Fall 2008

Synthetic Window: Game Space and the Player's Dilemma

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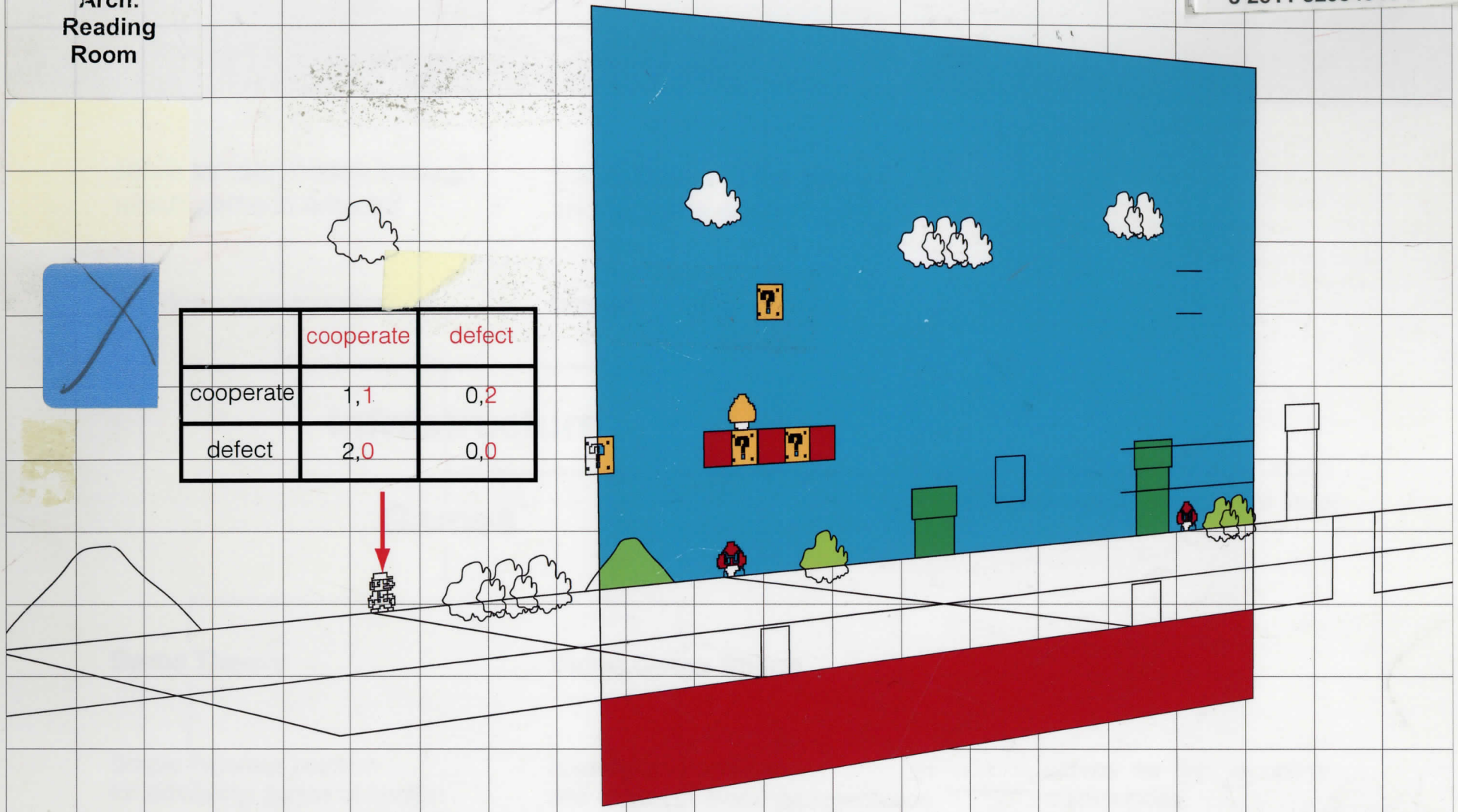
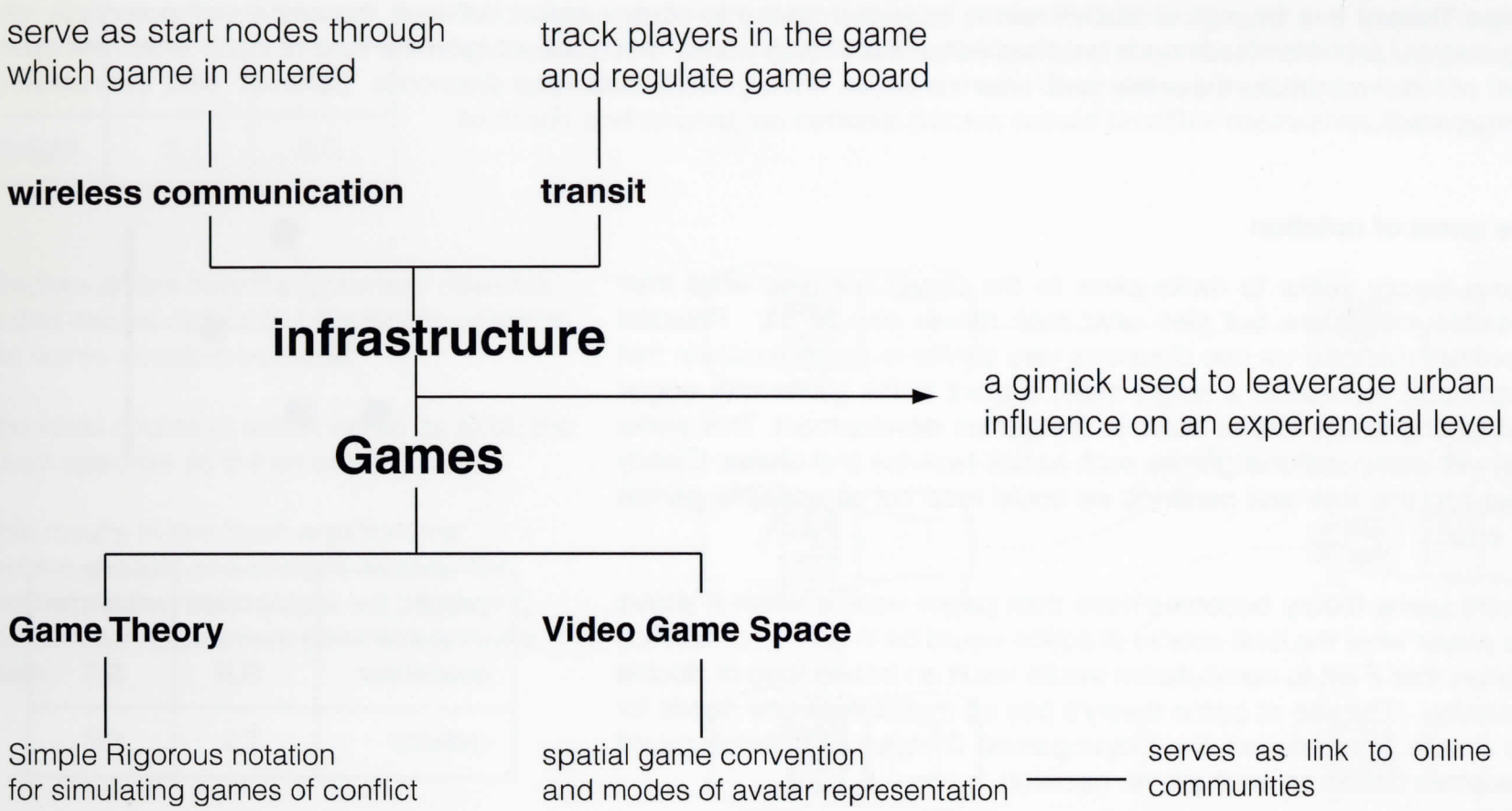


