

Massivizing Social Games: Yesterday, Today, and The Next Five Years



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A Scientist and a Gamer Meet in a Bar...

- ***Civilization arises in and as play, and never leaves it.***
Huizinga, Homo Ludens, 1938, p.178
- ***Science and scholarship are much like games.** Players are drawn into games because of their **challenges**, and playing involves **creating, testing and revising strategies as well as the skills necessary for progressing in the game.***
Mayra, Game Studies, 2009, p.3



Traditional Gaming

*Play is a **voluntary** activity or occupation executed within certain fixed **limits of time and place**, according to **rules** freely accepted but absolutely binding, having its aim in itself and **accompanied by a feeling of tension, joy, and the consciousness that it is "different" from "ordinary life"***

Huizinga, Homo Ludens, 1938, p.28



Chess players,
Lucas van Leyden, c.1508



Awari, solved by
J. Romein et al.,
c.2000

Super Mario Bros. (1985)



- Designed by Shigeru Miyamoto
 - Also created the *Zelda* games (1986-)
- Mario, the new age **hero**
 - Nintendo could not get *Popeye* license
 - Main character of *Donkey Kong* (1981)
 - Saved Nintendo, 150M copies sold by 2002
 - In 1990, Mario better recognized by US children than Mickey Mouse (Sheff, 1999)



A Brief History of Computer Games

1970s: The Device Era

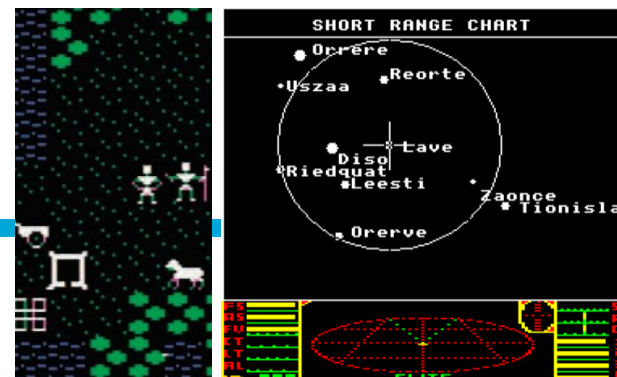


1980s: The Hero Era

1981: Handheld Crash

1983: Videogames Crash

1990s: The Tech & Genre Era



What's in a name?

Massively Social Gaming

(online) games with massive numbers of players (100K+), for which social interaction helps the gaming experience



Romeo and Juliet

1. Virtual world

Explore, do, learn, socialize, compete

+

2. Content

Graphics, maps, puzzles, quests, culture

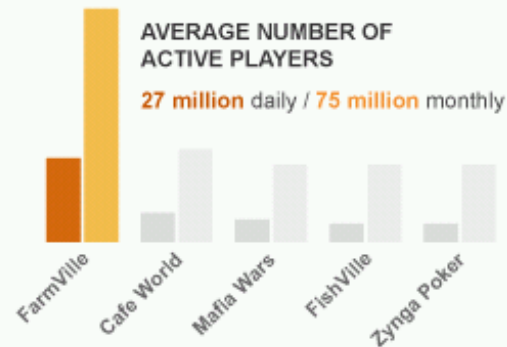
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3. Game data

Player stats and relationships

FarmVille, a Massively Social Game

ZYNGA GAME FarmVille



PLAYER PROFILE

N/A average age
60% female, 40% male

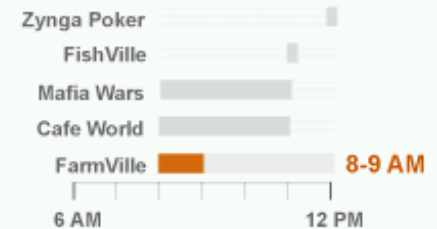


118

THAT'S A LOT

FarmVille boasts 118 million total installs. It has more monthly active users than the population of France.

MOST POPULAR TIME TO PLAY (EST)



