



GE Global Research

GE's Imagination Markets - Oct 2007

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2007PRE027, October 2007

Public (Class 1)

Technical Information Series

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GE Global Research

Technical Report Abstract Page

Title GE's Imagination Markets - Oct 2007

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Report Number 2007PRE027 **Date** October 2007

Number of Pages 15 **Class** Public (Class 1)

Key Words: Information market, Idea generation, Brainstorming, Group support system.

Abstract: Information markets combine the opinion aggregation capabilities of financial markets with the engagement of online games. This presentation discusses the results of the Imagination Market run at GE's Global Research Center in Niskayuna, NY in the summer of 2005 as well as the results of subsequent Imagination Markets run in 2005 and 2006 for GE businesses.

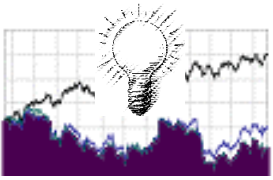
Manuscript received October 25, 2007

GE's Imagination Markets

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imagination at work

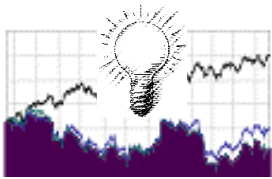


Imagination Markets

What Are Imagination Markets?

Virtual stock market games where the securities are ideas proposed by the participants

- > **Ideas from Everywhere** – supporting potentially thousands of contributors,
- > **Ranked Results** – trading results in the automatic ranking of the ideas from best to worst,
- > **Real-Time** - Responsive to new information such as the release of a new product line by a competitor,
- > **Responsive** - Real-time feedback on ideas as they are generated,
- > **Transparent** – High visibility of the ideas and the process to all contributors, and
- > **Consensus building** - where all participants have a voice in the ranking process.



Imagination Markets Executed

GRC CDS Technology Market 2005 – First pilot of Imagination Market technology.

Participants:

85 members of the Computing and Decisioning Sciences Laboratory

Duration:

3 Weeks

Ideas generated:

63 new technology ideas generated and ranked by market. Top ranked idea funded for \$50K to explore idea.

Incentives:

IPODs & Amazon Gift Certificates for best portfolios

Benefits:

63 ideas formalized and ranked by profitability and viability.

65% participation due to fun-factor.

The screenshot shows the GE Imagination Markets website. At the top right is the GE logo and the text "Imagination Markets". A navigation bar includes links for "Welcome", "How to Play", "Movers", "My Portfolio", "Trading Floor", "Leaderboard", and "My Ideas". A yellow button in the top right corner says "Submit your Idea NOW!". The main content area has a "Welcome !" heading and a description: "The innovation game where you can invest in the best idea from your colleagues. Or submit your own! When colleagues buy-in, the idea stock goes up. Start playing with your \$3000 fantasy Imagination Market Bucks now and win!". Below this is a "REGISTER and PLAY NOW!" button. On the left, there are links for "Game Overview", "Trading Instructions", and "Winning Trades & Ideas". In the center, there are images of an iPod and a gift certificate with the text "Win Great Prizes! click here". On the right, there is a table titled "IMAGINATION MARKETS GAME" showing "Top Price % Movers" and "Top Volume Movers" with columns for "IDEA SYMBOL", "LAST", "CHG", and "VOL".

Top Price % Movers (last 1 day)			
IDEA SYMBOL	LAST	CHG	VOL
MEDGEN	\$78	↑ 34.3%	31
GEMAX	\$49	↑ 32.4%	43
CONSR	\$90	↑ 28.6%	26

Top Volume Movers (last 1 day)			
IDEA SYMBOL	LAST	CHG	VOL
GEASIA	\$27	↓ 20.6%	60
TLG	\$85	↓ 09.6%	45
GEMAX	\$49	↑ 32.4%	43

At the bottom of the page, there is a link for "OFFICIAL RULES" and a copyright notice: "Copyright © 2006 Enterprise Solutions. All Rights Reserved."

