 – january 2008

independently conducted by the university of
  birmingham

trial participants:
  91 uk nhs doctors, nurses & paramedics
  all on alsg major incident medical management
    and support (mimms) training courses

participants were randomly distributed:
  tt game (n = 47)
  non-game (n = 44)

triage trainer – preliminary trial results

tt game group:

    15 minute tutorial in game play / user interface

    60 minutes playing the tt game on their own

    instructor available to answer questions

non-game group:

    75 minute normal alsg instructor-led table top
        exercise

    involved sorting cards with vital signs variables
        written on them into priority groups

triage trainer – (knight et al., 2010)

trial results of tt game trainees <u>versus non-game trainees</u>:

tagging accuracy of tt game trainees:

significantly higher accuracy [$\chi 2 = 13.126$, $p<0.05$]

step accuracy of tt game trainees. comparing the ratios of participants who achieved an 8/8

accuracy rating (i.e. followed the correct protocol for all 8 casualties):

significantly more accurate (28%) than the non-game group (7%) [$\chi 2 = 7.29$, $p<0.05$]

time taken by tt game trainees to complete triage of all 8 casualties:

no significant difference on time taken ($p>0.05$)

triage trainer – preliminary trial results

possible conclusions:

a 'serious game' such as the triage trainer offers the potential to:

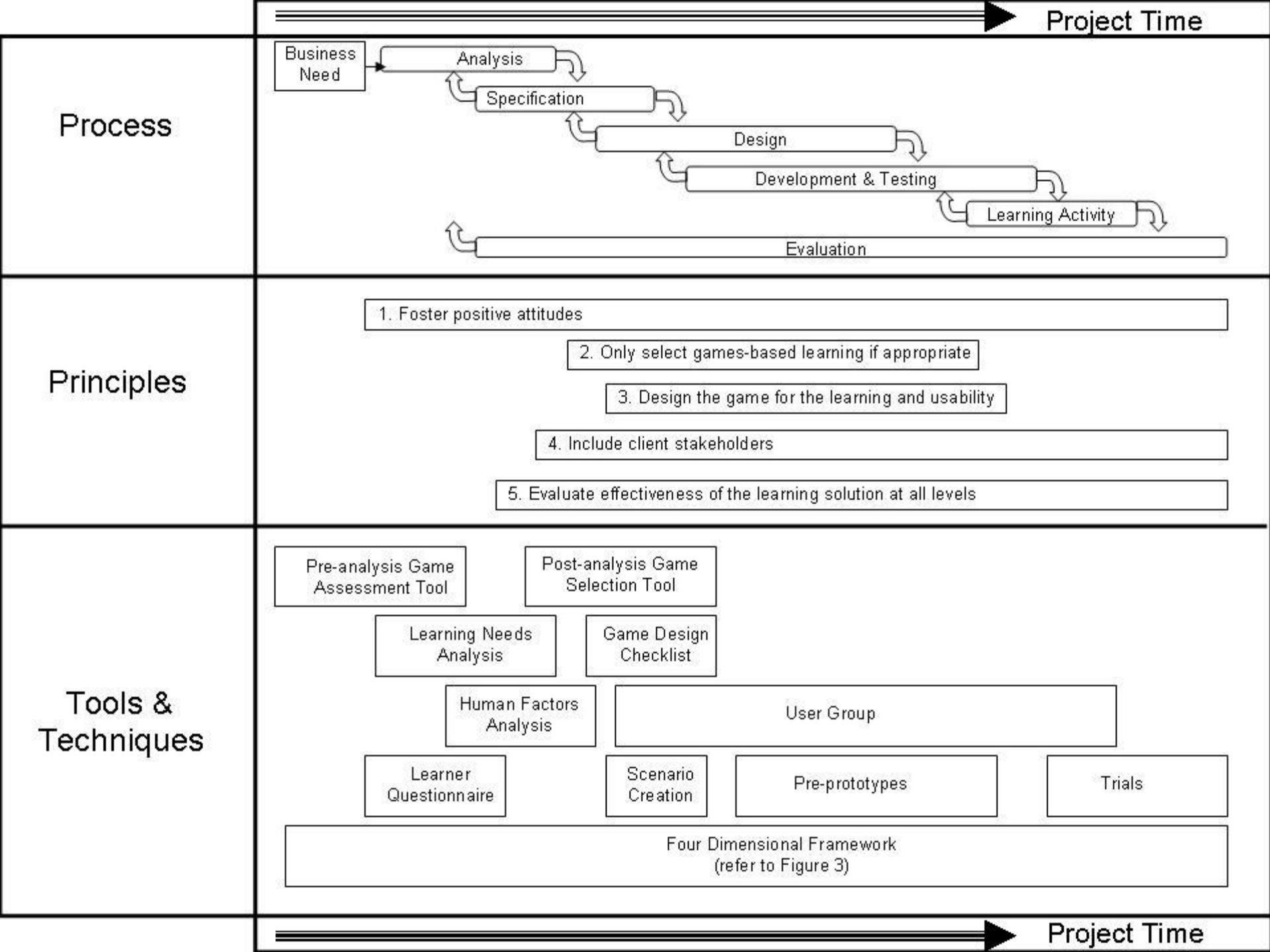> enhance learning; and

> improve transfer of training

possible reasons are that the game offers:

> opportunity to practice skills and knowledge gained on the course in a more realistic and more engaging environment

