



Army Science & Technology

scitech FUTURES

Aaron Chan

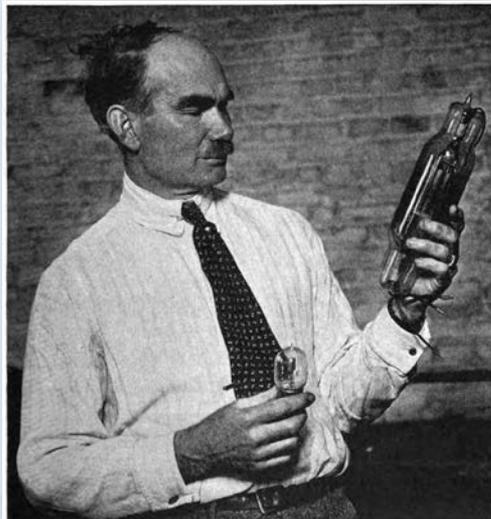
aaron.m.chan2.civ@mail.mil



DESIGN • DEVELOP • DELIVER • DOMINATE
SOLDIERS AS THE DECISIVE EDGE



*"Les avions sont des jouets intéressants
mais n'ont aucune utilité militaire.
Airplanes are interesting toys, but of no
military value"*



*"While theoretically and technically
television may be feasible, commercially
and financially it is an impossibility."*



"There is practically no chance communications space satellites will be used to provide better telephone, telegraph, television, or radio service inside the United States."

PAGE 48

AUGUST 16, 1993



From the Ether / Bob Metcalfe

Wireless computing will flop — permanently

Study the photos in computer publications, including this newspaper right now, and you will notice that almost all of the wires are missing. I'll wait while you look.

Hardly any wires, right? So does this mean that the uphottotic tangle hanging off the back of your desk is a thing of the past? Does this mean that several years of raised hopes about wireless mobile computing have already been realized? Does this mean that, unethereal at last, we can all take up the carefree wireless mobile lives of neoneomads? Answers: No, No, and No.

Furthermore, it is my sad duty to inform you that the coming resounding flop in wireless mobile computing will be, alas, permanent.

There is, I know, an exciting trend toward wirelessness. The relentless progression of smaller, faster, higher capacity, and lower priced computers cries out, "Wires have to go!"

Power cords have to go, replaced by longer-lasting batteries made from sealed lead, nickel cadmium, lithium ion, or maybe platinum cyclamates (just kidding). And, by the way, let's have a few battery standards so we can share them with our sistemes on planes.

Next, network cables have to go, replaced by higher frequency electromagnetics made from pallium arenoids, spread spectrum, frequency hopping, and packet cellular. And they, too, better work on planes.

Cutting all these cords and cables is exciting, but it isn't inevitable. The truth about wireless computing is that it's not going to pan out.

Simply put, there aren't enough megahertz to go around out there in our increasingly polluted electromagnetic

ether. It is an ecologically unsound waste of energy to broadcast bits in all directions when they need to be received in only one. The ether is too scarce to be wasted on nonbroadcast communications, and it won't be.

Cellular telephone companies like to brag about carrying up to 19.2Kb per second to and from your delightfully wireless mobile computer. Excuse me, but aren't you finding that 10Mb per second is a little on the slow side, maybe you're going to need ATM at several million multimedia megabits per second?

So after the wireless mobile bubble bursts later this year, we'll get back to stringing fibers. Instead of computing on the road without wires, we will be installing ubiquitous plugs.

After the wireless mobile bubble bursts this year, we will get back to stringing fibers.

This isn't to say there won't be any wireless computing. Wireless mobile computers will eventually be as common as today's pipeless mobile bathrooms. Portaporties are found on planes and boats, at construction sites, rock concerts, and other places where it is very inconvenient to run pipes. But bathrooms are still predominantly plumbed.

For more or less the same reasons, computers will stay wired.

