Serious Game and Human Computation

徐迎晓

xuyingxiao@126.com

On the Internet, nobody knows you're a dog

1993.7.5

《The New Yorker》

- Video Chat
- 开机人脸识别软件
- 聊天机器人

Captcha

- Completely Automated Public Test to tell Computers and Humans Apart

Luis *von Ahn*

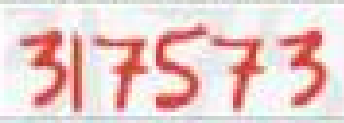
- 人工智能的奠基人艾伦•图灵1950年所提出了图灵测试
- 反向图灵测试则不是从人工智能的角度设计出具有智能的软件，而是从图灵测试的测试者的角度设计一些问题让人很容易回答出来、但计算机软件很难回答出来
-

- von Ahn, L., Blum, M., Hopper, N. and Langford, J. CAPTCHA: Using Hard AI Problems for Security. Advances in Cryptology, Eurocrypt 2003. pages 294-311, Warsaw, Poland, 2003
- *L von Ahn, M Blum and J Langford. "Telling Humans and Computer Apart Automatically", **Communications of the ACM**; Feb2004, Vol. 47 Issue 2, p57-60,*

Prevent malicious programs from

- posting spam comments to forums or blog,
- voting repeatedly in online polls,
- registering and creating numerous accounts,
- abuse of search engines,
- collection of email accounts from public sites,
- sending spam emails and carrying out dictionary attacks

- Yan, J. and El Ahmad, A. S. A low-cost attack on a Microsoft CAPTCHA. Proceedings of the 15th ACM conference on Computer and communications security(CCS '08), pages 543–554, New York, NY, USA, 2008. ACM.

Editor	CAPTCHA	Success Percentage	Required Time
Google		20% 80%	6s 1min
Microsoft		15% 70%	6s 1min
Yahoo		30% 80%	6s 40s
Ebay		80%	4s
PayPal		100%	2s
Clubic		100%	1s
phpBB (forum)		97%	3s
IPB (forum)		97%	7s

Captcha

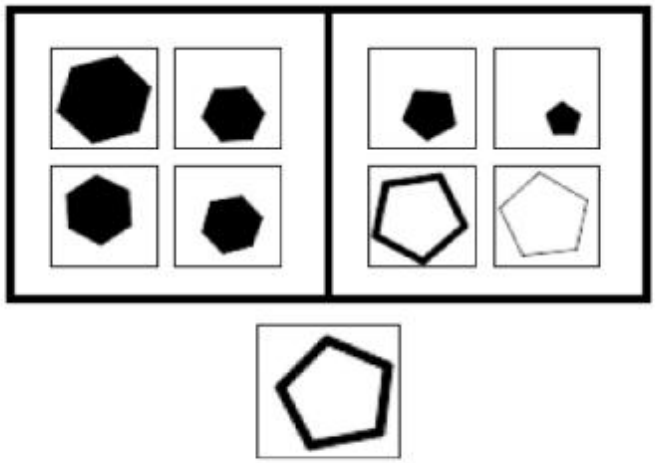


Figure 3: To which side does the block on the bottom belong?

Drag and Drop CAPTCHA

- Desai, A., Patadia, P. Drag and Drop: A Better Approach to CAPTCHA. IEEE India Conference (INDICON), 2009 , India

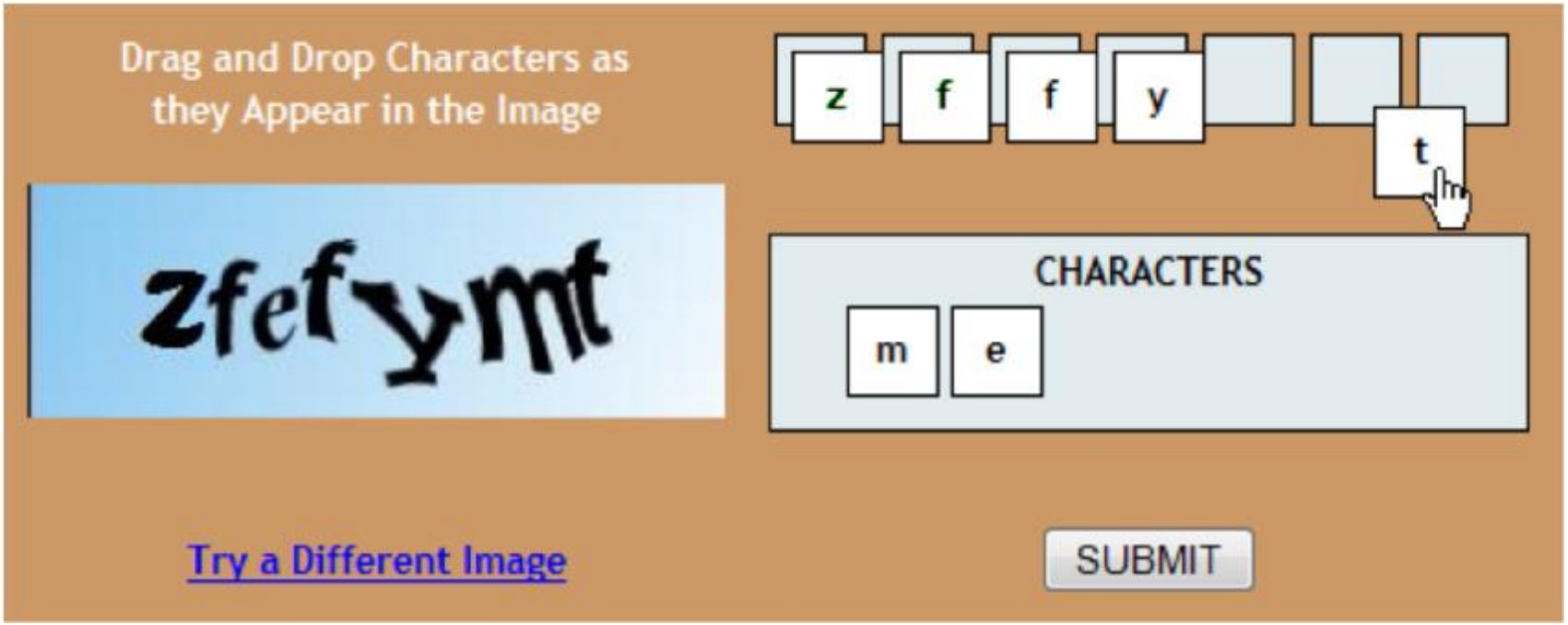
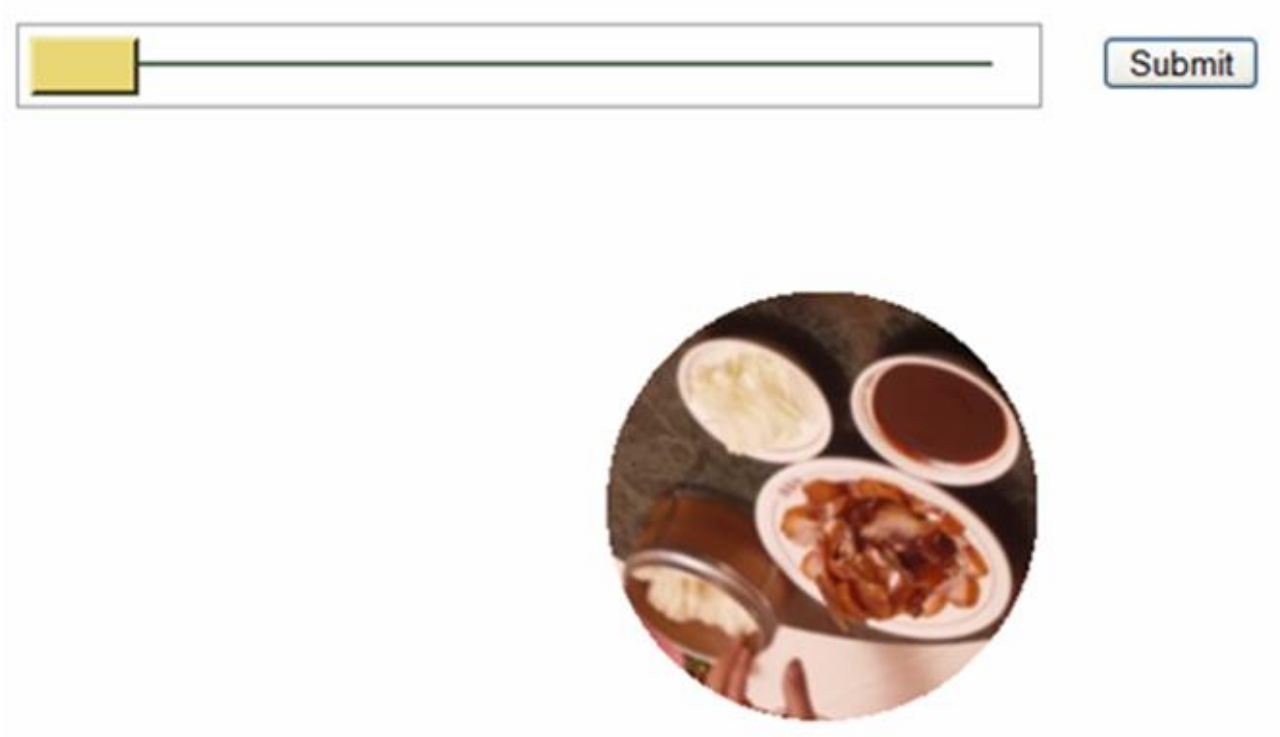


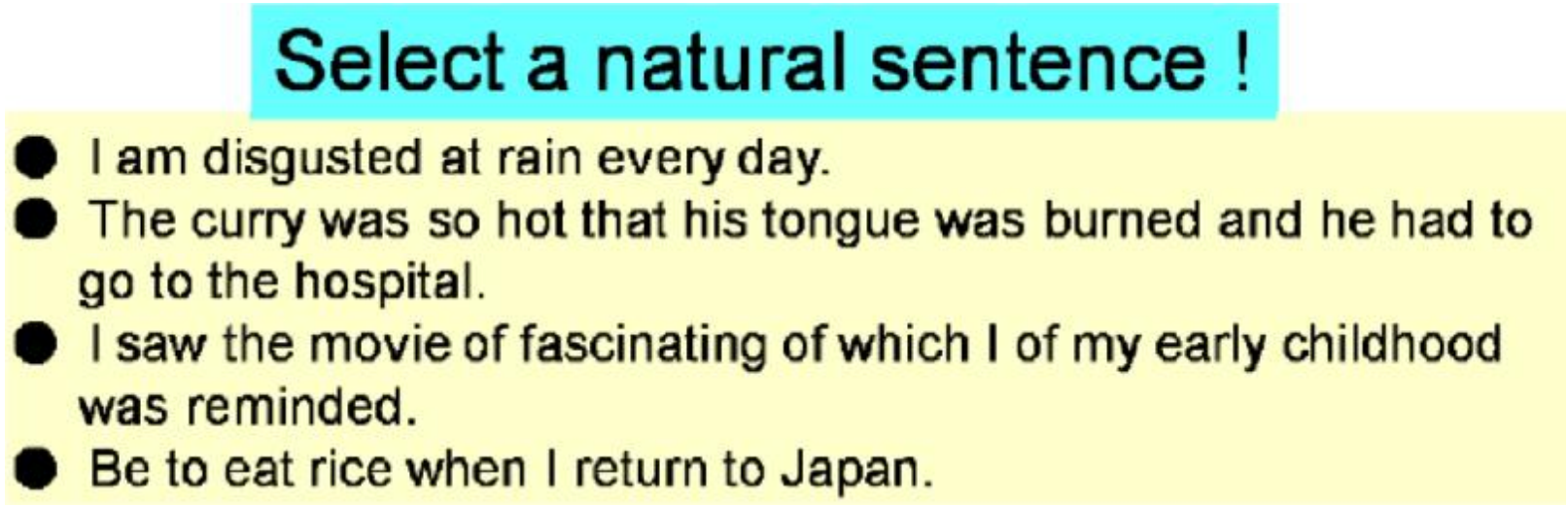
Image CAPTCHA

- Gossweiler,R., Kamvar,M. and Baluja, S. What's Up CAPTCHA?A CAPTCHA Based On Image Orientation. Proceedings of the 18th International conference on World wide web(WWW 2009), page:841-850, April 20–24, Madrid, Spain, 2009
- Ross, S.A., Halderman, J. A. and Finkelstein, A. Sketcha: a CAPTCHA based on line drawings of 3D models.Proceedings of the 19th international conference on World wide web(WWW2010). Pages: 821-830. Raleigh, North Carolina, USA. 2010