> personalised feedback which enables the game player to correct procedural errors made, through repeated play

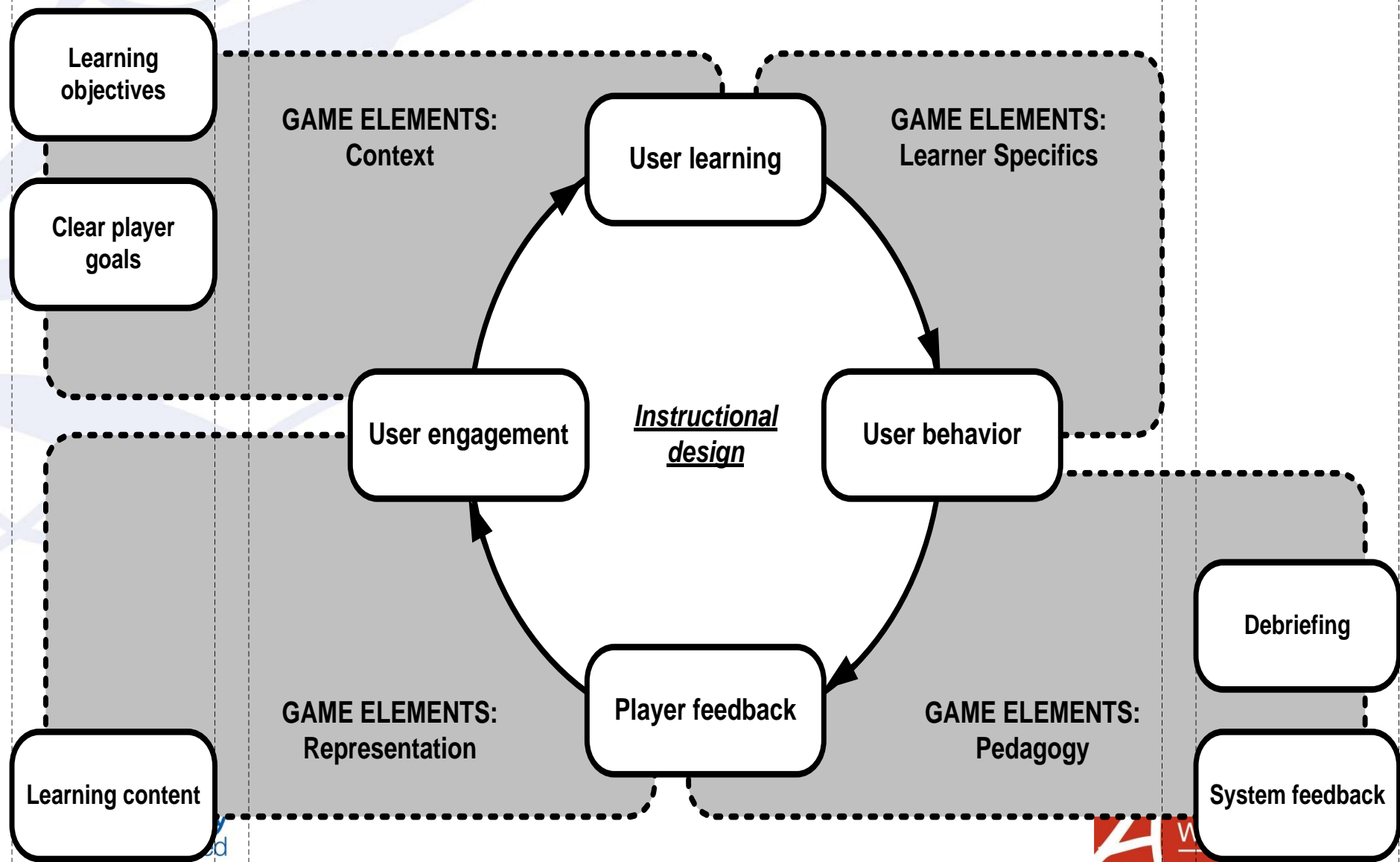models, frameworks and tools for measure effective game-based learning and supporting serious game development approaches