Need more reasons why wireless won't become widespread? There are the pri-

vacy challenges of wide-area data broadcasting, which you'll encounter as you demonstrate that you care. What about standards for wireless computer networking, which will settle down right after ISDN, HDIV, PCMCIA, and ATM are resolved. Consider governments around the world reallocating spectrum for use by wireless computer networks, which they will right after whale hunting is stopped. And there are the health risks of prolonged exposure to increasing levels of higher frequency electromagnetic radiations, which I hope are nil. And finally, what about the vast amounts of money needed for building wireless networking infrastructure, which will be raised right after The Deficit is eliminated?

Of course, many of these issues may be resolved in our lifetimes. So even if I'm wrong about the permanent shortage of real ether, wires will be keeping us civilized for a very long time.

Is it any wonder, then, that the TV industry, which has relied on broadcast radio for most of its history, is in a full-swing switch to cable? Increasingly we will switch data via fiber networks instead of broadcasting it via radio.

And in case you're not upset yet, there's this angle: If half the world's problems are caused by having too many people, the other half are caused by all of us wanting to move around so much — from home to work, from work to our customer's work, from our picturesque hometowns to identical airports, hotels, and tourist traps around the world. So let's just wire up our homes and stay there.

InfoWorld publisher Bob Metcalfe invented Ethernet in 1973 and founded 3Com Corp. in 1979. He receives E-mail via the Internet at bob.metcalfe@infoworld.com or at 524-1127 on MCI Mail.

INFO WORLD

Publisher/CEO Bob Metcalfe
President/COO Jim Cavallie
Senior VP/Editorial Stewart Alsop
Senior VP/Editorial Director Michael Lowy
Senior VP/Circulation & Research Patrick Conry
VP/Associate Publisher Joel Decker
VP/Publisher Ad Director Joe Kovich
Executive Assistants Rosemary Innes, Tina Tempin
Research Assistant Anne Taylor

SALES & MARKETING

National Accounts Director Vicki Gorin
Director of Demographic Relations Steven Orso
Regional Manager/Apple Demographic Bill Peck
Advertising Director Ian Ross
Sales Administrative Managers Jan Davis

Regional Managers Carol Fontaine, Ron Hall
 Rosalee Hicks, Elise Martin, Kathy Mollenau
 Steve Myles, Karen Niles, Peter Orso, David Rosenzweig
 Brenda Parker, Jim Sherman, Cindy Zach

Account Managers Jennifer Bellizzi
 Mindy Blankenship, Julie Denny, Susan Egan
 Neil Ferguson, Stephen Goring, Lauren Hoffman
 Christine Loveland, Judith Mack, Kelly Nady
 Leonard Newman, Erikel Schmitt

Sales Support Coordinator Florence Melow
Market Sales Manager/No. Calif. Michael Hamilton
District Sales Manager/New England Dana Housa
District Sales Manager/Sa. Calif. Debra Wright
InfoMarket Advertising Director Drew Temple
InfoMarket Sales Staff Marc Calverton, Sharon Chin
 Suzanne Fegley, Val Hoke, Lisa Walker

Ad Coordination Supervisor Chris Gair
Ad Coordinators Andre Angles, Christina Corbett

InfoMarket Ad Coordination Manager Janet Ohman
InfoMarket Advertising Coordinator Donna Kerr
InfoMarket Circulation Coordinator Dana Palmer
InfoMarket Design Coordinator Gary Palmer
InfoMarket Administrative Assistant Gina Baratta

Marketing Director Susan Orson
Director of Strategic Account Services Ken Ellis
Marketing Communications Manager Jo Shain
Sales Support Manager Amy Proctor
Marketing Coordinator Cathy Thurman
Marketing Assistant Steve Sarnowski

Director of Circulation Barbara Ruffner
Assistant Circulation Director Nancy Sholing Grant
Senior Circulation Manager Dale Quinley-Dennis
Circulation Manager Nils Cunningham
Distribution Manager Michael McWhorter
Distribution Assistant Stephanie Beach

"Cutting all these cords and cables is exciting, but it isn't inevitable. The truth about wireless computing is that it's not going to pan out"





Survey Data on Innovation

AGENCY RANKINGS BY CATEGORY

Innovation

The Innovation category measures employee perceptions of efforts to improve the way work is done, including their own personal motivation to promote change and the support and rewards they receive for promoting new ideas.