Semantic CAPTCHA

- Yamamoto, T., Tygar, J.D., Nishigaki, M. CAPTCHA Using Strangeness in Machine Translation. 2010 24th IEEE International Conference on Advanced Information Networking and Applications (AINA), Page: 430 – 437,Perth, Austrailia, 2010



Text/Audio/Video CAPTCHA

- Recognizing handwritten words
- Listening audio with background noise and recognizing the content of the audio
- Watching video from YouTube and typing words describe the video

登陆方式： 昵称 编号

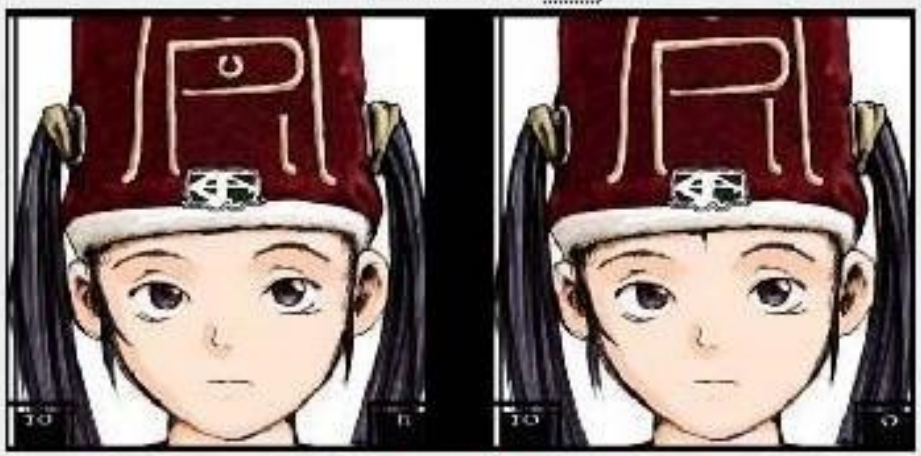
用户名： zhouye

密　码：

验证码： 请填回答以下问题

请回答： 以下图片中有几处不同

显示验证码



看不清点这里换一张

请输入问题的答案（阿拉伯数字）

图片为随机生成 看不出请放弃登陆

登　录

Qualifying question

Just to prove you are a human, please answer the following math challenge.

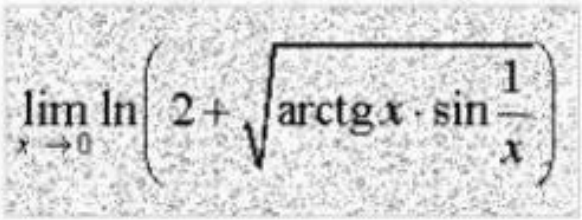
Q: Calculate:

$$\frac{\partial}{\partial x}\left[4 \cdot \sin\left(7 \cdot x - \frac{\pi}{2}\right)\right]\Big|_{x=0}$$

A:

mandatory

Note: If you do not know the answer to this question, reload the page and you'll get another question.



Введите ответ

Всё верно

登陆方式： ○ 昵称 ◉ 编号

用户名：

密　码：

验证码： 请回答以下法律问题

为了普及法律知识，本坛特设以下问题

1. 我国目前暂缺哪种法律条款：

刑法 ○　民法 ○　婚姻法 ○　未成年人保护法 ○

2. 目前暂代此法的是哪种条款：

民法通则 ○　贪婪规章 ○　森蓝规章 ○　无 ○

3. 请填写刑法第一章. 第一条 (缺一字都算错，请认真填写)

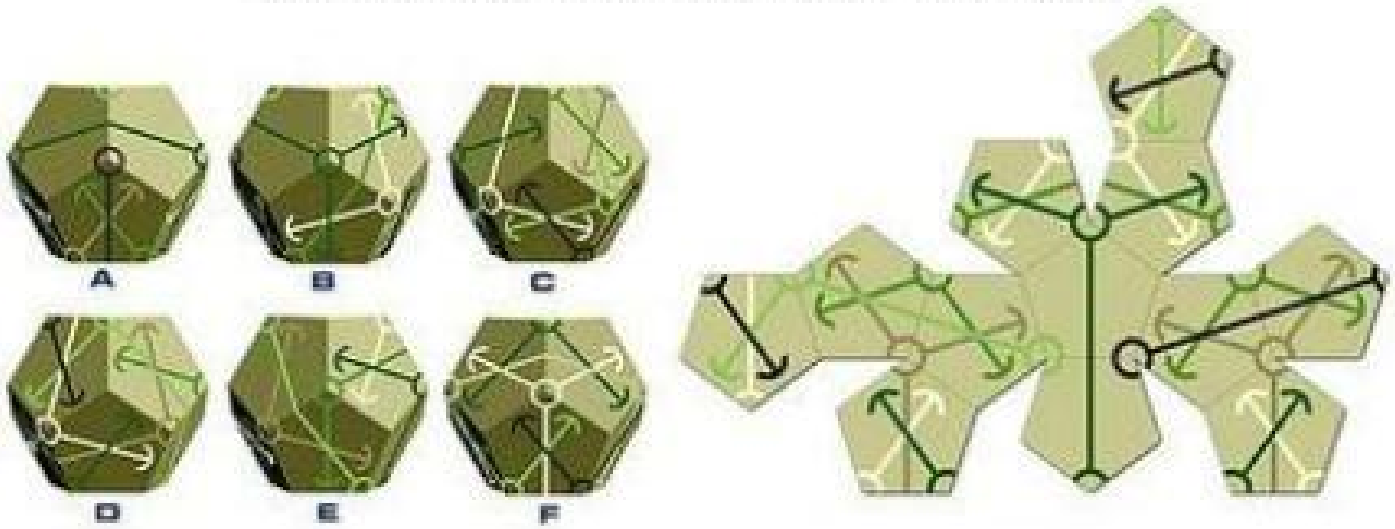
4. 请写出一条对于刑法的修改意见 (50-100字以内)

不懂请点击此处换题

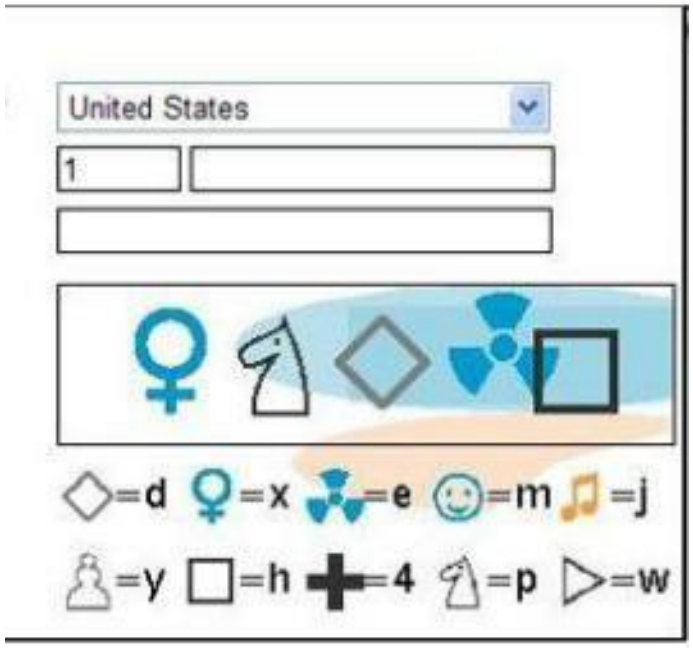
实在不懂的用户请点此进入法律补习班

登　录

No premium user. Please enter the one that can NOT be created from the unfolded pattern. 29 seconds remain.



Download via Cogent #2



No premium user. Please enter all letters having a  below.

Four letters with a  :

Download via TeliaSonera

Ajax Fancy Captcha

reCaptcha

- It is estimated that over 200 million CAPTCHAs are typed every day, each taking roughly ten seconds of human effort—that's 500,000 hours per day

- reCaptcha is used in more than 40,000 Web sites and has transcribed over 440 million words.
- 一年就识别了四亿多个疑难单词，相当于把17600本扫描下来的书全部人工电子化了

  – *Luis von Ahn, Benjamin Maurer, Colin McMillen, David Abraham, and Manuel Blum, reCAPTCHA: Human-Based Character Recognition via Web Security Measures.* ***Science****, 321(5895):1465--1468. 2008.*
- 图片识别系统
- 品牌推广系统
- 图像搜索系统
- 软件评测系统

- ACM International Conference on Knowledge Discovery and Data Mining
  - ACM SIGKDD Workshop on Human Computation, Paris, France *June 28 - 28, 2009*
- **WWW 2009**
- ACM SIGIR 2009
- *Communications of the ACM*.2009
- Science 2008

- Are you human?→ Captcha→reCaptcha→用你的矛攻你的盾

- Egele, M., Bilge L., Kirda, E., Kruegel, C. CAPTCHA smuggling: hijacking web browsing sessions to create CAPTCHA farms. Proceedings of the 2010 ACM Symposium on Applied Computing. Sierre, Switzerland. Pages: 1865-1870,2010

