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Emerging Technologies and Strategies for Jobs, Education, and Communities

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NETWORKS

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National Science Foundation

Funded, in part, by a grant from the
National Science Foundation.
DUE-0501626

NETWORKS



Poll

Click A-E to take the Poll

This webinar will have a Poll. Please answer:
I heard about this webinar through:

A. @matec
B. Email from ETD list serv
C. Email from NetWorks
D. Friend or colleague
E. Other (please type where in chat box)



NetWorks Webinar Presenter

Jim Brazell: Technology forecaster, public speaker and strategist focusing on innovation and transformative systems. Member of the Radical Platypus group and the Thornburg Center for Professional Development.

Mark Viquesney
Host

NETWORKS

Emerging Technologies & Strategies for Jobs, Education, and Communities

How the future works today.

JIM BRAZELL
jim.brazell@radicalplatypus.com

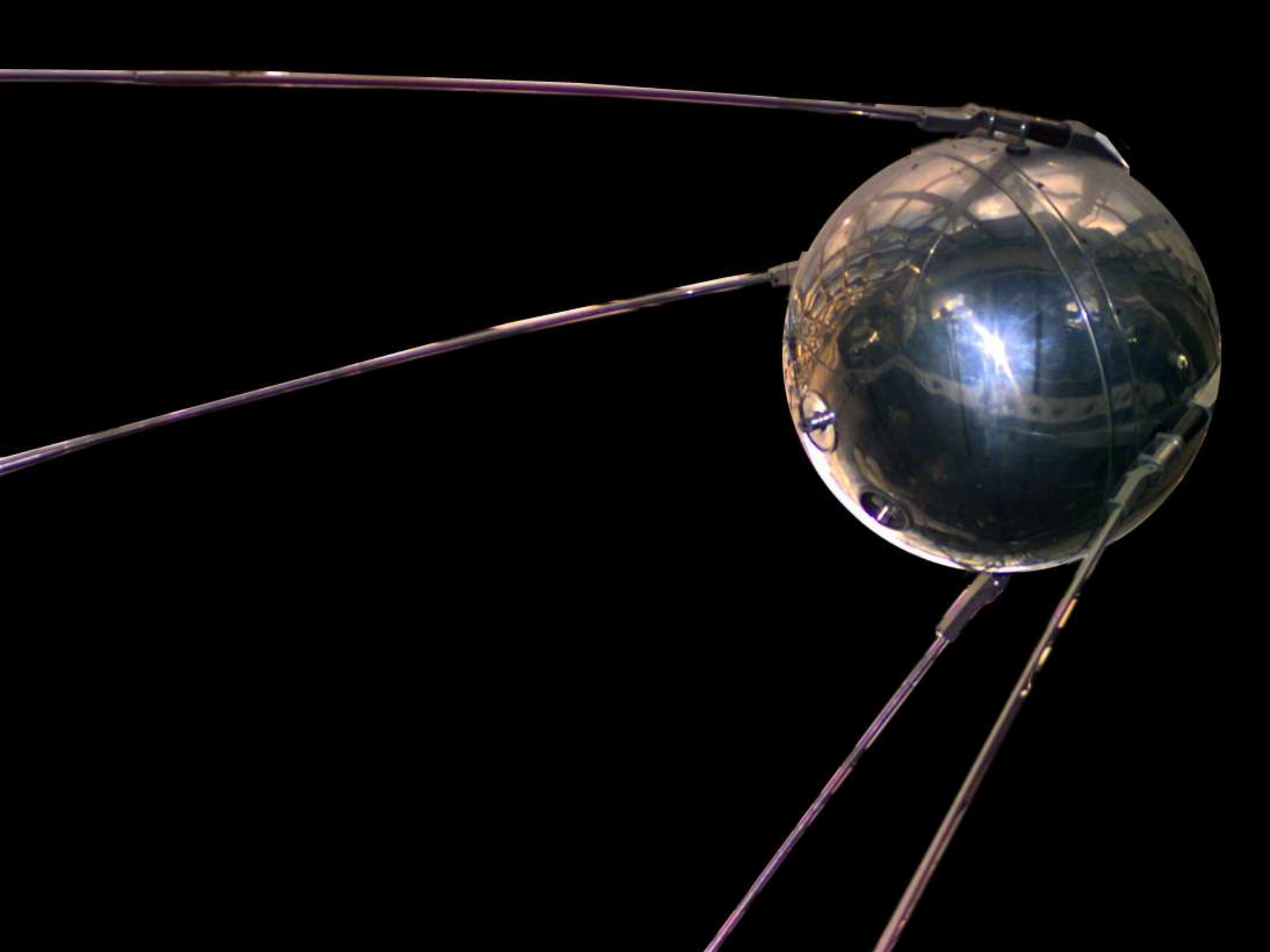
General Bernard Schriever

Feb. 19, 1957

Inaugural Air Force Office of Scientific Research Astronautics Symposium in San Diego.

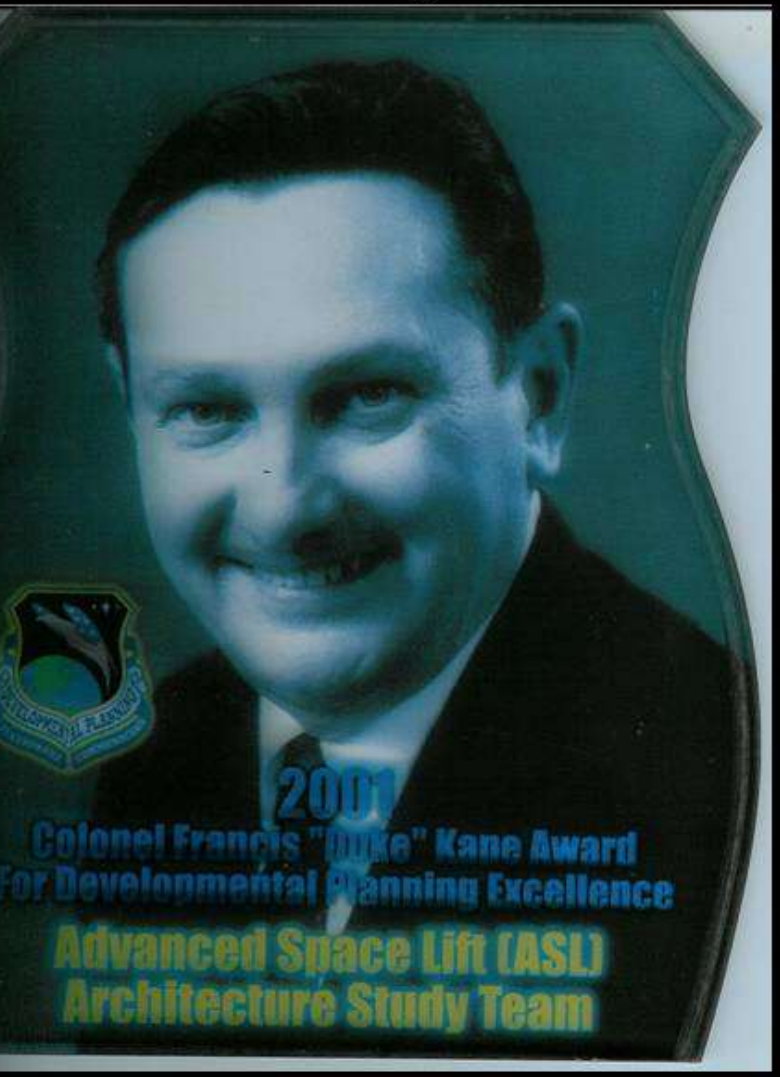
Commander of Western Development Division Headquarters

Charles Wilson



Dr. Francis Kane

founding father of GPS



Project Forecast


Globalization
STEM Education
Ecology

Here is further information presented in the chat box of the webinar:
Read Jim Brazell's comments about CTE to the President's Council of Advisors on Science and Technology

http://www.ventureramp.com/downloads/aggregateoralcomments.pdf

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

The Global Competitiveness Report 2010–2011

Klaus Schwab, World Economic Forum

THE ATLANTIC CENTURY

Benchmarking EU & U.S. Innovation and Competitiveness

February 2009

European-American Business Council

ITIF

Here is further information presented in the chat box of the webinar:
Read Jim's essay to the educational technology community titled STEM: Mainstreaming Career and Technical Education (CTE), EdNET Insight, Voice from the Industry, March 12, 2010

RISING ABOVE THE GATHERING STORM, REVISITED

Rapidly Approaching Category 5

By Members of the 2005 "Rising Above the Gathering Storm" Committee

Prepared for the Presidents of the

National Academy of Sciences

National Academy of Engineering

Institute of Medicine

NATIONAL ACADEMY OF SCIENCES,
NATIONAL ACADEMY OF ENGINEERING, AND
INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

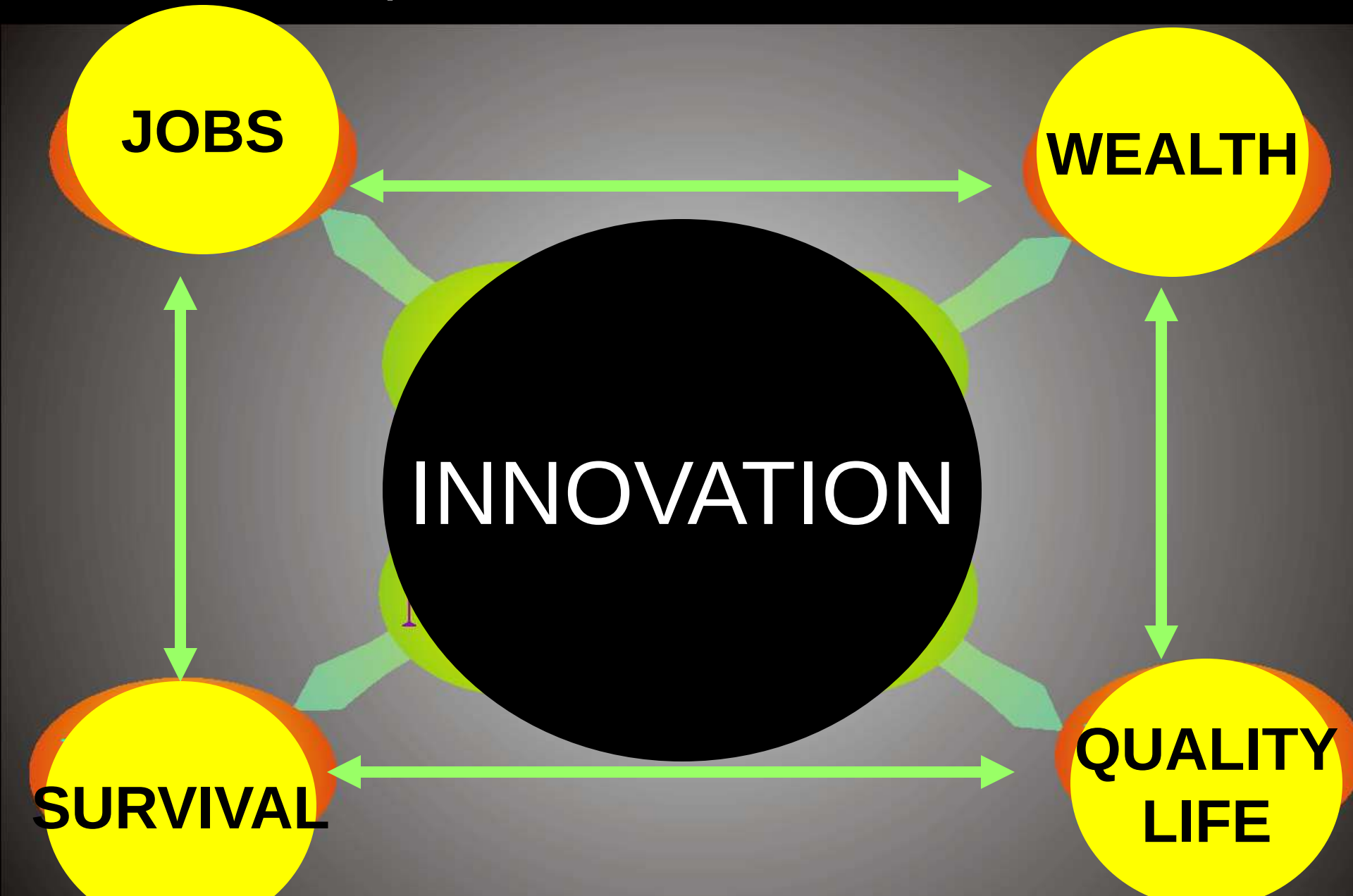
THE NATIONAL ACADEMIES PRESS
Washington, D.C.
www.nap.edu

Here is further information presented in the chat box of the webinar:

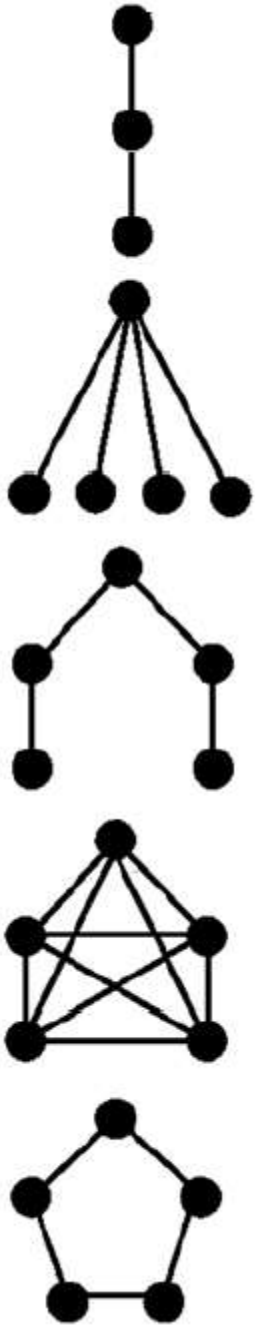
Elements of Technology 1829, Jacob Bigelow

http://books.google.com/books?id=ed8JAAAAIAAJ&printsec=frontcover&dq=elements+of+technology&source=bl&ots=xfHjkRJ8qD&sig=3hpeTU-pofnUlUnOXRs3duZ2Xbw&hl=en&ei=P3MBTejqNcOclgf42q2DCQ&sa=X&oi=book_result&ct=result&resnum=2&ved=0CB0Q6AEwAQ#v=onepage&q&f=false

The fundamental question of the 21st century is how do we organize to produce innovation and innovators?



Knowledge
Organizations
Industries
Markets
Technical Systems
Human Capital



ELEMENTS

OF

TECHNOLOGY,

TAKEN CHIEFLY FROM

A COURSE OF LECTURES

DELIVERED

AT CAMBRIDGE,

ON THE

APPLICATION OF THE SCIENCES

TO THE

USEFUL ARTS.

NOW PUBLISHED

FOR THE USE OF SEMINARIES AND STUDENTS.

BY JACOB BIGELOW, M. D.

Professor of Materia Medica, and late Rumford Professor in Harvard University; Corresponding Secretary of the American Academy of Arts and Sciences; Member of the American Philosophical Society; of the Linnean Societies of London and Paris, &c.

BOSTON.

HILLIARD, GRAY, LITTLE, AND WILKINS.

1829.

“Discovery is the process of science; invention is the work of art.”

–Jacob Bigelow, M.D., Elements of Technology 1829

1,000 MPG eq. Fuel Cell Car

Here is further information presented in the chat box of the webinar:

Learn more about Los Altos

The Los Altos Academy of Engineering is a student-run program that offers high **school** students **opportunities** to explore career paths through education, training in vocational and business skills, hands-on experience, and exposure to engineering and technology.