SYNTHETIC WINDOW

GAME SPACE AND THE PLAYER'S DILEMMA

ALEJANDRO PEREZ

Project Protocol

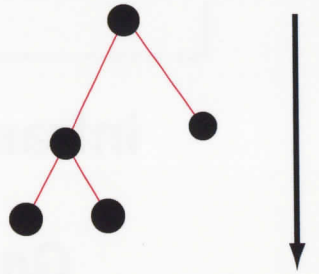


Game Theory

Game Theory is a branch of Mathematical logic that seeks to study conflict between thoughful and potentially deceitful opponents. John Von Neuman is credited with establishing Game Theory as a legitimate field of study when he developed and proved **minimax theorem** and later co-wrote Theory of Games and Economic Behavior with economist Oskar Morgenstern.

The game of notation

Game theory seeks to make clear to the player not only what their possible moves are but also what their moves should be. Potential move are mapped via tree diagrams very similar to graph theory in that each node represents a single state, a point in the game with edges connecting states further down in the games development. This works well with computational games such as tick-tack-toe and **chess**. Clearly if we had the time and patience we could map out all possible games for each.



Where game theory becomes more then paper work is when it shows the player what the best course of action would be in games of conflict. Games that if left to computation would result an infinite loop of double guessing. The use of game theory's pay off matrix is all one needs for the simple ,but profound, two player games. IT states all possible payoff outcomes based on each player decision.

payoff	cooperator	defector
cooperator	R,R	S,T
defector	T,S	P,P

Minimax Theorem proves that every finite, two-person, zero-sum game has a rational solution in the form of a pure or mixed strategy. (Poundstone pg 61)

Chicken Dilemma

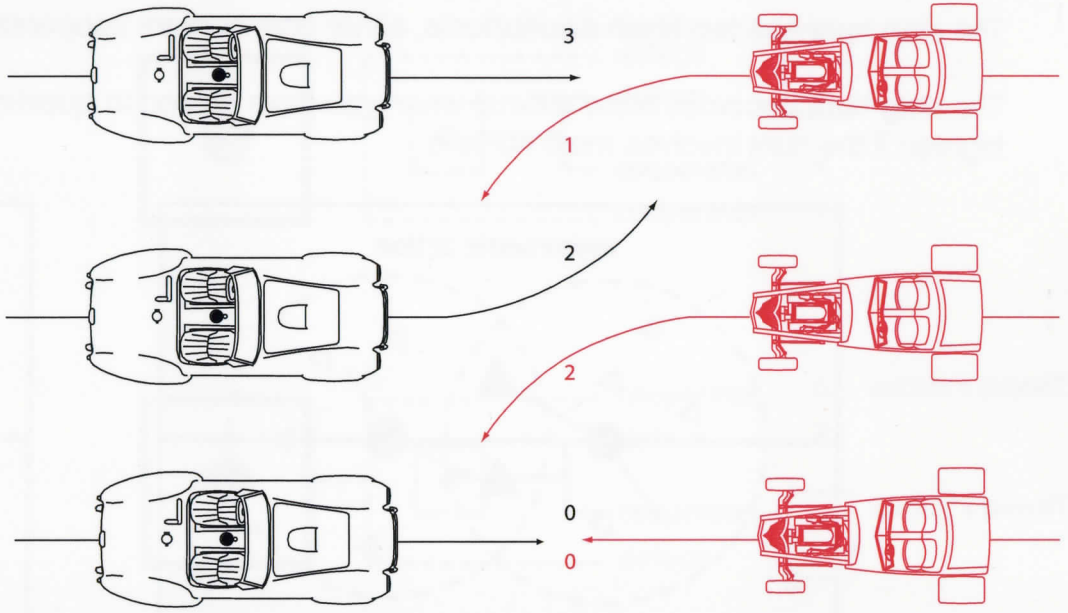
	swerve	straight
swerve	2,2	1,3
straight	3,1	0,0

Two teen age drivers, both eager to prove their courage, set out to play a game of chicken. The idea is simple the individual that stays the course the longest wins the respect and admiration of the crowd. Clearly the idea is for one of the teens to flinch and swerve, no rational person would sacrifice themselves for a game.