AVERAGE SESSION

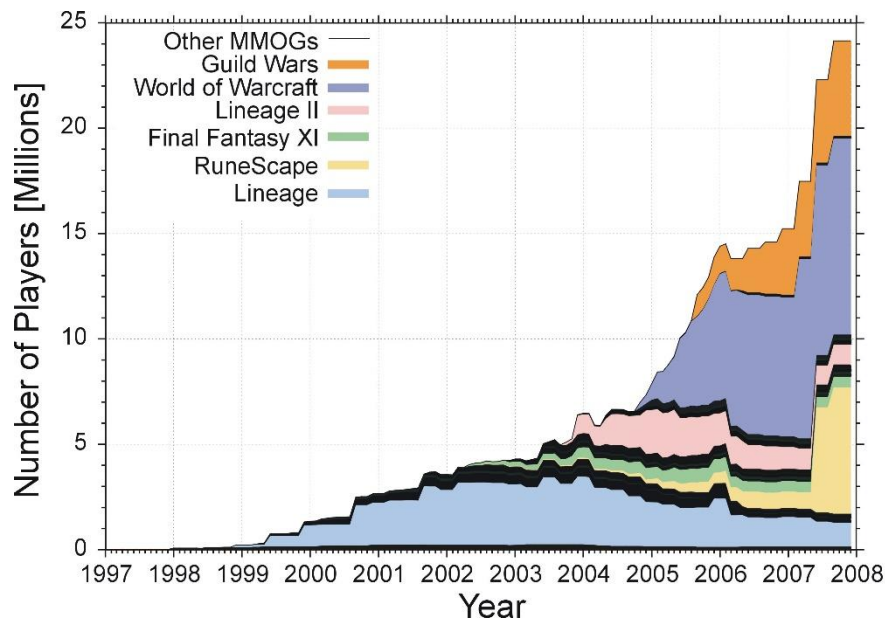
33 minutes



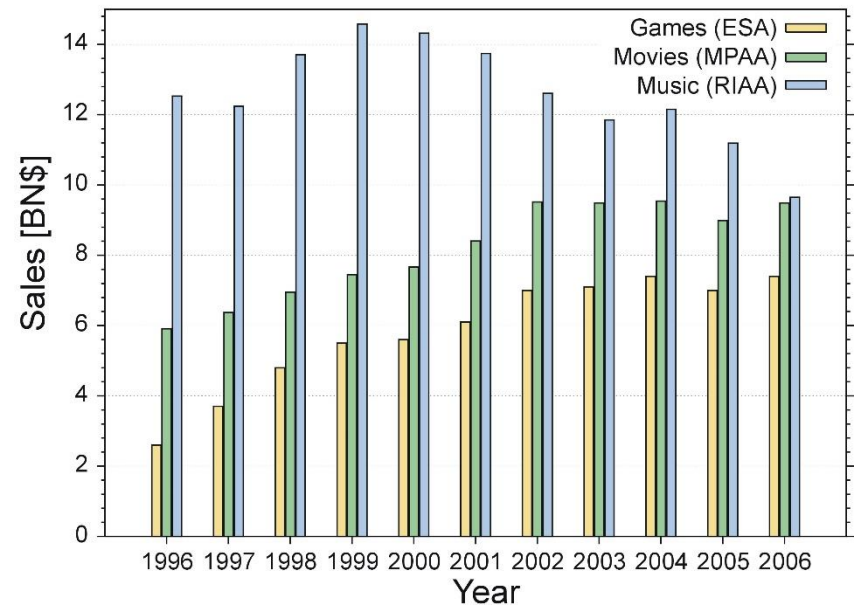
Source: InsideSocialGames.com

MSGs are a Popular, Growing Market

- **25,000,000** subscribed players (from 200,000,000+ active)
- **Over 10,000** MSGs in operation
- **Market size 7,500,000,000\$/year**



Sources: MMOGChart, own research.



Sources: ESA, MPAA, RIAA.

Agenda

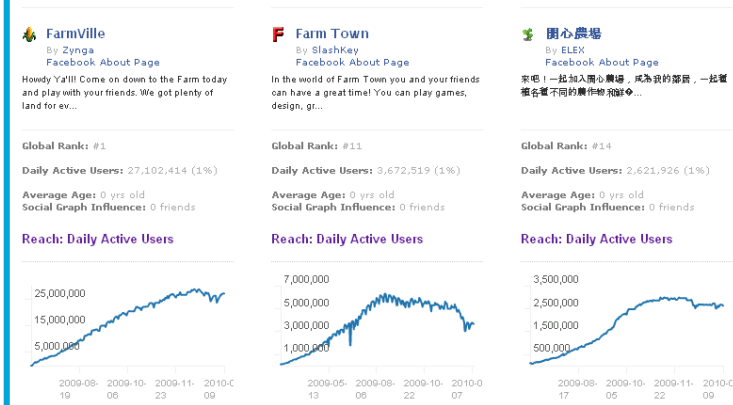
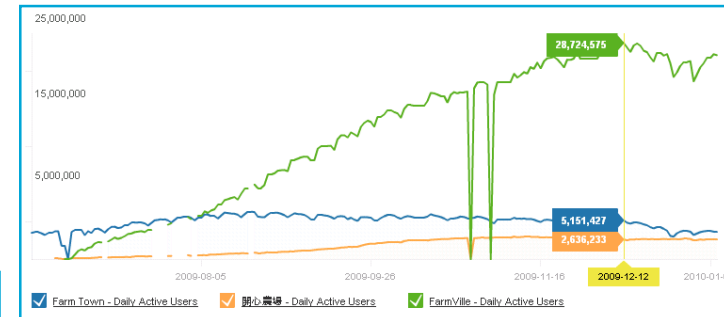
1. What's in a Name?
- 2. Three Current Challenges**
 - 1. Platform Scalability Challenge**
 2. Content Generation Challenge
 3. Gaming Analytics Challenge
3. The Next Five Years
4. Conclusion

Research Challenge: Solve the Platform Problem of MMOGs

The Platform Problem of MMOGs

Scaling quickly to millions of players

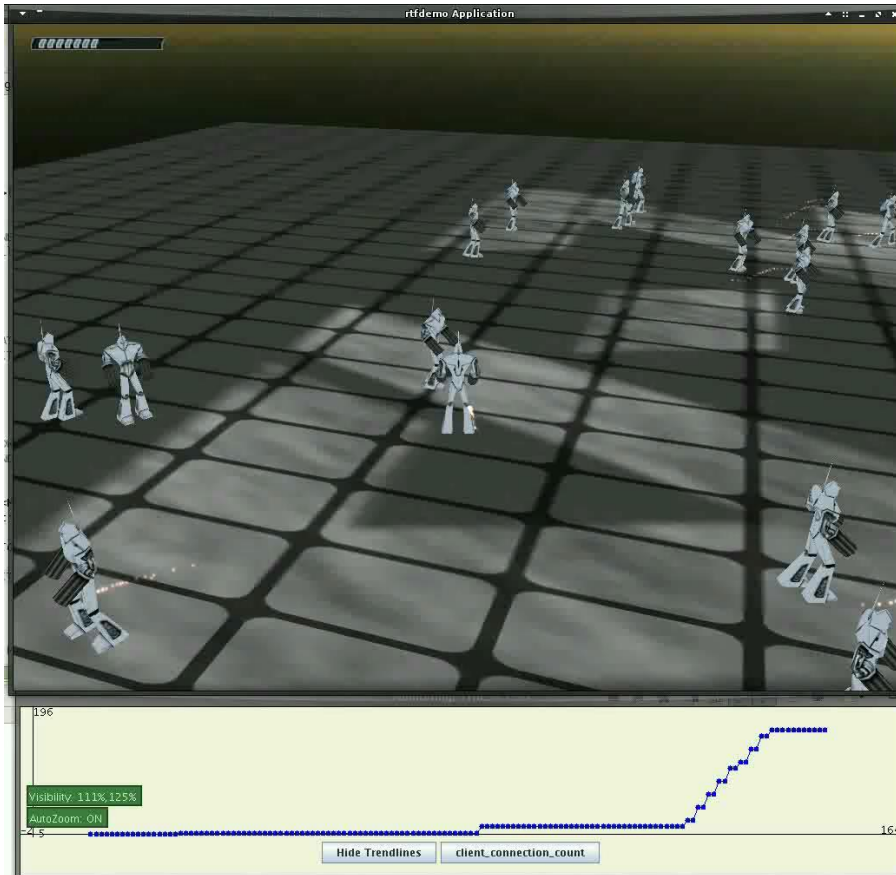
- 1M in 4 days, 10M in 2 months
- Up-front and operational costs
- Performance, Scalability, & Cost