The Los Altos Engineering Academy has a tradition of integrating math and science curriculum with student directed engineering projects. Students apply academic knowledge to solve real-world problems. From solar and electric powered cars to human powered airplanes, students learn to use teamwork to design and construct large scale projects. Associations with Edison, Toyota, AQMD, and Boeing give students access to leading-edge technology and expertise. Cooperation with Cal Poly Pomona, Cal State LA, Cerritos College has provided academy students with access to some of the leading hydrogen technology in America.

http://www.lasv.org/index.htm

The New Face of CTE

Los Altos Academy of Engineering

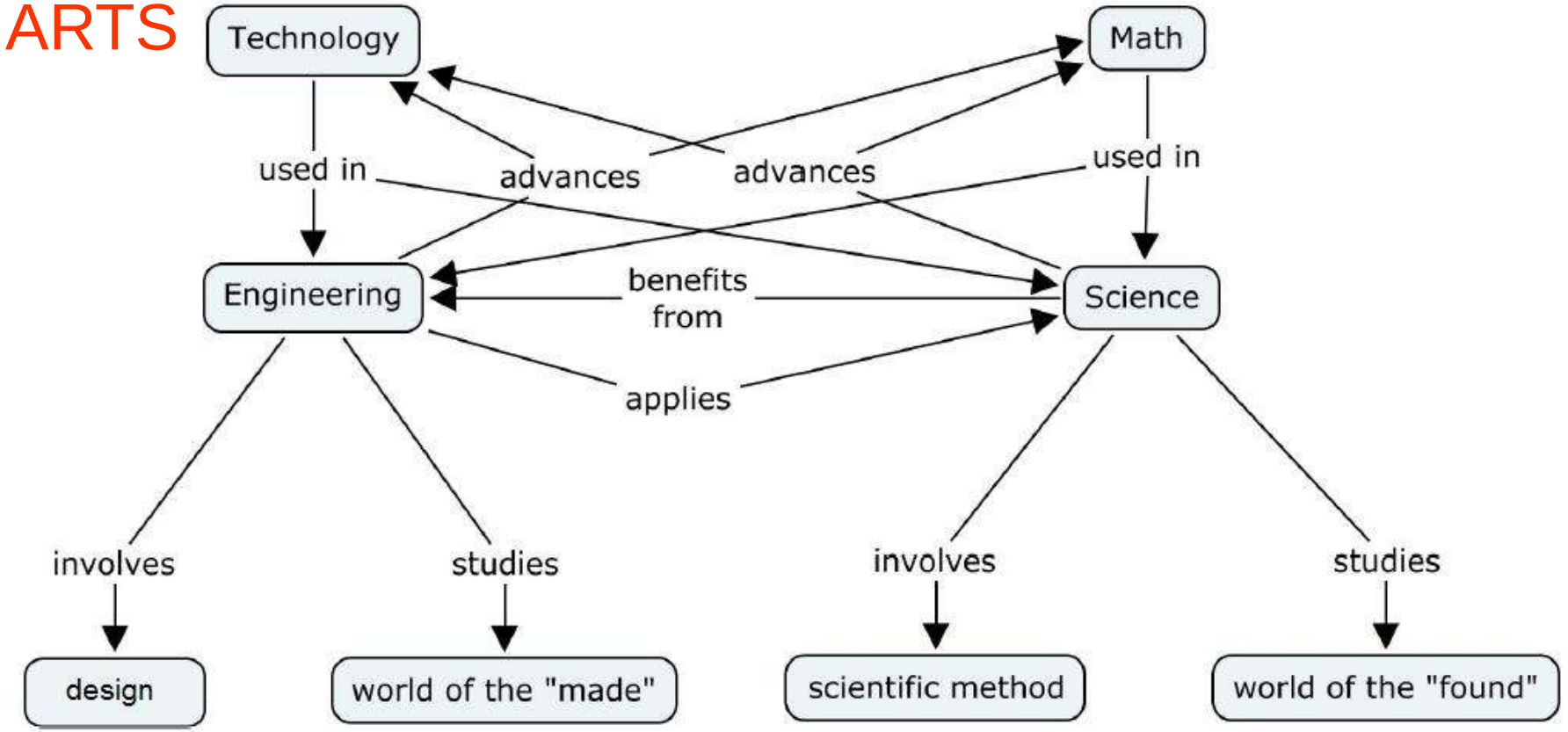
lasv.org

Dr. David Thornburg, Center for Professional Development.

"Design and Arts," adapted by Jim Brazell, 2008.

TEAMS

ARTS



October 30, 2010, Denton High School Automotive Technology Program students set a new world record of a 1/8 mile in 9.93 seconds at the National Electric Drag Racing Association's class DR/H 72 volt Dragsters. The previous record stood at 10.49 seconds in the 1/8 mile since 2002. --Denton Record Chronicle

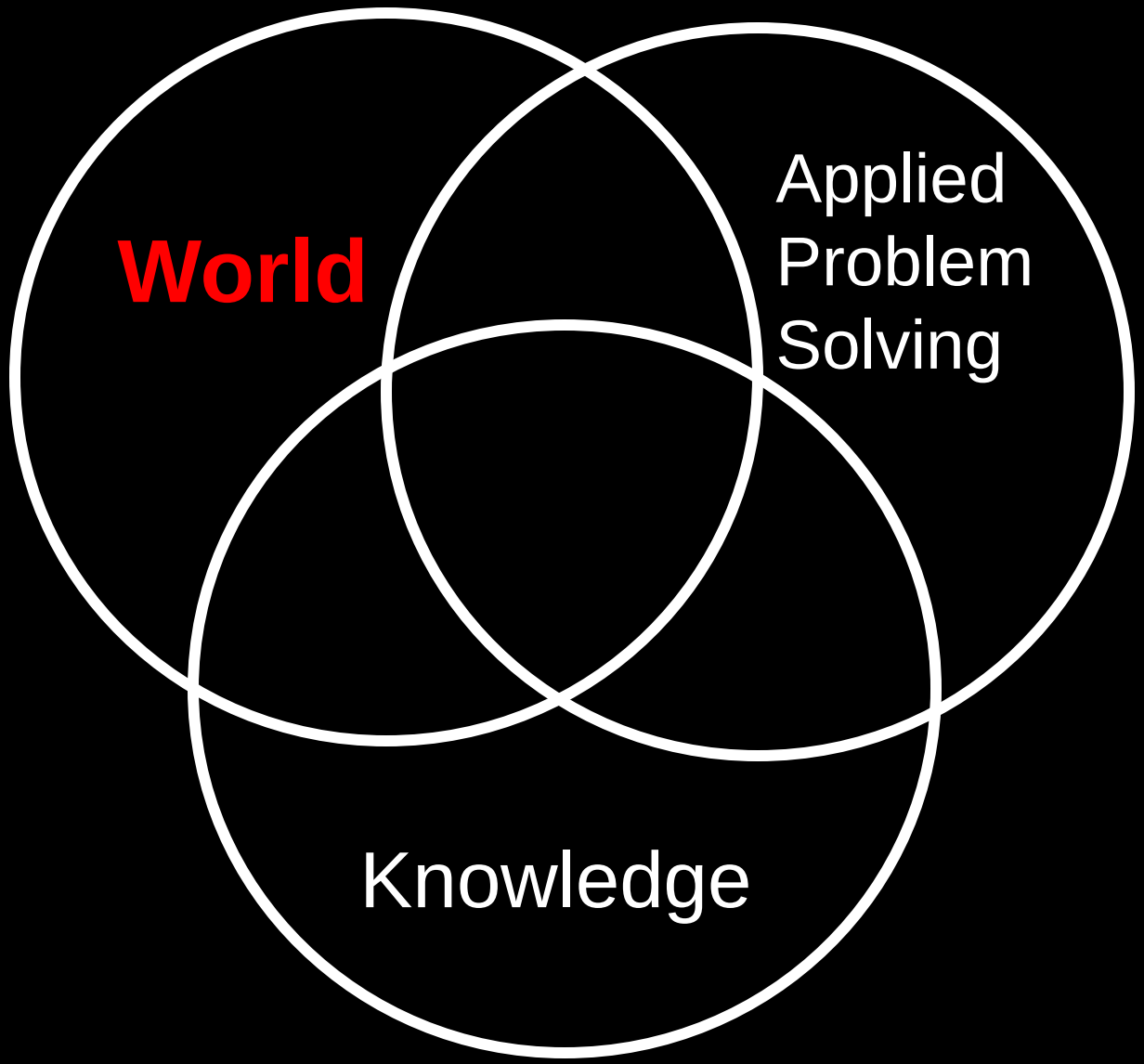
http://www.dentonrc.com/sharedcontent/utilities/clickedimage/index.html

Here is further information presented in the chat box of the webinar:

Learn more about Denton CTE programs

http://www.dentonisd.org/dentonisd/cwp/view.asp?A=3&Q=621645

The key missing literacy of the 21st century is transdisciplinarity.



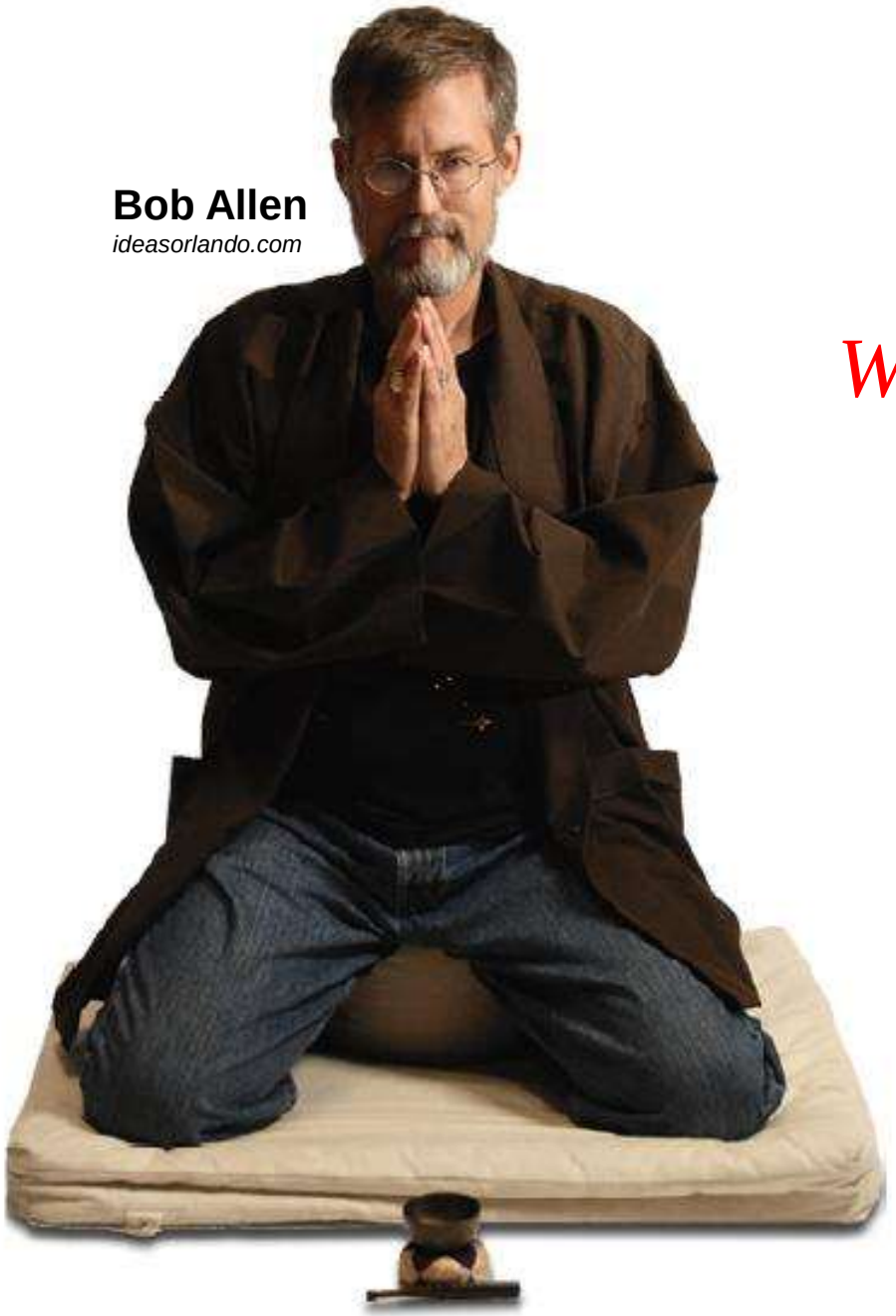
Here is further information presented in the chat box of the webinar:

Learn more about the transdisciplinary scientific and engineering society – SDPS. SDPS is seeking community college partners for joint STEM grants. Contact Jim Brazell.

http://www.sdpsnet.org/sdps/

Innovation is a function of moving beyond the disciplines, solving real world problems and integrating theory and applied techniques to create new knowledge, tools, processes, systems, environments, etc.

In a word *transdisciplinarity.*

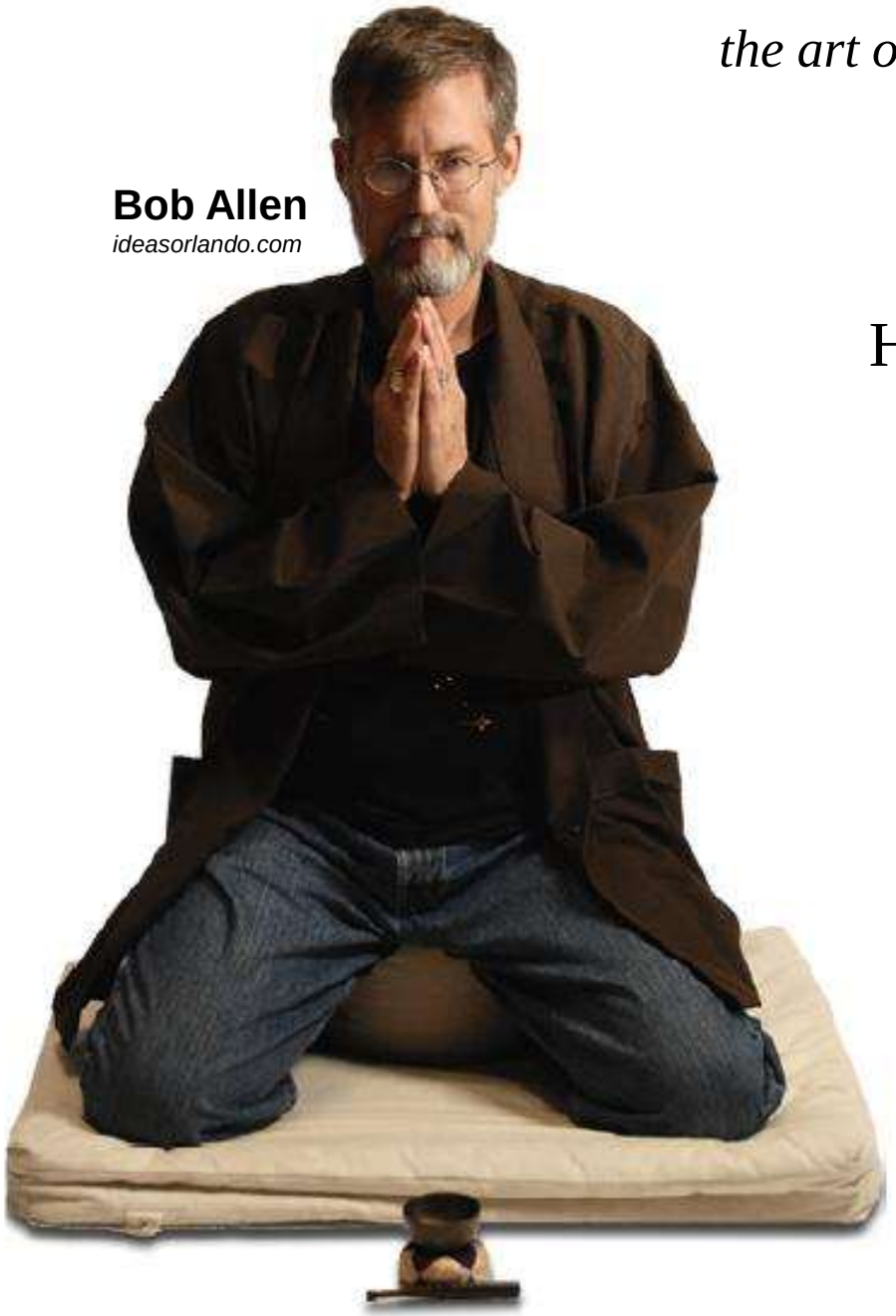


Activity #1

Write a haiku describing the ideal for how community colleges should organize learning for innovation.

Haiku

the art of it all



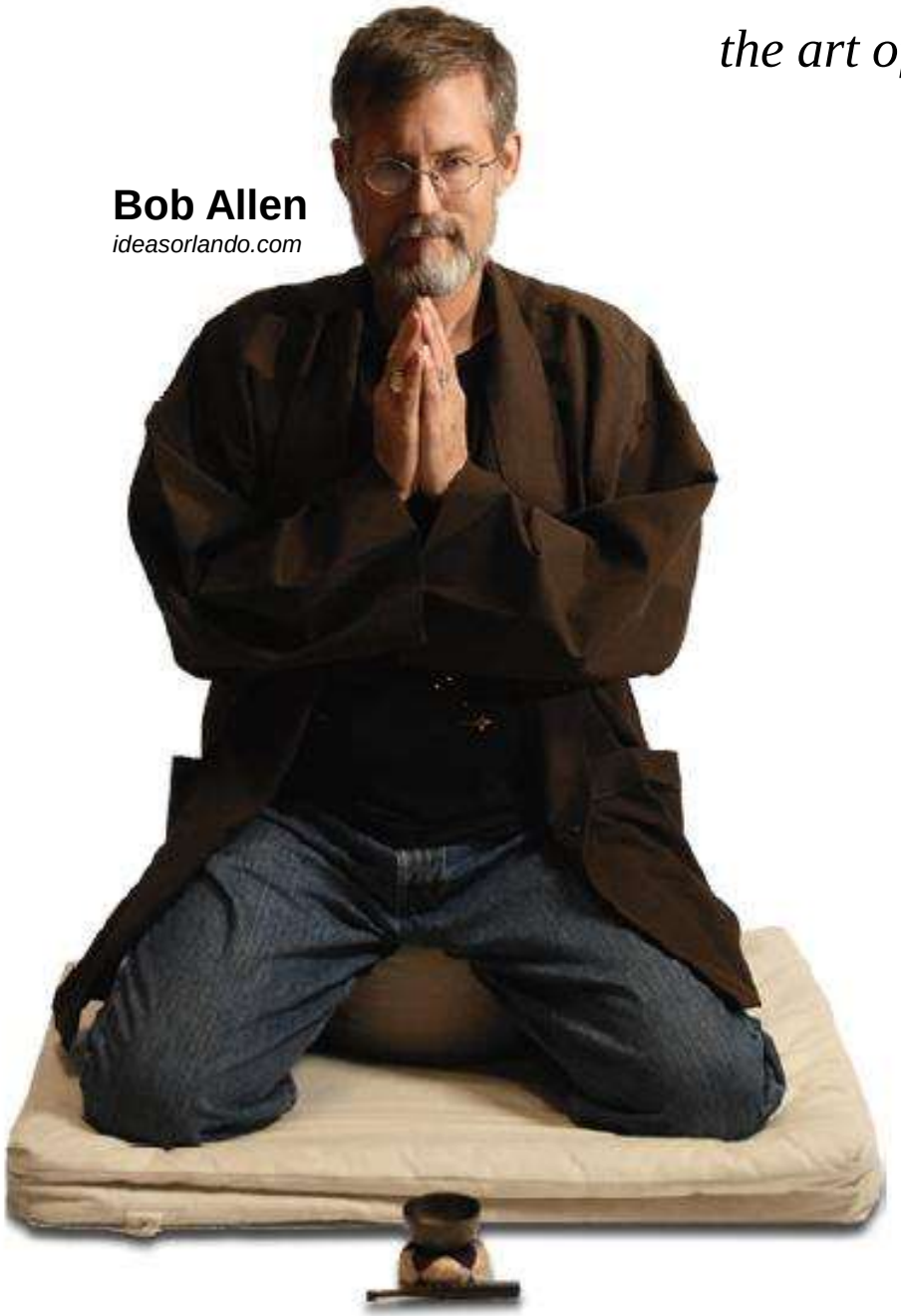
Haiku is a Japanese poem composed of three unrhymed lines of five, seven, and five syllables. Haiku usually emphasizes a season, intense emotion and vivid image designed to lead to an enlightened insight.

