Design:

Internet Technology in Pervasive Games

Mobile and Ubiquitous Games

ICS 163

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Content adapted from:

Pervasive Games: Theory and Design

Experiences on the Boundary between Life and Play

IT in Pervasive Games

- Supporting Play with Technology
- Giving Technology a Role
- Case Study: Epidemic Menace
- Designing Interactive Artifacts

IT in Pervasive Games

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IT in Pervasive Games: Supporting Play with Technology

- Using technology in pervasive games has benefits

- It has a cost:
  - economic
  - time
    - develop
    - deploy
    - test
  - risk of failure

IT in Pervasive Games: Supporting Play with Technology

- Technology often suffers from:
  - break downs
  - position inaccuracies
  - network outages
  - network lag

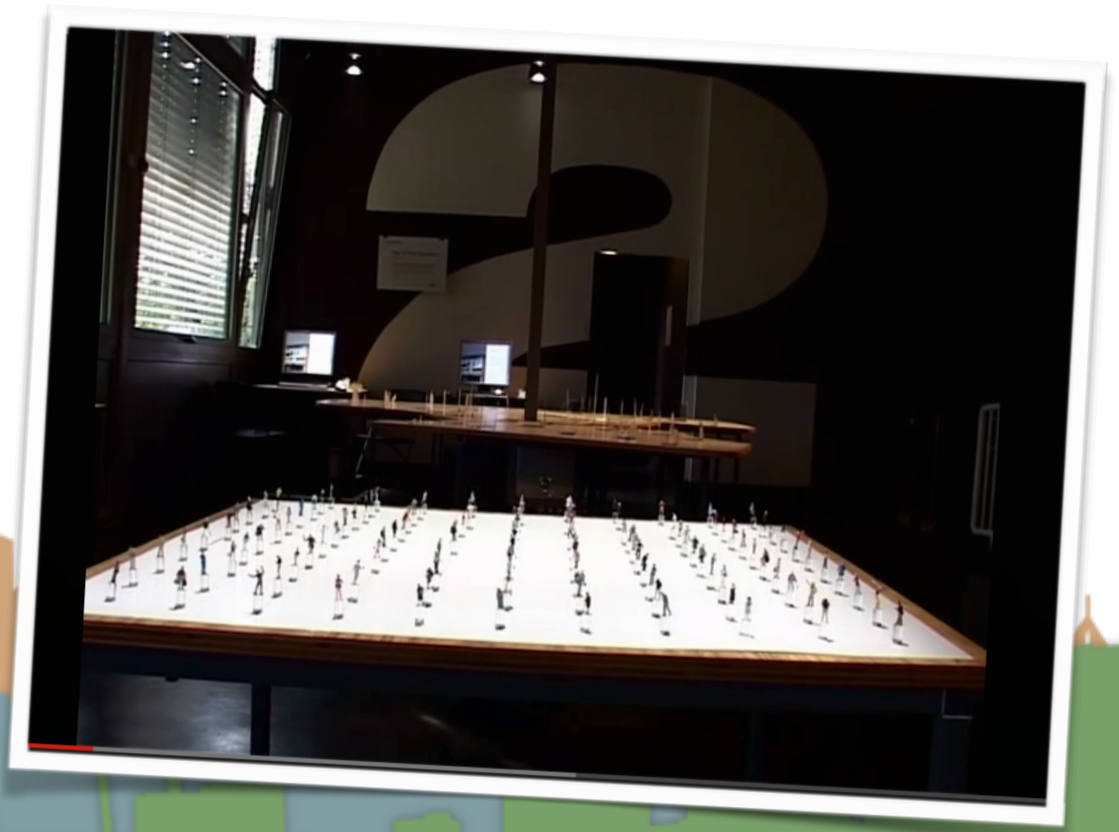
- As a result:
  - You need fall back solutions

IT in Pervasive Games: Technology-Sustained Games

- Technology-Sustained vs Technology-Supported Games
- -Sustained means
  - game is executed by technology
  - simulated world is maintained by a computer
  - state is revealed to players through technology
- -Supported means
  - game uses technology
  - “rule-engine” is not fully implemented by tech
  - game may be able to continue in the face of tech failure
- How does this apply to Killer?

IT in Pervasive Games: Technology-Sustained Games

- Supporting communication
  - Between players
  - Between game-masters and players
  - Between computer and players
  - Actual diegetic roles may be different
- Games can be built entirely around communication
  - SpyGames
  - Day of the Figurines