Show Survey Questions

View a Different Category

Frequently Asked Questions

Data Analysis

List of Participating Agencies

Large Agencies

Midsize Agencies

Small Agencies

Agency Subcomponents

Click on the links below to view an agency's full report. Click on the column headings to sort by rank, agency name, score or change.

SORT: RANK ↑

Rank ↑	Agency	2016	2015	Change (2015-16)
1	National Aeronautics and Space Administration	79.6	78.2	1.4
2	Intelligence Community	70.2		30.6
3	Department of Health and Human Services	67.0	65.0	2.0
4	Department of State	65.9	66.1	-0.2
5	Department of the Air Force	63.7	64.2	-0.5
6	Department of Commerce	63.5	62.4	1.1
6	Department of the Navy	63.5	62.3	1.2
8	Department of the Interior	62.9	61.5	1.4
9	Department of Justice	62.6	62.2	0.4
10	Office of the Secretary of Defense, Joint Staff, Defense Agencies, and Department of Defense Field Activities	62.4	61.0	1.4
11	Department of Labor	62.1	59.3	2.8
12	Department of the Army	61.9	61.3	0.6
13	Department of Transportation	61.5	59.7	1.8
14	Department of Agriculture	61.2	59.7	1.5
15	Social Security Administration	60.0	61.0	-1.0
16	Department of the Treasury	59.2	58.5	0.7
16	Department of Veterans Affairs	59.2	57.9	1.3
18	Department of Homeland Security	51.1	48.8	2.3

NASA



Air Force



Navy



OSD



Army





How you can help

SciTech FUTURES

Was [H.G. Wells](#) a visionary ahead of his time? Is [Electronic Warfare](#) an old idea from 1917 that just needed technology to catch up? Can you help us see what's next? Then the **U.S. Army science and technology community** needs your help to envision the role of robotics and artificial intelligence in the Future Operating Environment (FOE).

From 6-19 March 2017 we'll be running our latest futures game, sponsored by the Office of the Deputy Assistant Secretary of the Army (Research & Technology) in partnership with the U.S. Army Training and Doctrine Command's (TRADOC) Mad Scientist Initiative.

Through this game, you can join fellow thought leaders in exploring how advances in robotics, artificial intelligence, autonomous systems, and related technologies might transform the world and what that means for the Army. You will be able to share your ideas about the future, collaborate with (and challenge) other players, and bid on the most compelling concepts in an online marketplace.

At the end of the game, we'll evaluate your ideas to identify the most thought-provoking, challenging, and inspiring submissions. From this foundation, our team of analysts, concept artists, and authors will do further exploration that will be used to inform Army leaders, guide wargames examining future capabilities, and help shape over \$2 billion a year in S&T investments. Success depends on having a talented, diverse group of players who are eager to think differently about the key issues at the intersection of science, technology, and defense. That's why your involvement is so important.

What's in it for you? Well, apart from the opportunity to challenge conventional thinking and influence how the Army thinks about the future, all players will receive access to a digital library of concept art inspired by the ideas generated during the game. Top players will be recognized through our online leaderboards and recaps. Those players will also receive a high-quality print piece that brings their best submissions to life through full-color graphics. How do you become a top player, you ask? By getting inspired by someone else's thoughts, sharing your own ideas, and working collaboratively to inject your expertise!

You can learn more and register for the game at any time by visiting <http://futures.armysciotech.com>.