Subsequent Pilots

5 subsequent pilots across 5 GE businesses; some markets spanning multiple businesses

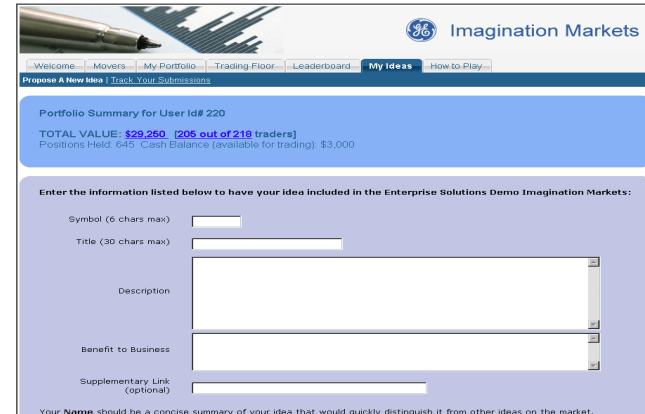
Imagination Market Process

1



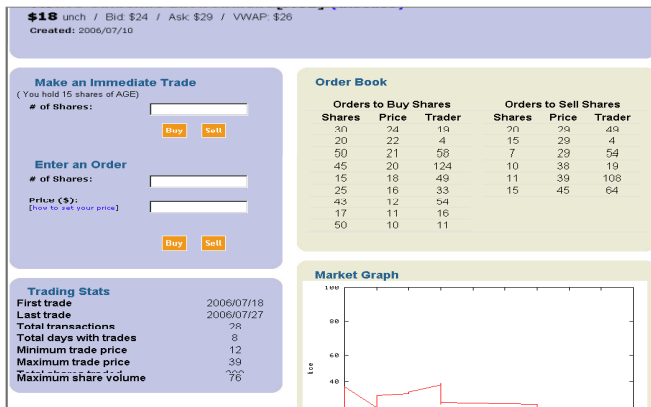
The business poses a question.

2



Participants can then suggest answers. Those answers then are added to the market as securities (if approved).

3



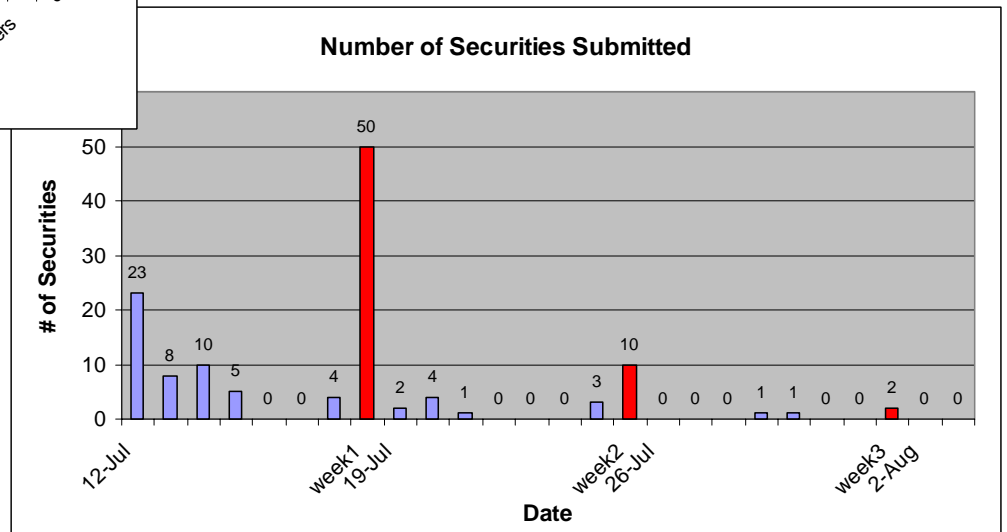
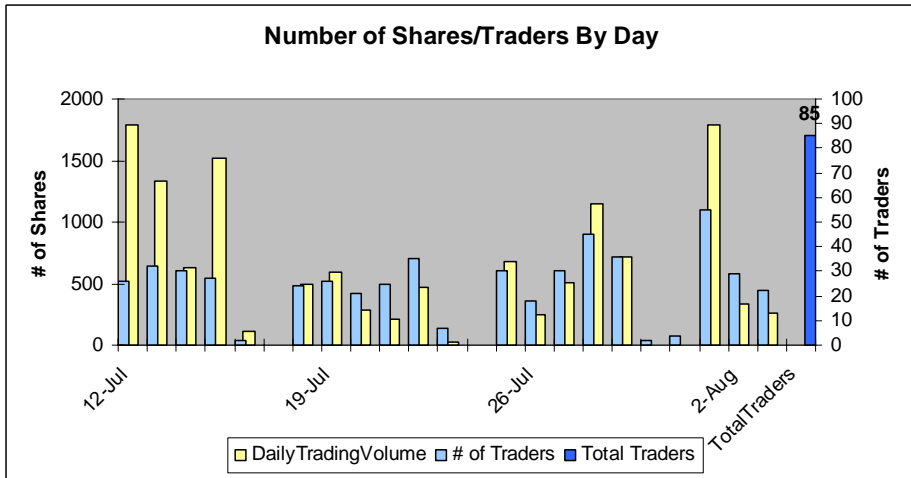
Market participants buy and sell shares of ideas based on how well they believe the idea will contribute to the business objectives.