(5) The moment two are
(7) united they both vanish
(5) A lotus blooms here.

Murakami, Kijo. (1865-1938), Adapted by Brazell
http://www.toyomasu.com/haiku/#time

Haiku

the art of it all



Bob Allen
ideasorlando.com

Example

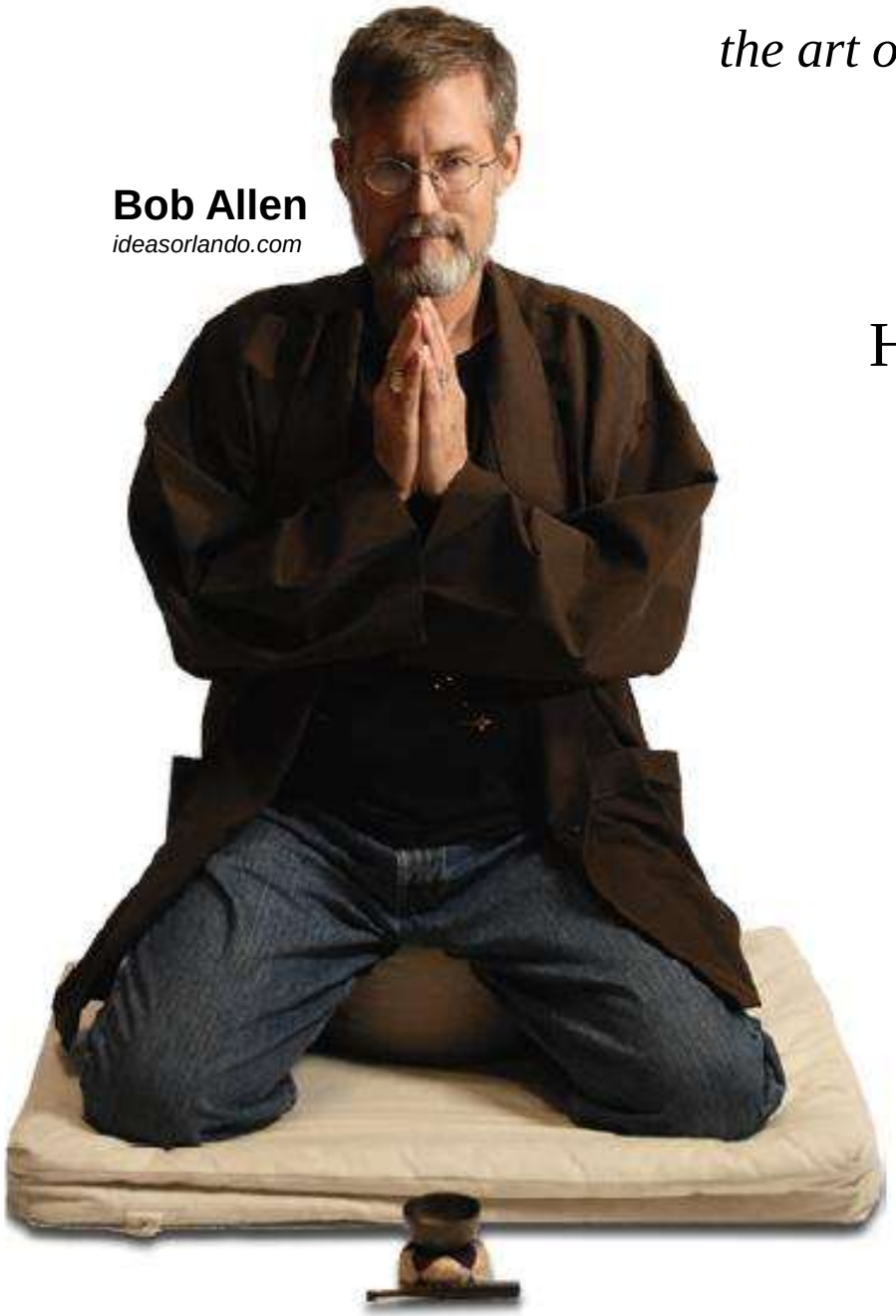
(5) Self determined child
(7) iPhone in hand all day long
(5) Educators scream

(5) All the venues merge
(7) Technology – arts – science
(5) Our future opens

(5) All instruction is
(7) Interdisciplinary
(5) Exceeding standards

Haiku

the art of it all



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STEM

The Bellwether Sounds - The Role of CTE in S.T.E.M. Education, by Jim Brazell, Consulting Analyst, The Schriever Institute, August 2008, Volume 1, Issue 2

“The conversation we are not having about S.T.E.M. reform in K-12 education today relates to the fact that science and mathematics have a place in the American K-12 education system; however, engineering, technology, and the arts are largely relegated to the nonessential (elective course curricula, few requirements for these subjects in the core curriculum, and little connectivity between these subjects and core academic subjects). The fundamental difference between technology, engineering, and arts courses is that these courses are applied in practice and not purely academic (theoretical). The placement of technology, engineering, and arts courses in a second tier track to academic learning represents a bias which inhibits American goals related to innovation and our leadership in the emerging globally integrated economy.“

http://www.nsba.org/SecondaryMenu/TLN/UsefulInformation/STEMInformationandResources/JimBrazell.aspx

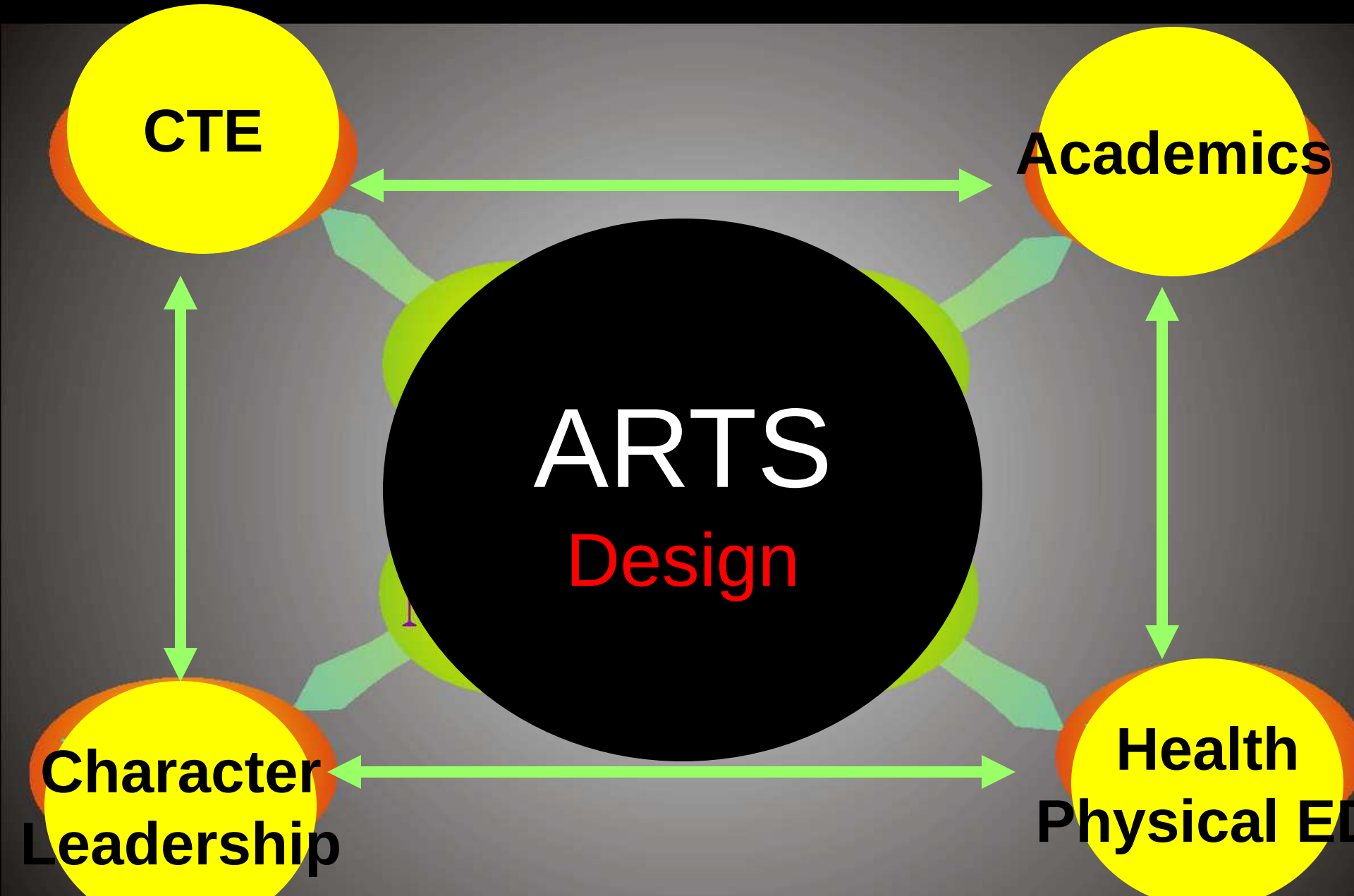
Here is further information presented in the chat box of the webinar:

Read the full article

The Bellwether Sounds - The Role of CTE in S.T.E.M. Education, by Jim Brazell, Consulting Analyst, The Schriever Institute, August 2008, Volume 1, Issue 2

http://www.nsba.org/SecondaryMenu/TLN/UsefulInformation/STEMInformationandResources/JimBrazell.aspx

The fundamental question of the 21st century is how do we organize to produce innovation and innovators?



How can we understand where technology is going?

What are the key requirements of 21st century jobs?

What does educational innovation look like?

How many of you have a cell phone in your pocket?

Nokia Research Center, Helsinki Finland in MIT Technology Review

http://geeklit.blogspot.com/2007_03_01_archive.html

http://www.nasa.gov/multimedia/

In historic shift, smartphones, tablets to overtake PCs

Perils ahead for vendors who can't adapt to market shift, IDC says
Computer World, Dec. 6, 2010

"IDC said worldwide shipments this year of app-enabled devices, which include smartphones and media tablets such as the iPad, will reach 284 million. In 2011, makers will ship 377 million of these devices, and in 2012, the number will reach 462 million shipments, exceeding PC shipments. One shipment equals one device.

For PCs, IDC is forecasting 356 million PC shipments this year and 402 million in 2011. In 2012, there will be 448MM shipments."

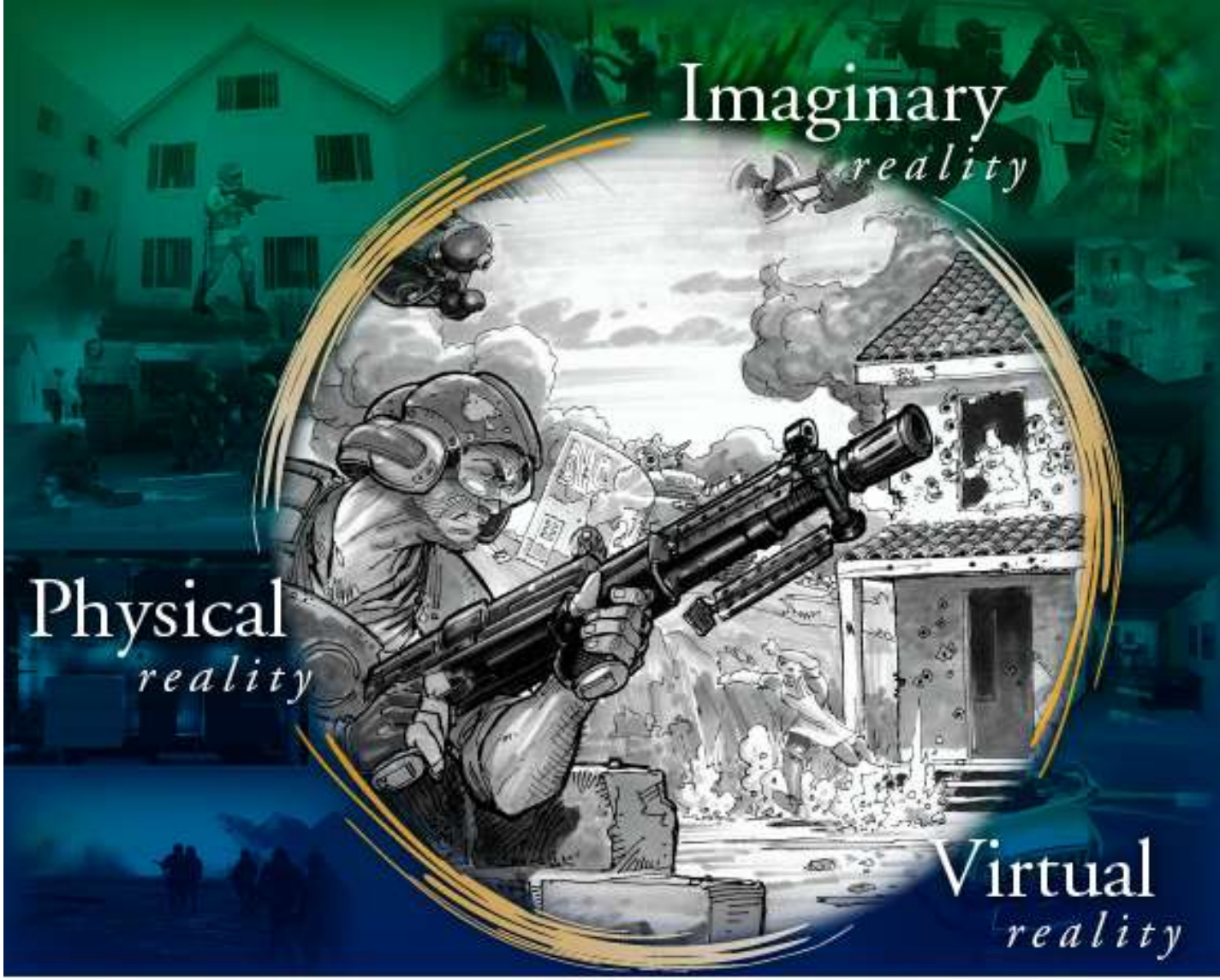
http://www.computerworld.com/s/article/9199918/In_historic_shift_smartphones_tablets_to_overtake_PCs


Tourist
Special
£25!
Temperature 10°
Pollen Level: Low
3 messages
1 priority message

Mixed Reality


Pacman 1 Details:
Wealth 24
Life
Message:
Request Update:
Nearby Ingredient
Nearby Ghost
Yaw
115.6300
Pitch
0.7800
Roll
3.8600
Pacman 2
Status: Normal
Position:

Through mixing realities, research is expanding the potential of embedded training in the field and in battle labs to provide integrated training anytime, anywhere. Advancements are being transferred across industries from business prototypes to hospitality training. Integrated research in tracking, registration, rendering, display, and scenario delivery are **expanding the possibilities of CONSTRUCTIVE simulation as well as after action review, and command and control visualizations.**



Enhancing Military Operations in Urban Terrain (MOUT) with Mixed Reality and Theme Park Techniques

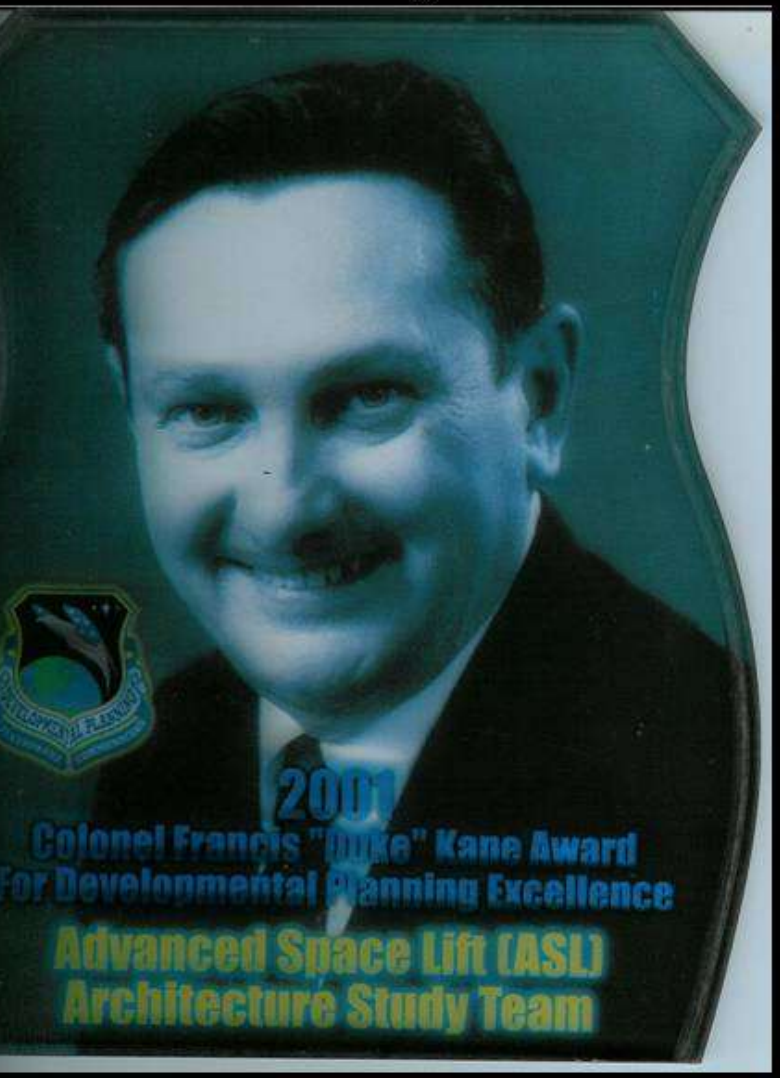
Mixed Reality & Training

University of Central Florida

http://thewere42.wordpress.com/2009/07/15/augmented-reality-ar-will-it-change-your-life-tech-world-says-yes/

Dr. Francis Kane

founding father of GPS



"The path of technological innovation is knowable at least several decades in advance of the future. It is simply not true that we can not determine the structure, path and strategy of technology for planning and operations. All we have to do is lift our eyes up from the ground to look over the horizon."