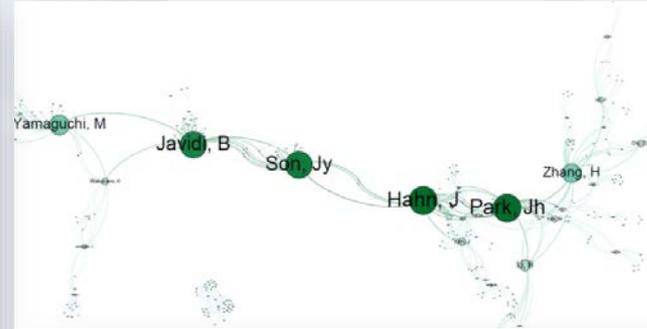
We hope to see you in-game starting on 6 March, and look forward to your contributions! Feel free to share this invitation with fellow creatives, technologists, and futurists who might be interested in playing.

Thank you,
-The SciTech Futures Team
<http://futures.armysciotech.com>
<http://ict.usc.edu>

SciTech Futures is a partnership between the Deputy Assistant Secretary of the Army (Research & Technology) and the USC Institute for Creative Technologies



USC Institute for Creative Technologies



Top Funding Organizations in WoS Publication

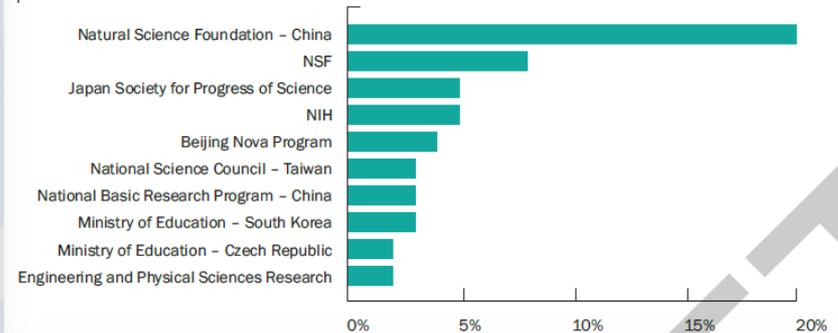


Table 2. Top U.S. UD Researchers by Citations

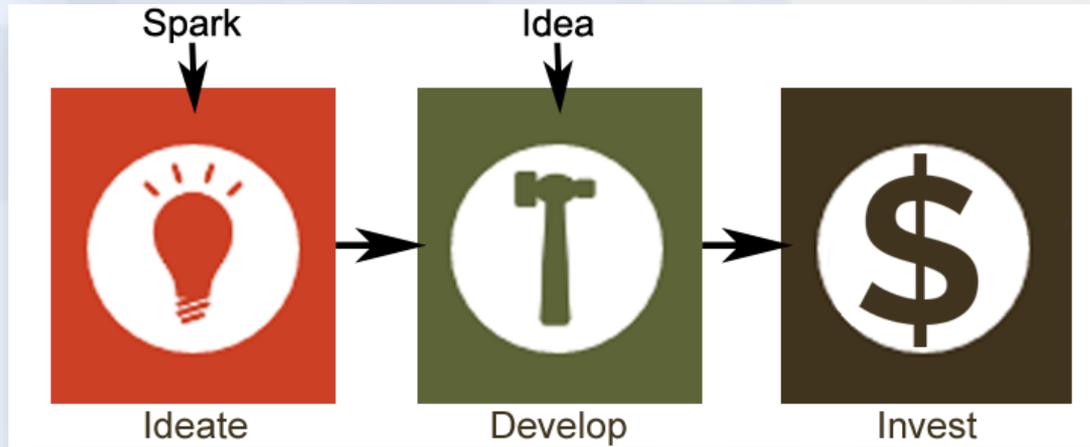
Researcher	Citations	Organization	Background
Javidi, Bahram	368	University of Connecticut	3D Imaging/Visualization/Display
Banks, Martin S.	338	University of California, Berkeley	Vision Science/Human Factors
Hoffman, David ¹⁹	241	University of California, Berkeley	Human Vision/3D Imaging/Graphics
Bove, V Michael	92	MIT, Media Lab	Visual Display/Optics
Barabas, James ²⁰	91	MIT, Media Lab	Visual Perception/Display Technology