Chicken differs from the prisoners' dilemma in that mutual defection (not flinching) yields the worse possible outcome.

The ideal course of action would be to do the exact opposite as the on coming player.

This results in two Nash equilibriums; swerve-straight and straight-swerve. The problem is that each player will be playing for the Nash equilibrium point that benefits them.



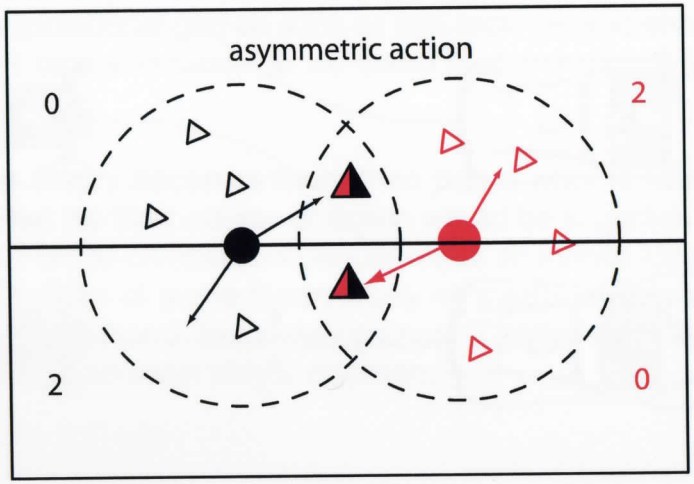
Stag Hunt Dilemma

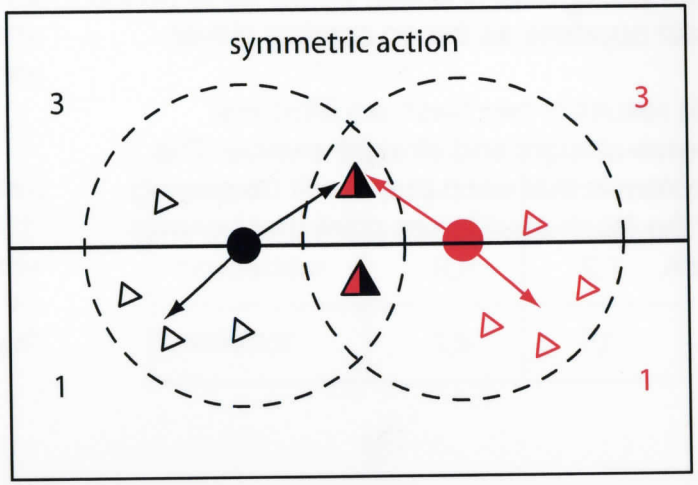
	stag	hare
stag	3,3	0,2
hare	2,0	1,1

Two hunters set out in search of a stag since the stag is much stronger then any one individual it will take the combined efforts of both hunters. The hunters separate to lay in wait; they soon notice that the field hold a healthy population of hares which each can catch on their own. Does the individual go for the sure bet of the hare or do they followed the agreed upon plan.

The stag hunt has two Nash equilibriums, either both hunters cooperate or they both defect (symmetric actions).

The stag hunt becomes more difficult when you have reason to question the rationality of the other hunter. This can highten if the hunt involves more hunters





Prisoners' Dilemma

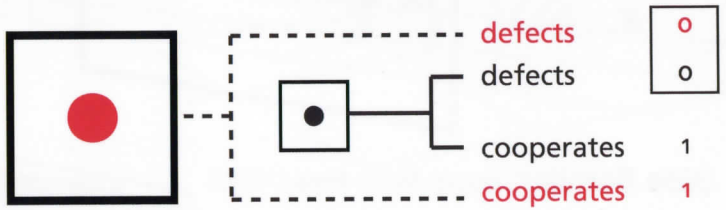
	cooperate	defect
cooperate	1,1	0,2
defect	2,0	0,0

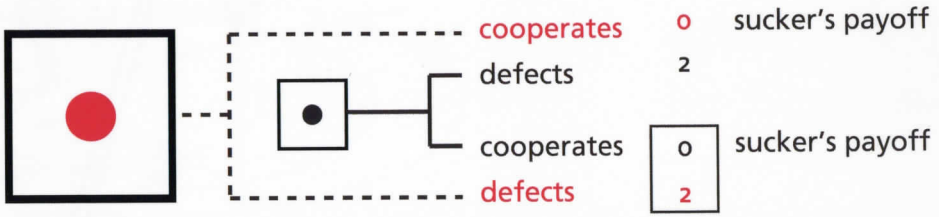
Two thieves have been picked up by the police and put into separate holding cells. They are each given the chance to confess to the crime with the promise of a reduced sentence if they testify against their accomplice (defect). If neither confesses they will both be charged at a lesser sentence; but if they both confess they both do time.

Its clear to see that mutual cooperation would yield favorable results for both parties, but remember they can not communicate and all decisions happen simultaneously. This means that the prisoners can not influence each others decisions.