Project Time
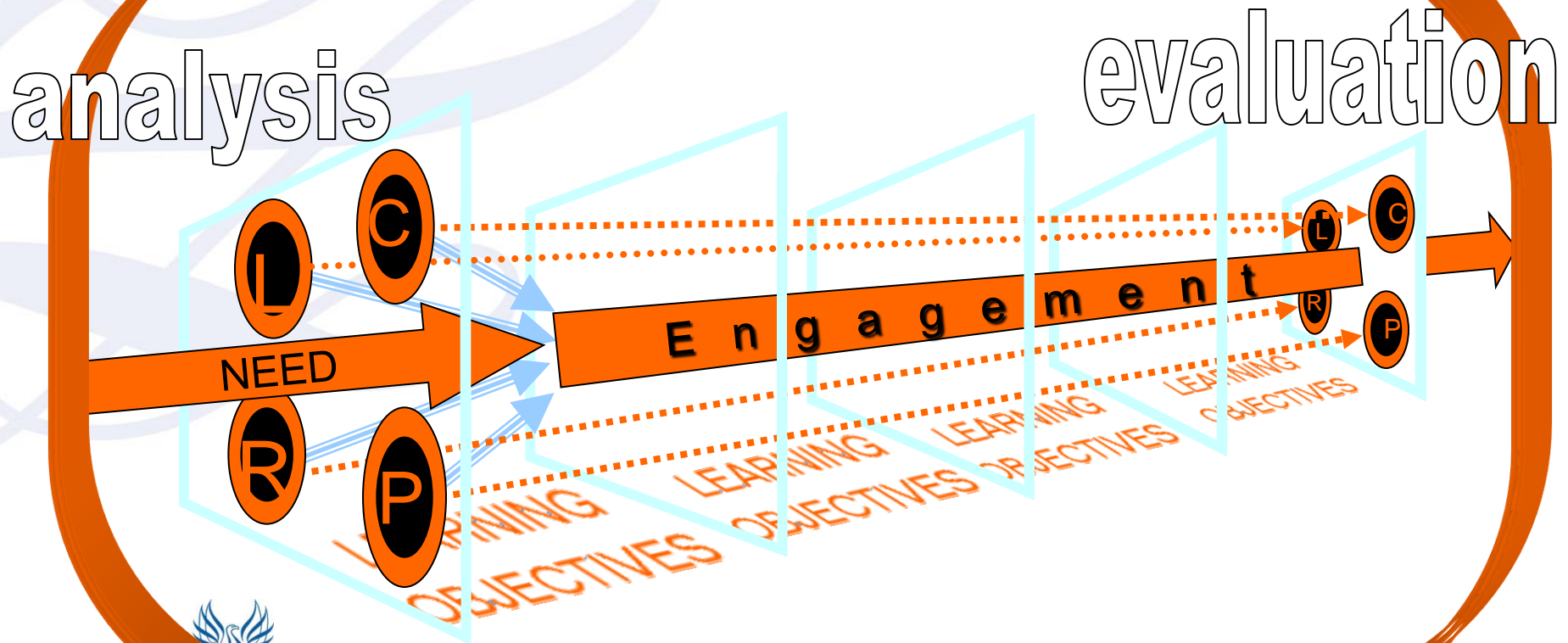
Process
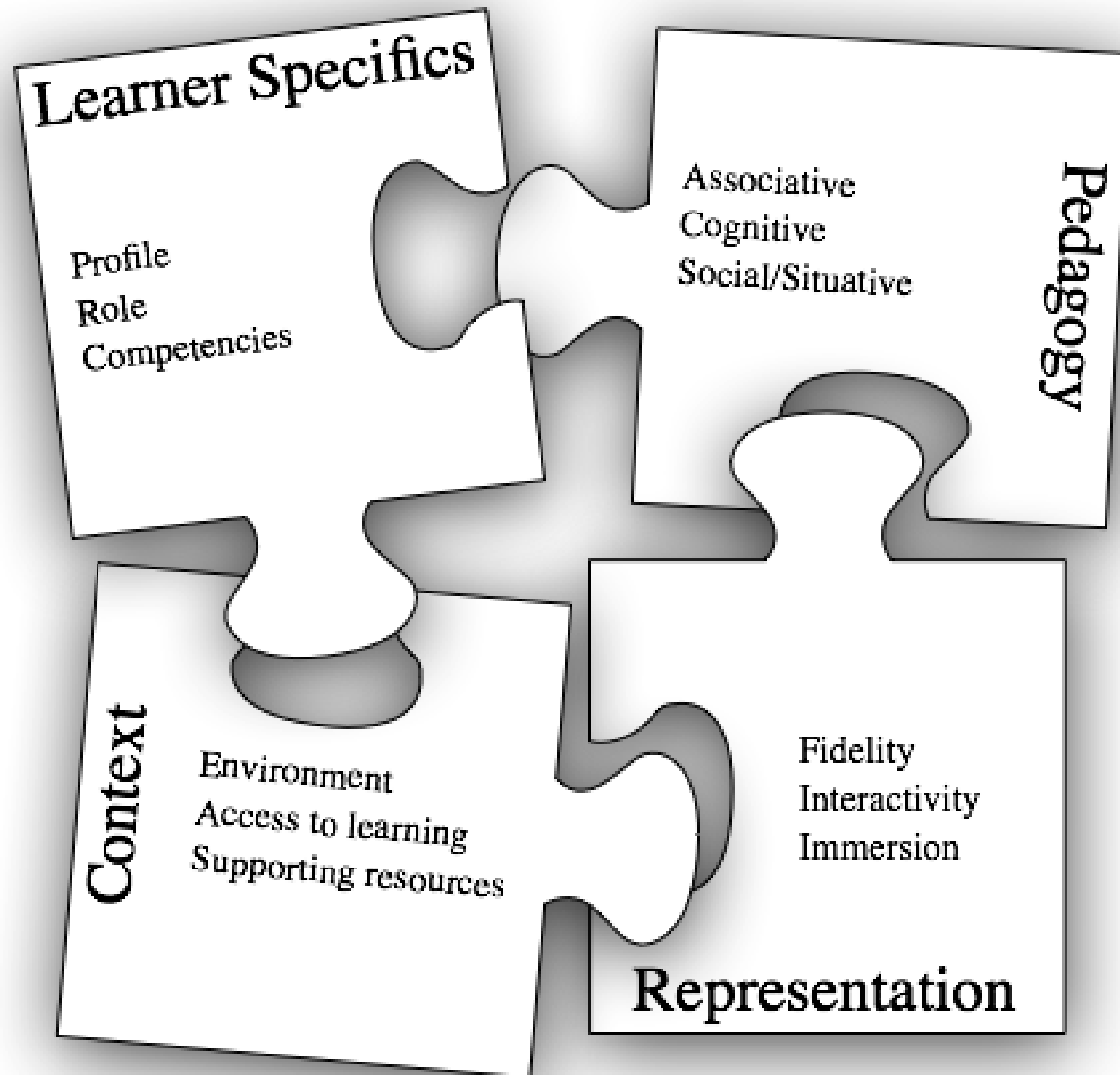
Business Need → Analysis → Specification → Design → Development & Testing → Learning Activity → Evaluation