Table 3. Dr. Bahram Javidi Top Three Cited Papers

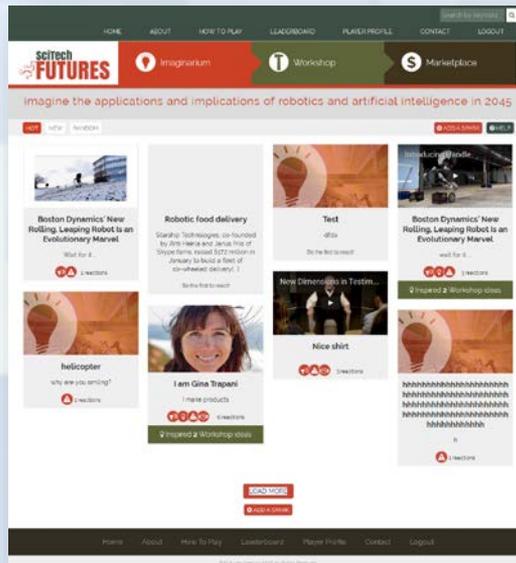
Year	Title	Topic
2003	3D object watermarking by a 3D hidden object	Presenting a method to watermark a 3D object with another hidden 3D object using digital holography
2006	Methods for displaying three-dimensional images	Overview of essential components to generate 3D images: image acquisition, multiplexing processing, and display mechanisms.
2013	Advances in three-dimensional integral imaging: sensing, display, and applications	Physical principles and applications of integral imaging.