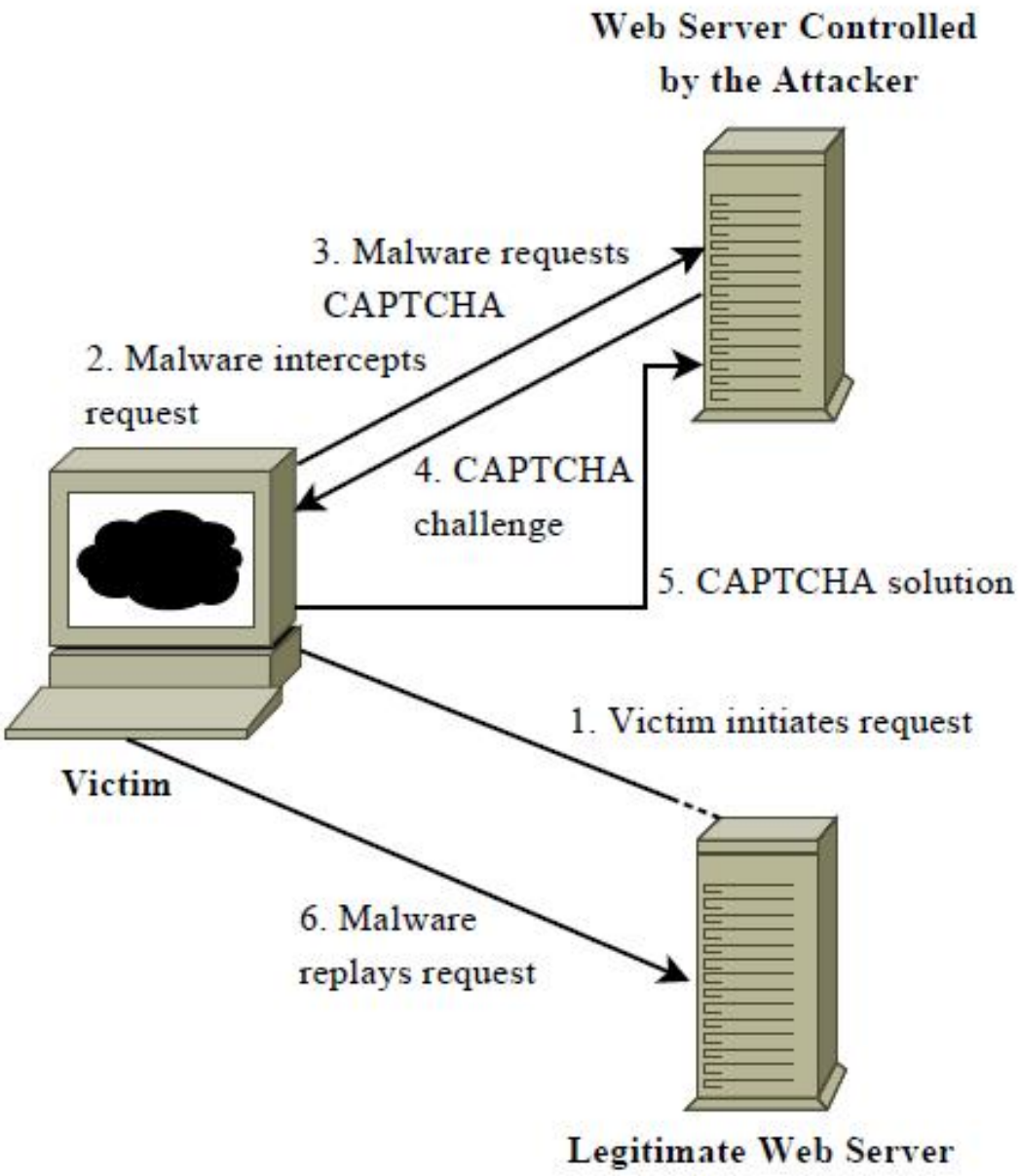
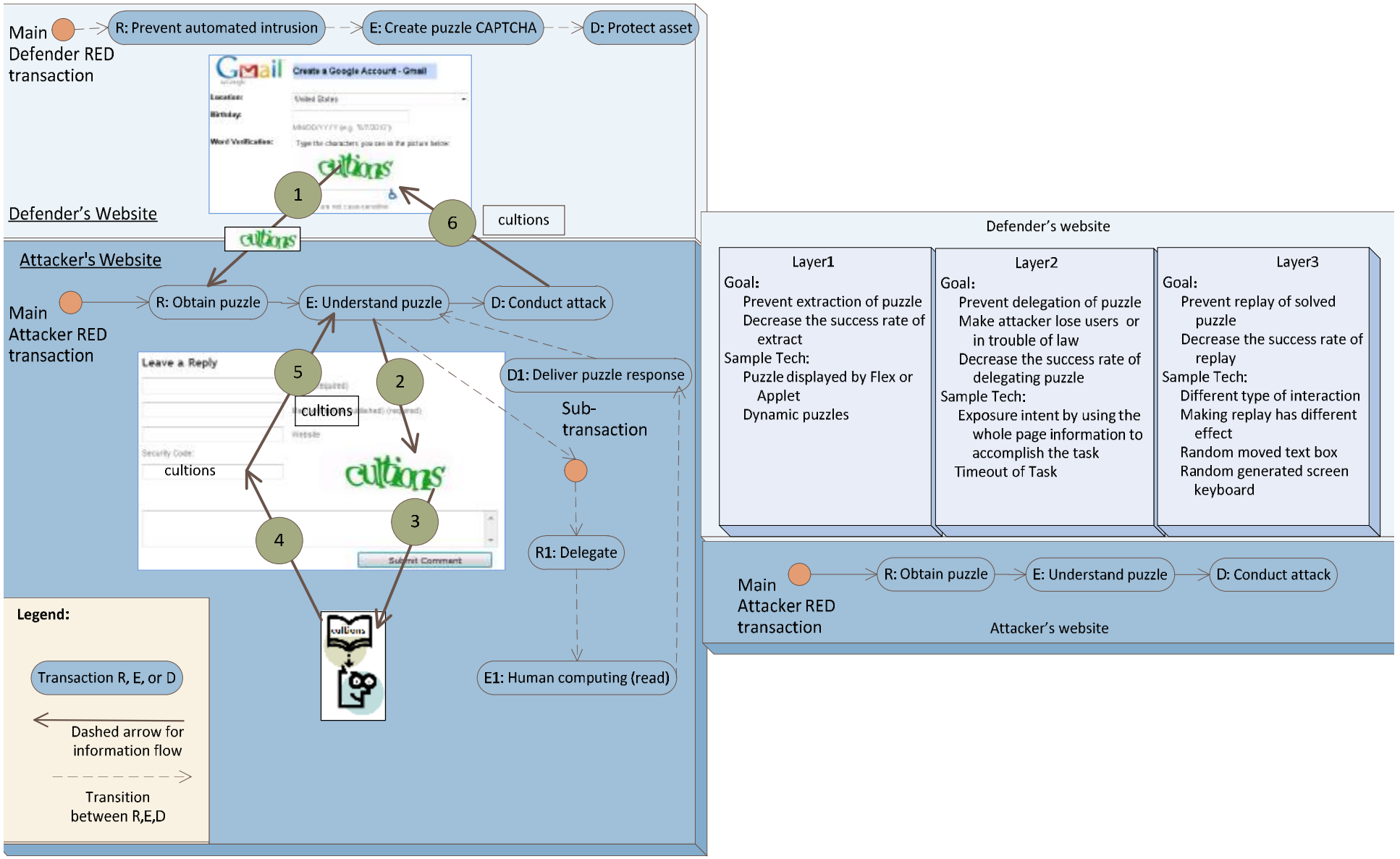


Figure 1: CAPTCHA Smuggling



Another View of reCaptcha

- Captcha→reCaptcha→
- *Utilizing wasted computing power of computers* → utilizing wasted human brain power

Utilizing wasted computing power of computers

- It is reported that most desktop machines are busy less than 5% of the time over a business day
- Great Internet Mersenne Prime Search (GIMPS) started in 1996,梅森素数
- 1997 , use volunteer computing for optimal mark golomb rulers and cryptography.
- The most well-known volunteer computing is SETI@home project [6, 7]to search for the evidence of extraterrestrial life.
- Grid computing

中国分布式计算总站

Distributed Computing Information in Chinese

进入 搜索

首页 关于我们 教程指南 文献资料 项目介绍 程序下载 分布式论坛

SETI@home（Search for ExtraTerrestrial Intelligence at Home，在家搜寻外星智慧（地外文明---也就是我们常说的"外星人"）），是一个通过互联网利用家用个人计算机处理天文数据的分布式计算项目。该项目试图通过分析阿雷西博射电望远镜采集的无线电信号，搜寻能够证实外星智能生物存在的证据。该项目由美国加州大学伯克利分校的空间科学实验室主办。

目录 [隐藏]

SETI@home

SETI@home logo

Multi-Beam 任务的运行界面

开发者 加利福尼亚州大学伯克利分校，空间科学实验室

1999年5月17日 以独立运算平台公开运行，对独立平台的计算程序称为 SETI@home Classic .

2005年8月27日 开启基于 BOINC 平台的计算程序.

2005年12月15日 结束独立运算平台的 SETI@home Classic.

2006年5月3日 开始新程序版本并运算新任务的 SETI@home

版本历史

伯克利开放式网络计算平台（BOINC）	
生命科学类项目	Computational Structural Biology · Docking@Home · DNA@home · DrugDiscovery@Home · GeneticLife@Home · GPUGRID · Malariacontrol.net · Malaria Control Test Project · POEM@HOME · RALPH@home · RNA World · Rosetta@home · SciLink · SIMAP · Superlink@Technion · The Lattice Project · UH Second Computing · Virus Respiratorio Sincitial
地球科学类项目	Climate*prediction*.net · Quake-Catcher Network Seismic Monitoring · Seasonal Attribution Project · Virtual Prairie
人工智能类项目	FreeHAL@home · Intelligence Realm · MindModeling@Home
天文学项目	Astropulse · BRaTS@Home · Cosmology@Home · MilkyWay@home · Orbit@Home · **SETI@home** · SETI@home/AstroPulse Beta
物理化学类项目	EDGeS@Home · Einstein@Home · eOn: Long timescale dynamics · Hydrogen@Home · Leiden Classical · LHC@home · Magnetism@home · Mopac@home · QMC@Home · QuantumFIRE alpha · SLinCA@Home · Spinhenge@home · µFluids@Home
网络与计算机类项目	Biochemical Library · Evo@home ·DynaPing · Luxrenderfarm@home
数学类项目	ABC@home · Collatz Conjecture · Goldbach's Conjecture Project · Mersenne@home · NFS@Home · primaboinca · PrimeGrid · Ramsey@Home · Ramsey@Home Test · Rectilinear Crossing Number · RSA Lattice Siever (2.0) · Sudoku@vtaiwan · SZTAKI Desktop Grid · WEP-M+2 Project
密码类项目	DistrRTgen · Enigma@Home · MilestoneRSA · Moo! Wrapper · SHA-1 Collision Search Graz
艺术类项目	BURP · Open Rendering Environment · PicEvolvr.com · Renderfarm.fi
游戏类项目	Chess960@Home · Eternity@Home
多种应用的项目	CAS@home · Gerasim@Home · Ibercivis · World Community Grid · Yoyo@home
与 BOINC 平台相关的项目	AlmereGrid Boinc Grid · AlmereGrid TestGrid - Boinc · BOINC Alpha Test · Pirates@home · WUProp@Home
其他	CzechNationalTeam project · Distributed Data Mining · Steiner@Home
规划中的项目	
已结束/暂停的项目	3x+1@home · ABC@home beta · Anansi · APS@Home · AQUA@home · Artificial Intelligence · BBC Climate Change Experiment · BCL@Home · Cels@Home · Cels@Home test2 · Cels@Home (old) · DepSpid · DNETC@HOME · EAPS@HOME · Eternity2.fr · HashClash · LHC Alpha · Nano-Hive@home · pPot Tables · NQueens Project · Predictor@home · Project Neuron · RND@home · TANPAKU · TMRL DRTG · TSP · XtremLab · Zivis
BOINC 相关的工具	BOINCstats BAM! · BOINC Translation Services · BOINC TThrottle · BoincTasks · Boinc.NET · OGM (Organizational Grid Manager)

reCaptcha → utilizing wasted human brain power

- Utilizing processing cycles in human brains- computational power of humans
- solving difficult problems that no known efficient computer algorithms can yet solve