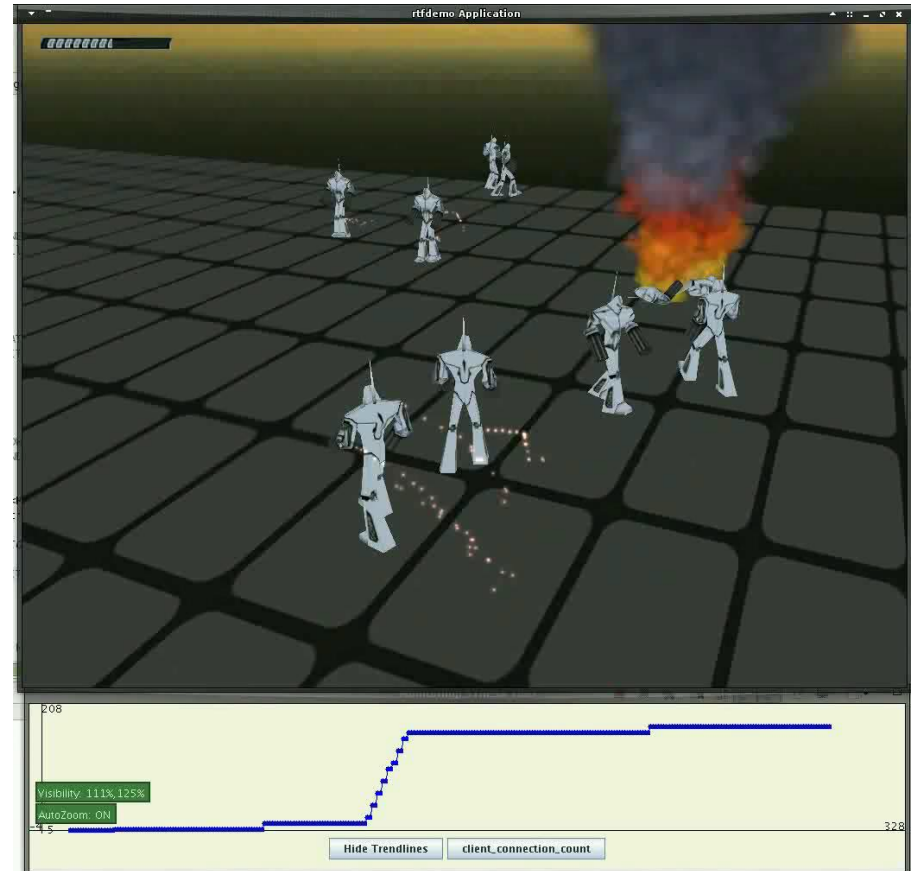
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Load Impact on Game Experience

Responsive game



Unresponsive game



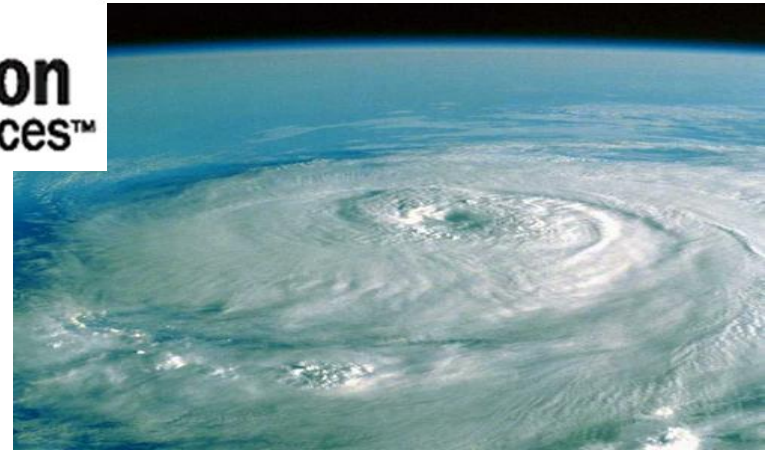
Online games hosting model

- Generic Online Games (non-MM)
 - **Static:** dedicated isolated single servers
- MMOGs
 - **Static:** dedicated clusters - using **parallelization**
- Problems with these approaches
 1. Large amount of over-provisioning
 2. Non-efficient coverage of the world

Background on Cloud Computing



VS



Tropical Cyclone Nargis (NASA, ISS, 04/29/08)

- “The path to abundance”
- On-demand capacity
- Pay what you use
- Great for web apps (EIP, web crawl, DB ops, I/O)
- “The killer cyclone”
- Not so great performance for compute- or data-intensive applications¹
- Long-term perf. variability²

1- Iosup et al., Performance Analysis of Cloud Computing Services for Many Tasks Scientific Computing, IEEE TPDS, 2011 (in print)

2- Iosup et al., On the Performance Variability of Production Cloud Services, Technical Report PDS-2010-002, [Online] Available:

<http://pds.twi.tudelft.nl/reports/2010/PDS-2010-002.pdf>

Proposed hosting model: dynamic

- Using data centers for dynamic resource allocation



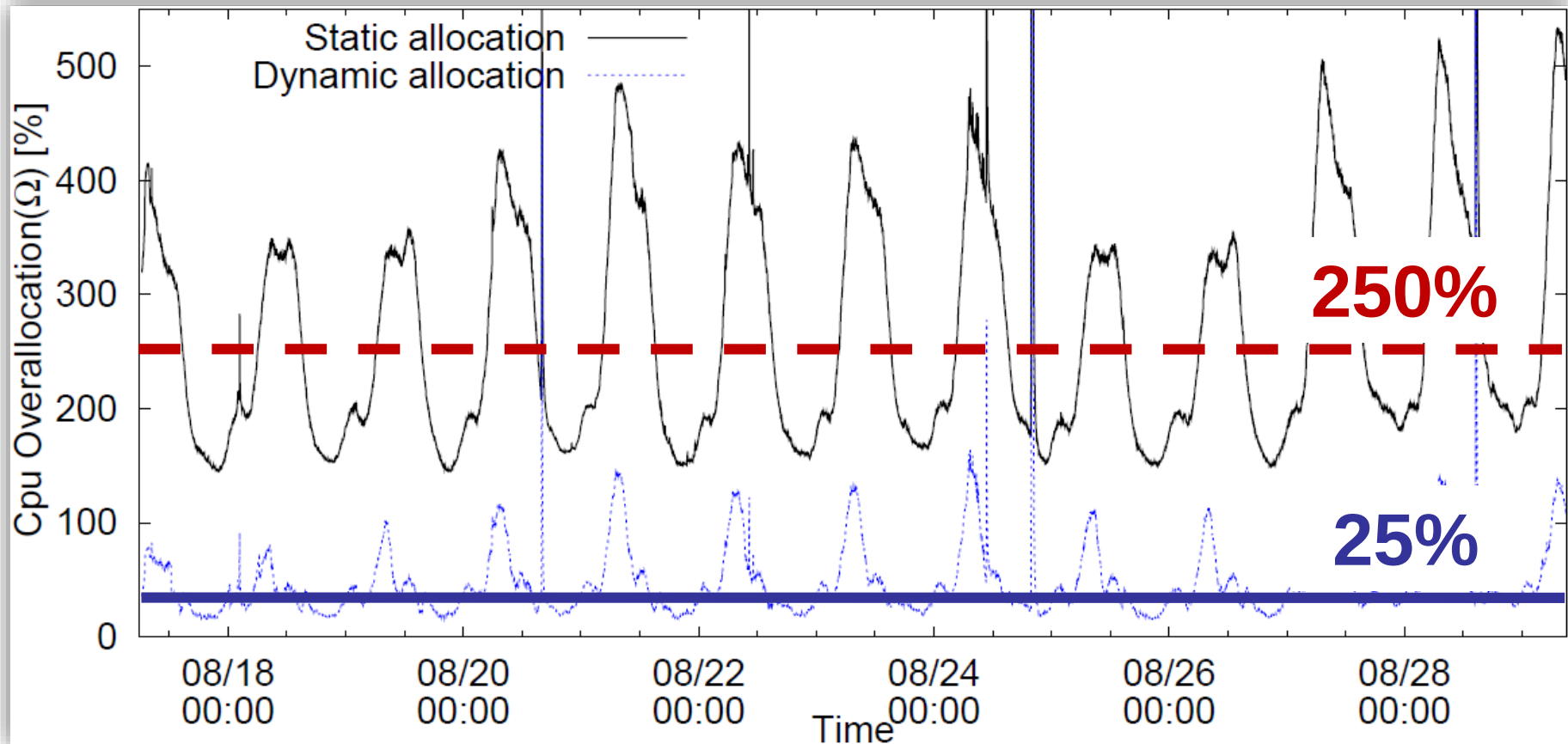
- Main advantages:
 1. Significantly lower over-provisioning
 2. Efficient coverage of the world is possible

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[Source: Nae, Iosup, and Prodan, ACM SC 2008]

Static vs. Dynamic Allocation

Q: What is the penalty for static vs. dynamic allocation?



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[Source: Nae, Iosup, and Prodan, ACM SC 2008]

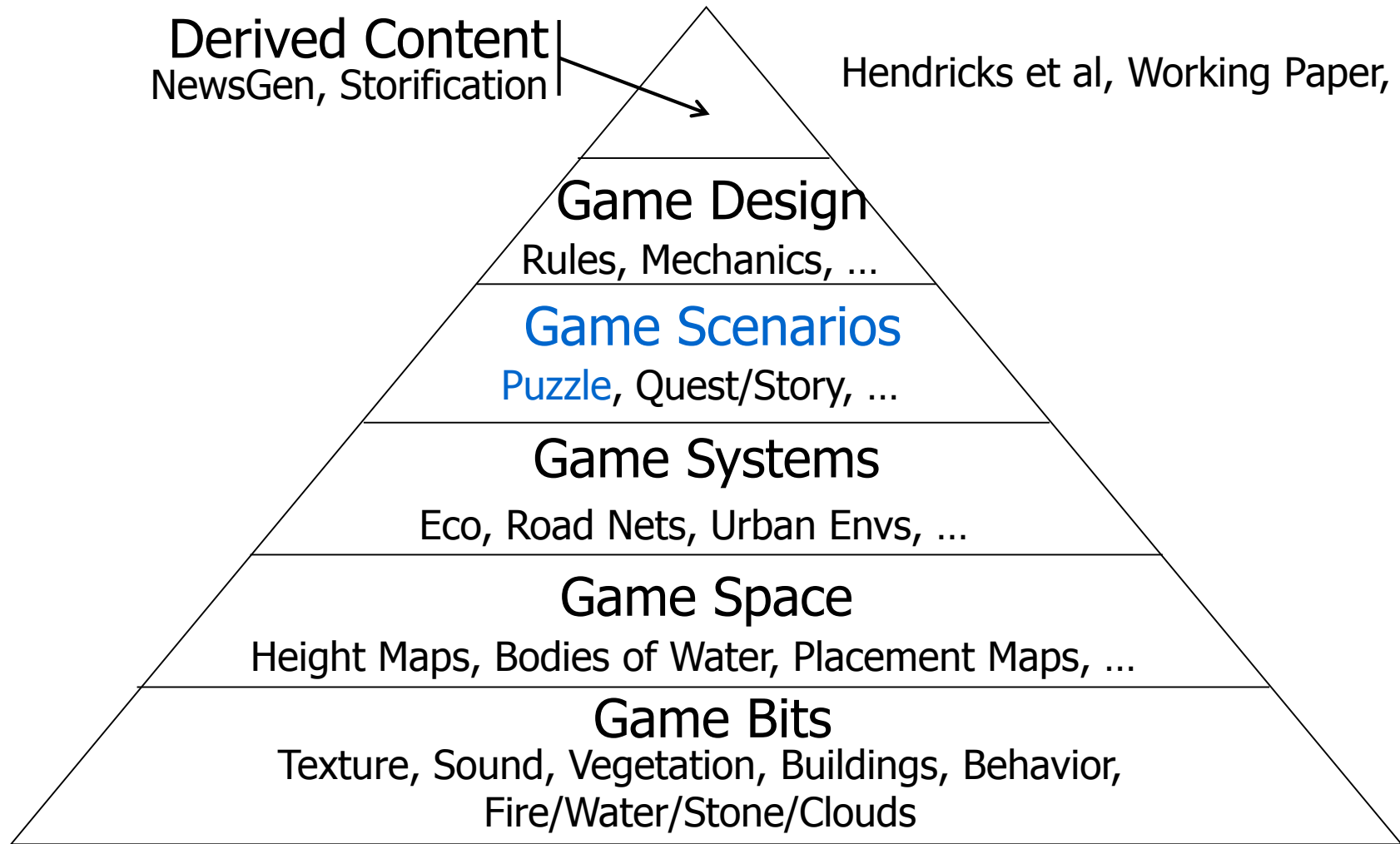
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(Procedural) Game Content (Generation)