Principles

1. Foster positive attitudes
2. Only select games-based learning if appropriate
3. Design the game for the learning and usability
4. Include client stakeholders
5. Evaluate effectiveness of the learning solution at all levels

Tools & Techniques

Pre-analysis Game Assessment Tool

Post-analysis Game Selection Tool

Learning Needs Analysis

Game Design Checklist

Human Factors Analysis

User Group

Learner Questionnaire

Scenario Creation

Pre-prototypes

Trials

Four Dimensional Framework
(refer to Figure 3)

Project Time

LEARNING   **INSTRUCTION**   **ASSESSMENT**

Learning objectives

Clear player goals

GAME ELEMENTS: Context

User learning

GAME ELEMENTS: Learner Specifics

User engagement

Instructional design

User behavior

Learning content

GAME ELEMENTS: Representation

Player feedback

GAME ELEMENTS: Pedagogy

Debriefing

System feedback

four dimensional framework (de freitas and oliver 2006)

analysis

evaluation

NEED

Engagement

LEARNING OBJECTIVES

BUSINESS / ORGANIZATION NEED

Four Dimensional Framework

RANA
STORMSTRIKER

131 131 131 131 100 100 LVL 62 83,336

Year 1

Perminant Barriers

£

£

£

❌ Commit

Alternative Barriers

£

£

£

❌ Commit

Temporary Barriers

£

£

£

❌ Commit

Flood Defence Budget

A Large Flagship Project

High expenditure on one project that will defend a high number of people in a densely populated area - e.g. Thames Barrier and its role in protecting London. But is it fair that spending should be concentrated in one area, to the detriment of other cities?