4



The ideas with the highest VWAP over the last five days of trading are declared the winners.

Prototype Market: Participation



Markets have resulted in 60-150 proposed ideas, but only about 50 ideas are usually let onto the market.

2006 Market: New vs. Established Ideas

Symbol	Final Price	Volume	Total Unique Traders	Founder Volume	Founder Volume %	Initial Seed	Established/ New?
FF	98	1910	60	0	0%	y	new (new application for an old idea)
D	98	2324	68	1145	49%		established/2004 funding, no longer funded
H	89	2113	56	1093	52%		new
Q	81	1082	56	0	0%		established
JJ	80	2144	46	1556	73%		new
II	77	1614	46	943	58%		new
F	73	1178	55	68	6%		new
HH	69	712	38	312	44%		new
R	54	1071	52	0	0%		new
C	53	1042	50	322	31%		new
S	52	1165	55	0	0%	y	established
KK	50	705	31	15	2%		new
EE	50	1350	47	465	34%	y	established
O	50	1010	48	261	26%		new
MM	45	980	55	45	5%		new
NN	45	1358	56	0	0%	y	established
Z	44	475	28	0	0%		new
E	42	931	48	238	26%		new
A	41	1215	53	0	0%		new
P	41	1453	54	625	43%		established
W	36	1367	52	45	3%		new
LL	36	710	37	5	1%		established
DD	36	1265	58	0	0%	y	new
BB	35	1691	54	0	0%		established
N	34	689	41	237	34%		new
I	34	741	36	97	13%		established
T	34	735	29	105	14%		new
J	34	780	45	35	4%		established
G	33	819	51	0	0%	y	established
Y	32	1205	50	0	0%		established/funded
X	30	974	52	0	0%	y	new
CC	29	1035	53	0	0%	y	established
AA	28	876	42	227	26%		new
V	26	1120	47	0	0%		established
K	25	1655	57	15	1%		new
M	24	832	39	5	1%		established
B	23	987	35	321	33%		new
U	23	827	43	105	13%		new
L	22	857	46	0	0%		established
GG	21	655	40	31	5%		established

Market participants seem to favor new ideas over old ideas, but winning ideas have been of both types.