Derived Content
NewsGen, Storification

Hendricks et al, Working Paper, 2010

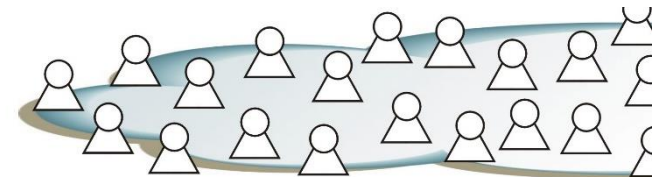


Research Challenge: Solve the Content Problem of MMOGs

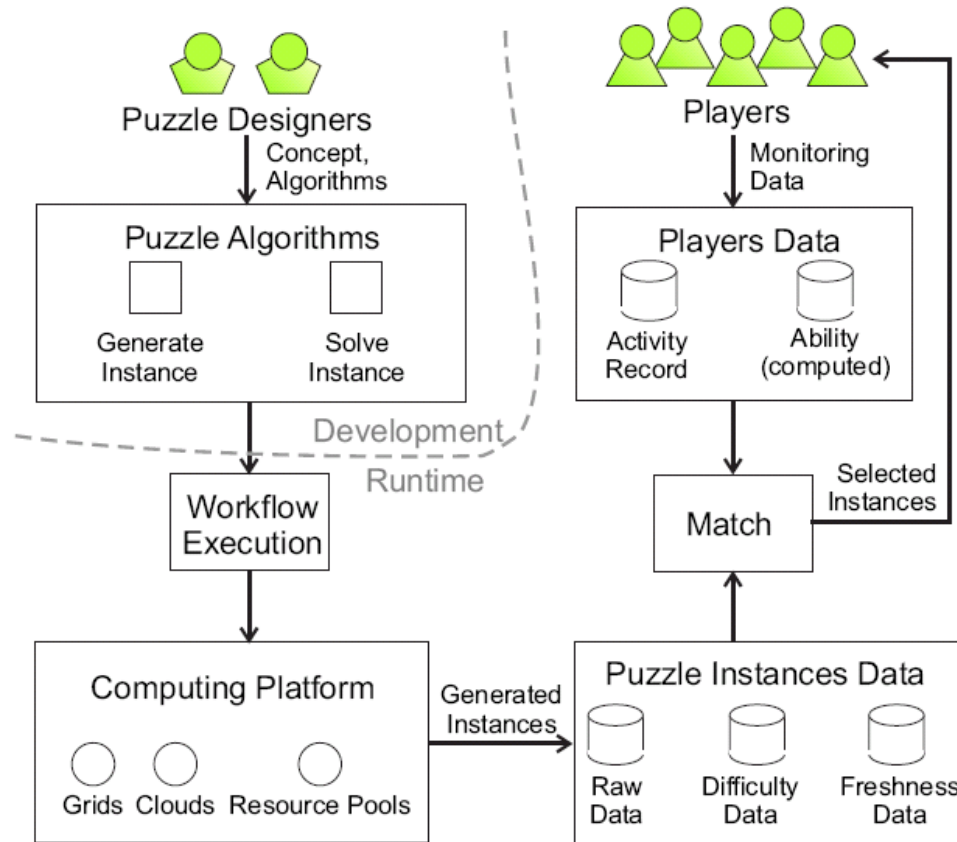
The Content Problem of MMOGs

Generating content on time for millions of players

- Player-customized: Balanced, Diverse, Fresh
- Up-front and operational costs
- Response time, Scalability, & Cost



The New Content Generation Process*



Only the puzzle concept, and the instance generation and solving algorithms, are produced at development time

* A. Iosup, POGGI: Puzzle-Based Online Games on Grid Infrastructures, EuroPar 2009 (Best Paper Award)