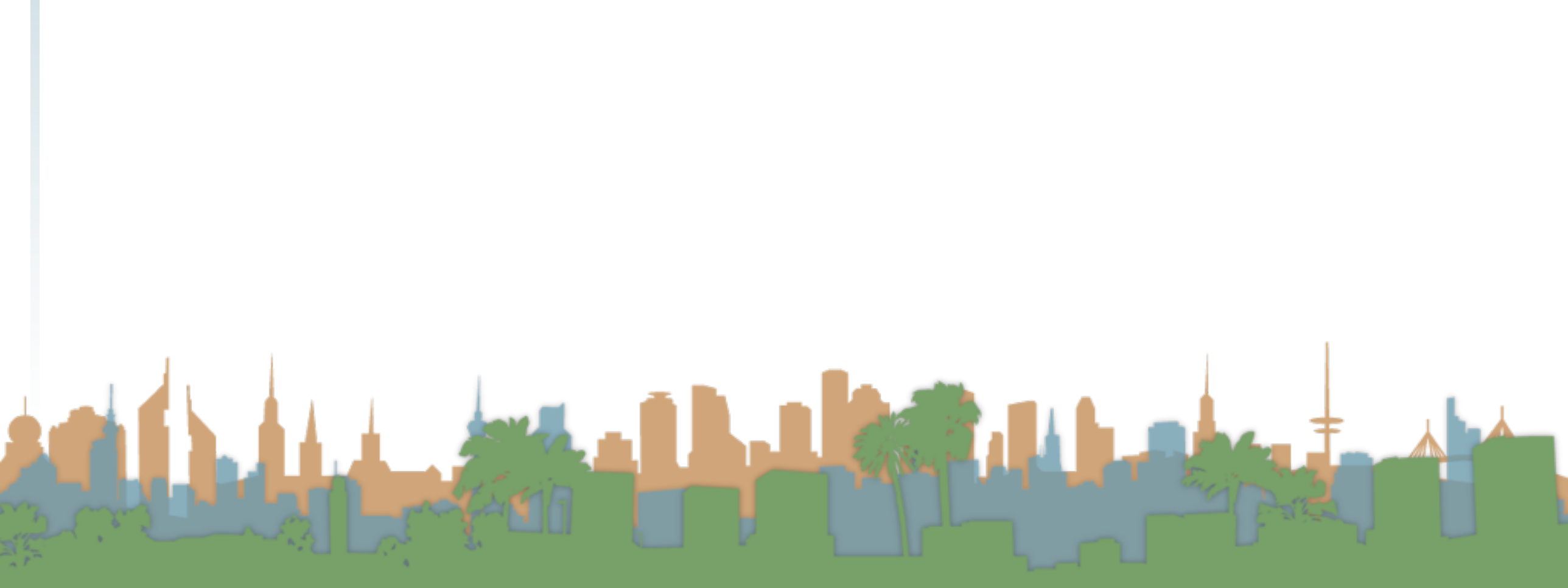


IT in Pervasive Games: Technology-Sustained Games

- Keeping track of score and player activities
  - Sensors
- Hiding information
  - Passwords
  - QR codes
- Sequencing Tasks
- Game Mastering

IT in Pervasive Games: Technology-Sustained Games

- Too much technology induces cheating
  - impersonal
  - the game becomes about beating the technology
  - To fix this, use technology to provide rewards rather than restricting actions or assigning penalties



IT in Pervasive Games: Seamful Design

- Seamful design
  - acknowledges that tech always breaks down
  - use it as a design resource rather than a limitation
  - applies to -sustained or -supported

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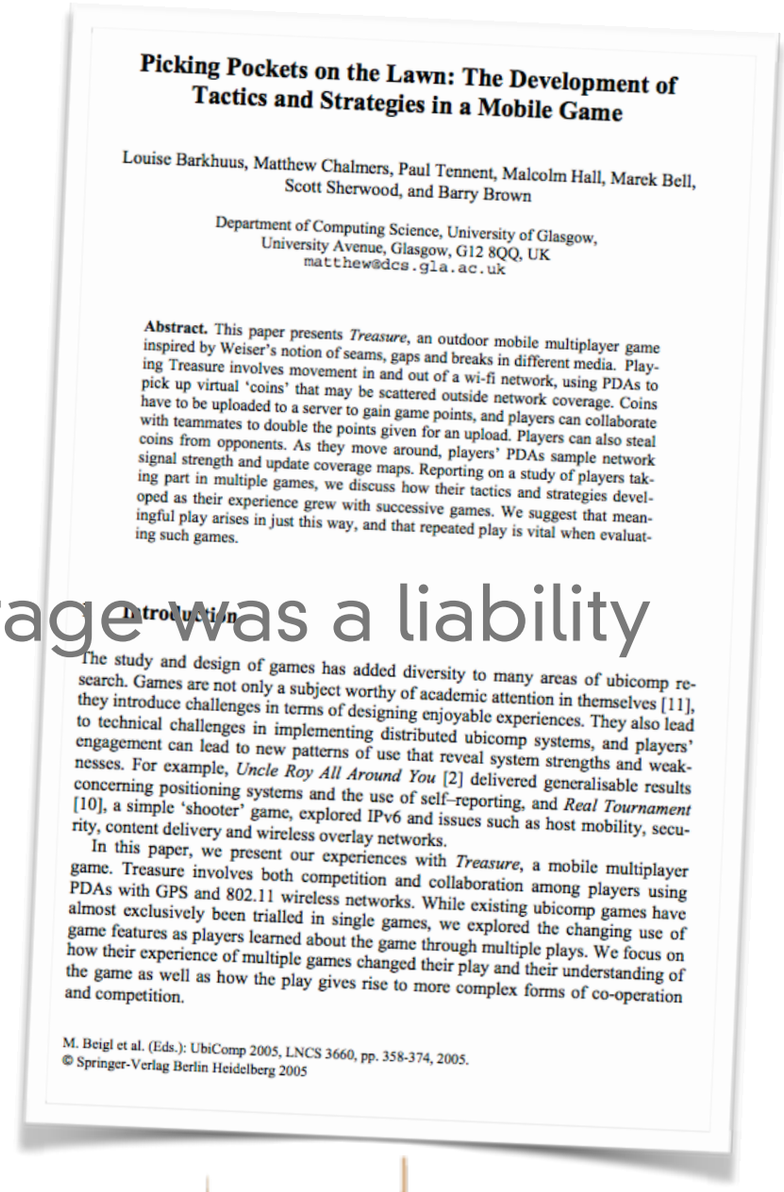
danah boyd