  – Captcha→reCaptcha→

  – *Utilizing wasted computing power of computers* → utilizing wasted human brain power

Human Computation

- Games with a purpose
  - ESP Game -image tags
    - *Luis von Ahn,Laura Dabbish.Designing games with a purpose.Communications of the ACM.Volume 51,Issue 8 August 2008*
    - Google Image Labeler
- Crowdsourcing marketplaces
  - Amazon Mechanical Turk
- reCapcha
  - reCAPTCHA -OCR

Player 1 guesses: purse
Player 1 guesses: bag
Player 1 guesses: brown

Success! Agreement on “purse”

Player 2 guesses: handbag

Player 2 guesses: purse
Success! Agreement on “purse”

0:11
Time Left

The ESP Game

2100
score

Taboo Words

MAN

BEARD

Your Guesses

HAT

Type your next guess:

Pass

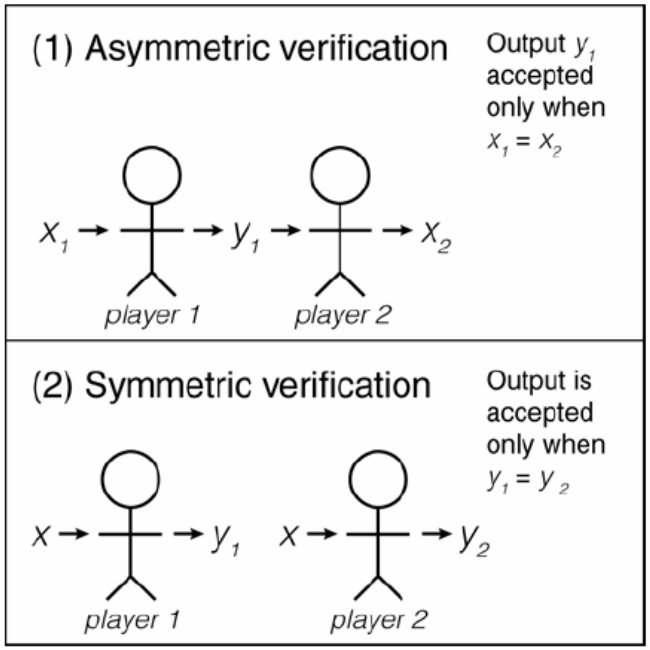
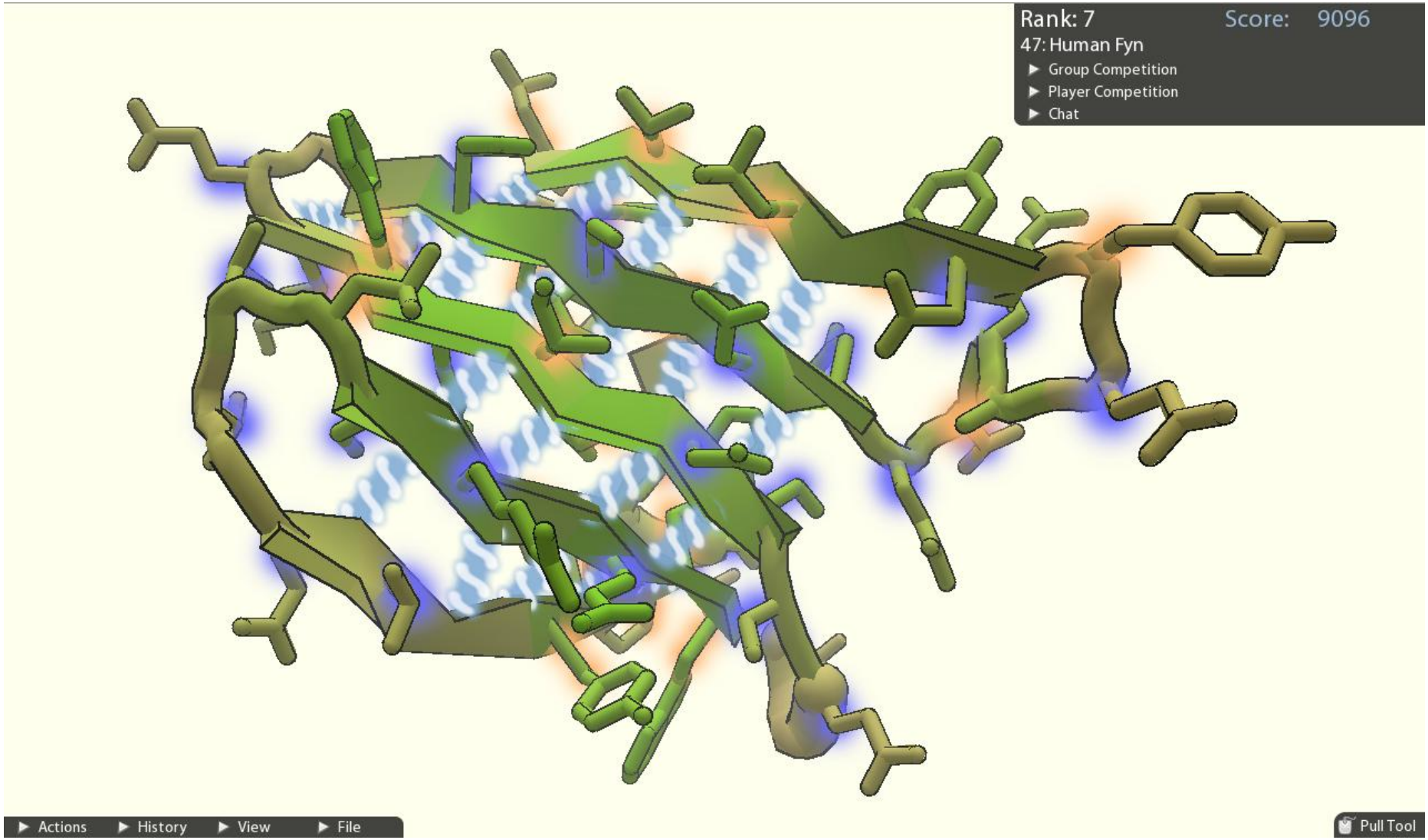


TABLE II
EXAMPLES OF SOCIAL GAMES

Game Structure	Verification Method	Game Mechanism	Player Requirement		Examples
			Num of Player	Game Play	
Output-agreement	Symmetric	Collaborative	2	Synchronous	ESP, Matchi, Squigl, OntoGame
		Hybrid	Multi-players	Synchronous	Common Consensus, Social Heroes
		Hybrid	Multi-players	Asynchronous	Gopher Game
Input-agreement	Symmetric	Collaborative	2	Synchronous	TagATune
		Hybrid	N/A	N/A	N/A
Inversion-problem	Asymmetric	Collaborative	1 or 2	Synchronous	Peekaboom, Verbosity
		Competitive	2	Asynchronous	Dogear, CyPRESS, CARS
		Hybrid	1 or Multi-players	Synchronous	Phetch
Output-optimization	Symmetric	Collaborative	2	Synchronous	Restaurant Game
		Competitive	N/A	N/A	N/A
		Hybrid	Multi-players	Synchronous	Diplomacy
	Asymmetric	Collaborative	N/A	N/A	N/A
		Competitive	N/A	N/A	N/A
		Hybrid	N/A	N/A	N/A