October 23, 2010

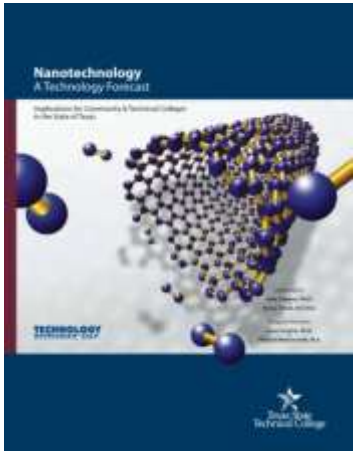
Here is further information presented in the chat box of the webinar:

Learn more about Dr. Duke Kane, Father of GPS and Jim Brazell's mentor

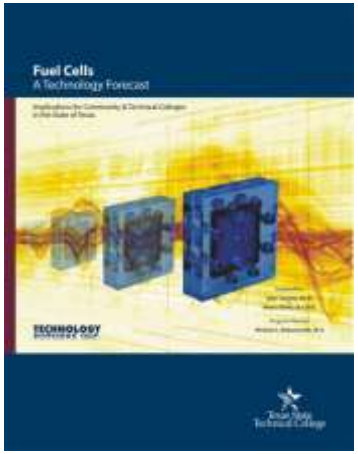
http://www.speedoflightgen.com/

Forecasting.TSTC.edu

Nanotechnology

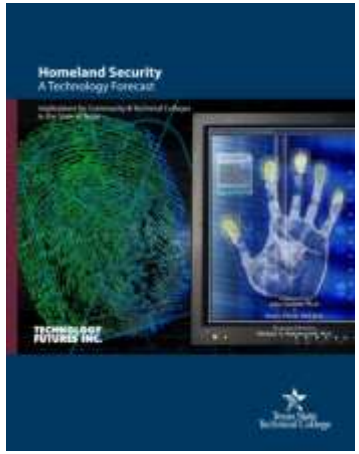


Fuel Cells



Digital Games

Homeland Security



ADM, Hybrid, MEMS, Computer Forensics

Wireless: M2M

Biotechnology

Home Technology Integration

Mechatronics

Here is further information presented in the chat box of the webinar:

Explore TSTC forecasts and free tech briefs

http://**Forecasting.TSTC.edu**

Body Net: Wearable Network Computer

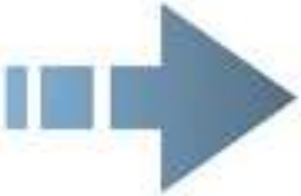
Brazell, 1998, World Book Fair, Singapore

the invisible train

Brazell, NCWE, 10.21.2005

Vienna University of Technology

Players operate track switches and adjusting the speed of virtual trains to prevent virtual trains from colliding. Researchers Daniel Wagner, Thomas Pintaric and Dieter Schmalstieg

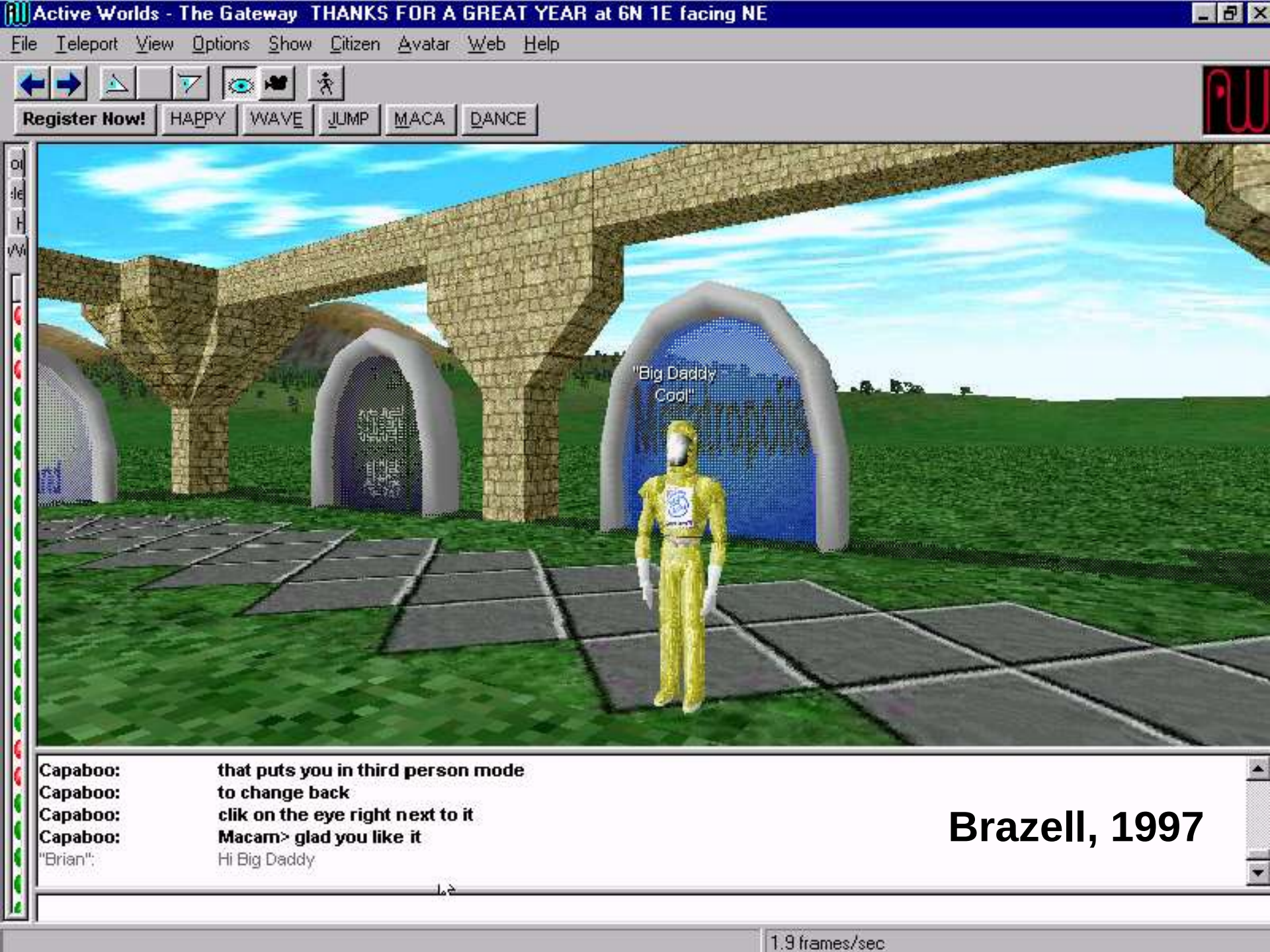



Tourist
Special
£25!
Temperature 10°
Pollen Level: Low
3 messages
1 priority message

Brazell,
NCWE,
10.21.2005

New
HCI &
HSI

Kinect – You are the controller


Active Worlds - The Gateway THANKS FOR A GREAT YEAR at 6N 1E facing NE
File Teleport View Options Show Citizen Avatar Web Help
Register Now! HAPPY WAVE JUMP MACA DANCE
"Big Daddy"
Cool"
Capaboo: that puts you in third person mode
Capaboo: to change back
Capaboo: clik on the eye right next to it
Capaboo: Macam> glad you like it
"Brian": Hi Big Daddy
Brazell, 1997
1.9 frames/sec

Constructivist Learning Enviornment

① Content is organized around a specific community of interest or knowledge domain.

② 2-way communication channels promote relationships and knowledge transfer.

③ Digital manipulatives provide tools to "learn by doing."

④ Construtivist tools allow community members to build, govern, and manage their enviornment.

Brazell, 1997

CyberDesic

XBOX 360

In 1994 a single super computer with the power of an X-box did not exist.

USC ISI and Tactical Language Training

(ITSEC 2005)

"While we tend to focus on simulators associated with our flying mission such as aircrew training, air traffic control and aircraft maintenance ... the fact is simulators permeate every aspect of qualification training in the United States Air Force, as well as the other military services," General Rice said.

An array of simulation systems supporting all of the military services, first responders, the Department of Homeland Security and the health care industry were on display across some 220,000 square feet of floor space. The environments featured technologies to enhance capabilities ranging from irregular warfare to casualty care and serious games.

Here is further information presented in the chat box of the webinar:

Read about Jim’s impact in the K-12 educational technology community related to video games and learning

Gaming is the future of classroom instruction: FETC 'eye opening' keynote speaker Jim Brazell stresses the importance that gaming will soon have in K-12 classrooms,
Saturday, Jan 24, 2009, By Maya T. Prabhu, Assistant Editor, eSchool News
Immersive Gameplay: The Future of Education? Jim Brazell Discuses Serious Games and Education at Florida Education Technology Conference,
Saturday, Jan 24, 2009, By Chris Riedel,
Technological Horizons in Education (THE) Journal
Thinking games: The next generation of e-learning: Jim Brazell discusses STEM and Educational Technologies including Video games, Virtual Worlds and Mixed Reality,
March 29-April 1, 2008, Conference Daily for the 2008 NSBA Annual Conference, Orange County Convention Center Orlando, Florida

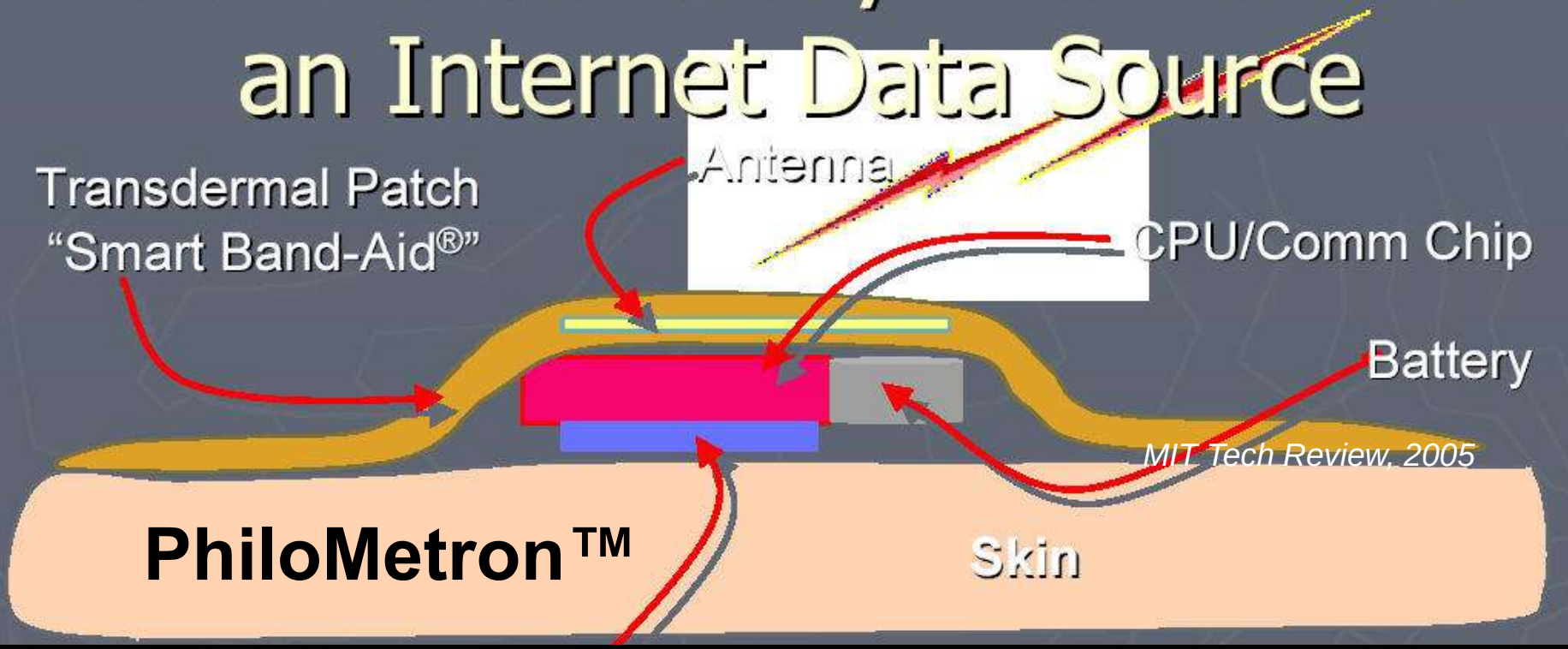
Whyville.net

Emergence of a new class of computing

4th generation computing is a class of Information and Computing Technology (ICT) that combines computer, communication and power technologies to enable remote human and machine interaction with physical, chemical, biological and neurological systems, processes and environments.

--M2M: The Wireless Revolution, 2005

The Human Body Will Become an Internet Data Source



Sensors	Actuators
Physical	Physical
Chemical	Chemical
Biological	Biological

monitors heart rate, respiratory rate, bodily fluids, and overall activity

http://medgadget.com/archives/2010/01/corventis_gets_us_ok_for_wireless_cardiac_arrhythmia_monitoring_system.html

MedApps HealthPAL

http://www.flickr.com/photos/timgee/3533875453/sizes/o/in/photostream/

Pacemakers and Implantable Cardiac Defibrillators: Software Radio Attacks and Zero-Power Defenses

Daniel Halperin[†]
University of Washington

Thomas S. Heydt-Benjamin[†]
University of Massachusetts Amherst

Benjamin Ransford[†]
University of Massachusetts Amherst

Shane S. Clark
University of Massachusetts Amherst

Benessa Defend
University of Massachusetts Amherst

Will Morgan
University of Massachusetts Amherst

Kevin Fu, PhD[*]
University of Massachusetts Amherst

Tadayoshi Kohno, PhD[*]
University of Washington

William H. Maisel, MD, MPH[*]
BIDMC and Harvard Medical School

Abstract—**Our study analyzes the security and privacy properties of an implantable cardioverter defibrillator (ICD). Introduced to the U.S. market in 2003, this model of ICD includes pacemaker technology and is designed to communicate wirelessly with a nearby external programmer in the 175 kHz frequency range. After partially reverse-engineering the ICD's communications protocol with an oscilloscope and a software radio, we implemented several software radio-based attacks that could compromise patient safety and patient privacy. Motivated by our desire to improve patient safety, and mindful of conventional trade-offs between security and power consumption for resource-constrained devices, we introduce three new zero-power defenses based on RF power harvesting. Two of these defenses are human-centric, bringing patients into the loop with respect to the security and privacy of their implantable medical devices (IMDs). Our contributions provide a scientific baseline for understanding the potential security and privacy risks of current and future IMDs, and introduce human-perceptible and zero-power mitigation techniques that address those risks. To the best of our knowledge, this paper is the first in our community to use general-purpose software radios to analyze and attack previously unknown radio communications protocols.**

1. Introduction

Wirelessly reprogrammable *implantable medical devices* (*IMDs*) such as *pacemakers*, *implantable cardioverter defibrillators* (*ICDs*), *neurostimulators*, and implantable *drug pumps* use embedded computers and radios to monitor chronic disorders and treat patients with automatic therapies. For instance, an ICD that senses a rapid heartbeat can administer an electrical shock to restore a normal heart rhythm, then later report this event to a health care practitioner who uses a *commercial device programmer*[1] with wireless capabilities to extract data from the ICD or modify its settings without surgery. Between 1990 and 2002, over 2.6 million pacemakers and ICDs were implanted in patients in the United States [19]; clinical trials have shown that these devices significantly improve survival rates in certain populations [18]. Other research has discussed potential security and privacy risks of IMDs [1], [10], but we are unaware of any rigorous public investigation into the observable characteristics of a real commercial device. Without such a study, it is impossible for the research community to assess or address the security and privacy properties of past, current, and future devices. We address that gap in this paper and, based on our findings, propose and implement several prototype attack-mitigation techniques.

Our investigation was motivated by an interdisciplinary study of medical device safety and security, and relied on a diverse team of area specialists. Team members from the security and privacy community have formal training in computer science, computer engineering, and electrical engineering. One team member from the medical community is a practicing cardiologist with hundreds of pacemaker and implantable defibrillator patients and was past chairperson of the FDA's Circulatory System Medical Device Advisory Panel. Our technical contributions toward understanding and improving the security, privacy, and safety of these devices include: analyses; software radio-based methodologies; and human-perceptible and zero-power (battery-free) defenses.