IT in Pervasive Games: Seamful Design

- Seamful design examples
  - GPS
    - only works outdoors
    - takes time to lock-on to satellites (5 - 20 minutes)
  - Bluetooth takes times to form connections (10-20 sec)
  - Kinects have a limited field of view
  - Microphones fidelty falls off with distance
  - WiFi has a limited range and is attenuated by environs

IT in Pervasive Games: Seamful Design

- Seamful design as a resource
  - Turn limitations into assets
    - "Treasure"
      - Getting coins required GPS
      - Turning in coins required Wifi
      - Being in both GPS and Wifi coverage was a liability



Picking Pockets on the Lawn: The Development of Tactics and Strategies in a Mobile Game

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Abstract. This paper presents *Treasure*, an outdoor mobile multiplayer game inspired by Weiser's notion of seams, gaps and breaks in different media. Playing Treasure involves movement in and out of a wi-fi network, using PDAs to pick up virtual 'coins' that may be scattered outside network coverage. Coins have to be uploaded to a server to gain game points, and players can collaborate with teammates to double the points given for an upload. Players can also steal coins from opponents. As they move around, players' PDAs sample network signal strength and update coverage maps. Reporting on a study of players taking part in multiple games, we discuss how their tactics and strategies developed as their experience grew with successive games. We suggest that meaningful play arises in just this way, and that repeated play is vital when evaluating such games.