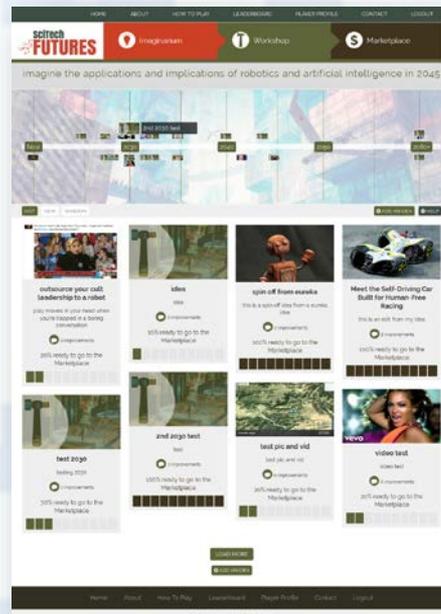
Online Ideation Exercise Structure



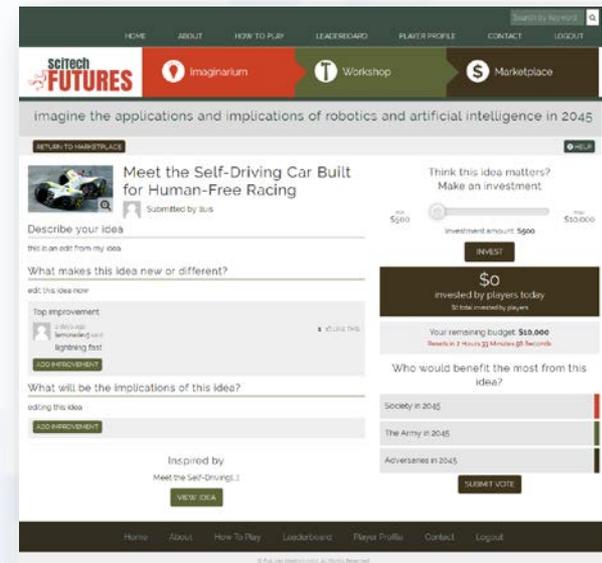
Imaginarium



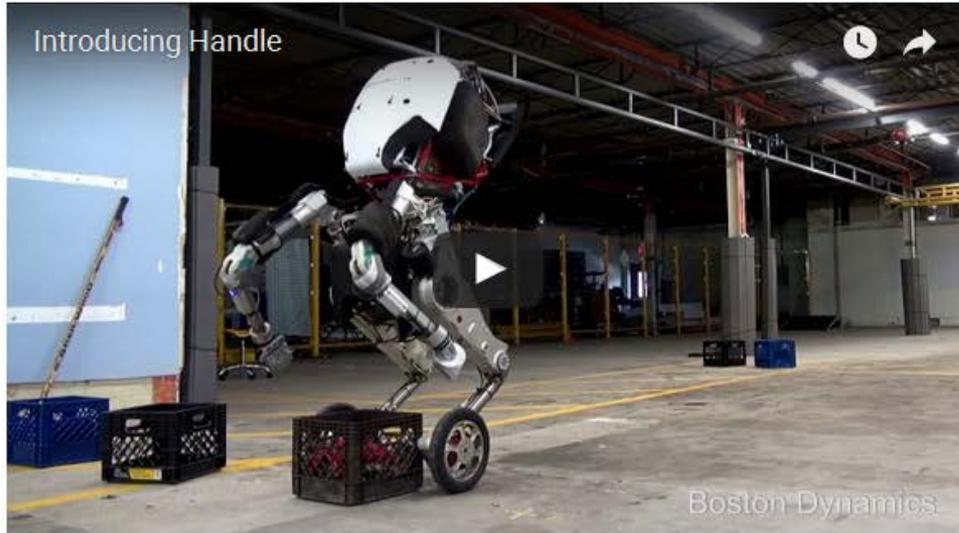
Workshop



Marketplace



Boston Dynamics' New Rolling, Leaping Robot Is an Evolutionary Marvel



wait for it...

 <https://www.wired.com/2017/03/boston-dynamics-new-rolling-leaping-robot-evolutionary-marvel/>



Does this give you an idea about Robotics and Artificial Intelligence in 2045?
Click the button below to create an idea in the Workshop.

EUREKA!



Added by lluis



Reactions



Challenges conventional wisdom



I never thought of that



Potential risk



Potential opportunity

SUBMIT REACTION



imagine the applications and implications of robotics and artificial intelligence in 2045

RETURN TO WORKSHOP

HELP



The future of sports

Submitted by lluis

Available for investment in the Marketplace.

INVEST IN THIS IDEA

4

Describe your idea

The future of sports entertainment will be ruled by robot athletes

ADD IMPROVEMENT

What makes this idea new or different?

with robots

ADD IMPROVEMENT

What will be the implications of this idea?

the robots may not be as interesting as real athletes

Top improvement

3 days ago
skenny said

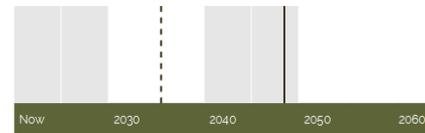
robots are not fun

1 LIKE THIS

ADD IMPROVEMENT

When will this idea make a difference?

Your vote | Average vote | Total votes



You can change your vote in 2 Hours 10 Minutes 57 Seconds

Has this given you an idea?

CREATE SPIN OFF

Help make this idea better.

Explore suggestions from other players and add your own.

1. What part of this idea do you want to build on?

Description

New / Different

Implications

2. What would you build on this idea?

0/1000 characters

ADD IMPROVEMENT

What other players said





Marketplace

RETURN TO MARKETPLACE
HELP



spin off from eureka

Submitted by lemonade

Describe your idea

this is a spin off idea from a eureka idea

What makes this idea new or different?

with tiny robots

Top improvement

1 hour ago
lemonade said LIKE THIS

this is new

ADD IMPROVEMENT

What will be the implications of this idea?

will this work properly?

Top improvement

23 hours ago
icet said LIKE THIS

boop

ADD IMPROVEMENT

Think this idea matters?
Make an investment

min \$500 max \$9,500

Investment amount: \$500

INVEST

\$1,000
invested by players today
\$1,000 total invested by players

Your remaining budget: **\$9,500**
Resets in 2 Hours 2 Minutes 6 Seconds

Who would benefit the most from this idea?