Overview of contributions. We assess the security and privacy properties of a common ICD and present attacks on privacy, integrity, and availability. We show that the ICD discloses sensitive information in the clear (unencrypted); we demonstrate a *reprogramming* attack that changes the operation of (and the information contained in) the ICD; and

[*]Corresponding faculty authors:

- Kevin Fu, Medical Device Security Center, Department of Computer Science, University of Massachusetts Amherst, 140 Governors Drive, Amherst, Massachusetts 01003 (kevinfu@cs.umass.edu);
- Tadayoshi Kohno, Medical Device Security Center, Department of Computer Science and Engineering, University of Washington, Box 352350, Seattle, Washington 98195 (yoshi@cs.washington.edu);
- William H. Maisel, Medical Device Safety Institute, Beth Israel Deaconess Medical Center, Harvard Medical School, 185 Pilgrim Road, Baker 4, Boston, MA 02215 (wmaisel@bidmc.harvard.edu).

Additional information online at http://www.secure-medicine.org.

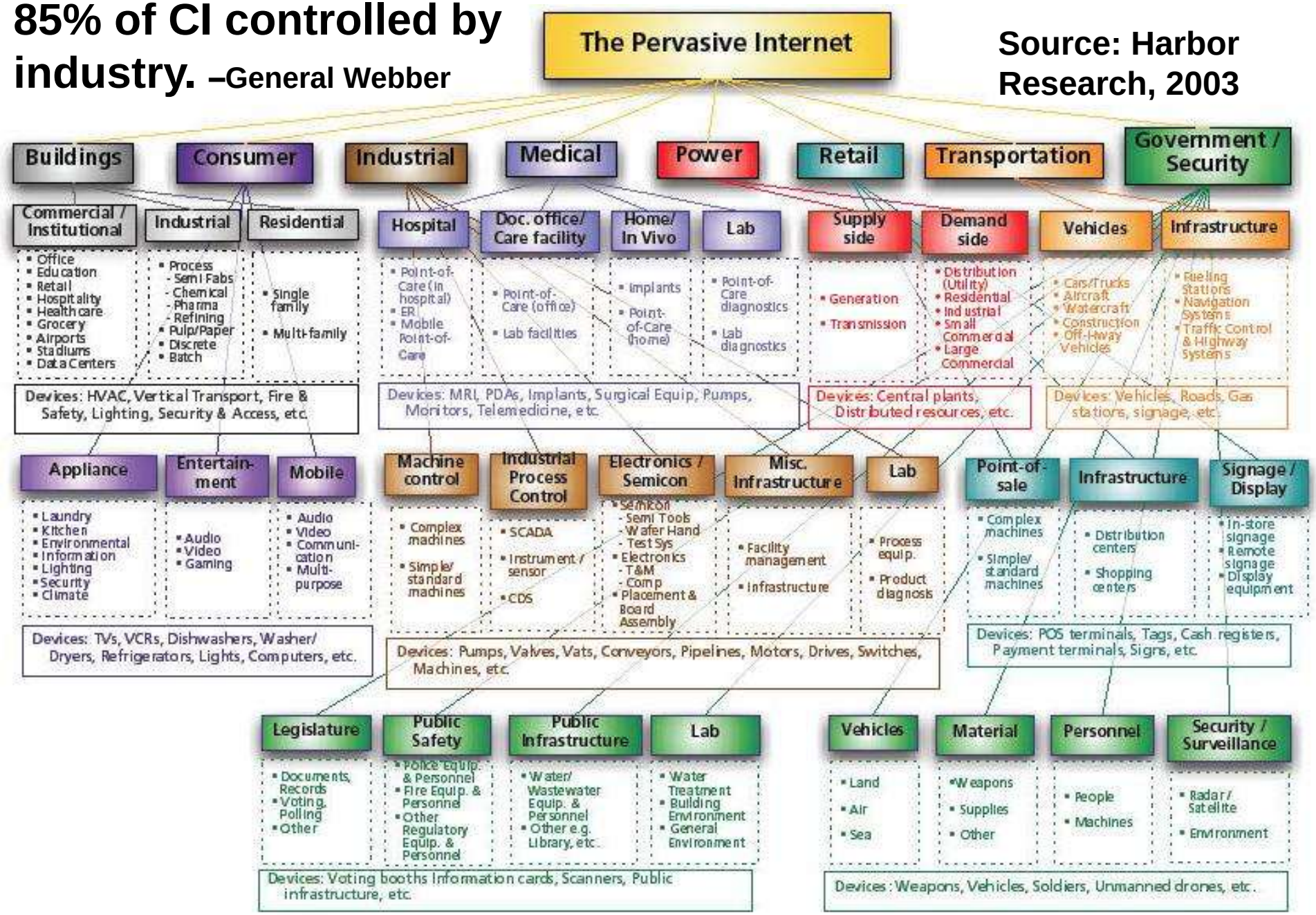
[†]Co-student leads listed in alphabetical order; each participated equally.

[1]The reader should not confuse the term "device programmer" with a person who programs computers. The former is an external device that communicates with and adjusts the settings on an IMD.

“Every 15 seconds a new life form is released on the Internet.”

--Dr. Fred Chang, University of Texas San Antonio

85% of CI controlled by industry. –General Webber



Source: Harbor Research, 2003

A Human Capital Crisis in Cybersecurity

Technical Proficiency Matters

A White Paper of the
CSIS Commission on Cybersecurity for the 44th Presidency

COCHAIRS
Representative James R. Langevin
Representative Michael T. McCaul
Scott Charney
Lt. General Harry Raduege, USAF (ret.)

PROJECT DIRECTOR
James A. Lewis

July 2010

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

Here is further information presented in the chat box of the webinar:

Learn about Jim’s speech to the Armed Forces Communications and Electronics Association CYBER SECURITY Conference

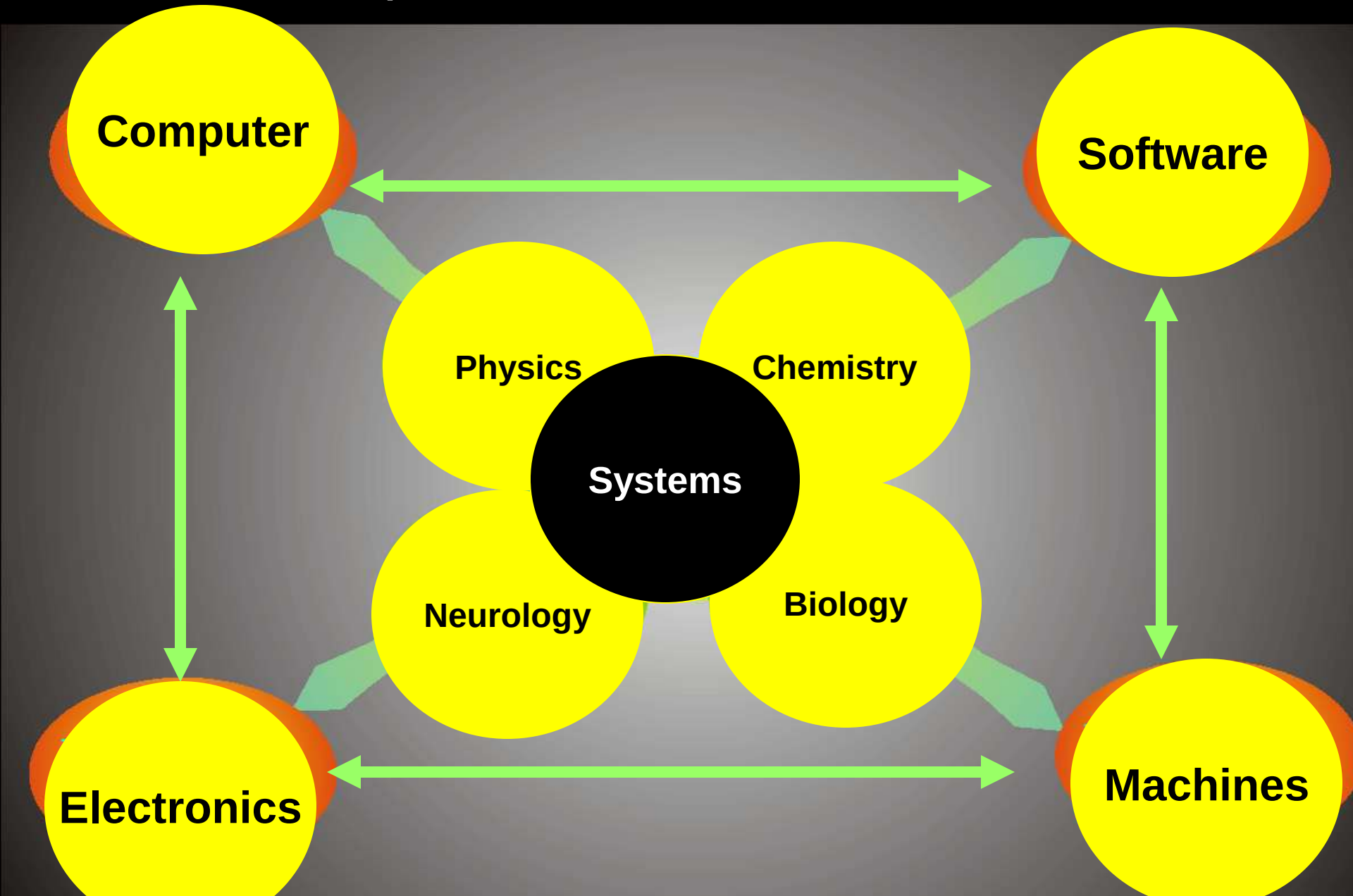
Cybersecurity networking in S.A., By Jason Buch - Express-News Web
Posted: 11/04/2010 6:27 PM CDT

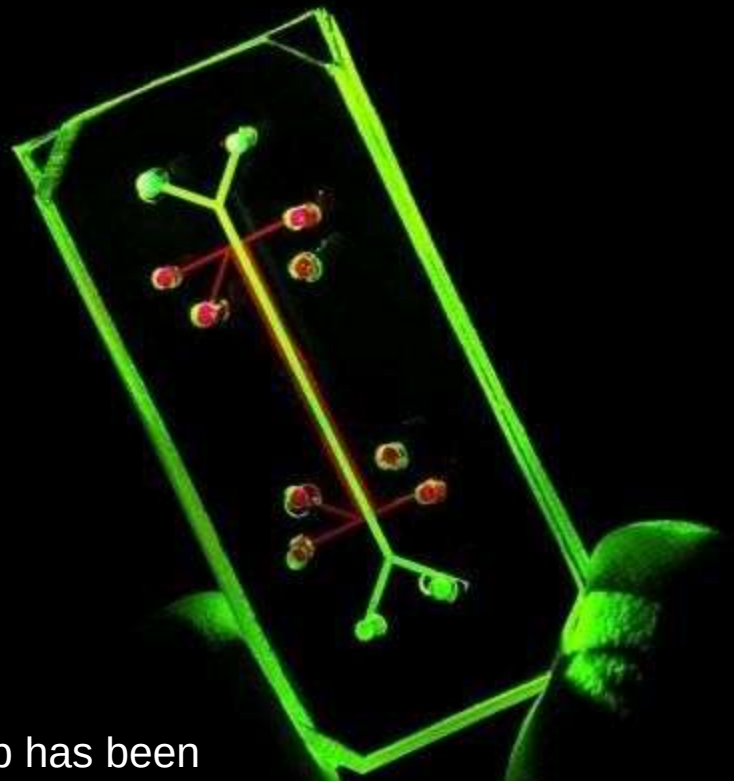
"The cyber threat to the United States affects all aspects of society, business, and government, but there is neither a broad cadre of cyber experts nor an established cyber career field to build upon, particularly within the Federal Government. [Using an] airplane analogy, we have a shortage of 'pilots' (and 'ground crews' to support them) for cyberspace." ***(Center for Strategic and International Studies, Report of the Commission on Cybersecurity for the 44th Presidency, December 2008)***

"I cannot get the technical security people I need." ***(Gen. Charles Croome, Commander, Joint Task Force - Global Network Operations, in response to a question from a CSIS Commissioner asking what is the most critical problem he faces in meeting the growing cyber challenge. May 28, 2008)***

"There are about 1,000 security people in the US who have the specialized security skills to operate effectively in cyberspace. We need 10,000 to 30,000." ***(Jim Gosler, Sandia Fellow, NSA Visiting Scientist, and the founding Director of the CIA's Clandestine Information Technology Office, October 3, 2008.)***

The fundamental question of the 21st century is how do we organize to produce innovation and innovators?





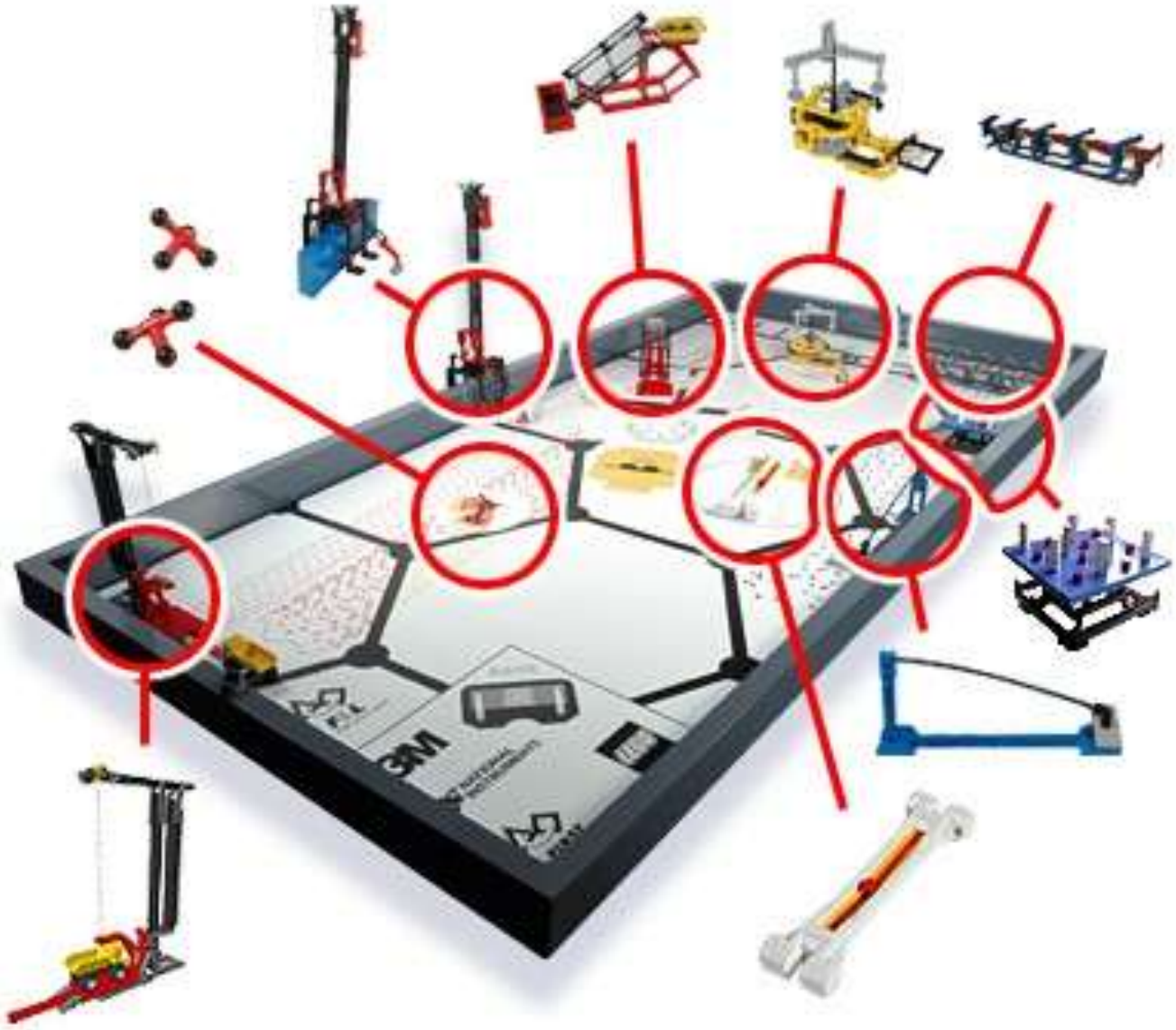
A living, breathing lung-on-a-chip has been developed. As well as mimicking the cellular structure of the lung, the chip copies its behavior too: it can "breathe.“ About the size of a rubber eraser, the device was developed by a team from the Wyss Institute for Biologically Inspired Engineering at Harvard University, Harvard Medical School and Children's Hospital Boston.