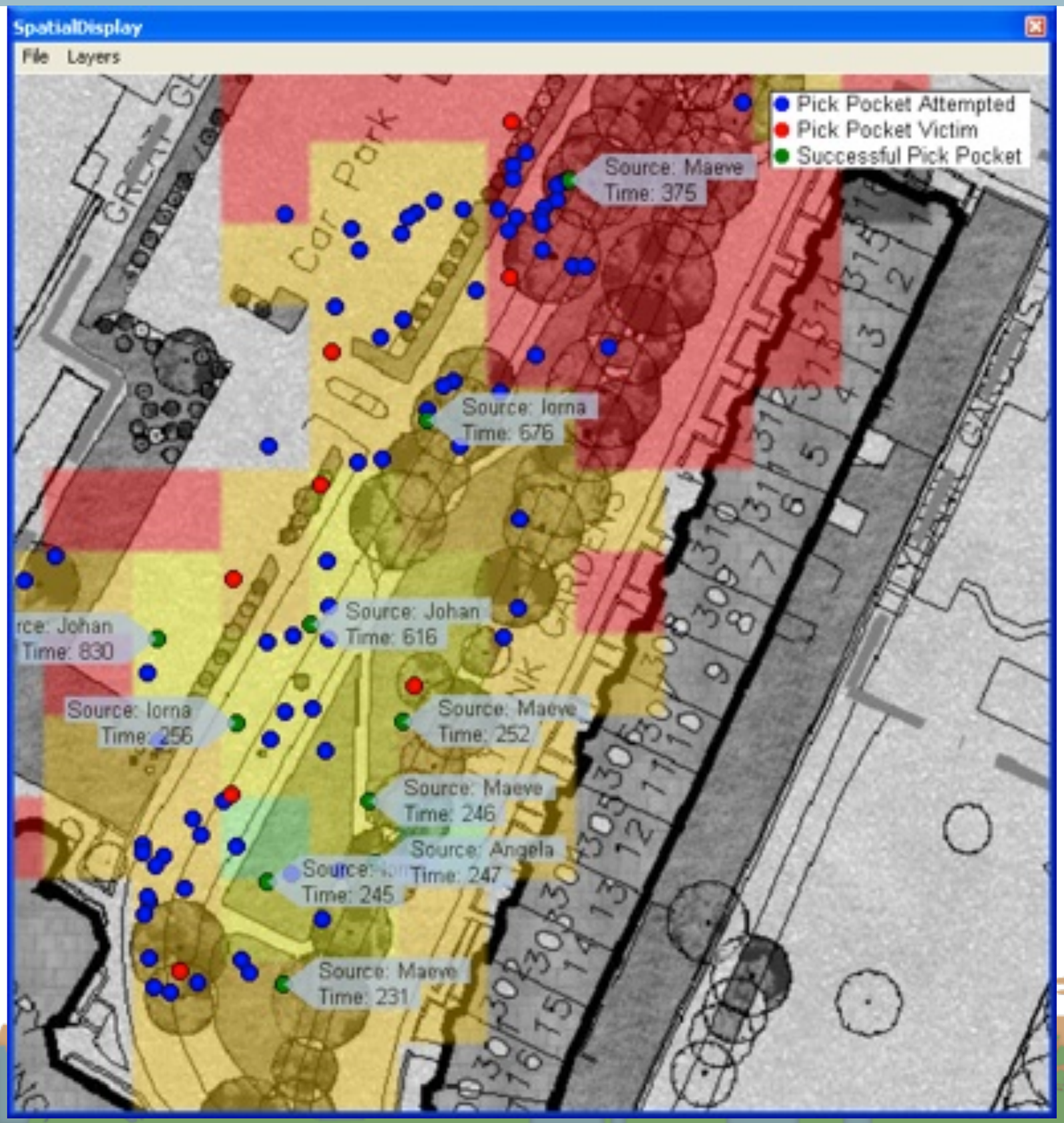
Introduction

The study and design of games has added diversity to many areas of ubicomp research. Games are not only a subject worthy of academic attention in themselves [11], they introduce challenges in terms of designing enjoyable experiences. They also lead to technical challenges in implementing distributed ubicomp systems, and players' engagement can lead to new patterns of use that reveal system strengths and weaknesses. For example, *Uncle Roy All Around You* [2] delivered generalisable results concerning positioning systems and the use of self–reporting, and *Real Tournament* [10], a simple 'shooter' game, explored IPv6 and issues such as host mobility, security, content delivery and wireless overlay networks.

In this paper, we present our experiences with *Treasure*, a mobile multiplayer game. Treasure involves both competition and collaboration among players using PDAs with GPS and 802.11 wireless networks. While existing ubicomp games have almost exclusively been trialled in single games, we explored the changing use of game features as players learned about the game through multiple plays. We focus on how their experience of multiple games changed their play and their understanding of the game as well as how the play gives rise to more complex forms of co-operation and competition.

M. Beigl et al. (Eds.): UbiComp 2005, LNCS 3660, pp. 358-374, 2005.

IT in Pervasive Games: Seamful Design



IT in Pervasive Games: Seamful Design

- Seamful design as a resource
  - Incorporate maintenance in a positive way
    - Design technology that clearly displays errors
      - e.g., dot matrix printer in Momentum
  - Show the environmental influence on the technology
    - Provide feedback about why technology is failing

IT in Pervasive Games

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IT in Pervasive Games: Giving Technology a Role

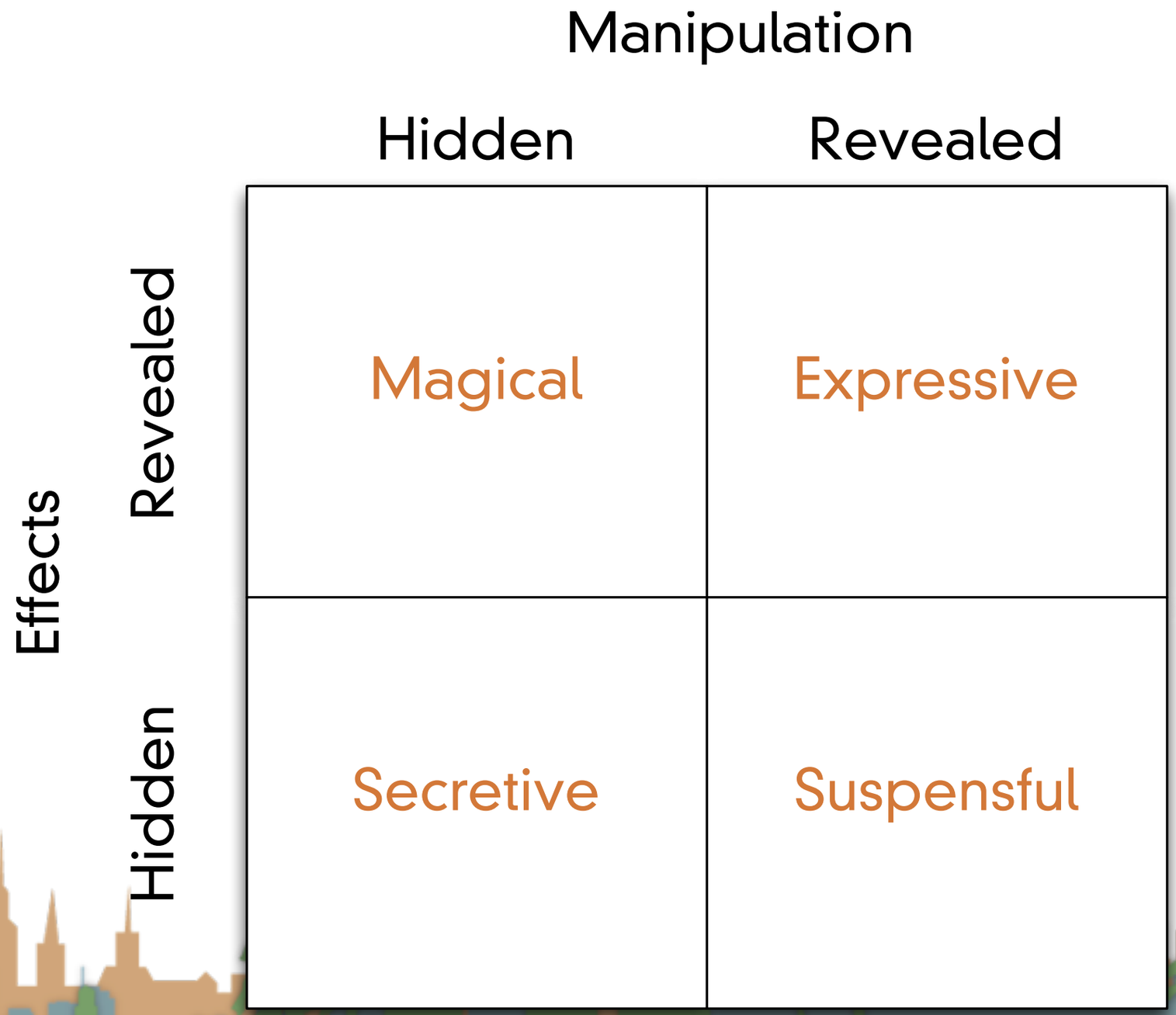
- Technology-supported games
  - technology is made available to improve game context
  - Four strategies
    - Gaming Device
    - Diegetic Artifact
    - Body Extensions
    - Environmental Embedding
      - possibly invisible to players
      - possibly a problem with the magician's curtain