- Foldit,把确定蛋白质的最佳三维形状设计成一个游戏

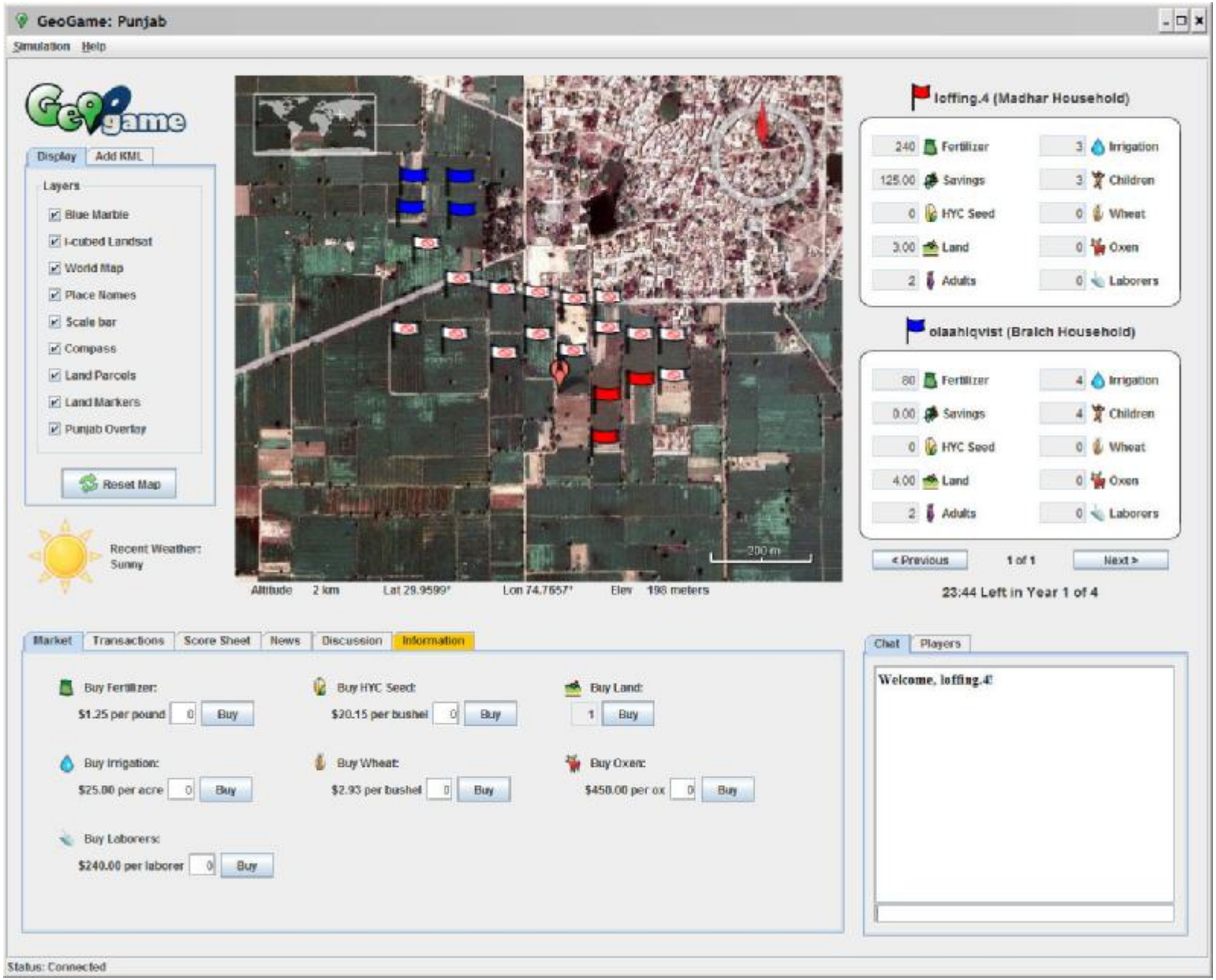


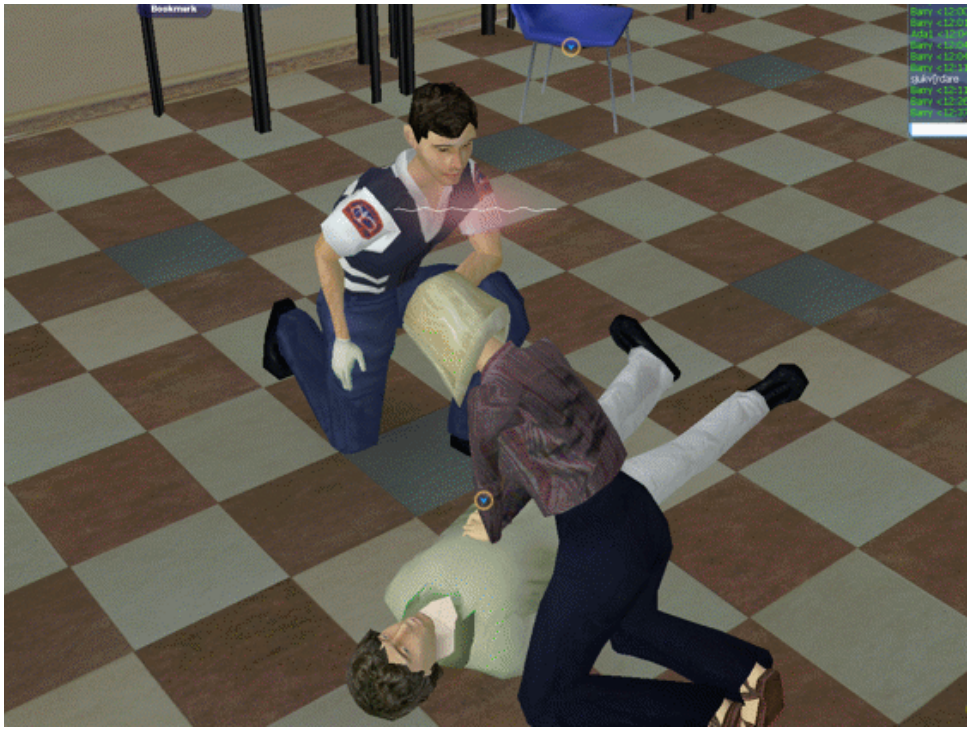
Serious Game

- *Utilizing wasted computing power of computers*
  → utilizing wasted human brain power
- Captcha→reCaptcha→
  → Game with a Purpose

- Serious Game

- 1970年Clark C. Abt《严肃游戏》一书
- 2002年伍德罗威尔逊国际学者中心（Woodrow Wilson International Center for Scholars）在华盛顿发起的“严肃游戏倡议”。
  - 英国开发商闪雷游戏公司（Blitz Games）成立了专门的严肃游戏开发部门，美国的Game2 Train公司推出系列游戏型学习软件
  - 微软公司和麻省理工学院联合推出了Games-to-Teach项目
  - 英国的Immersive Education公司联合剑桥大学制作了RPG游戏型学习软件Kar20uche，
  - 法国推出了游戏型学习软件《凡尔赛：宫廷疑云》和《埃及：法老王之墓》，
  - 韩国的Kidnkid公司开发了“Bubble Shooter Edu．Pangpang”游戏型学习软件系列。
- 2009年12月17日，第一届严肃游戏(北京)创新峰会
- 2010年12月，在上海市经信委支持下，由10多家从事严肃游戏的企业和机构共同发起了国内第一个专注于严肃游戏发展的产业联盟：上海市严肃游戏产业发展联盟





J. Creutzfeldt, et al., "Exploring Virtual Worlds for Scenario-Based Repeated Team Training of Cardiopulmonary Resuscitation in Medical Students,"
Journal of Medical Internet Research, vol. 12, Jul-Sep 2010.

Chapter 18

Serious Game Framework for Design of Medical Applications

Yingxiao Xu
CETI, The Ohio State University, USA & Fudan University, China

Jay Ramanathan
CETI, The Ohio State University, USA

Rajiv Ramnath
CETI, The Ohio State University, USA

Anatomy

Department of Biomedical Informatics

Serious Gaming Options for Medical Training

Presented by

Yingxiao Xu

Visiting Scholar,

Computer Science & Engineering

The Ohio State University

Wednesday, January 12, 2011

10:30 - 11:30 a.m.

3167 Graves Hall

ABSTRACT: Serious Games are an innovative training method to make learning more enjoyable, effective and cost saving in many disciplines. By applying the theories of learning and theories of gaming to the field of medical training, we illustrate how games can help the cognitive, skill-based and affective learning in medical training. For typical learning outcomes, we give the possible game designs with different game styles to facilitate the learning process and overcome the problems facing in traditional training approaches. In addition, we talked about how games can be used as a means of human computation to help the Knowledge organization. Finally, by analyzing the player's motivation, game attributes and its influence to the training effect, we discussed some of the medical serious game design principals.

OHIO STATE Medical Center

Learning object

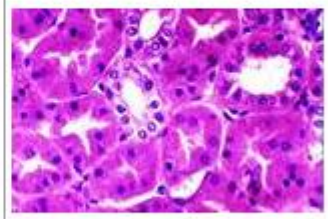
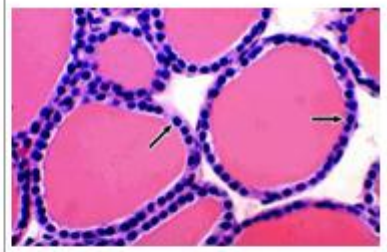
Representing static knowledge

Learning Object1--
declarative knowledge

Simple cuboidal epithelium:
- cross-sectional shape of each cell is hexagonal
- Perpendicular shape is cuboidal

depends

Learning Object3--
declarative knowledge

simple cuboidal epithelium	
simple cuboidal epithelium	

depends

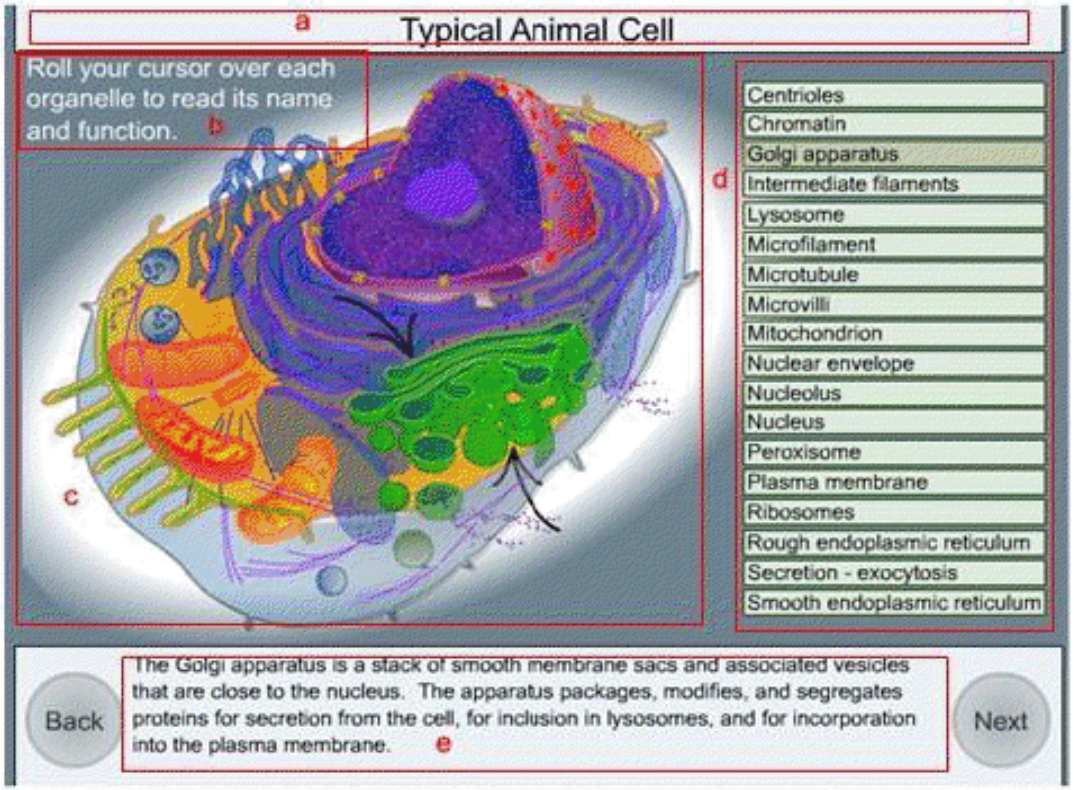
Learning Object2
declarative knowledge

.....