2006 Market: Idea Clustering

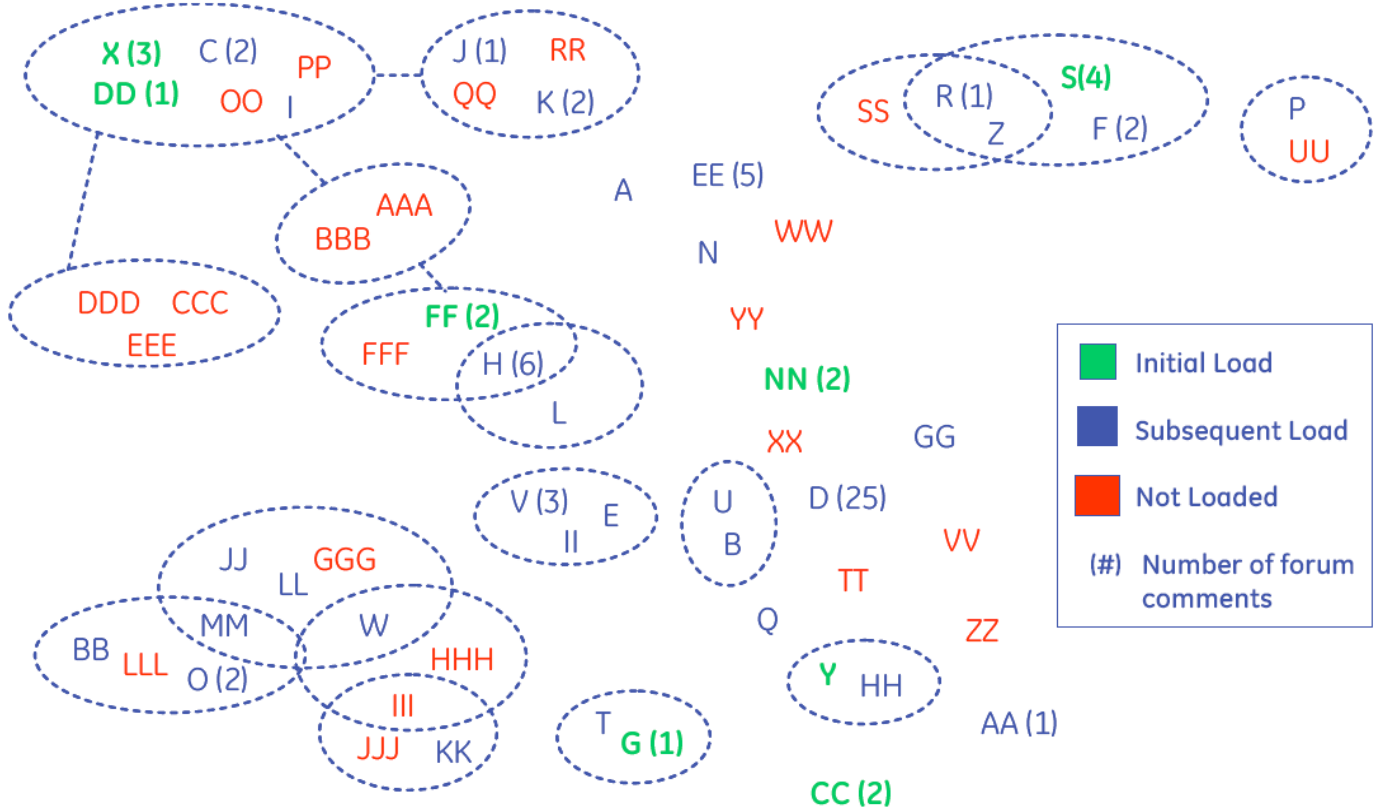


Figure 4: Idea Clustering - Many ideas were stimulated by existing ideas in the market

Idea springboarding gives the market the benefits of a large brainstorming session

Incentives

Incentive types:

- > Best idea:
 - Funding to allow submitter the opportunity to flesh out (Prototype market only)
 - Small Prizes & Bragging Rights
 - May incentivize manipulation
- > Best portfolio:
 - Small Prizes & Bragging Rights
 - Incentivizes “market makers,” which add liquidity to the market
 - Incentivizes speculation, which may cause individuals to abandon their opinion
 - May incentivize manipulation
- > Participation Lottery:
 - Lottery Prizes based on # of shares traded
 - Motivates participation without biasing trading behavior.

Prizes desirable to encourage participation.
Lottery prizes best able to motivate the “right” behavior.