IT in Pervasive Games: Giving Technology a Role

- Giving information a role
  - Technology delivers information
  - What information are you delivering?
    - How does that inform the technology used?
  - Information can be diegetic
  - Information can be meta- or back story
  - Information can be graphical

IT in Pervasive Games: Giving Technology a Role

- Technological Performatives
  - The use of technology impacts the game play



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IT in Pervasive Games: Epidemic Menace

- Scenario
  - Biohazard, pre-zombie, disease epidemic
- Goal: Prototype to explore cross-media gaming
- Game play:
  - Competitive
  - Technological mediated
    - Augmented Reality
- Score
- Whodunnit

IT in Pervasive Games: Epidemic Menace

- Technology
  - Cellular phones
  - Augmented Reality goggles
  - Video Feeds
  - Public displays
- Props
  - Movie sequences
  - Live actors
  - Campus/Hospital setting

EEPA
EUROPEAN EPIDEMIC PREVENTION ASSOCIATION

IT in Pervasive Games: Epidemic Menace

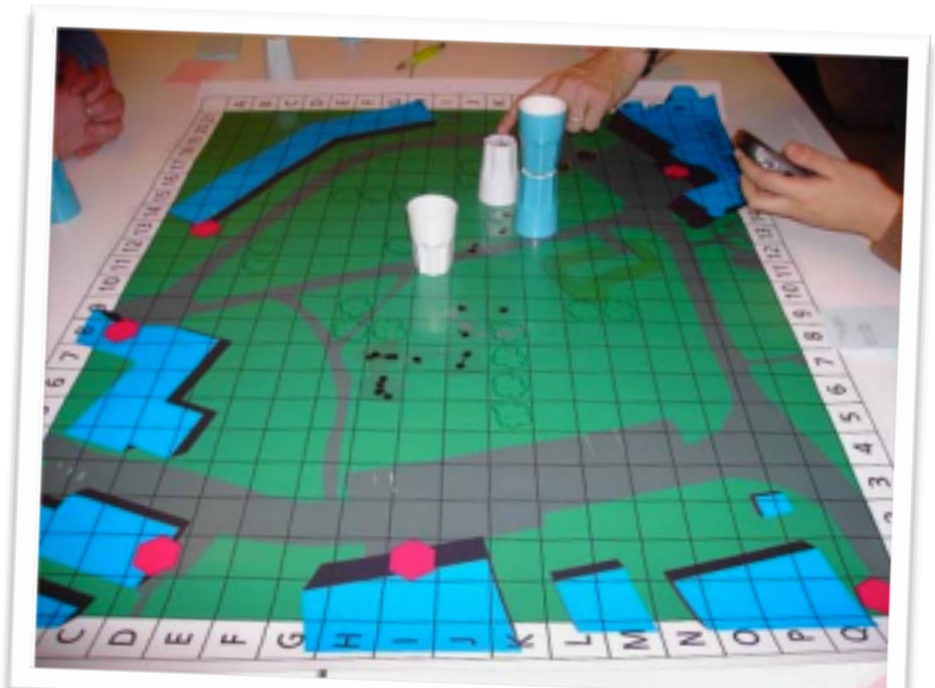
Technology/Device	Amount	Mode of play	Function
LCD touch screen, large (>30")	2 (1/team)	Stationary players	• Overview 2D map of playing field, main tool of interaction
PC workstation	2 (1/team)	Stationary players	• Communication
PC workstation	2	Stationary players	• Observation, access to video streams
PC workstation	2	Stationary players	• Time count and decision window
Mobile phone	4 (2/team)	Mobile players	• Anti-virus weapon • Communication device
PDA	2 (1/team)	Mobile players	• Positioning
Augmented Reality system	2 (1/team)	Mobile players	• Augmented reality visual system • Player can carry another gaming device as well
Webcams	4	Playing field	• Fixed positions on campus.
Weather station	1	Playing field	• To influence virus spreading.