- **Factual knowledge chunks and dependencies**
- **Can be aggregated – learning objects can be grouped into larger collections, allowing for their inclusion within a traditional course structure**
- **Attributes used for training and testing**

Learning objects

- Self-contained – each learning object can be consumed independently
- Reusable – a single learning object may potentially be used in multiple contexts for multiple purpo



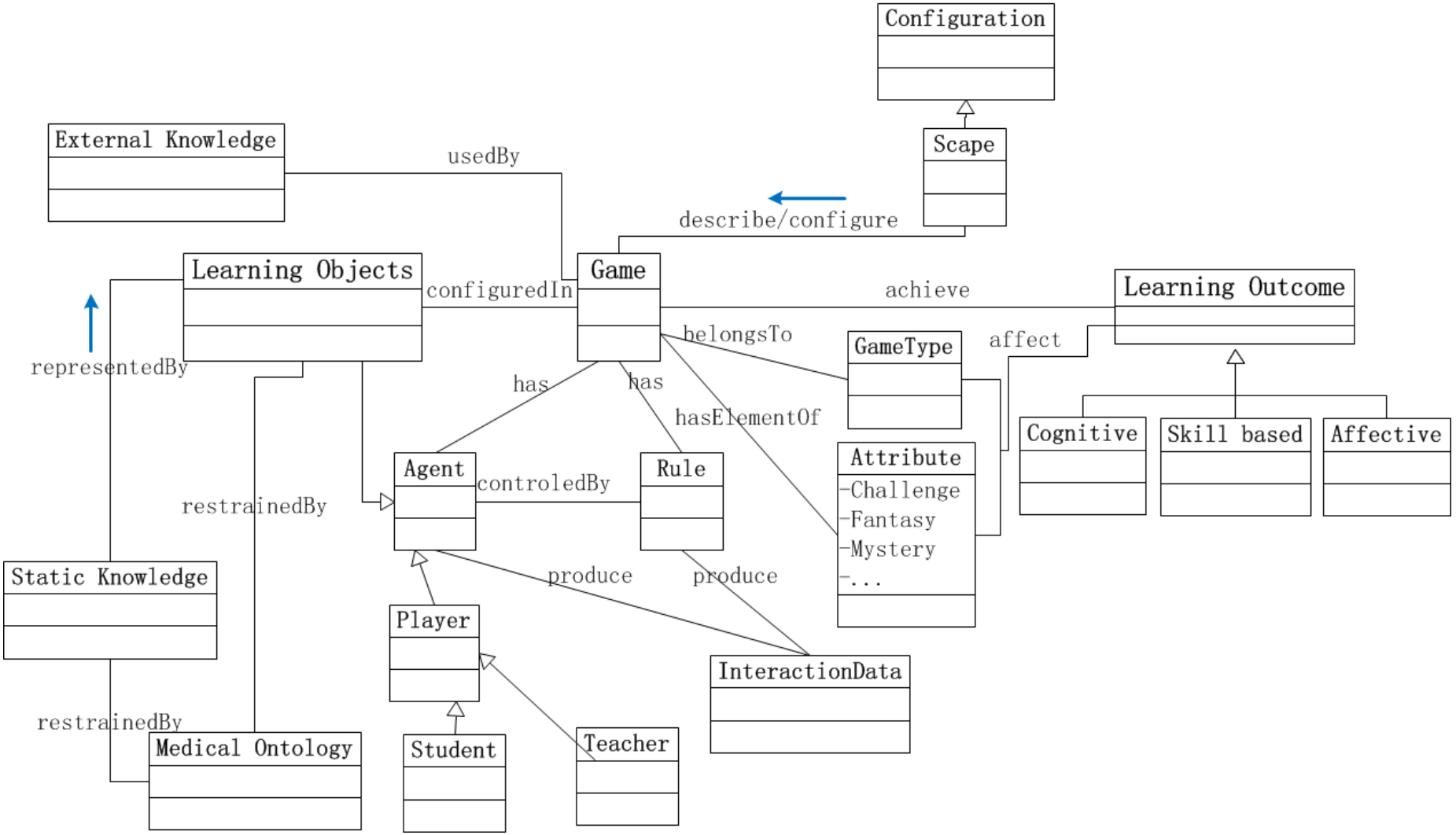
Are tagged with metadata – every learning object has descriptive information allowing it to be easily found by a search -- which facilitates the object being used by others. (SCORM standard)

Learning objects allow for learning that is:

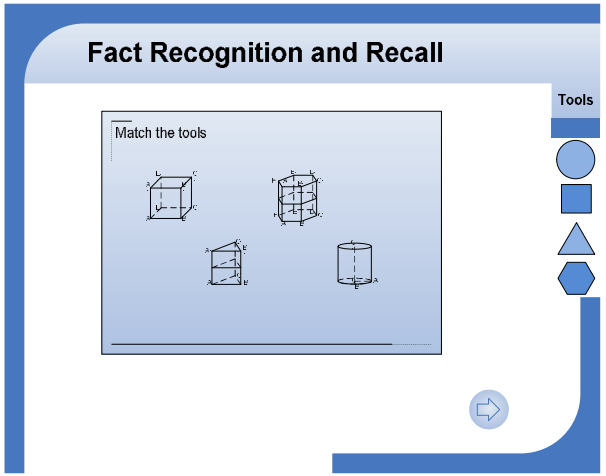
- Just enough – if you need only part of a course, you can use the learning objects you need
- Just in time – learning objects are searchable, you can instantly find and take the content you need
- Just for you – learning objects allow for easy customization of courses

George Vorvilas,Thanassis Karalis,Konstantinos Ravanis. Applying Multimodal Discourse Analysis to Learning Objects' User Interface. CONTEMPORARY EDUCATIONAL TECHNOLOGY, 2010, 1(3), 255-266

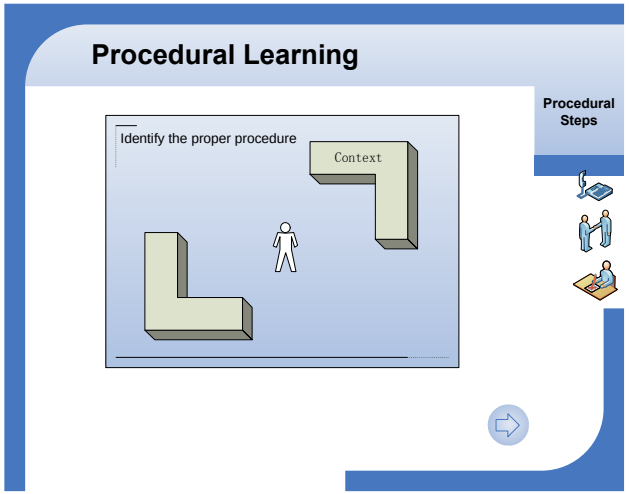
Serious Game Framework for Design of Medical Applications