South East England

Berkshire
Buckinghamshire
Hampshire • Ilse of Wight
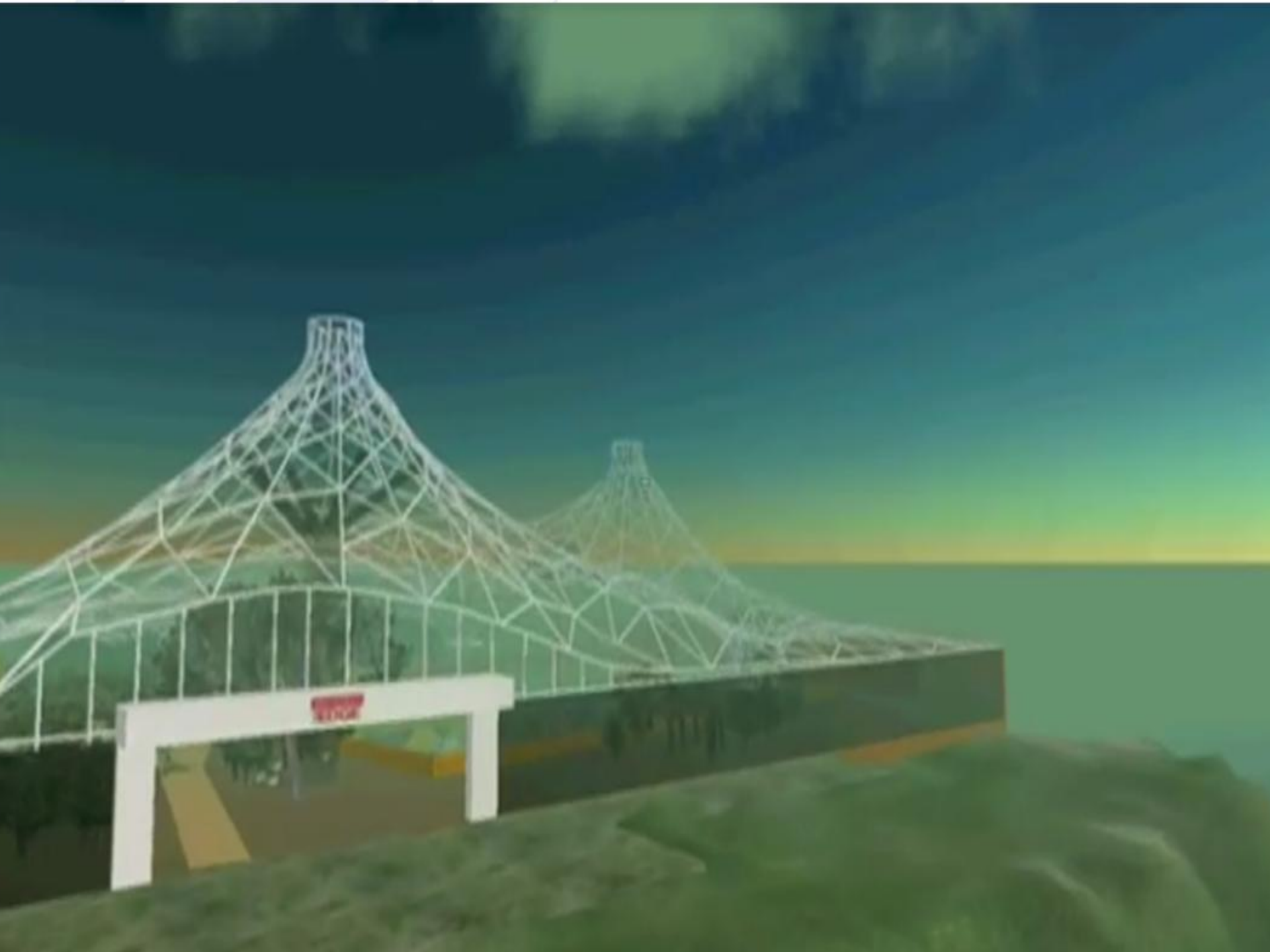Kent • Surrey • Sussex
Oxfordshire

Population

Economy

Flood Risk

Policies

Hello, I am your Advisor, here you can see several main areas of interest...

a new vision for e-assessment through immersion: future work around developing an intelligent tutoring environment integrating advanced a-life techniques with multimodal interfaces

intelligent tutoring environments: roma nova

semantic web and geocoding

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RomaNova

A serious game for cultural heritage

part 2 : social behaviours

BCIs

Sound I/F

ATOM Spoken Dialogue SDK

Haptic Devices

Visualization

conclusions

so are applications of games technologies really changing our approaches to working, learning, social interactions and how we consider experiences?

provising new tools for flow, feedback, visual and actual realism leading to higher levels of immersion

great potential for the medium for supporting immersive education through increased motivation and engagement

potential changes for e-assessment (gbl assessment, peer assessment, collaborative assessment, competency analysis, mentoring)

future developments for gbl may include intelligent tutoring environments integrating multimodal interfaces including sensors, handheld, haptics and biofeedback devices for many applications (e.g. school education, training)

upcoming second wednesday events:
- <u>e-learning and innovation 8th june in london</u>
- playgen workshop in london, 12th october
- robotics workshop 9th november

upcoming conferences:
ieee vs-games conference in athens 4-6th may
virtual world conference, 14th september

upcoming workshops:
emergency response and management training
    workshop, 17th november

any questions contact: prof. sara de freitas
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