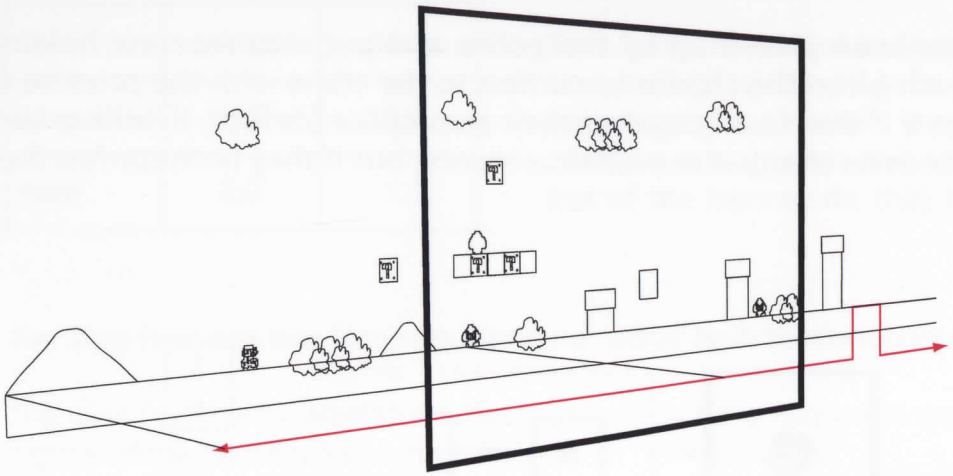
From the red prisoners perspective it is clear to see that the safest course of action is to defect; at best it offers the maximum yield and at worse it avoids the sucker's payoff, meaning you doing time for both.

It is therefore clear that the Nash equilibrium is for both players in this situation to defect.





Game Space - 2D



Side Scroller: Super Mario Bros (1985)

Overhead 2D : Ms. Pacman (1980)

Overhead 2D and side scrollers are games with a single fixed camera view with side scollers offering motion via the camera on a set rail. These 2D games made up the majority of early arcade and console games as they were easy to program and did not tax the existing hardware.

Side scoller gameplay is based around quick **reaction** time and muslce memory; this creates an avatar that is more object then individual.

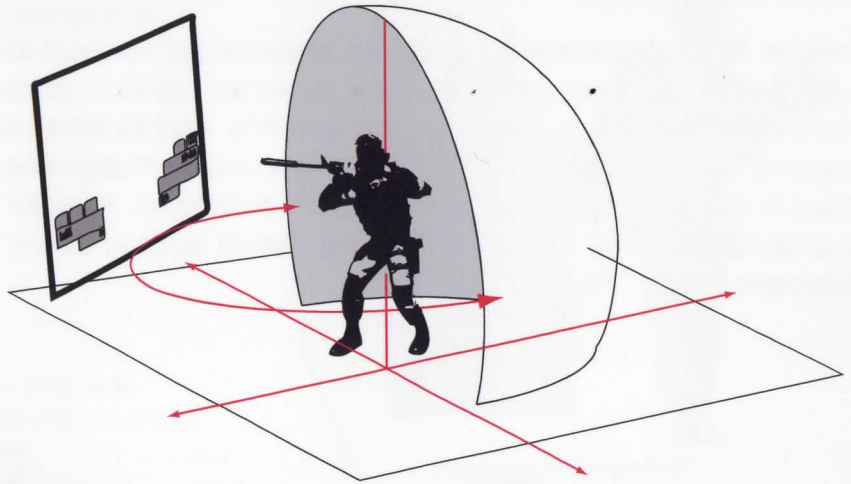
Overhead 2D and **Static 2D** game are dependant on the player being able to situate their **avatar** in relation to the entire map. The plan view that these game provide favor gameplay where planning and projection are critical to succeed.

Game Space - 3D

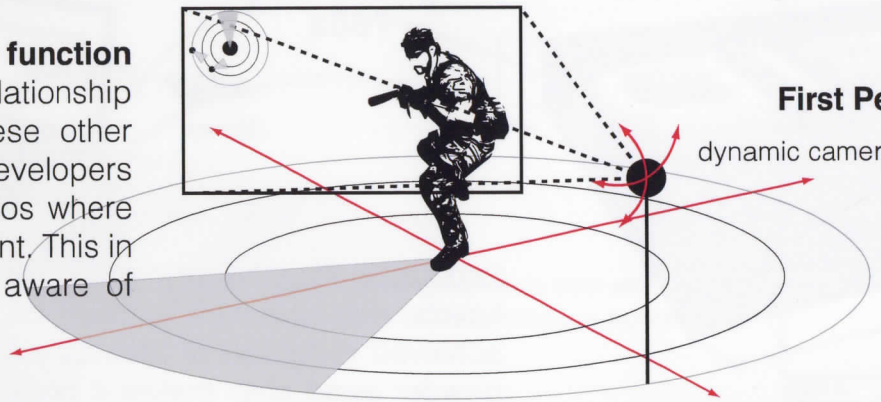
Three dimensional games came into the home in the early 90's with such title as **Wolfenstein 3D** and **Quake.** These new have of three dimensional games pushed the limits of the cpu processing power and were a factor that let to comsumer level GPU video cards.

First Person Shooters place gamers in the POV of the avatar. Game space is revealed based on player preference with other players avatar seen as objects do be dealt with swiftly.

The addition of a **mapping function** which map other avatars in relationship the players avatar give these other avatars importance. Game developers are then able to create scnerios where timing and stategy are important. This in turn makes the player more aware of their own spaciality.