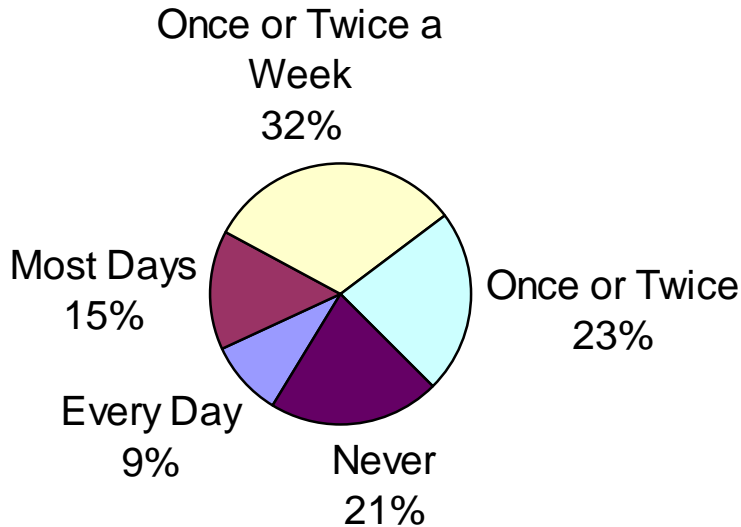
Validation

- Independent ranking by leadership team
 - > Different ranking of the winning idea
 - > Overall, not a significant difference between market and leadership ranking
 - > Causes:
 - Wishful thinking
 - Differing private information
 - All at once vs. random-selection/appearance of market
 - > Number of Ideas: 10=Greater, 1=Less
 - > Quality of ideas: 4=Better, 5=Equal, 1=Less
- Business “gut” test

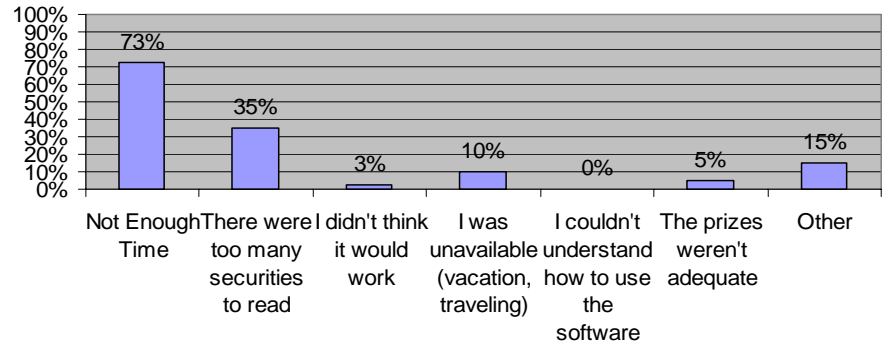
Validation is significant challenge
with preference markets.

Participant Survey

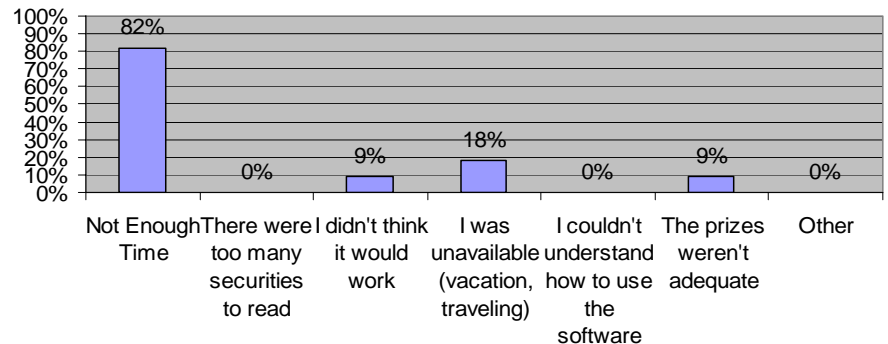
How Often Did You Trade (N=53)



If You Did Not Trade Most Days, Why Not? (N=40)