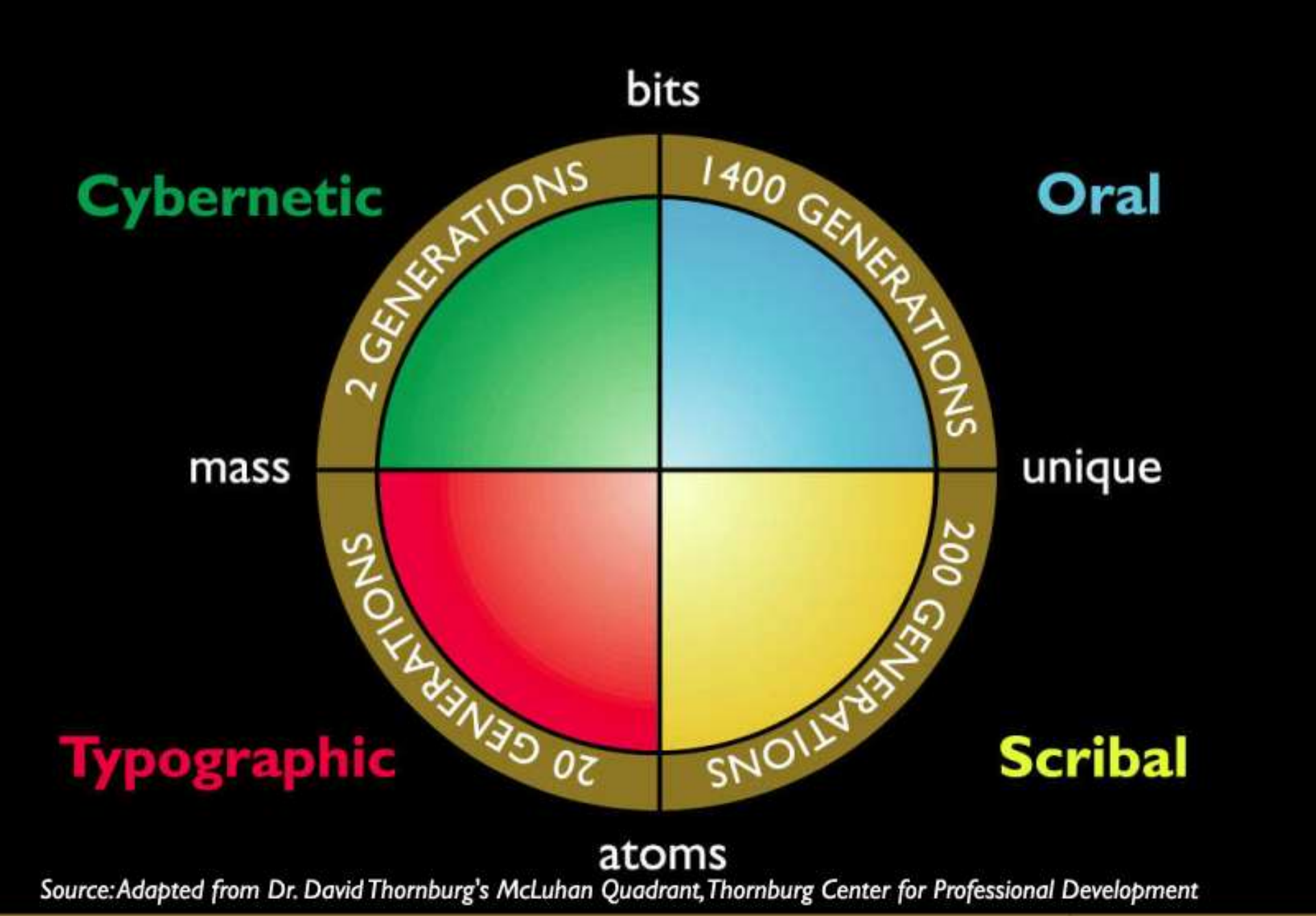
http://www.newscientist.com/article/dn19085-lungonachip-points-to-alternative-to-animal-tests.html

2006 NANO QUEST CHALLENGE

FIRST LEGO®
LEAGUE

Over 80,000 middle-school students in 34 countries participate in the Nano Quest Challenge.





Source: Adapted from Dr. David Thornburg's McLuhan Quadrant, Thornburg Center for Professional Development

How can we understand where technology is going?

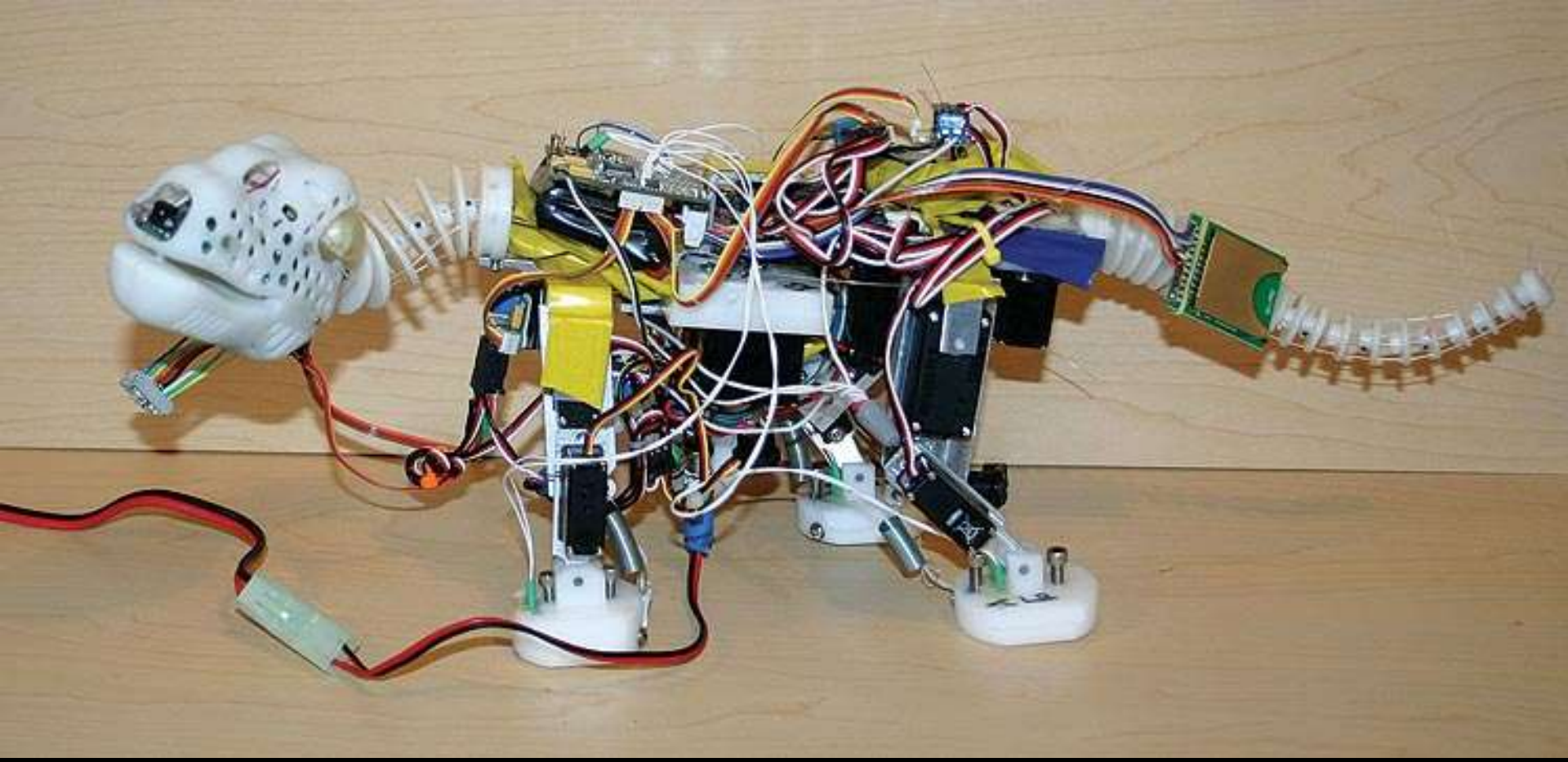
What are the key requirements of 21st century jobs?

What does educational innovation look like?

Robots are now part of the fabric of 21st century life, work and play.

PLEO

http://www.camarasaur.us/alloria/gallery/view_image.one?photo_id=13532351



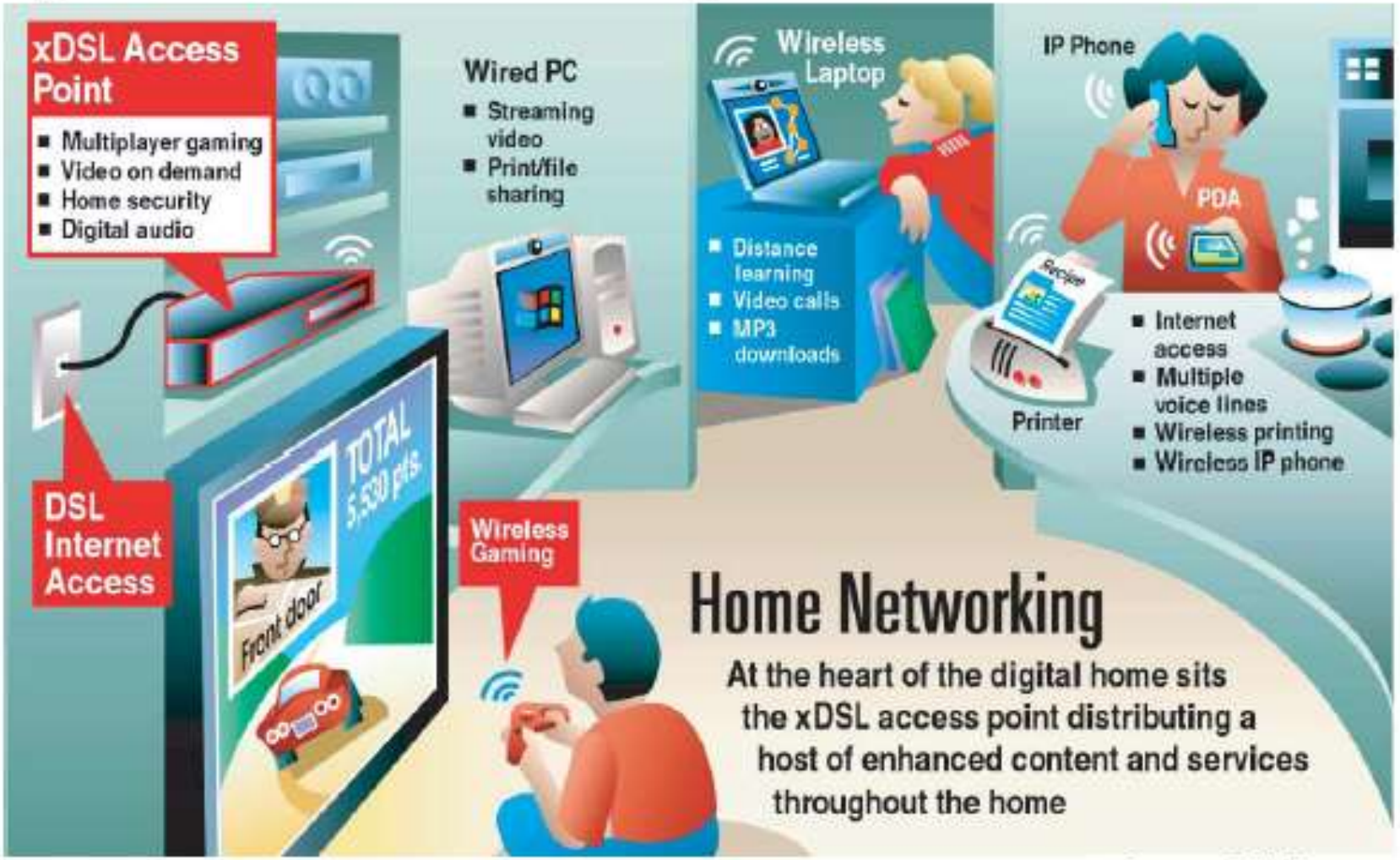
“A robotic life form with an evolving Personality.”

--Ugobe PLEO by Tom Atwood, ROBOT Spring 2008

http://www.camarasaur.us/alloria/gallery/view_image.one?photo_id=13532351

Home Technology

Figure 13 Wireless home networking



Source: DSL Forum

Automotive navigation & driver info $655 MM (2002) $1.7 B (2006) (VDC).

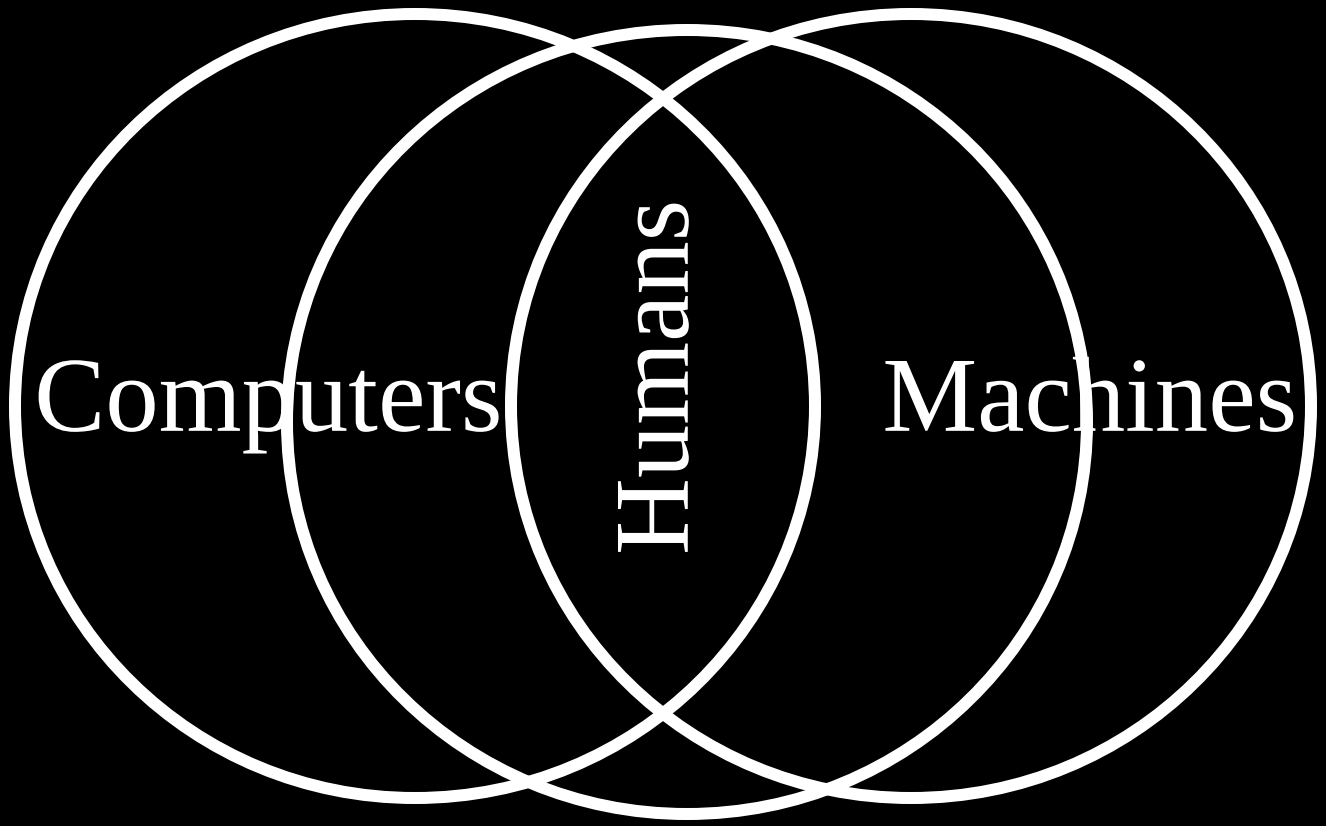
Auto telematics $2.7 B (2001) to $10.7 B (2005) (Allied Business Intell.)

TELEMATICS

SwRI Transguide

http://www.teradyne-ds.com/telematics/telematics01a.htm
http://www.itsdocs.fhwa.dot.gov/JPODOCS/REPTS_TE/13599.html

Work



Wesley Medical Center,
Butler Community College
April 7 to 11, 2008

GM Train

Butler Community College
April 7 to 11, 2008

Spirit AeroSystems

"1,000 workers a year needed for the aerospace cluster… 2,000 plus when we are on the up side."

--Jeff Turner, CEO

D-J Engineering

Engineering Design

$50K - $180K

Machinists & Sheet Metal

$22K - $42K

--Razaul A. Chowdhury, President

Butler Community College
April 7 to 11, 2008

Job Mergers - Wind Turbine

Lineman

Oil Field

Farm Mechanic

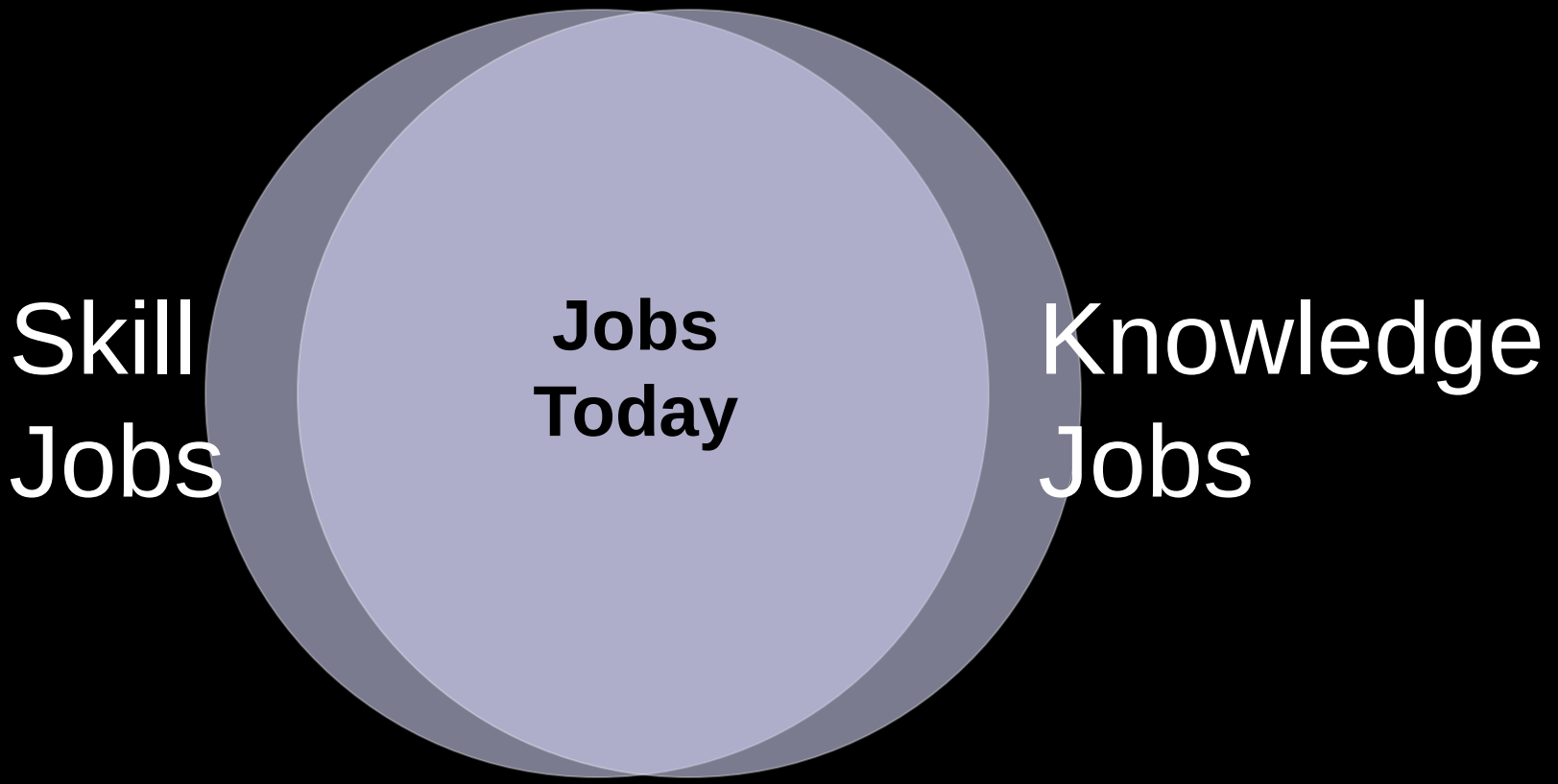
11.1.2006, TSTC West TX, Sweetwater

“In this plant, in the next three years we will need nine Instrumentation and Numerical Control (INC) technicians.”