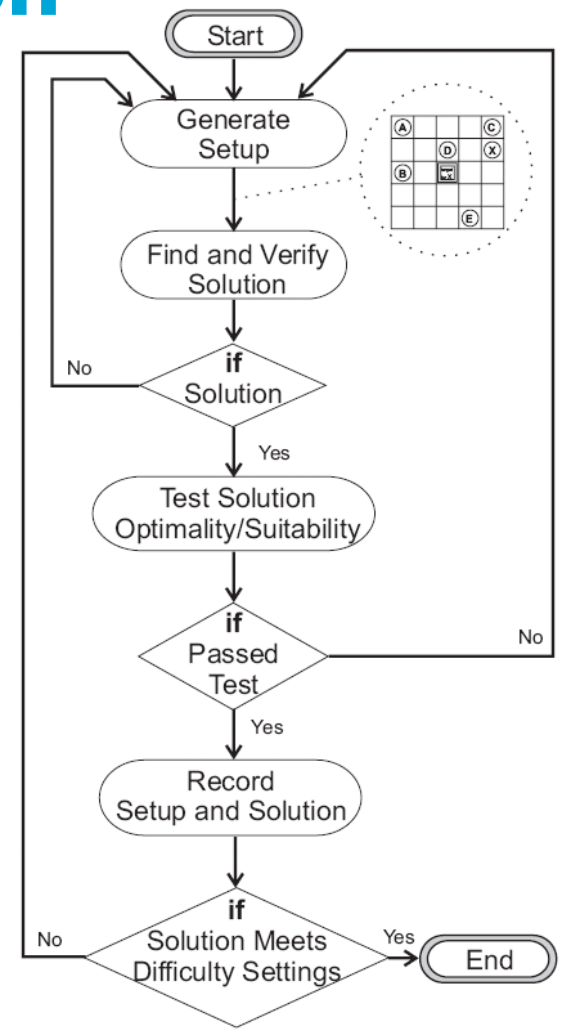
Workflow Execution Engine for Puzzle Instance Generation

Generic engine for puzzle generation

- Can plug-in different puzzles
- Can plug-in different solvers
- Can plug-in different policies for instance generation

Reduce execution overheads

- By-pass RMS (similar to Condor glide-ins, Falcon/Swift, etc., but for WFs instead of tasks)
- Execute on single resource (current implementation, simplicity)

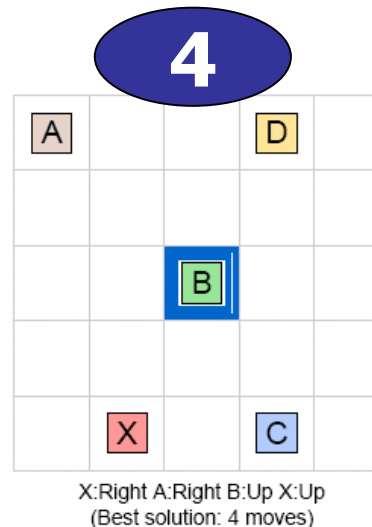


Puzzle-Specific Considerations

Generating Player-Customized Content

Puzzle difficulty

- Solution size
- Solution alternatives
- Variation of moves
- Skill moves



Player ability

- Keep population statistics and generate enough content for most likely cases
- Match player ability with puzzle difficulty
- Take into account puzzle freshness

Target: Pins:



Agenda

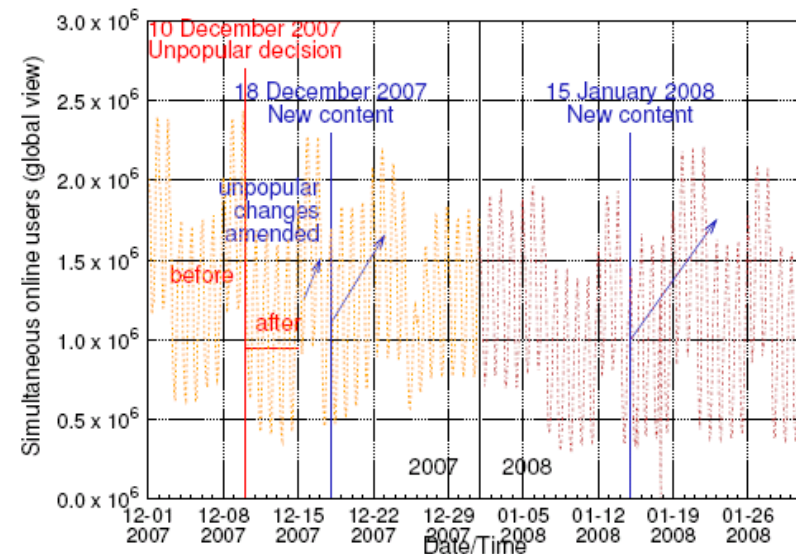
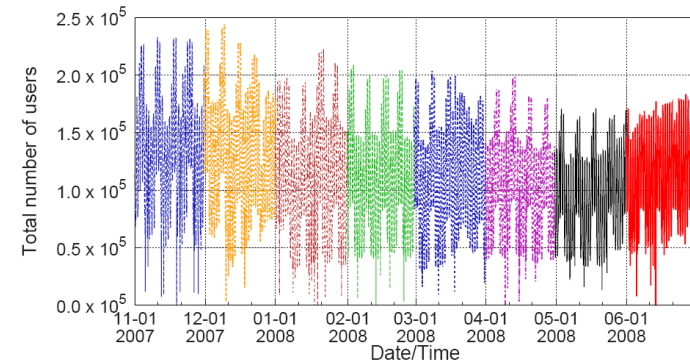
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Continuous Analytics for MMOGs

MMOG Data =
raw and derivative information
from the virtual world (millions
of users)

Continuous Analytics for MMOGs =
Analysis of MMOG data s.t.
important events are not lost