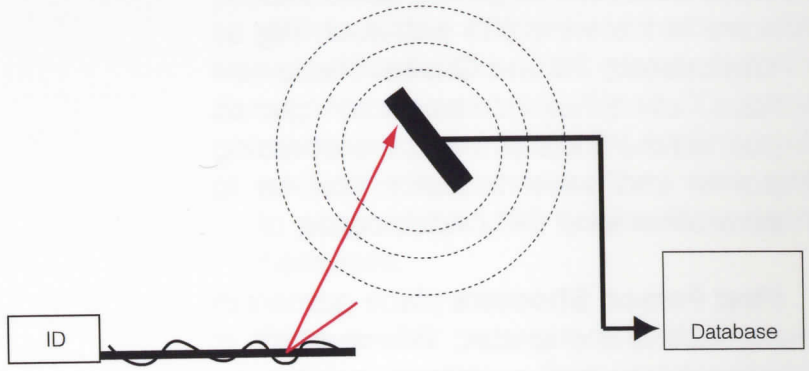
First Person Shooter: Raindow Six (1998)

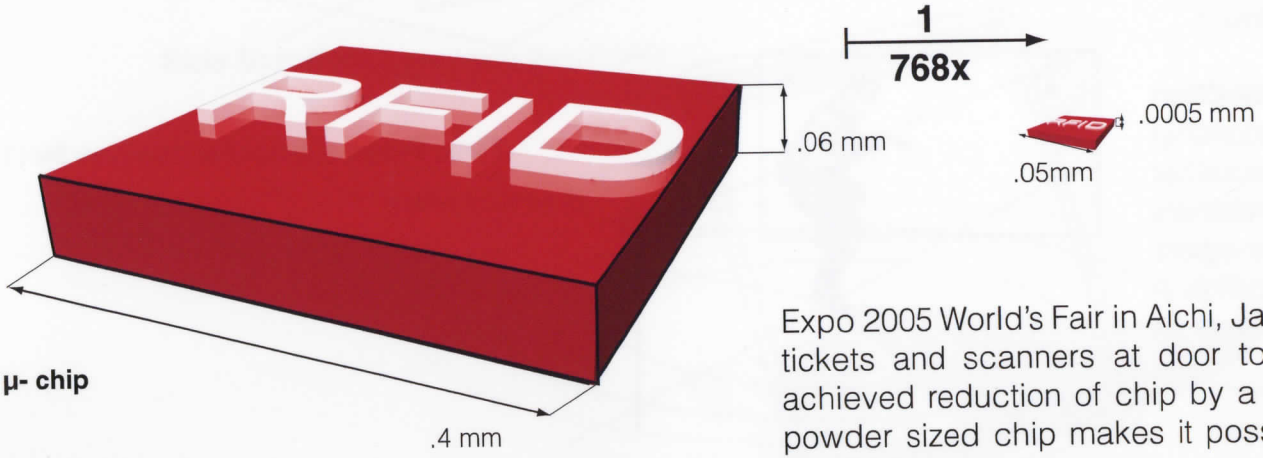


Third Person With Mapping: Metal Gear Solid (1998)

RFID- Radio Frequency Identification

Passive RFID chips use an attached antenna set to react to 2.45-gigahertz microwave from a scanner device. The microwave induces a current in the antenna and triggers a respond from the 128-bit IC in the form of a unique id tag. The id tag is then inputted into the database containg id. In order to understand what the id means one needs access to the database.





Expo 2005 World's Fair in Aichi, Japan used embbeded RFID chips in tickets and scanners at door to regulate access. Hitachi recently achieved reduction of chip by a factor of 768% in volume; the new powder sized chip makes it possible to embed it in such things as paper.

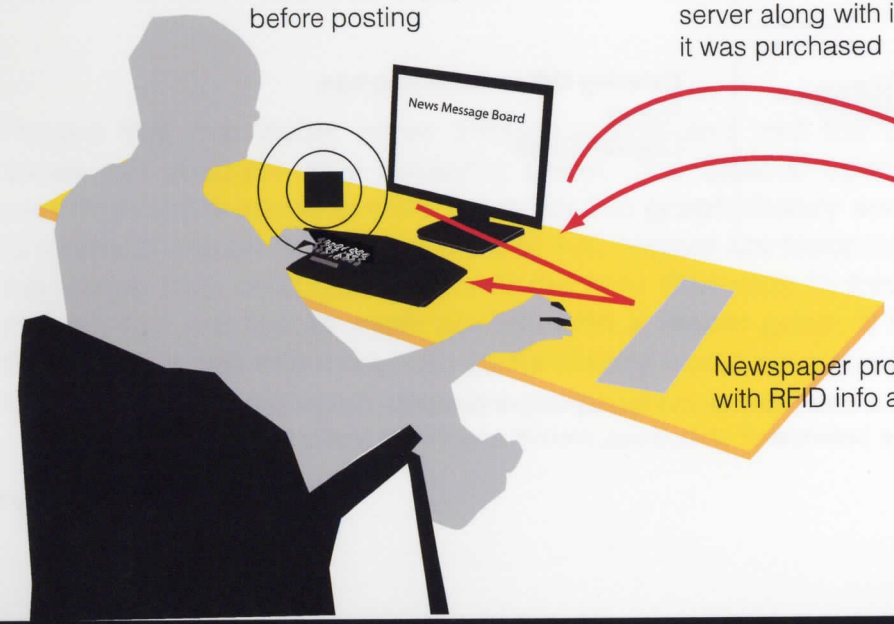
RFID- Radio Frequency Identification

Through the use of RFID daily routines such as purchasing a newspaper can take on spatial ramifications. A newspaper with an RFID makes it possible to track where it was purchased and in combination with internet message boards can place a thought in space. The aim would be to give the reader and poster a spacial identity in the urban fabric.