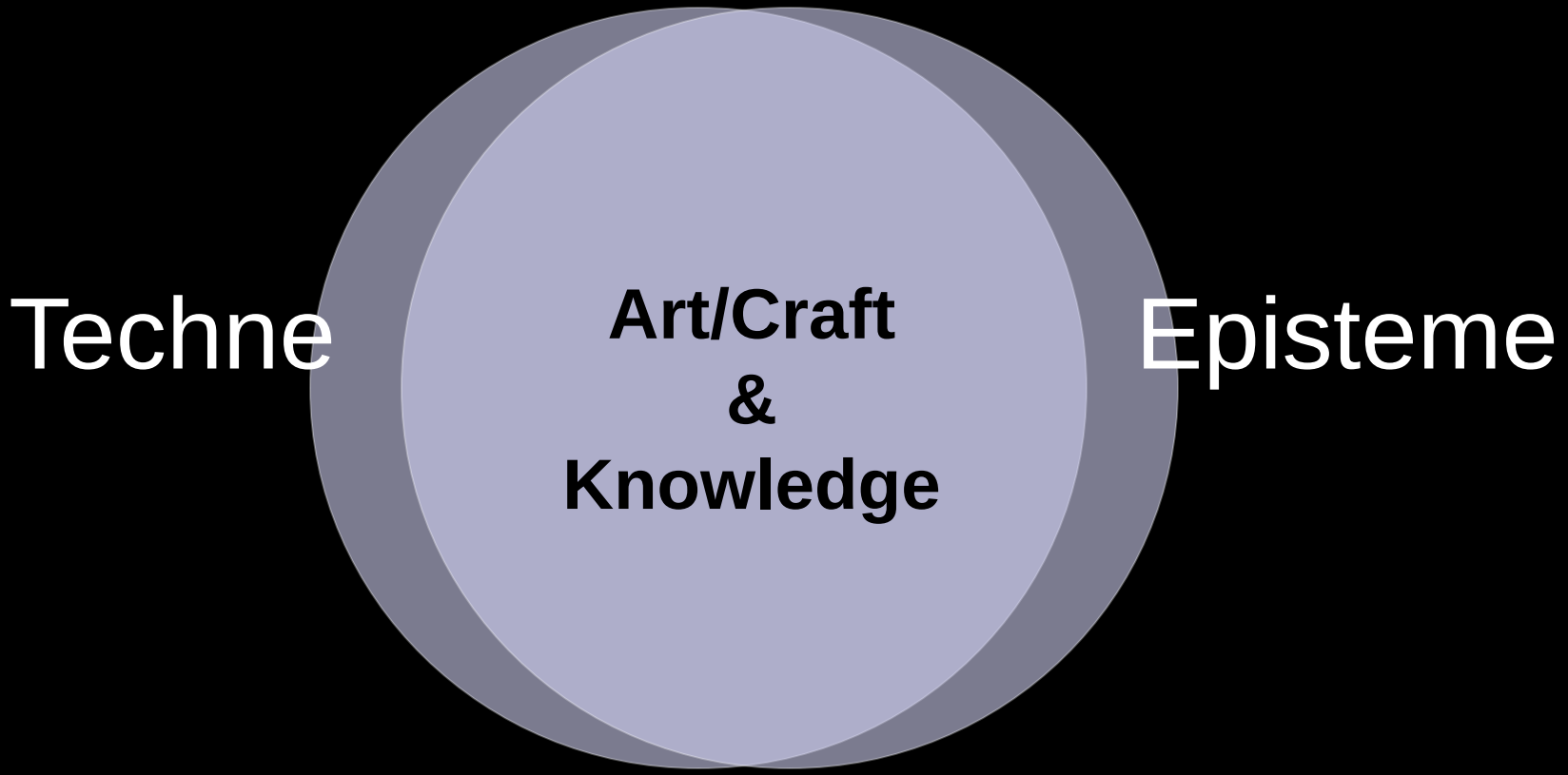
Edward C. Trump
Plant Manager
Entergy

4/2007, TSTC Marshall

Post Industrial Workforce Transformation



Mind Body Unification



A Human Capital Crisis in Cybersecurity

Technical Proficiency Matters

A White Paper of the
CSIS Commission on Cybersecurity for the 44th Presidency

COCHAIRS
Representative James R. Langevin
Representative Michael T. McCaul
Scott Charney
Lt. General Harry Raduege, USAF (ret.)

PROJECT DIRECTOR
James A. Lewis

July 2010

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES


Cyber Patriot
highschoolcdc.com

Here is further information presented in the chat box of the webinar:

Learn about the Cyber Patriot Competition

http://www.uscyberpatriot.org/Pages/default.aspx

NORTHROP GRUMMAN

CyberPatriot III

- Virtual competitions start Nov 2010
- Service Championship in Orlando Feb, 2011
- National Championship in DC April, 2011
- Competitors must be at least 13 years old and in grades 9-12 (or equivalent if home schooled/in a school that does not make this distinction) as of September 2011
- Teams must have between 2 and 5 members
- Only 1 team per school per division
- Registration deadline Oct 8, 2010 (or 500 teams)
- $350 team fee for Open division
- 2009 participation: 170+ schools, over 1,000

www.highschoolcdc.com

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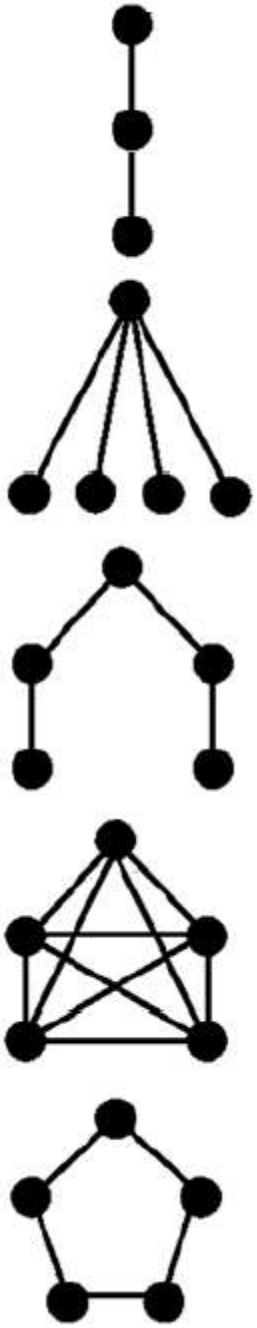
COLLEGIATE
CYBER
DEFENSE
COMPETITION

nationalccdc.org

Knowledge
Organizations
Industries
Markets
Technical Systems
Human Capital



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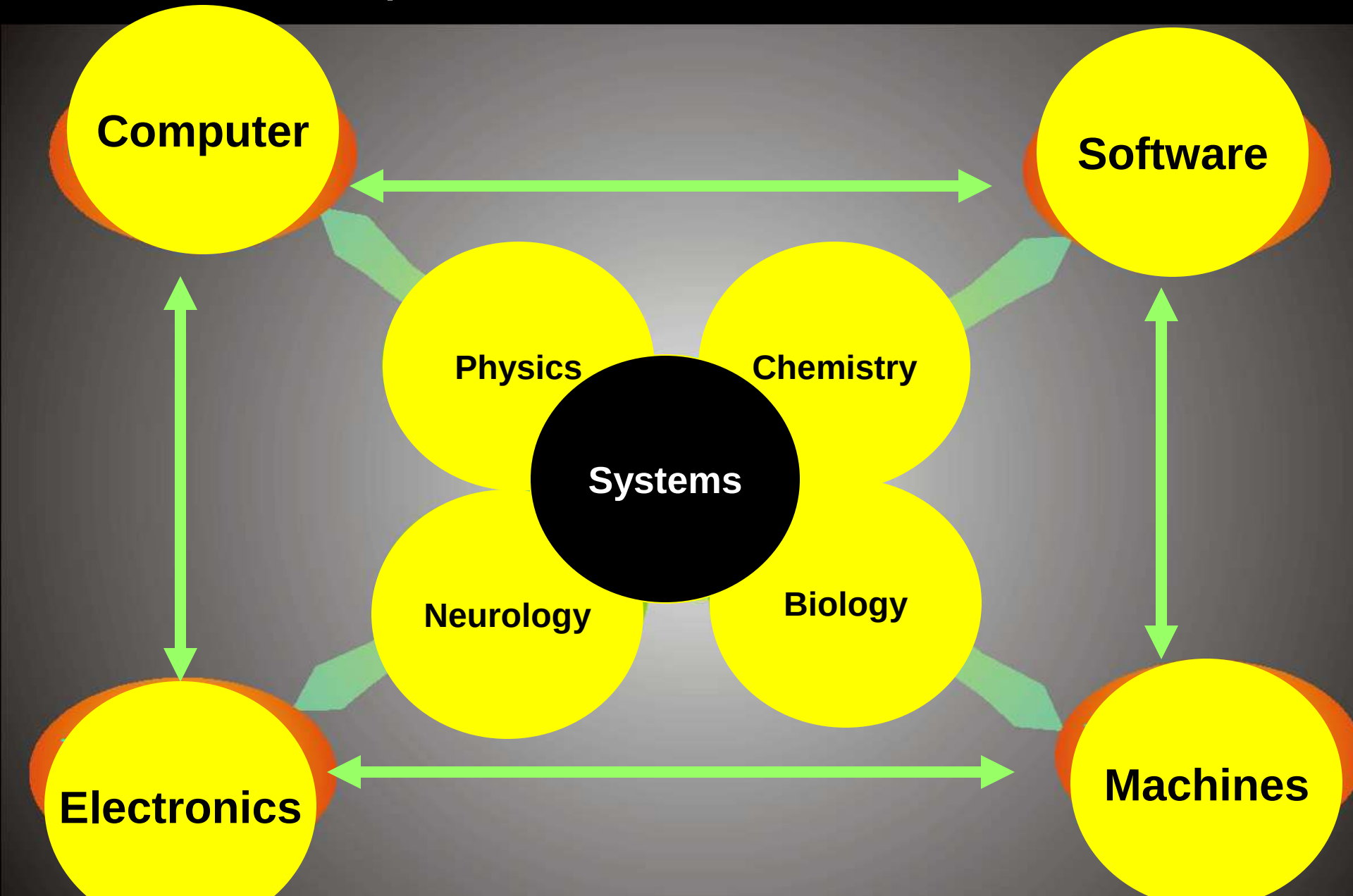

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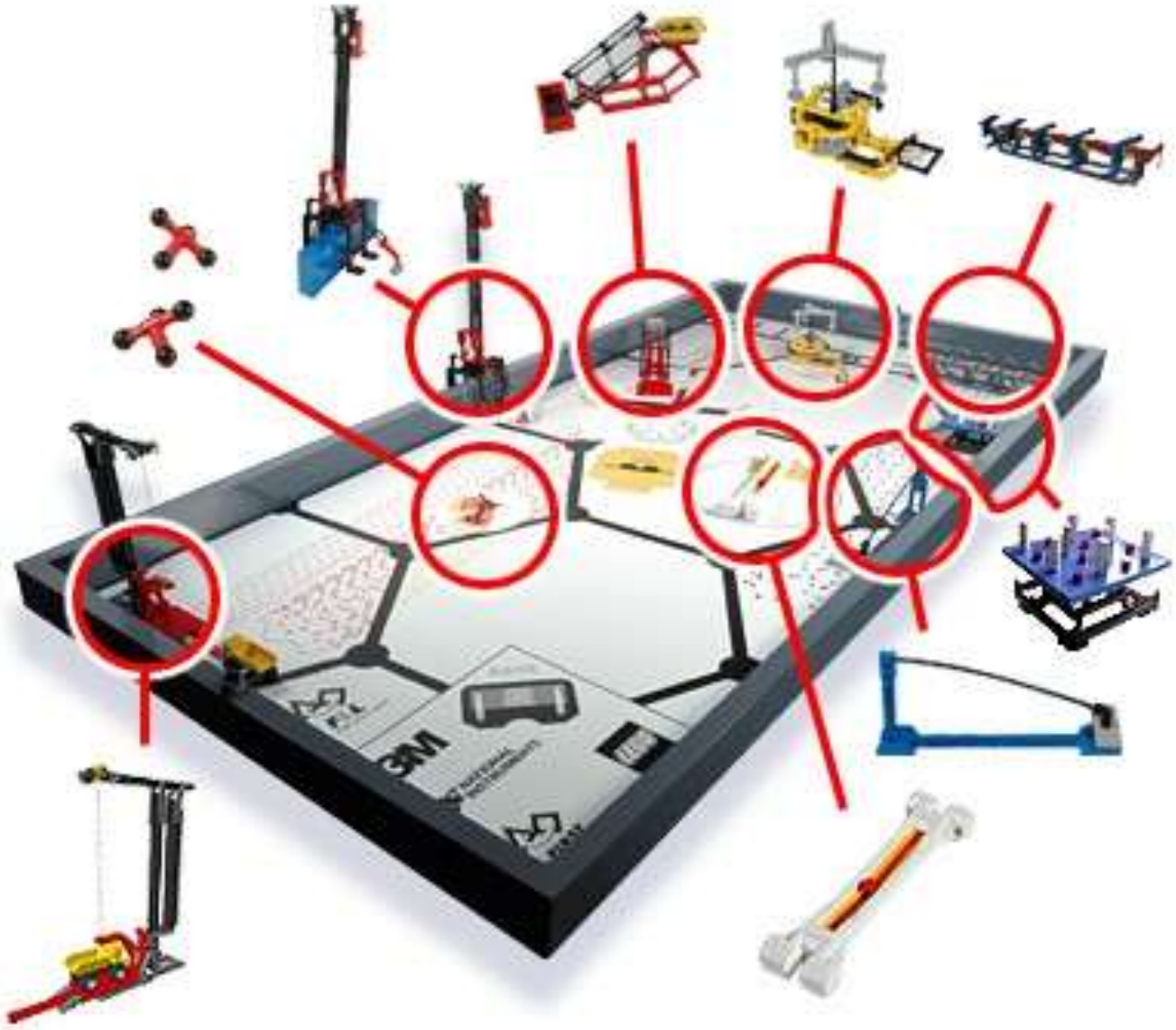
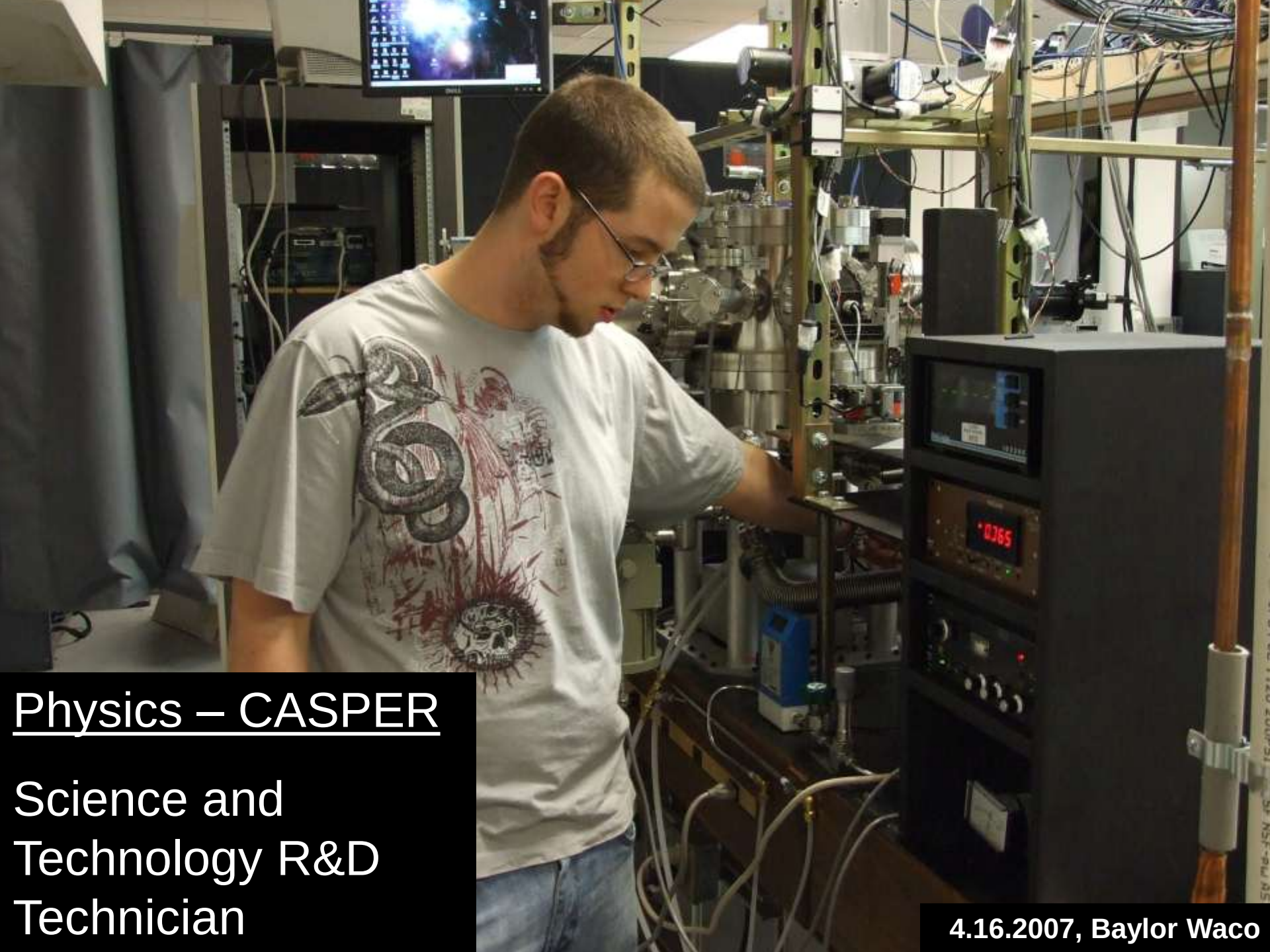