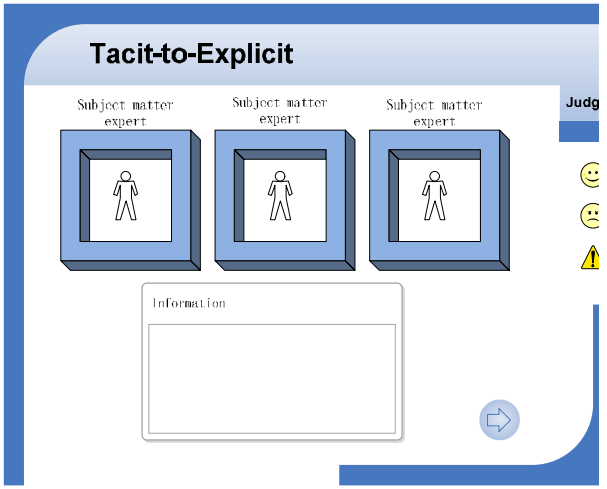
Fact Recognition and Recall



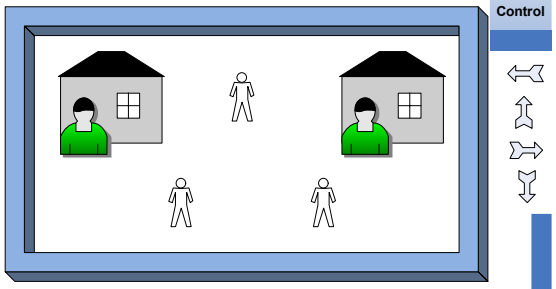
Procedural Learning



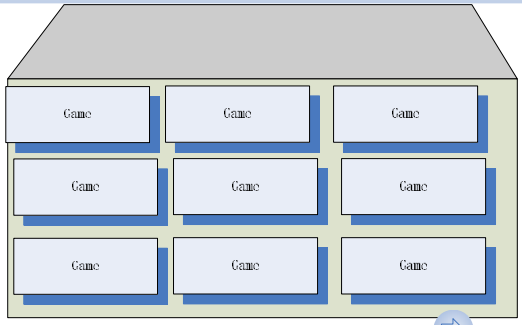
Tacit-to-Explicit



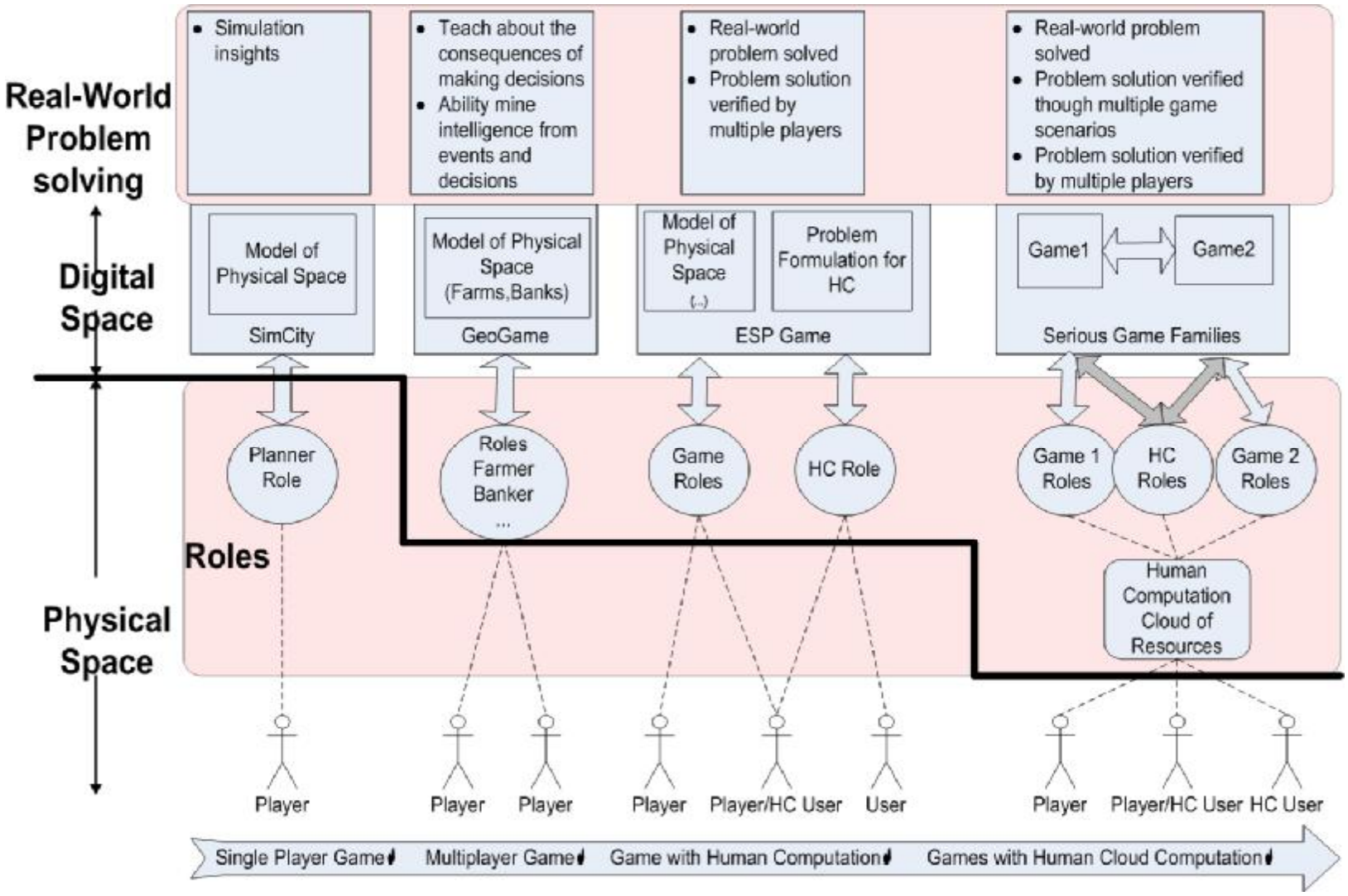
Human Computation



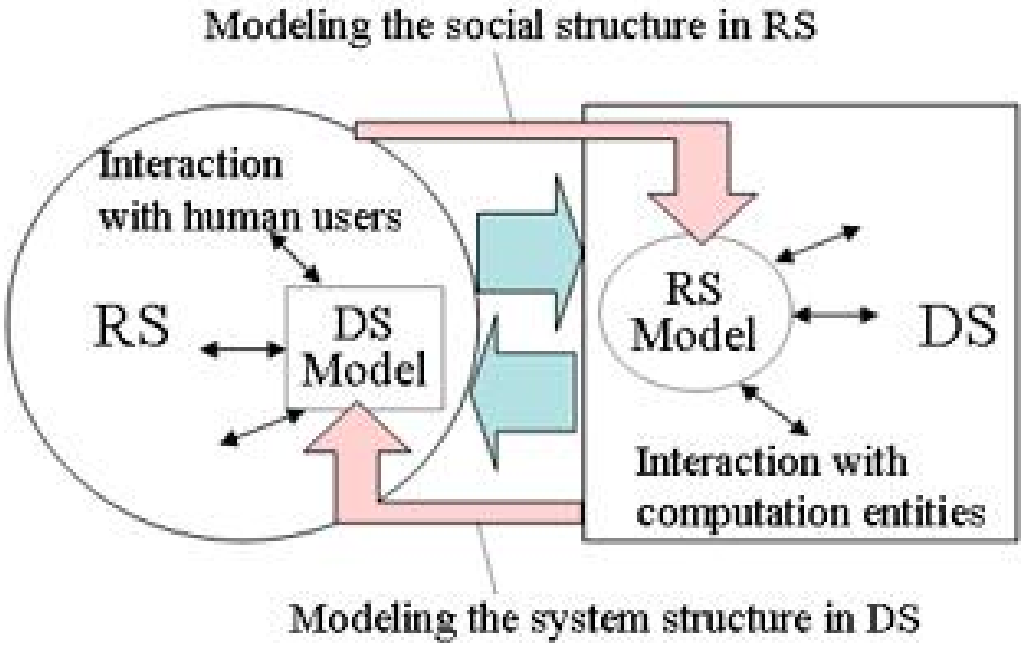
Composite Game

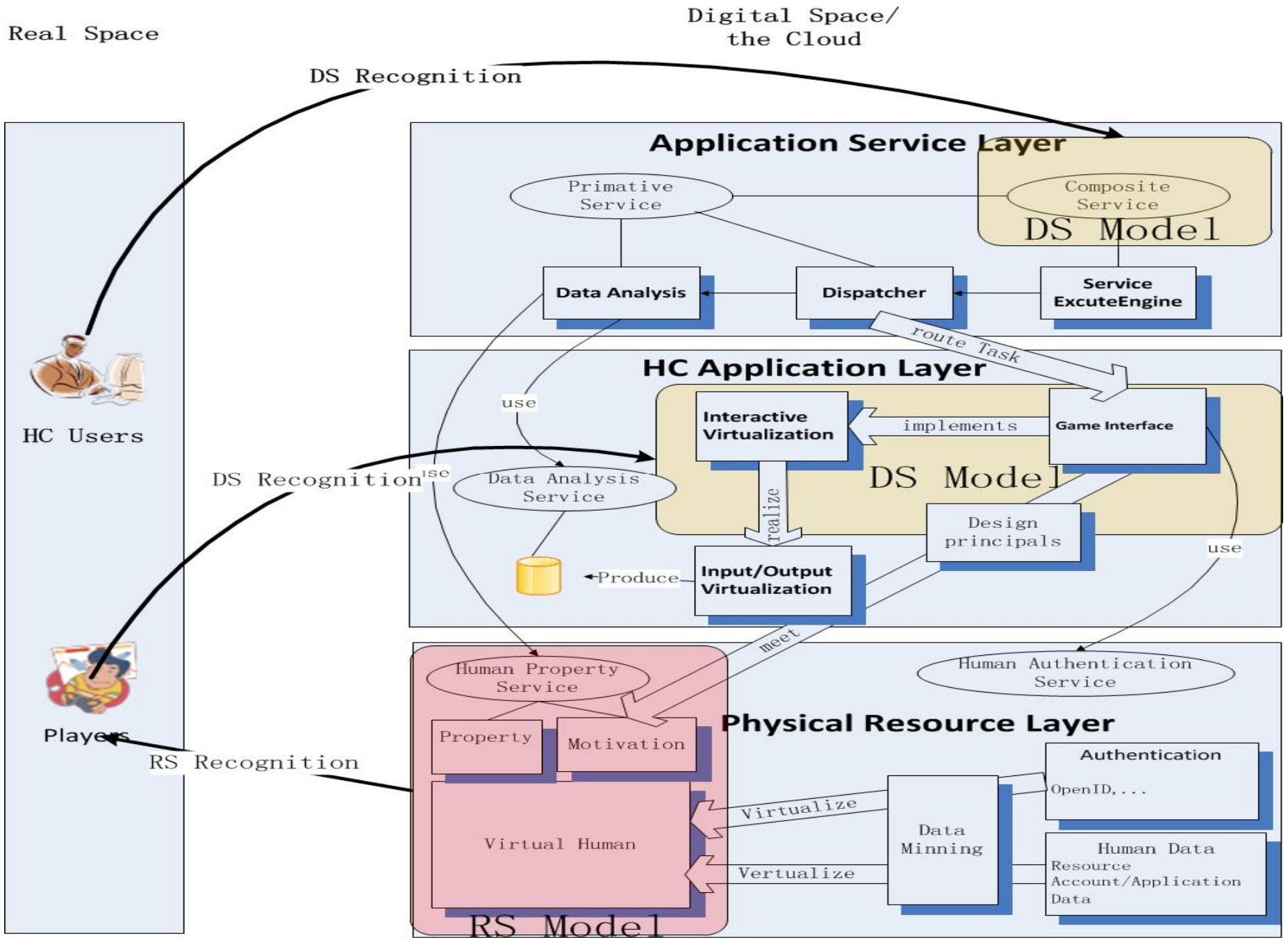


Human Motivation	Design Principles
Social Needs	● Humans are social animals needs social communication and will be happier in social interaction , so interface can connect to social network or provide a place for different people to communicate.
Convenience	● Portal suggested to provide all resources in one place.
Engage the audience	● Declare the project as interesting and groundbreaking.
Impatience	● Game sessions should be short to encourage people to play e.g. during quick breaks. ● The game should designed "Easy to learn". ● Actions can be pre-recorded in multi-player games in case the number of online players are not enough at certain time periods.
Goal driven	● Describe the goal clearly and set several different levels of goals
Enjoy proper challenge	● The task in game should have time limits. ● Although designed "Easy to learn", The game should "difficult to master". ● The outcome of game should be uncertain with randomness. ● The game should contain different levels of difficulty allowing the player to choose the degree of challenge.
Encouragement （incentives）	● Declare extrinsic incentives(such as opportunity to win IPOD kit).
Encouragement （spirit）	● Assign points for players' operation. ● The task in game should have time limits.
Continuing Encouragement	● Small, incremental rewards should be given when player making any progresses; ● Game should provide new challenge and new fun continuously.
Reputation	● Rank list or high-score lists can be used to stimulate player.



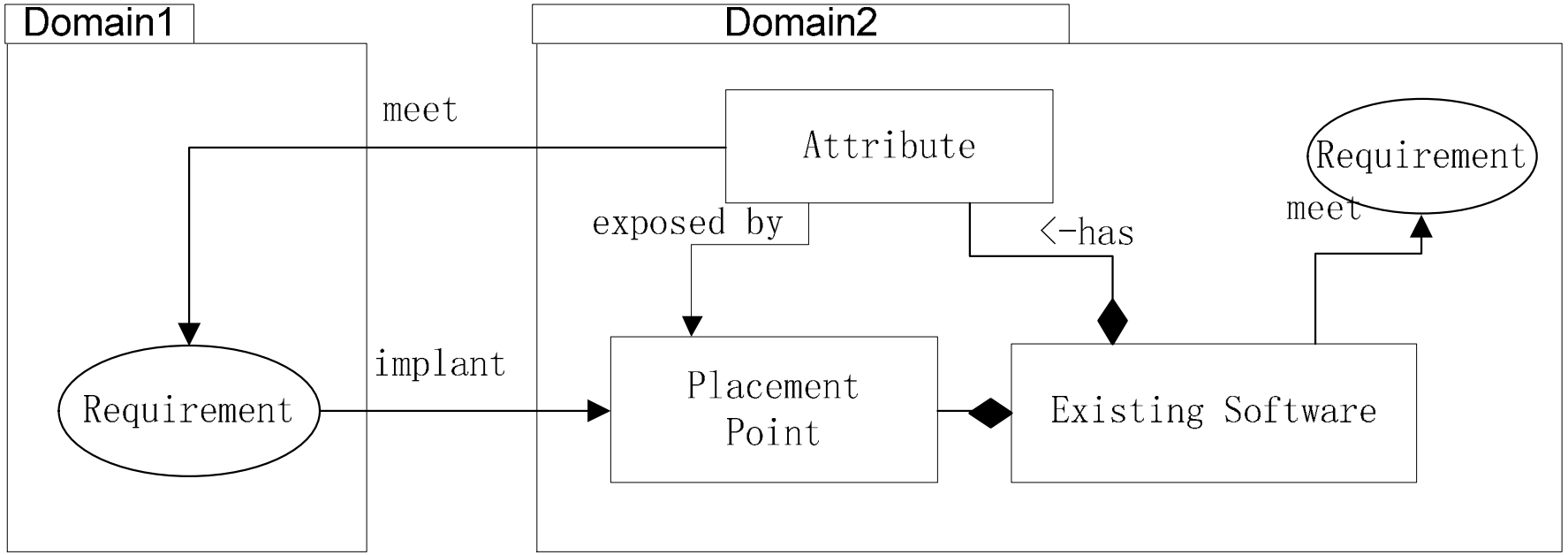
- A Symbiotic Computing model in http://symbiotic.agent-town.com/03-e.html