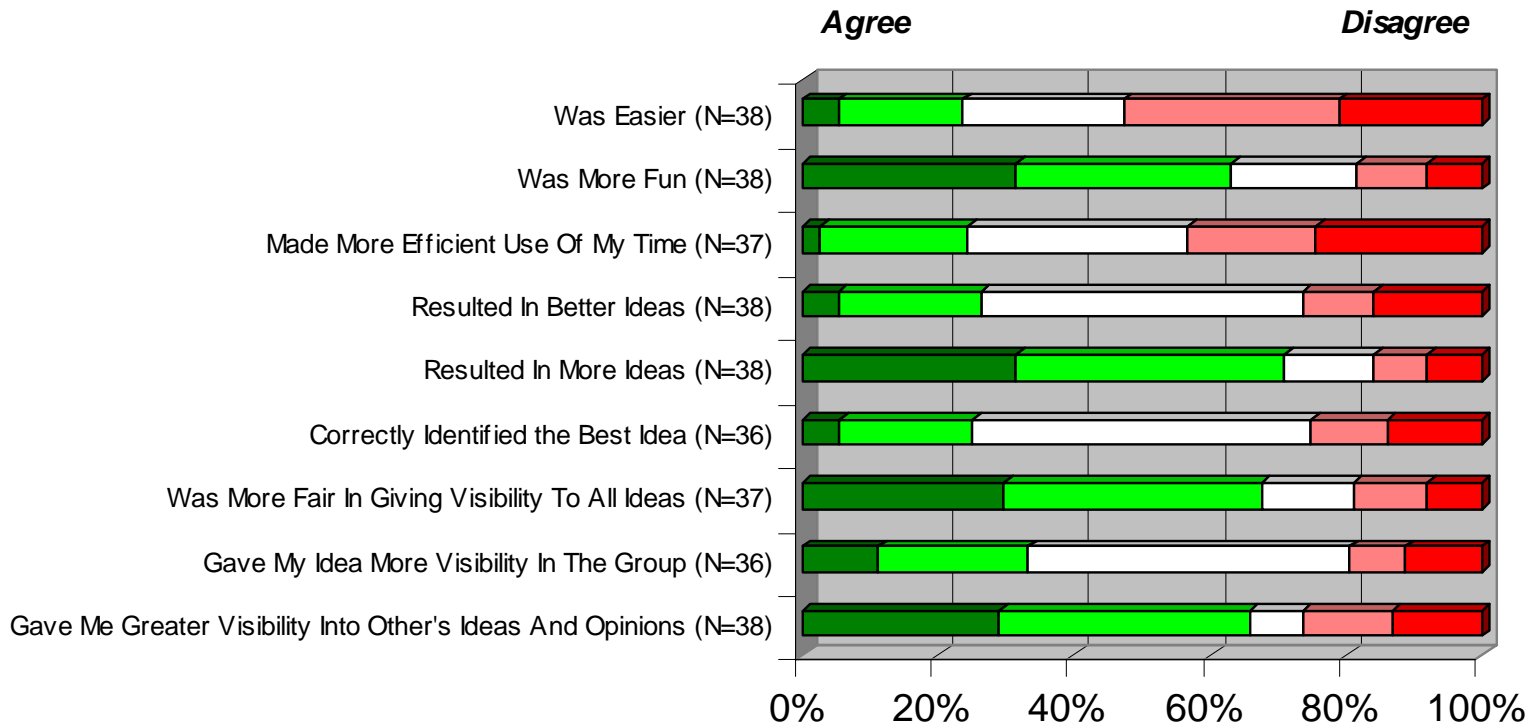
If You Did Not Trade At All, Why Not? (N=11)



Internal promotion used to encourage participation.
 Typical participation rate is around 15-20%

Participant Survey (cont.)

Market vs. Other Idea Generation Methods



Participants had more fun and appreciated the visibility.
“Not easier” ratings were largely due to short selling,
which was resolved in later versions.

Summary

- Fun and novel means to engage employees in innovation
- Allows everyone to be part of the decision making process
- Several design aspects of markets require further research:
 - > Effective thin markets
 - > IPO process to pre-filter ideas for markets
 - > Validation of preference markets
 - > Engagement strategies
 - > Simplified markets
 - > Incentives
 - > Cashing out securities during the course of a market