Society in 2045

The Army in 2045

Adversaries in 2045

SUBMIT VOTE

Why should others invest in this idea?

Let other players know what made you invest in this idea

0/1000 characters
Please enter a comment.

SUBMIT COMMENT

Inspired by

Boston Dynamics' New[...]

VIEW SPARK

spin off from eureka

VIEW IDEA





Join us at

https://futures.armyscitech.com



Intelligent Machines

AI Software Learns to Make AI Software

Google and others think software that learns to learn could take over some work done by AI experts.

by Tom Simonite January 18, 2017

Progress in artificial intelligence causes some people to worry that software will take jobs such as driving trucks away from humans. Now

leading
learn
design

In on
intell
system
language

“...those were simple computers, of course, this being before the time of the rational use of computers to design more advanced computers had been established.”



ARTIFICIAL INTELLIGENCE

Bill Gates Says Robots Should Be Taxed Like Workers

David Z. Morris
Feb 18, 2017



In a new [interview with Quartz](#), Microsoft founder Bill Gates makes a rather stunning argument—that robots who replace human workers should incur taxes equivalent to that worker’s income taxes.

“Right now, the human worker who does, say, \$50,000 worth of work in a factory, that think that we

Get Data Show

Gates argues to help fund would be tax workers will “slow down time to mana

“...the new law said that companies were free to fire any employee, but a worker replaced by a nubot that "appears or pretends to be human" had to be compensated.”





Backup

<http://futures.armyscitech.com>





Why Crowdsourcing

“The superior human strategies stem from the mind’s ability to capture the essence of a problem. Quantum concepts may seem less bizarre to people in a game than they do in other contexts, because it is an environment in which they expect rules to be broken,

The screenshot shows the Nature journal website. The main article is titled "Human mind excels at quantum-physics computer game" by Elizabeth Gibney, dated 13 April 2016. The article features a blue and purple graphic of a quantum well. A sidebar on the right lists "Killer landslides" and "Seven chemical separations to change the world".

How to Be Less Terrible at Predicting the Future

January 14, 2016 @ 10:07am
by Stephen J. Dubner
Produced by: Arwa Gunja



LISTEN NOW: Future 46:52



Our latest Freakonomics Radio episode is called "How to Be Less Terrible at Predicting the Future." (You can subscribe to the podcast at iTunes or elsewhere, get the RSS feed, or listen via the media player above.)

Experts and pundits are notoriously bad at forecasting, in part because they aren't punished for bad predictions. Also, they tend to be deeply unscientific. The psychologist Philip Tetlock is finally turning prediction into a science — and now even you could become a superforecaster.

How did typical Americans with no foreign-policy expertise come to make remarkably accurate predictions for U.S. intelligence officials? Not with Magic 8 balls. (photo: frankieleon)

Below is a transcript of the episode, modified for your reading pleasure. For more information on the people and ideas in the episode, see the links at the bottom of this post. And you'll find credits for the music in the episode noted within the transcript.

* * *

“A bad forecaster: I think an unwillingness to change one’s mind in a reasonably timely way in response to new evidence. A tendency, when asked to explain one’s predictions, to generate only reasons that favor your preferred prediction and not to generate reasons opposed to it.”