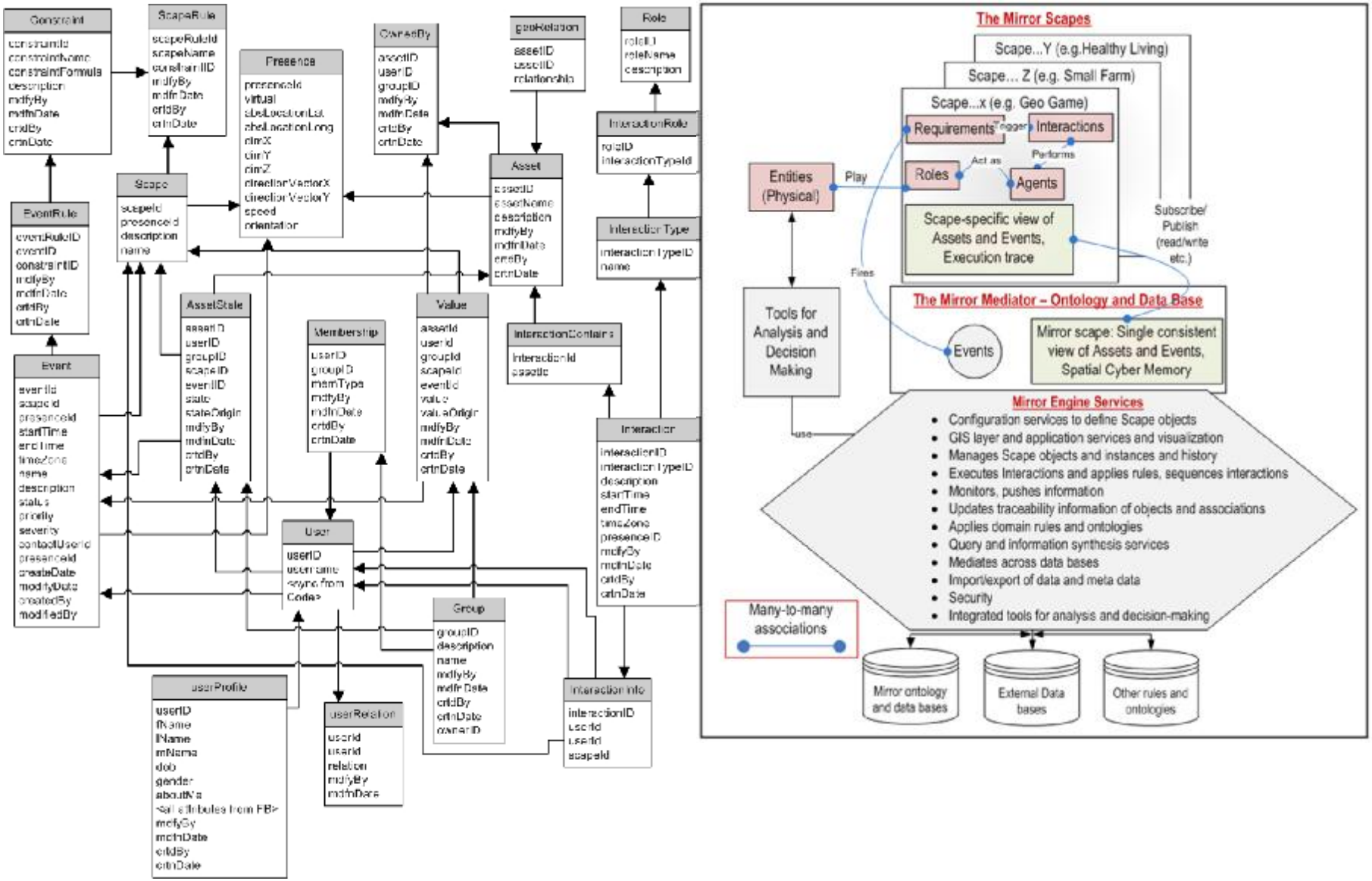


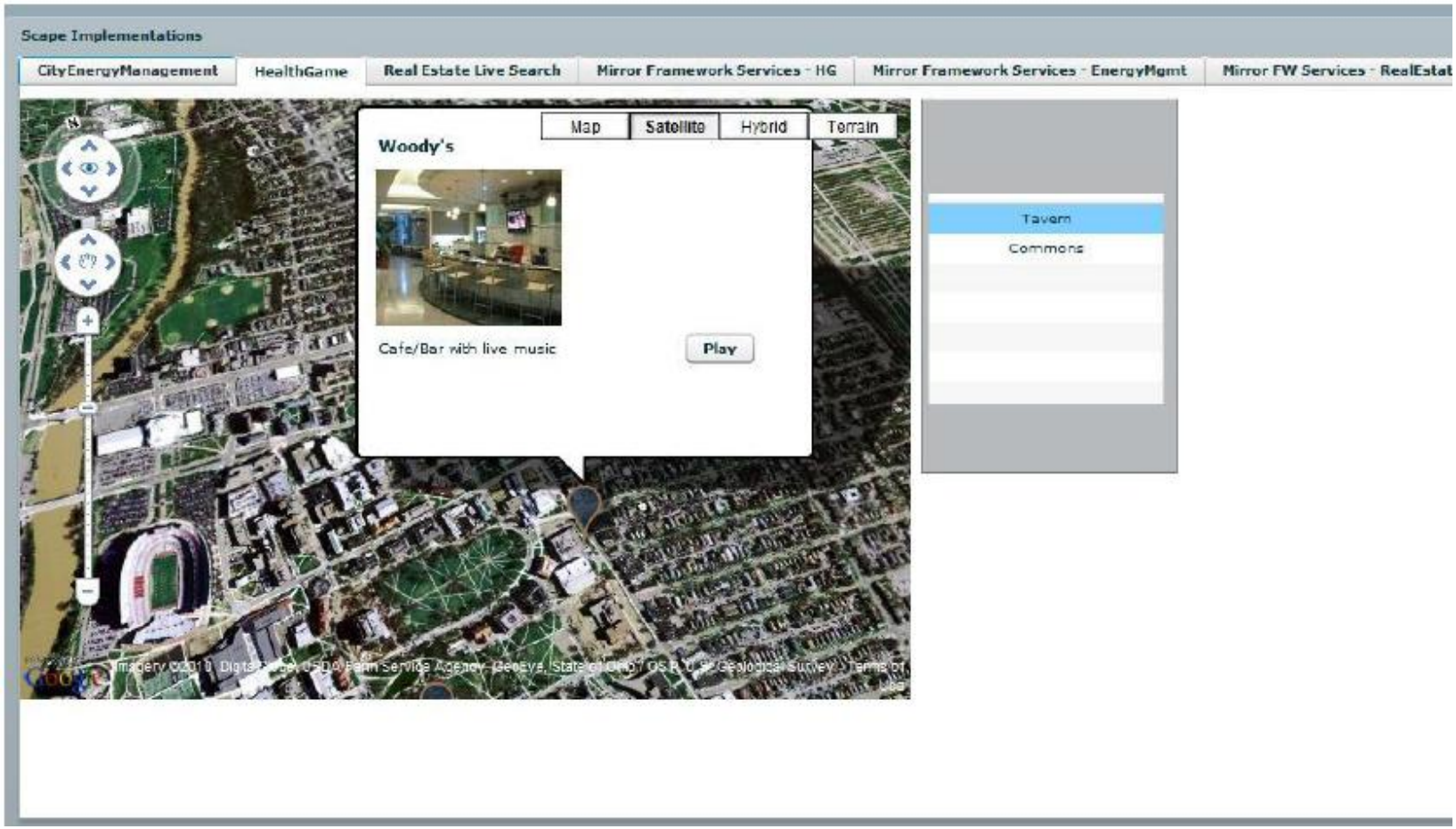
Reuse by Placement

- Reuse by Placement: A Paradigm for Cross-Domain Software Reuse with High Level of Granularity

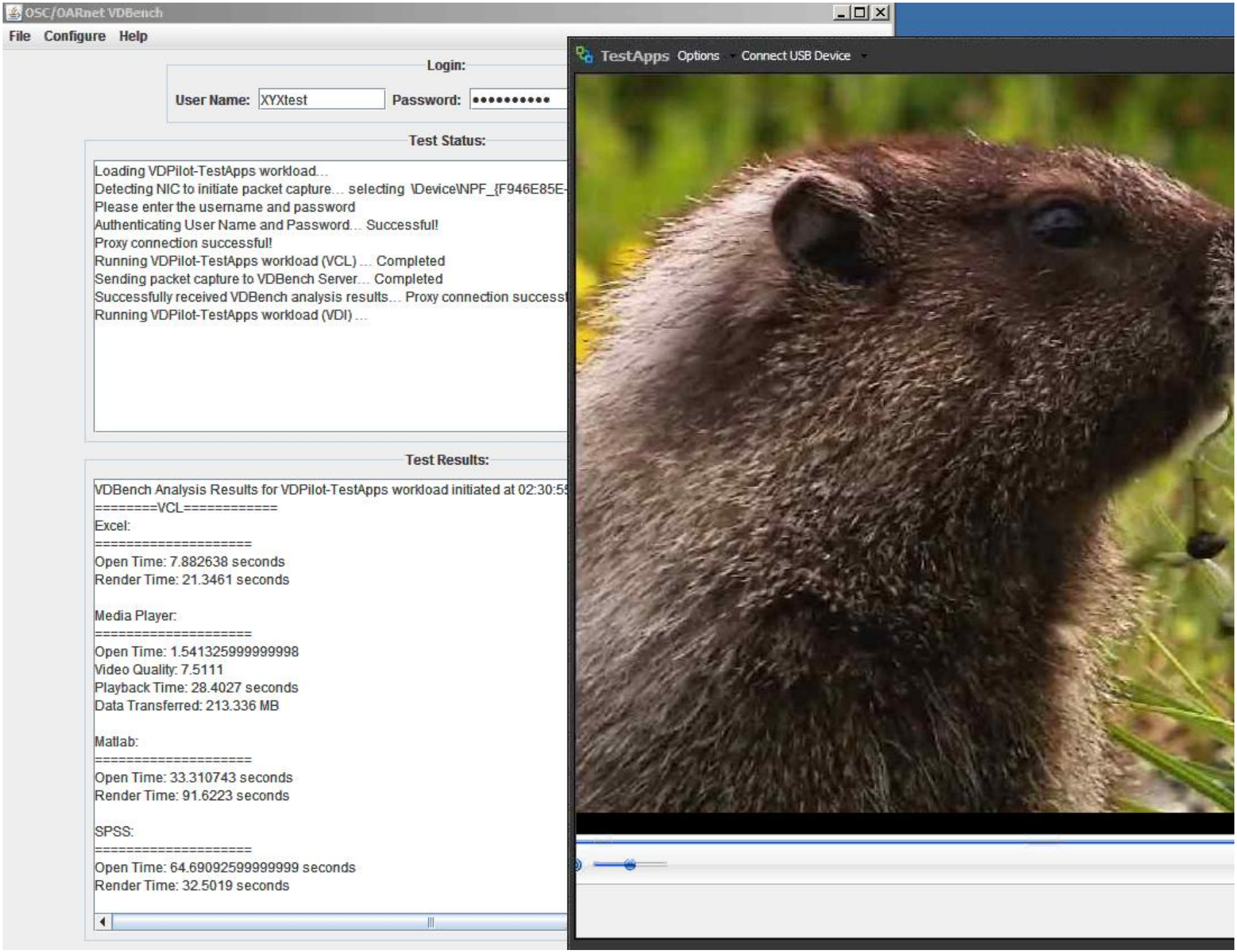


Mirror





QoE Measurement in Cloud



VDBench Framework—Physical System

- The client connect to cloud through Internet or network emulator.
- The client reserve cloud resources(virtual desktop) through web portal.
- The client access virtual desktop through RDP/PCoIP protocol
- The automatic test application deployed in virtual desktop will be activated.
- The test application will send marker packets to broker server which route marker packets to client