newspaper dispenser tells database which newspapers it contains

Reader uploads post onto server along with info on where it was purchased

Reader scans paper before posting



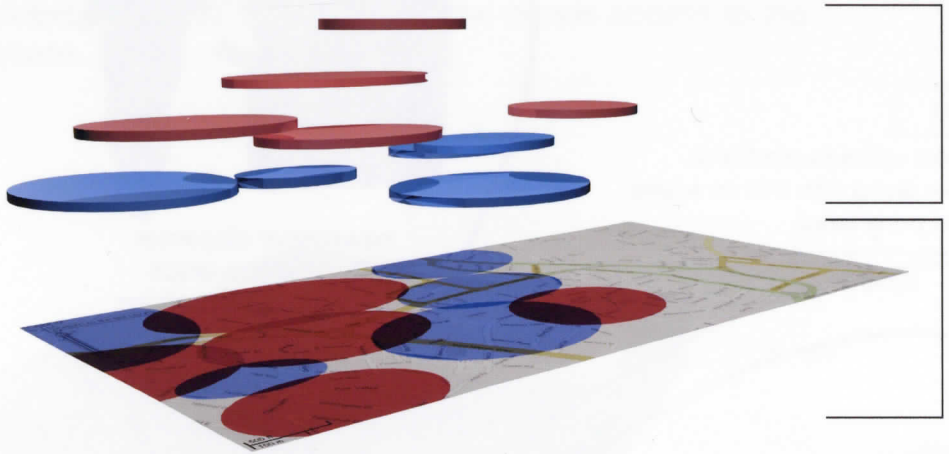
Newspaper processes post along with RFID info and displays accordingly

News Database

Tycoon

Case Study

Tycoon is Seamful game developed by **Mixed Reality Lab** and **Embedded Interaction Research Group** designed to graft an economic based game onto the urban experience. Tycoon uses GSM cells and divides them into production and consumer zones; players mine for virtual gold and silver in the production zones and trade them in for goods in the consumer zones. The longer players spend in production zones the more they mine; the catch is that while mining is limitless, the quantities of goods is so players must balance their time between mining and collecting goods. The objective of game play is to collect as many credits as possible until all objects are purchased.



Game Scenerio
Production mining zones
Consumer zones

Existing Urban Infrastructure
Transit
Cellular Zones

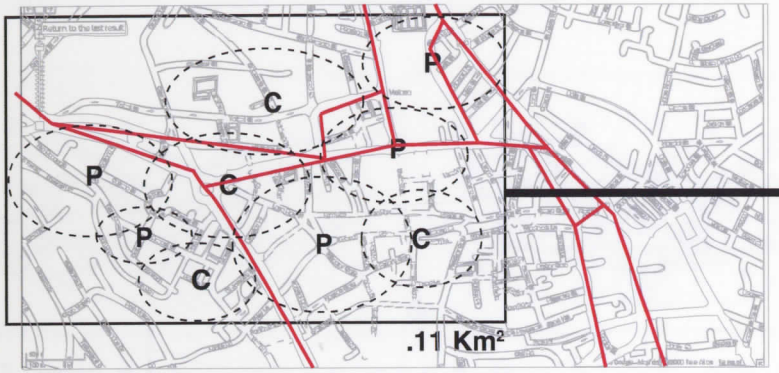
"The Mixed Reality Laboratory (MRL) at the University of Nottingham is a dedicated studio facility where computer scientists, psychologists, sociologists, engineers, architects and artists collaborate to explore the potential of ubiquitous, mobile and mixed reality technologies to shape everyday life."

-Mixed Reality Lab

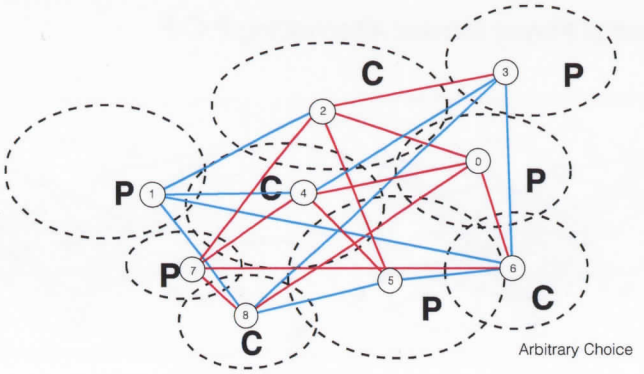
seamful games: are mobile multiplayer games, designed to let people use -- or even take advantage of -- the limits and gaps of ubicomp infrastructure, e.g. wireless networks and positioning systems. They are vehicles for an approach to system design that deliberately exposes limits and variations in such technology, which is often assumed to be uniformly accessible and 'seamless'.