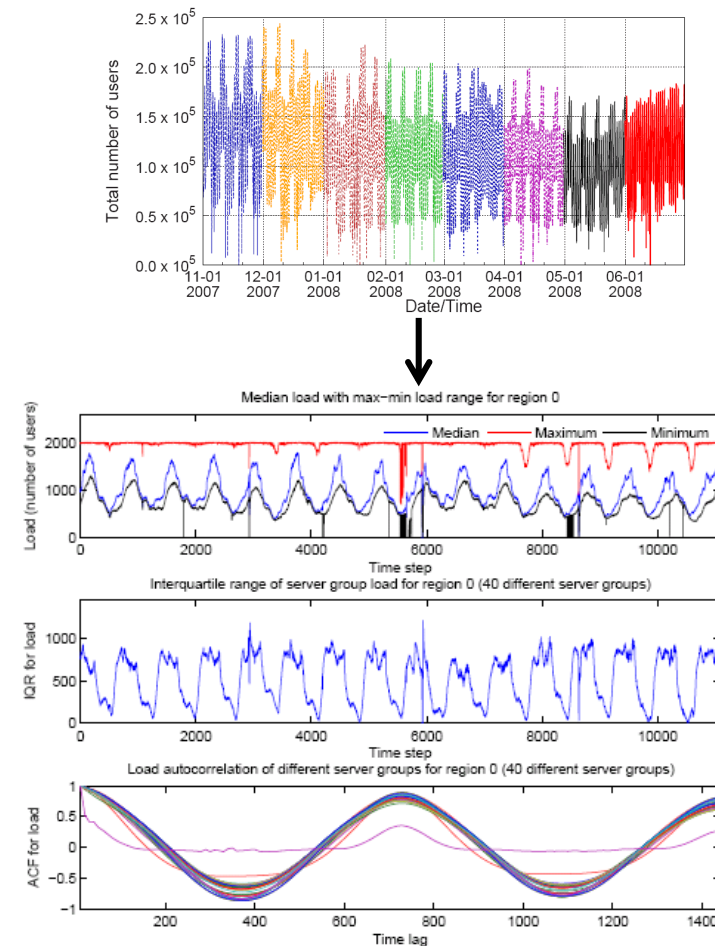
- Data collection
- Data storage
- Data analysis
- Data presentation
- ... at MMOG rate and scale



Continuous Analysis for MMOGs

Main Uses By and For Gamers

1. Support player communities
2. Understand play patterns
(decide future investments)
3. Prevent and detect cheating or disastrous game exploits
(think MMOG economy reset)
4. Broadcasting of gaming events
5. Data for advertisement companies
(new revenue stream for MMOGs)

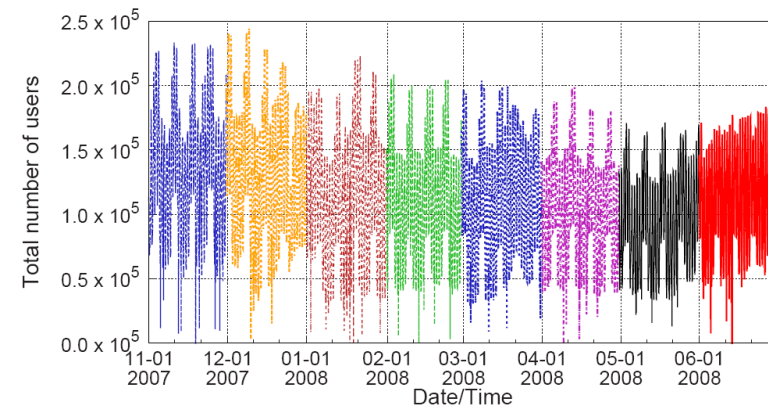
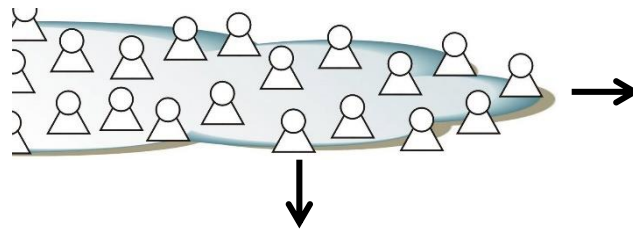