IT in Pervasive Games: Epidemic Menace

Name	Hardware equipment (per team)	Display resolution	Purpose
Stationary control board	Large display (>30"), SMART board interactive overlay, Windows XP workstation, loudspeaker, keyboard	1280 x 1024	Application to observe and control virus behavior.
Stationary monitors	3 TFT monitors, 3 Windows XP workstations or laptops	1024 x 768	1. Webcam access, 2. Communication, 3. Time count & decisions
Mobile phone	Sony Ericsson V800	176 x 220	Mobile phone application
Mobile Augmented Reality system	Shimadzu Data Glass 2/A monocular HMD, Windows XP Laptop in backpack, Intersense IntertiaCube, Holux GR-236 GPS-Empfänger	800 x 600	3D virus augmentation outdoors
Spray system	Bluetooth mouse connected to mobile Augmented Reality system	-	Destroying the virus.
Spectator website	Windows XP computer with web browser, standard mouse and keyboard	1024 x 768	Watch some aspects of the game.
Orchestration interface	Windows XP workstation, large TFT monitor	1024 x 786	Control board for game masters
Mobile Positioning system	Windows Mobile 2005 PDA, Holux GPSlim236 GPS receiver	640 x 480	Positioning of mobile players.
Weather station	Weather station, data available via website	-	Monitor weather conditions that influence virus behavior.

IT in Pervasive Games: Epidemic Menace

- Game play
  - Command Center
    - Strategic
  - Field Workers
    - Tactical
  - Minimal Role-playing
    - T-shirts
  - Device upgrades
  - Hyper-surveillance
    - video feeds shown to other teams



IT in Pervasive Games: Epidemic Menace

- Cross-media gaming
  - vs multi-platform games
- Cross media
  - different interfaces do different things
  - multiple interfaces are typically necessary
    - consider baseball: bat, glove
- Multi-platform
  - different interfaces generally are interchangeable
  - consider tennis: one of many rackets

IT in Pervasive Games: Epidemic Menace

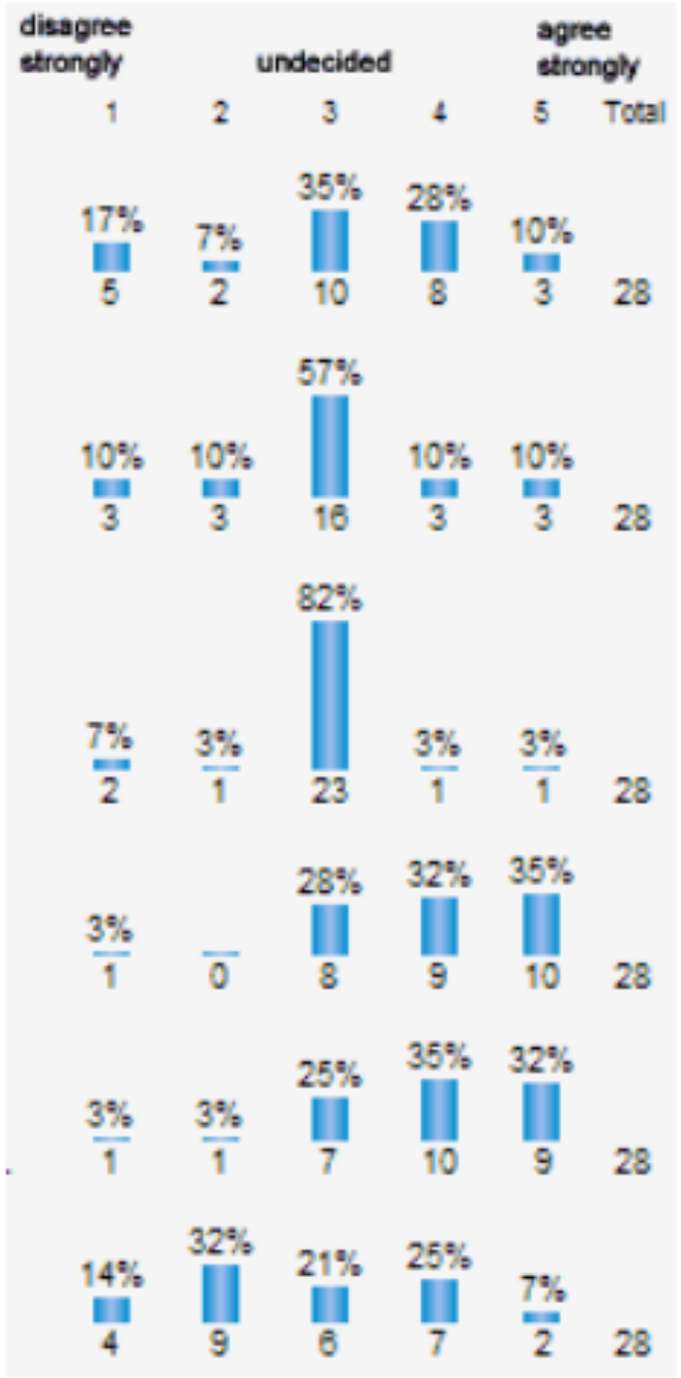
- Unique elements
  - Real weather impacted virus spread
    - wind
    - humidity
    - temperature
- Limited pervasive qualities
  - No social expansion
  - Limited temporal duration
  - Limited spacial expansion

IT in Pervasive Games: Epidemic Menace

IT in Pervasive Games

IT in Pervasive Games: Epidemic Menace

Please correspond to the following statements:



It was easy, to use the mobile phone to capture viruses.

It was easy, to use the AR to capture viruses.

It was easy, to use the tablet AR to capture viruses.

It was easy, to use the control screen.

It was easy, to use the communication station.

The devices provided good feedback, I always knew, what I just did in the game.