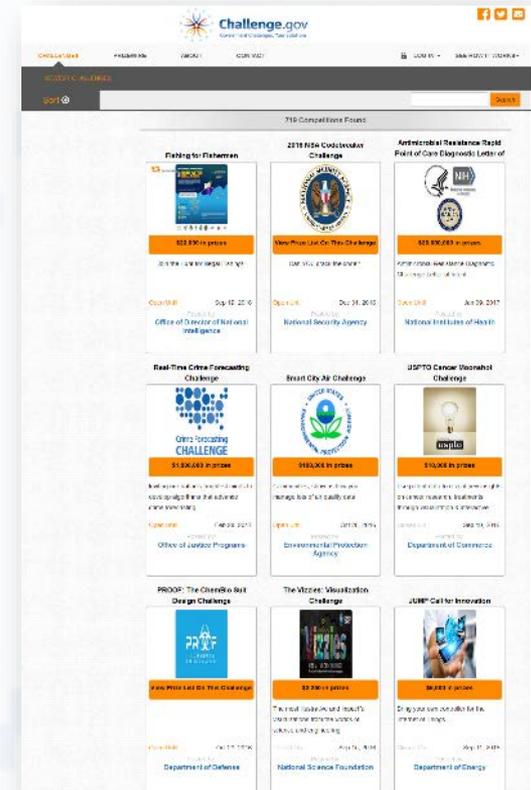
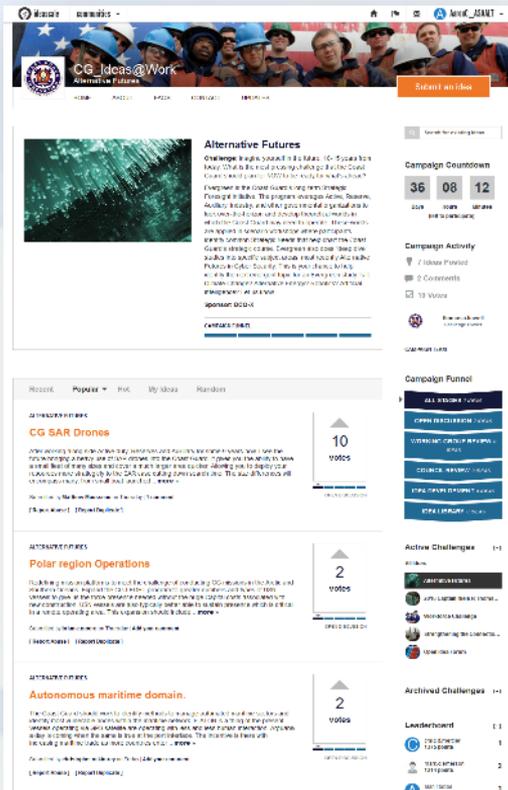
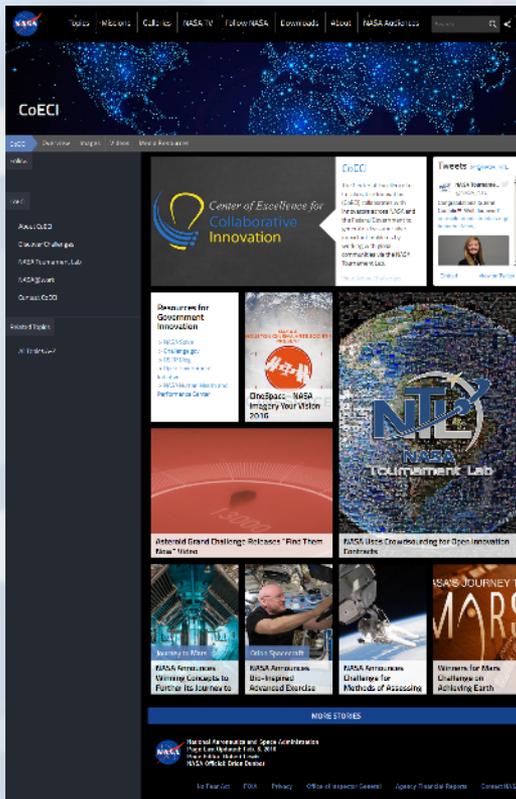


Crowdsourcing Efforts Across USG

NASA Center of Excellence for Collaborative Innovation

USCG CG_Ideas@Work

Challenge.gov





Alignment to Policy

- Aligned with overarching USG/DOD Guidance
 - Implementation Directive BBP 3.0 “...increase access to innovation within the national security environment through engaging non-traditional suppliers, entrepreneurs, and inventors.”
 - OSTP Memo 30 SEP 2015 “build capacity for citizen science and crowdsourcing.”
 - OMB Memo M-15-16 “encourages Federal agencies to consider incorporating citizen science and crowdsourcing into their programs.”