Research Challenge: Solve the Analytics Problem of MMOGs

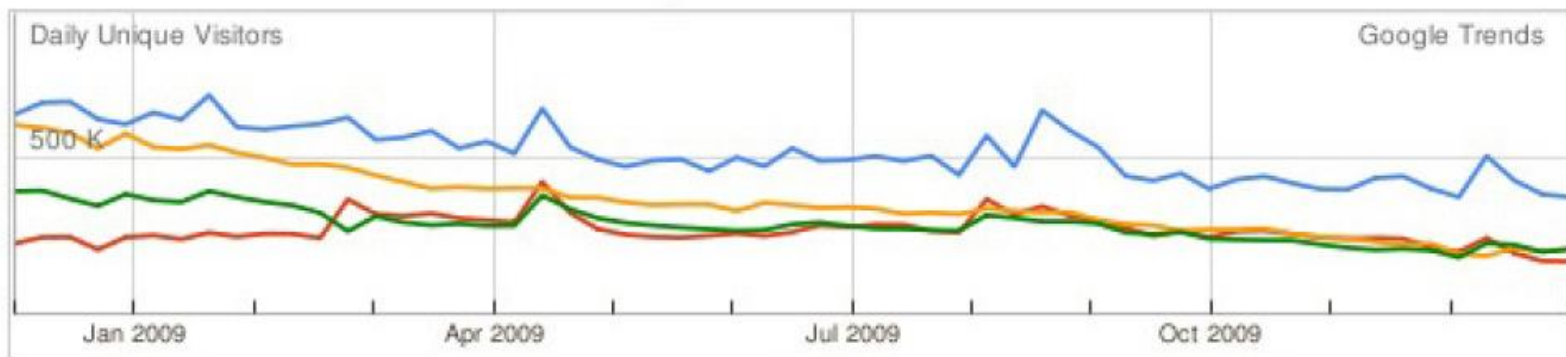
The Analytics Problem of MMOGs

Analyzing the behavior of millions of players, on-time

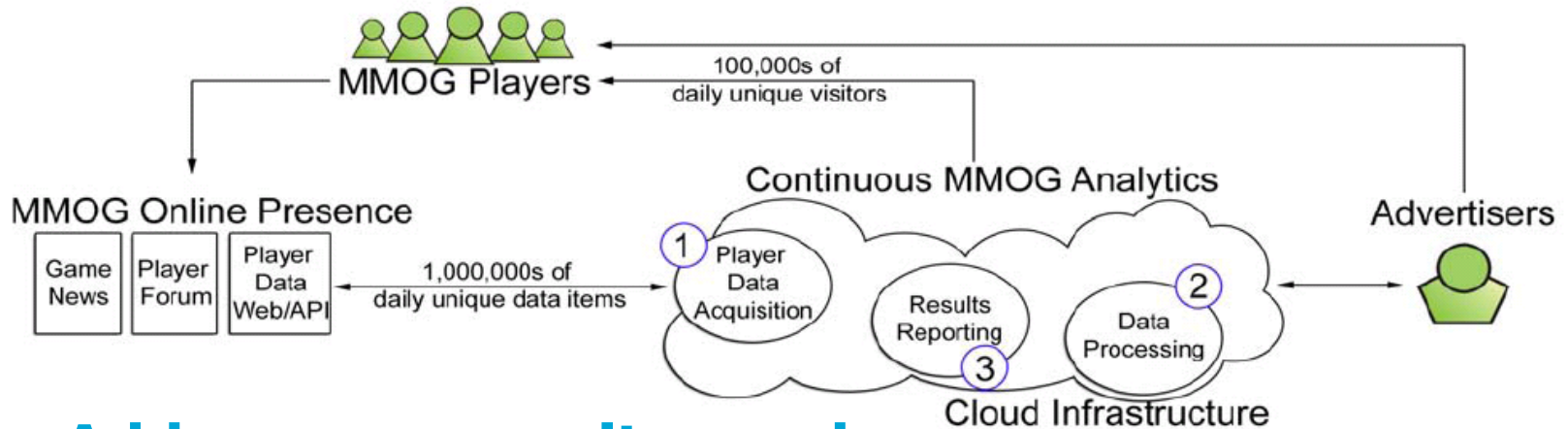
- Data mining, data access rights, cost v. accuracy, ...
- Reduce upfront costs
- Low response time & Scalable



● worldofwarcraft.com ● mmo-champion.com ● thottbot.com ● wowwiki.com



The CAMEO Framework*



1. Address community needs

- Can analyze skill level, experience points, rank
- Can assess community size dynamically

2. Using on-demand technology: Cloud Comp.

- Dynamic cloud resource allocation, Elastic IP

3. Data management and storage: Cloud Comp.

- Crawl + Store data in the cloud (best performance)

4. Performance, scalability, robustness: Cloud Comp.

* A. Iosup, CAMEO: Continuous Analytics for Massively Multiplayer Online Games on Cloud Resources. ROIA, Euro-Par 2009 workshops, LNCS 6043, (2010)

Agenda

1. What's in a Name?
2. Three Current Challenges
- 3. The Next Five Years**
 - 1. Cloudification**
 2. Mobile Social Gaming
 3. Content, Content, Content
 4. Social Everything!
4. Conclusion



Cloudification: PaaS for MSGs

(Platform Challenge)

Build MSG platform that uses (mostly) cloud resources

- Close to players
- No upfront costs, no maintenance
- Compute platforms: multi-cores, GPUs, clusters, all-in-one!
- Performance guarantees
- Code for various compute platforms—platform profiling
- Load prediction miscalculation costs real money
- What are the services?
- Vendor lock-in?
- *My data*



Mobile Social Gaming and the SuperServer

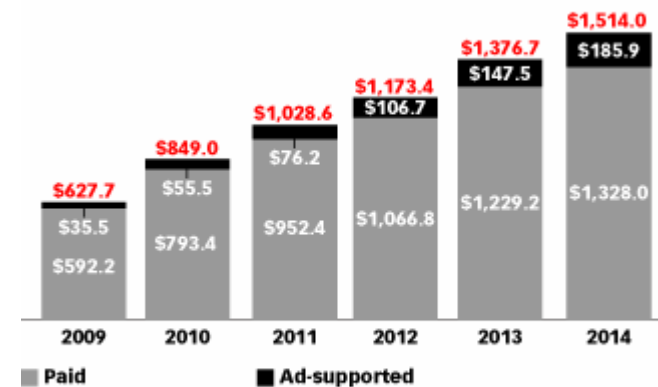
(Platform Challenge)

Support MSGs on mobile devices

- Mobiles everywhere (2bn+ users)
- Gaming industry for mobiles is new Growing Market
- SuperServer to generate content for low-capability devices?
- Battery for 3D/Networked games?
- Where is my server? (Ad-hoc mobile gaming networks?)
- Security, cheat-prevention



US Mobile Gaming Revenues, by Segment, 2009-2014
millions and CAGR



Note: paid revenues CAGR (2009-2014)=17.5%; ad-supported revenues CAGR (2009-2014)=39.2%; total revenues CAGR (2009-2014)=19.3%
Source: eMarketer, July 2010

117982

www.eMarketer.com

Content, Content, Content

(Content Challenge)

Produce and distribute content for 1BN people

- Game Analytics → Game statistic
- Crowdsourcing
- Storification
- Auto-generated game content
- Adaptive game content
- Content distribution/
Streaming content



Social Everything!

- **Social Network**=undirected graph, **relationship**=edge
- **Community**=sub-graph, density of edges between its nodes higher than density of edges outside sub-graph

(Analytics Challenge)

Improve gaming experience

- Ranking / Rating
- Matchmaking / Recommendations
- Play Style/Tutoring

Self-Organizing Gaming Communities

- Player Behavior



Massive Social Gaming

- Million-user, multi-bn market
- Sim, Content, Analytics

Current Technology

- Upfront payment
- Cost and scalability problems
- Makes players unhappy

Publications Gaming and Clouds

2008: ACM SC

2009: ROIA, CCGrid, NetGames, EuroPar (**Best Paper Award**), ...

2010: IEEE TPDS, Elsevier CCPE

2011: Book Chapter CAMEO, IEEE TPDS, IJAMC

Graduation (Forecast)

2010/2011: 1PhD, 2Msc, 4BSc

Summary

Our Vision

- Scalability & Automation
- Economy of scale with clouds

Ongoing Work

- Content: POGGI Framework
- Platform: edutain@grid
- Analytics: CAMEO Framework

The Future

- **Happy players**
- **Happy cloud operators**

Thank you for your attention!

Questions? Suggestions? Observations?

More Info:

- <http://www.st.ewi.tudelft.nl/~iosup/research.html>
- http://www.st.ewi.tudelft.nl/~iosup/research_gaming.html

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Do not hesitate to
contact me...