Tycoon

Case Study



spactial optimization



Each C or P Node is connected by 5 or 4 edges respectably

Beginning and Ending Node contain all outgoing or incoming edges respectably

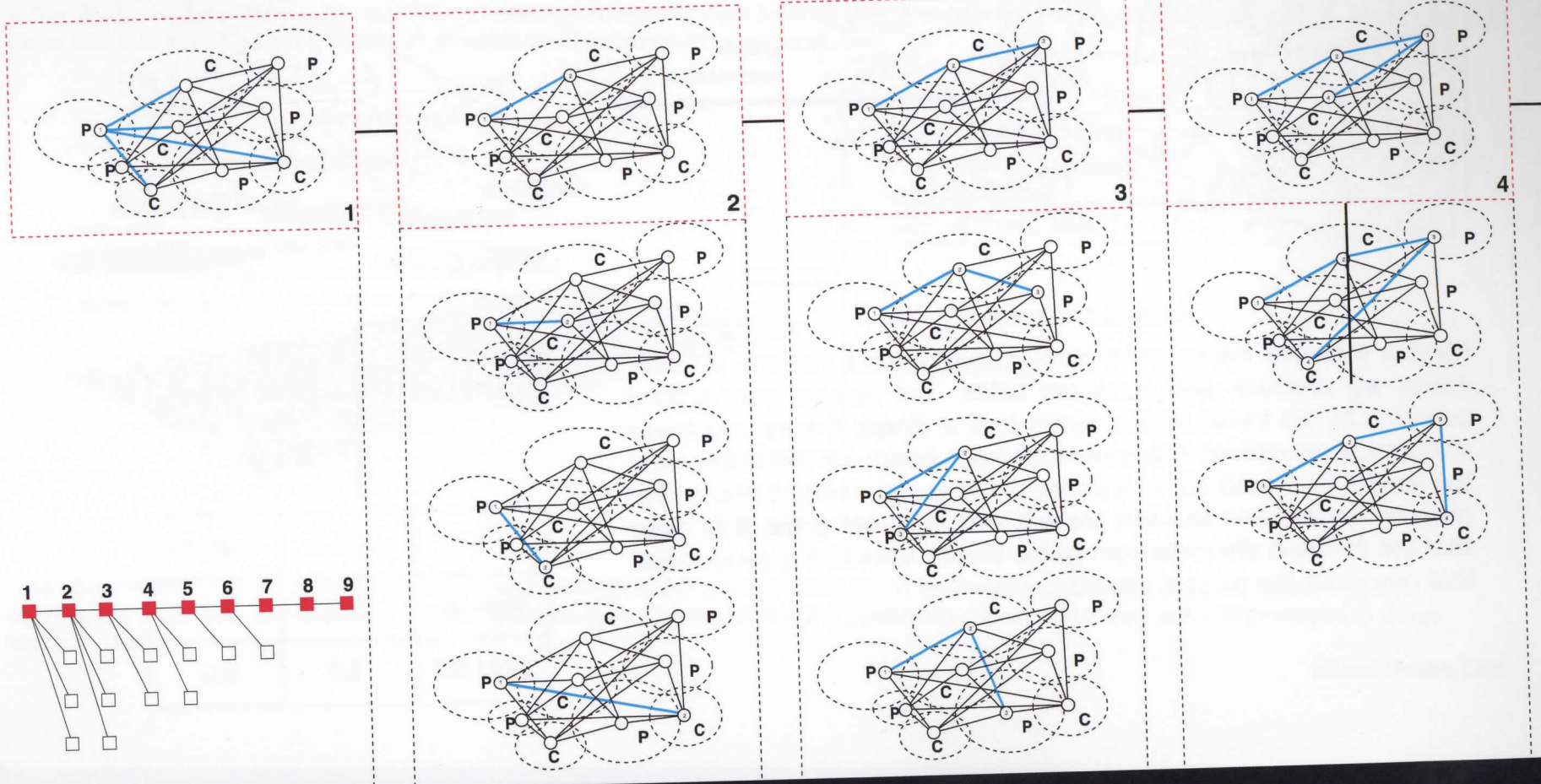
Players that can better move through space and visit the different zones will produce and consume better. The Spacial connections provided by the transit system lends itself to **graph theory** and a way to optimize movement. But remember that players are rewarded more the longer they hold out in a zone; the only downside to this is that players that **are last to cash are left with a lesser prize. It is clear that the chicken dilemma** from **game theory** would be a good model that describes the players intended goals.

Player vs Player Strategy

	cash in	hold out
cash in	2,2	1,3
hold out	3,1	0,0

Graph Theory: Study of mathematical structures used to model pairwise relations between objects from a certain collection. A "graph" in this context refers to a collection of vertices or 'nodes' and a collection of edges that connect pairs of vertices