Appendix

2005 Prototype Market Design

Design Constraint	Reason
Participants	
Participant community	All members of the Computing and Decisioning Sciences Technology Center, including lab managers, project leaders, individual contributors, contractors, summer interns, and other support staff. Team members administering the market were not allowed to participate.
Securities	
Initial seed securities	The market was seeded with five ideas generated before the market opened so there would be securities to trade at the start of the market.
New ideas (securities) were entered into market throughout the course of the market	There was no limitation on entry of new ideas into the market (e.g., ideas were entered as late as two days prior to market close). Ideas submitted by participants were only screened for similarity to those already proposed.
Short selling allowed	We felt that traders should be allowed to make a profit from identifying <i>good</i> ideas as well as identifying <i>bad</i> ideas. Therefore, short selling was allowed.
Security values could range from \$1 to \$99	Design aspect of the Foresight software.
All securities IPO'd 100 shares at \$50	To help provide an easy way for participants to buy initial shares of securities, we IPO'd all securities at \$50 per share. The \$50 price was selected since it was the midpoint between the price caps of \$1 and \$99 and therefore indicated no preference for or against the idea.
Overall market design	
Final payout to participants (and determination of the best idea) was based on the volume-weighted average price (VWAP) during the 5 business days prior to market close	This was done to limit any impact of manipulation and to discourage tournament behavior, the tendency of low-performance players to make high-risk trades at the end of the market in the hopes of raising their net worth enough to qualify for performance-based awards. The best idea was the security with the highest volume-weighted average price (VWAP) during the 5 business days prior to market close. Traders were paid VWAP for securities they owned; this both rewarded traders for owning shares of ideas ranked high by the market and penalized traders for owning shares ranked low. Traders who short sold were paid \$100 minus VWAP for the security; again, this rewarded traders for short selling ideas that were ranked low by the market, and penalized traders for shorting ideas ranked high.
Portfolio valuation, as viewed by each participant during the course of the market, was based on the most recent trading price for each security	Design aspect of the Foresight software.
Market duration: 3-4 weeks (actually ran 3 weeks, 2.5 days)	We did not publicize a specific market close date to mitigate the risk of manipulation and tournament behavior as the close date approached.
\$10,000 initial grant to participants	Initial play money granted to each participant for trading.
\$1000/week stipend to participants	A weekly play money allowance was given to all registered participants to add liquidity as ideas were added to the market. Late registrants all started with \$10,000.
Anonymity was maintained for all participants within the market	Whether suggesting a new idea or trading, all participants were only known to each other through their trader ids. This was to make traders feel more comfortable expressing their true opinion about ideas without fear of retribution from other participants. However, this did not preclude traders sharing identity information outside of the market.
Weblogs available for sharing information	We wanted participants to share their opinions about the securities in an online discussion format, so we added blogging capability.

2005 Prototype Market Design (cont.)

Incentives & Participation	
Incentive for best idea: research funding	The reward for the best idea was \$50k of research funding to pursue the idea.
Portfolio value-based incentives	The top two traders (based on portfolio value) received Apple iPods[1]. The next top ten traders received \$25 gift certificates. Although performance-based rewards have been proven to encourage tournament behavior, we felt that these incentives were necessary to encourage participation (James and Issac, 2000).
Lottery incentive	An additional Apple iPod was awarded by random drawing (lottery). Lottery entries were created for each trade so the more a participant traded, the better chance they would have to win the lottery.
Training sessions	Three training sessions were scheduled during the first week of the market. The purpose of these sessions was twofold: to ensure that participants understood how to trade (particularly, short selling), and to increase participation.
Incentives for new participants during the course of the market	Due to the low participation in the first week of trading, three random drawings for \$25 gift certificates were held half way through the market: one for current participants, one for registered traders who had not traded yet, and one for new participants.
Trading parties	In order to boost participation, we held two trading parties for an hour during lunchtime with free lunch provided. Participants brought laptops and traded while chatting about their trading experience and their opinions about the securities. Market administrators were available to assist with questions.
Limits imposed on traders	
After hours trading only	To ensure that the market did not interfere with regular work time, participants were asked to trade before or after work, during lunch, or for only a few minutes at a time during work hours.
Encouraged to trade honestly and without intent to manipulate	Integrity is important within GE and we used this to encourage appropriate, non-manipulative behavior within the market. All participants had to agree to the market rules upon registration.
One participant = one user id	Since we were able to base market registration on a standardized company-wide user id, we could force one trader to have only one trader id. This helped mitigate manipulation.