IT in Pervasive Games: Epidemic Menace

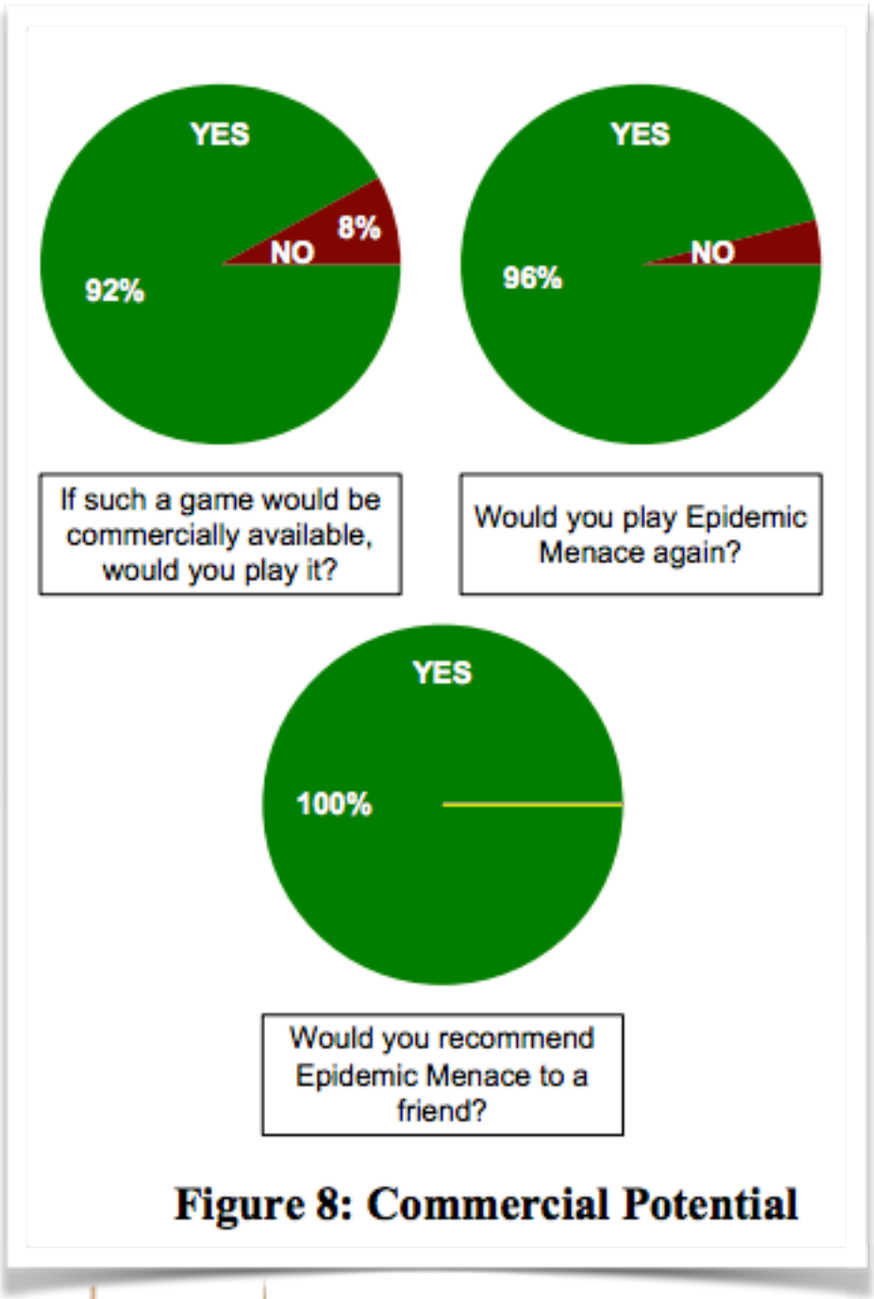


Figure 8: Commercial Potential

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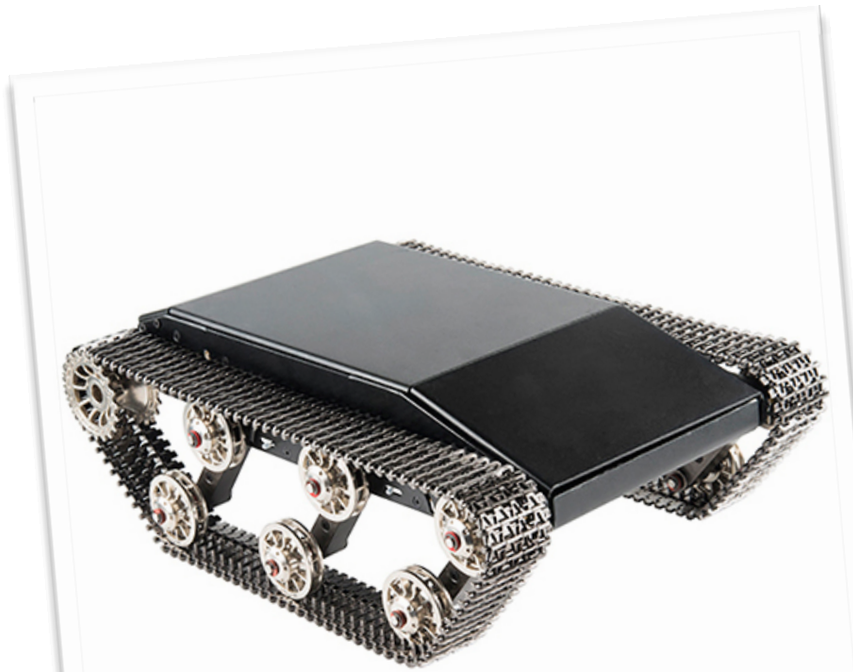
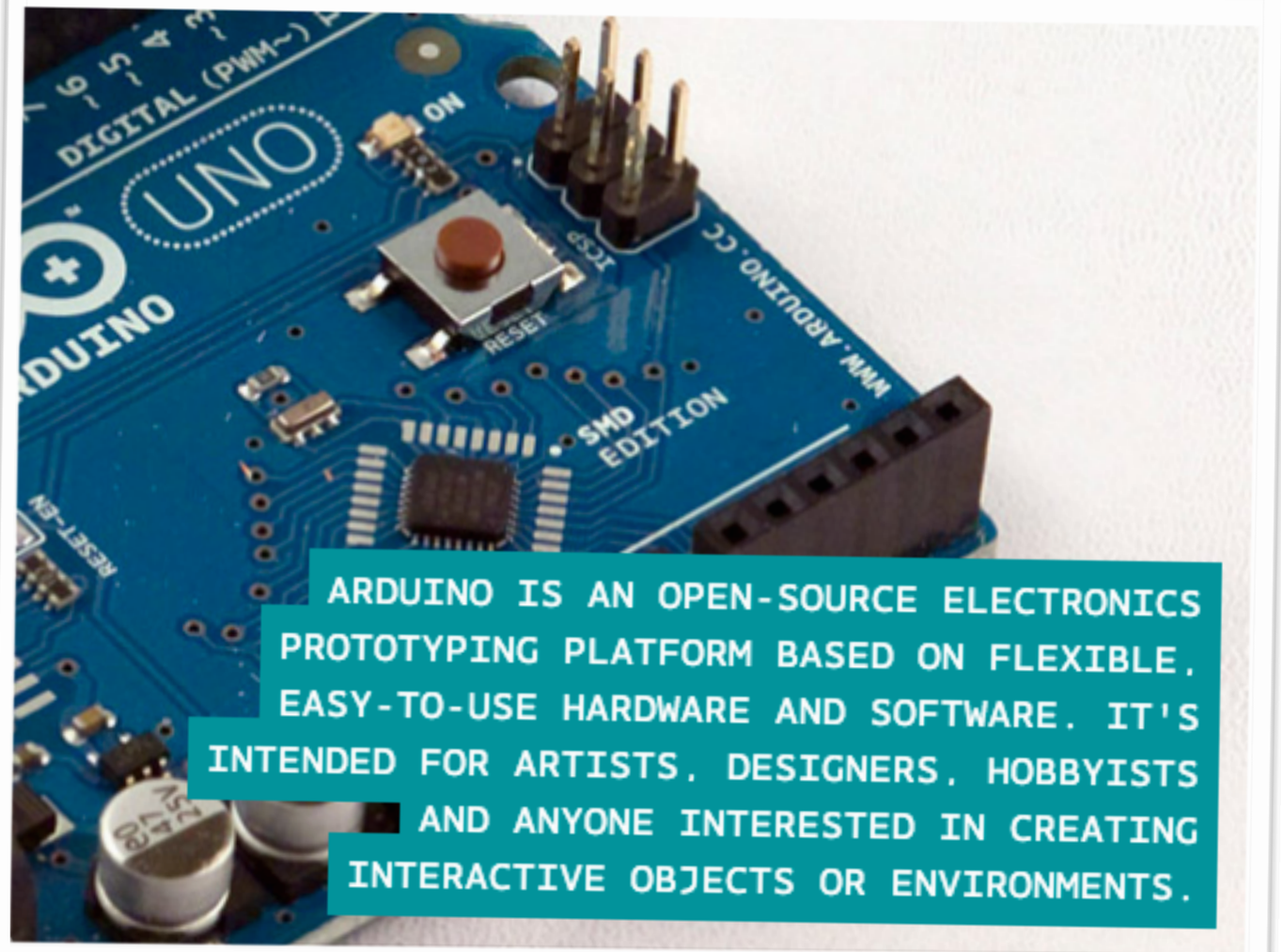
IT in Pervasive Games: Designing Interactive Artifacts

- Sensors are cheap
  - Arduino
  - SparkFun

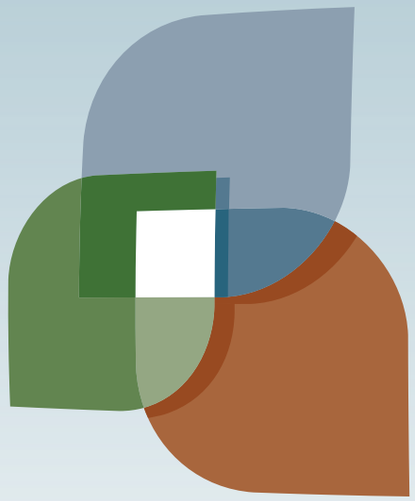




IT in Pervasive Games: Designing Interactive Artifacts

- Design interaction to fit all play modes in your game
  - Custom built hardware has limited flexibility
- Create consistent aesthetics
  - Aesthetics provide hints about how to play
  - Support style or mood of play
- Provide instantaneous feedback
  - Basic HCI principle to avoid confusion

Datamancer



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