Potential Player Moves: Alternating P-C-P



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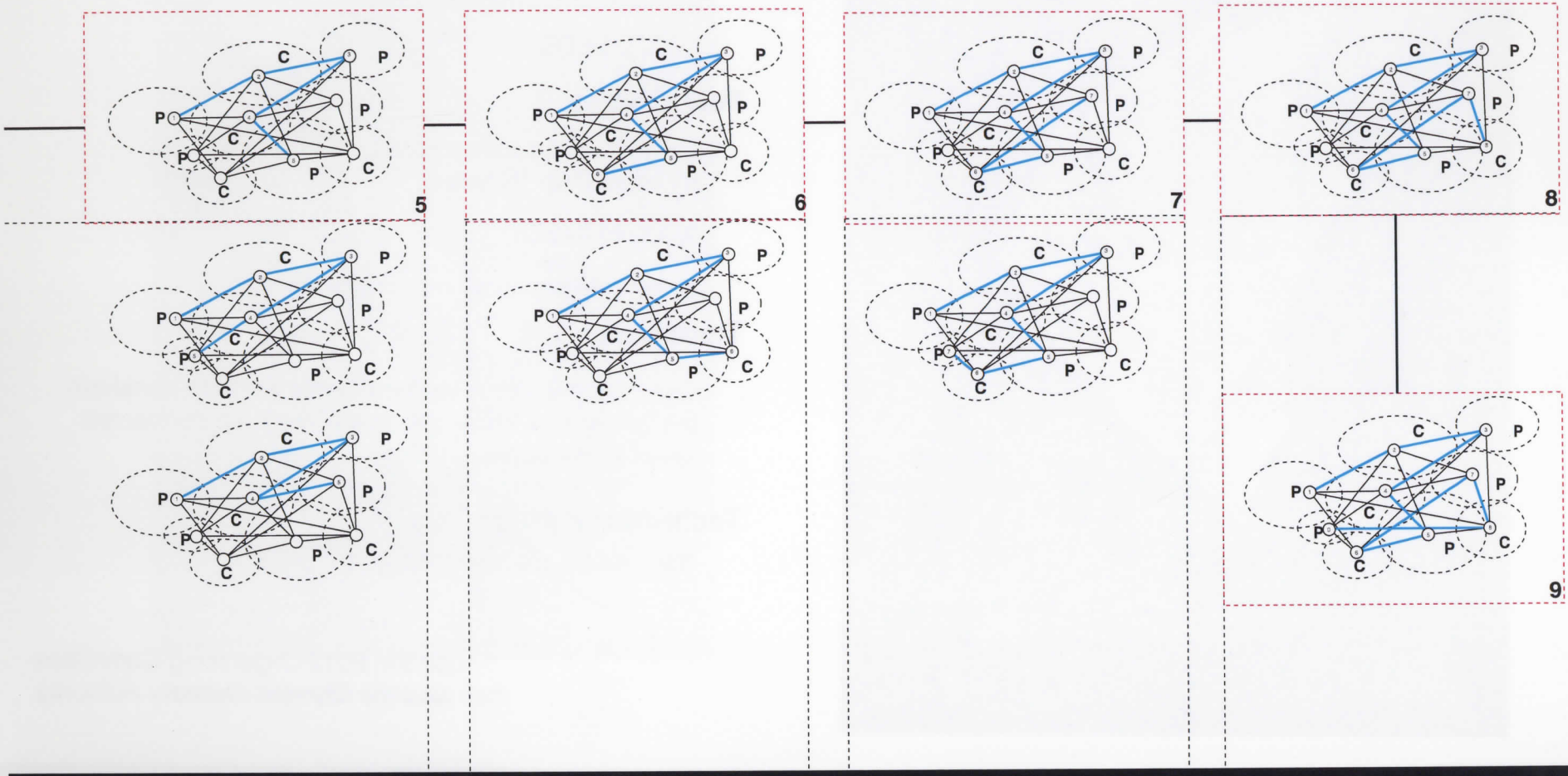


Olympic Park 2012- Lower Lea Valley, East London

Olympic Park

180,000 SPECTATORS DAILY

17,320 BEDS

Post Games

Largest urban park created in Europe for more than 150years

9,000 HOMES

Cross-city transport improvements

Transport

Our transport plans for the Games will help transform the Lower Lea Valley into one of the best connected areas in the capital

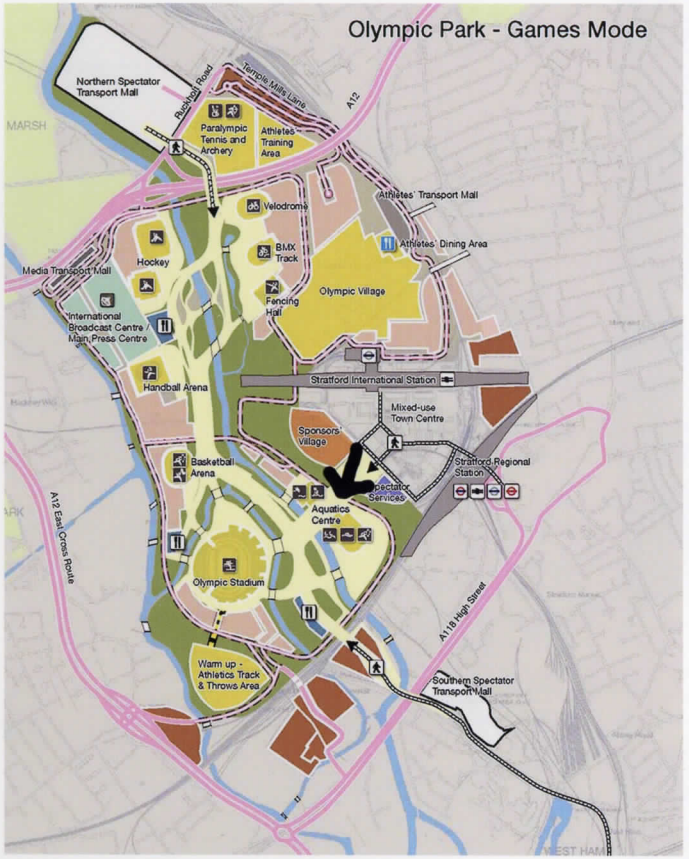
Technology

"Games for a connected world"

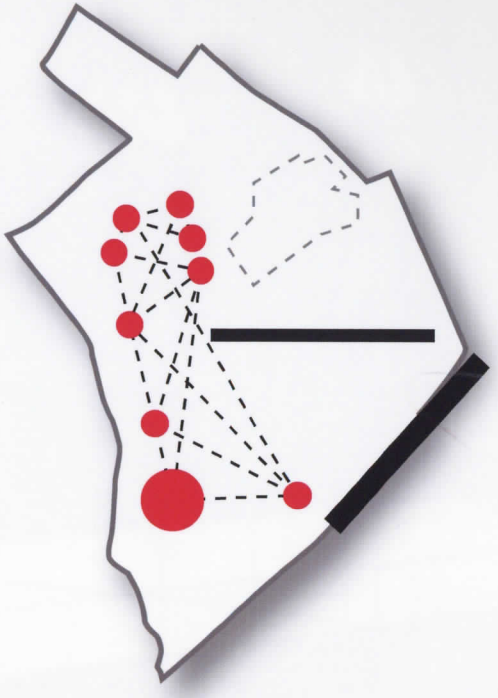
-London 2012 Organising Committee and the Olympic Delivery Authority.

Olympic Park 2012- Lower Lea Valley, East London

SITE



Proposed Plan for Olympic Park



Sports venue

Transit centers