Physics – CASPER

Science and Technology R&D Technician

4.16.2007, Baylor Waco

Chemistry

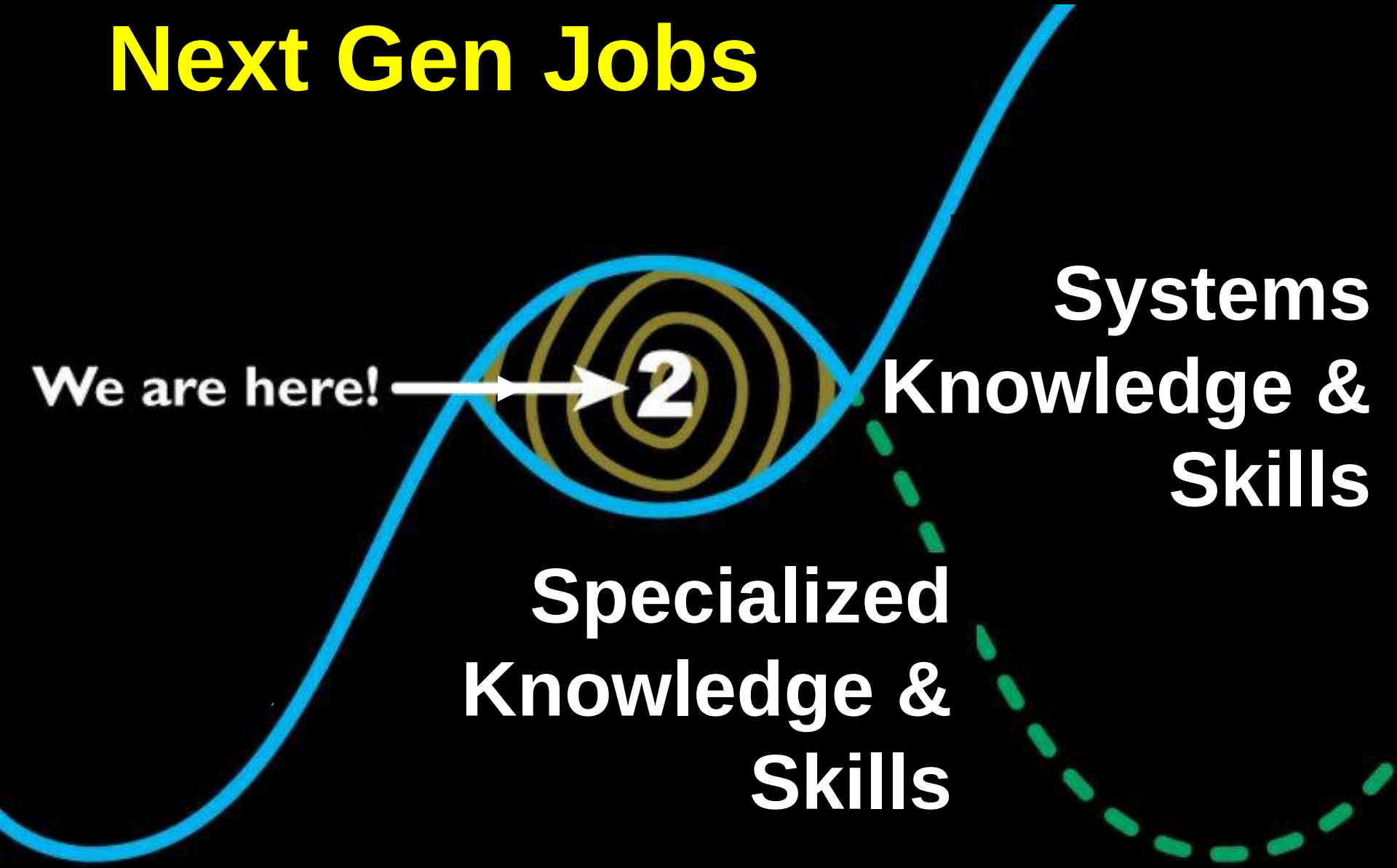
Science and Technology R&D Technician

2007, TSTC Harlingen

Agricultural Genomics

National Center for Agricultural Utilization Research, Peoria, IL

Next Gen Jobs



From TSTC Game Report 2004

Workers with transdisciplinary skills are needed in government, military, industry, and academia (World Technology Evaluation Center; Turpin, 2000; Stanford University, 2002; Arts and Humanities Research Board; Daly, Farley, Thomson, 2001; MST News, 2003; World Technology Evaluation Center; Office of Scientific and Technical Information, 2002; TANSEI, 2002; De Marca, Gelman; Carty, 1998; Nanotechnology Research Institute). To meet the needs and challenges of modern science, industry and private sector leaders are calling for a revolution in teaching.

> "Half a millennium ago, Renaissance leaders were masters of several fields simultaneously. Today, however, specialization has splintered the arts and engineering, and no one can master more than a tiny fragment of human creativity. The sciences have reached a watershed at which they must combine if they are to continue to advance rapidly. Convergence of the sciences can initiate a new renaissance, embodying a holistic view of technology based on transformative tools, the mathematics of complex systems, and unified cause-and-effect understanding of the physical world from the nanoscale to the planetary scale.
>
> ***"Educational institutions at all levels should undertake major curricular and organizational reforms to restructure the teaching and research of science and engineering so that previously separate disciplines can converge around common principles to train the technical labor force for the future.***
>
> "Manufacturing, biotechnology, information and medical service corporations will need to develop partnerships of unparalleled scope to exploit the tremendous opportunities from technological convergence, investing in production facilities based on entirely new principles and materials, devices and systems, with increased emphasis on human development." (World Technology Evaluation Center, 2002)

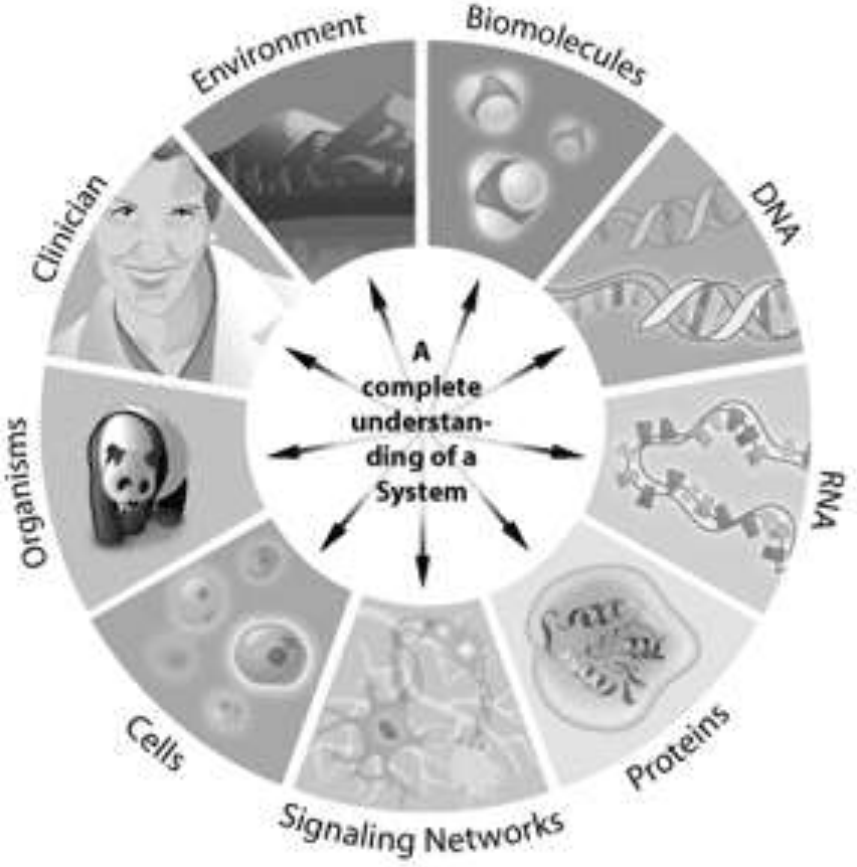
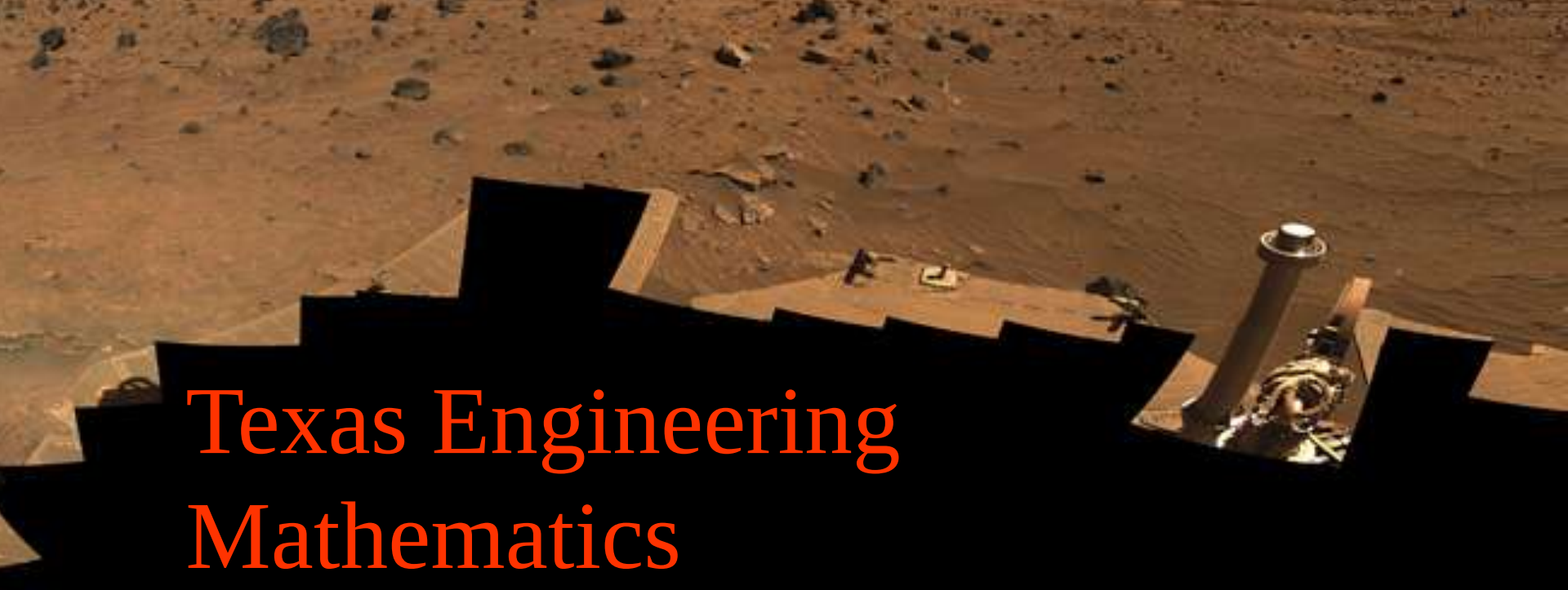


Figure 1. The Wheel of Biological Understanding. System biology strives to understand all aspects of an organism and its environment through the combination of a variety of scientific fields.

http://www.scq.ubc.ca/what-is-bioinformatics/



Texas Engineering Mathematics

Target Texas 4x4 – 4th Year of Math
Unify General Academics and CTE
Connect rigor and relevance
High motivation-TEAMS-Competition
Base for industry support in schools
Moving robotics from 10% penetration to 80% in 5 years

The appropriate mathematics to analyze computing seems to be systems approach with information theory, which will provide **a unifying principle for physics, chemistry, biology, and neuro science.** Brazell and Tanik, October 17, 2010

Learn more about the transdisciplinary scientific and engineering society – SDPS. SDPS is seeking community college partners for joint STEM grants. Contact Jim Brazell.

http://www.sdpsnet.org/sdps/

How can we understand where technology is going?

What are the key requirements of 21st century jobs?

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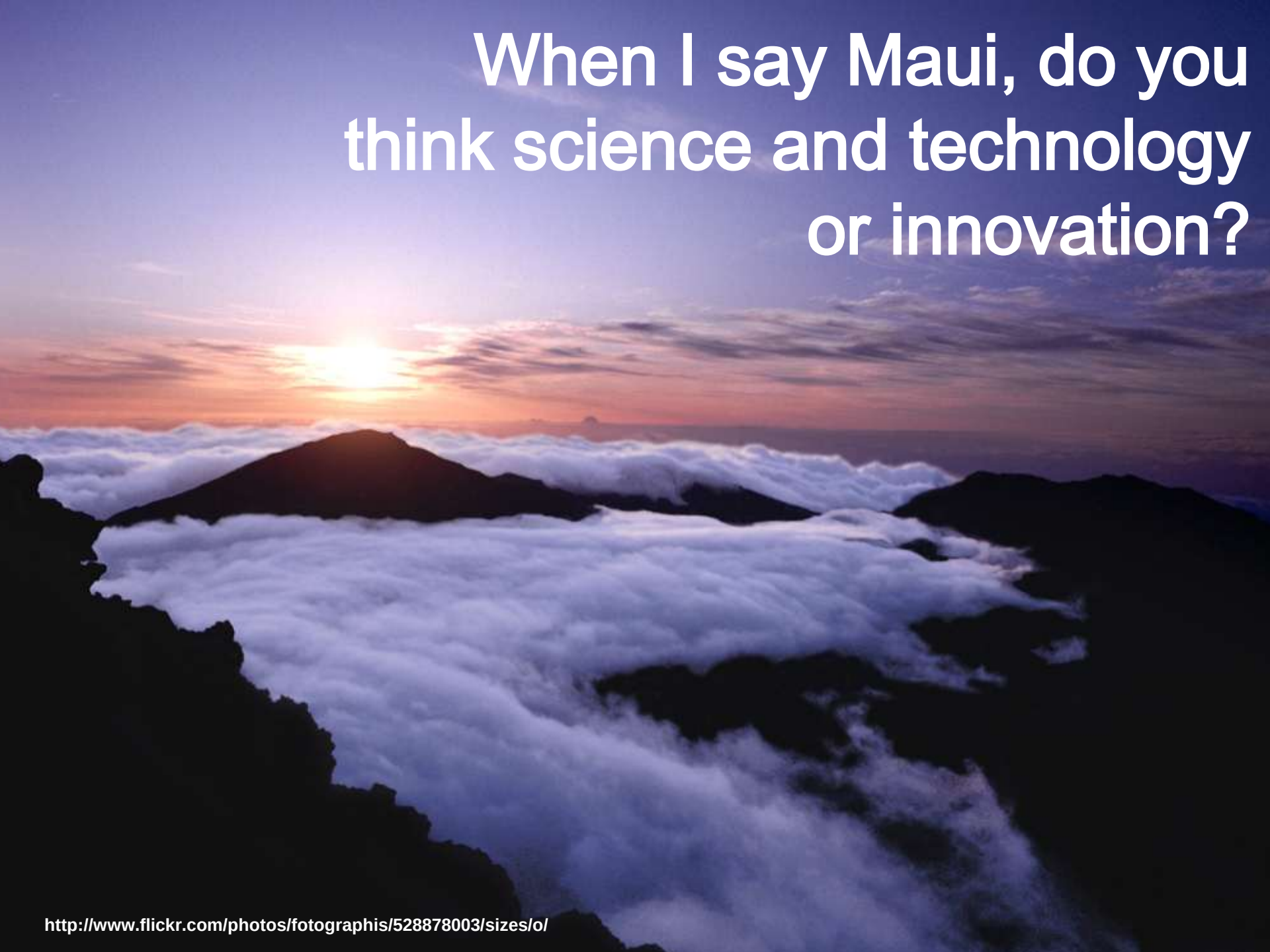
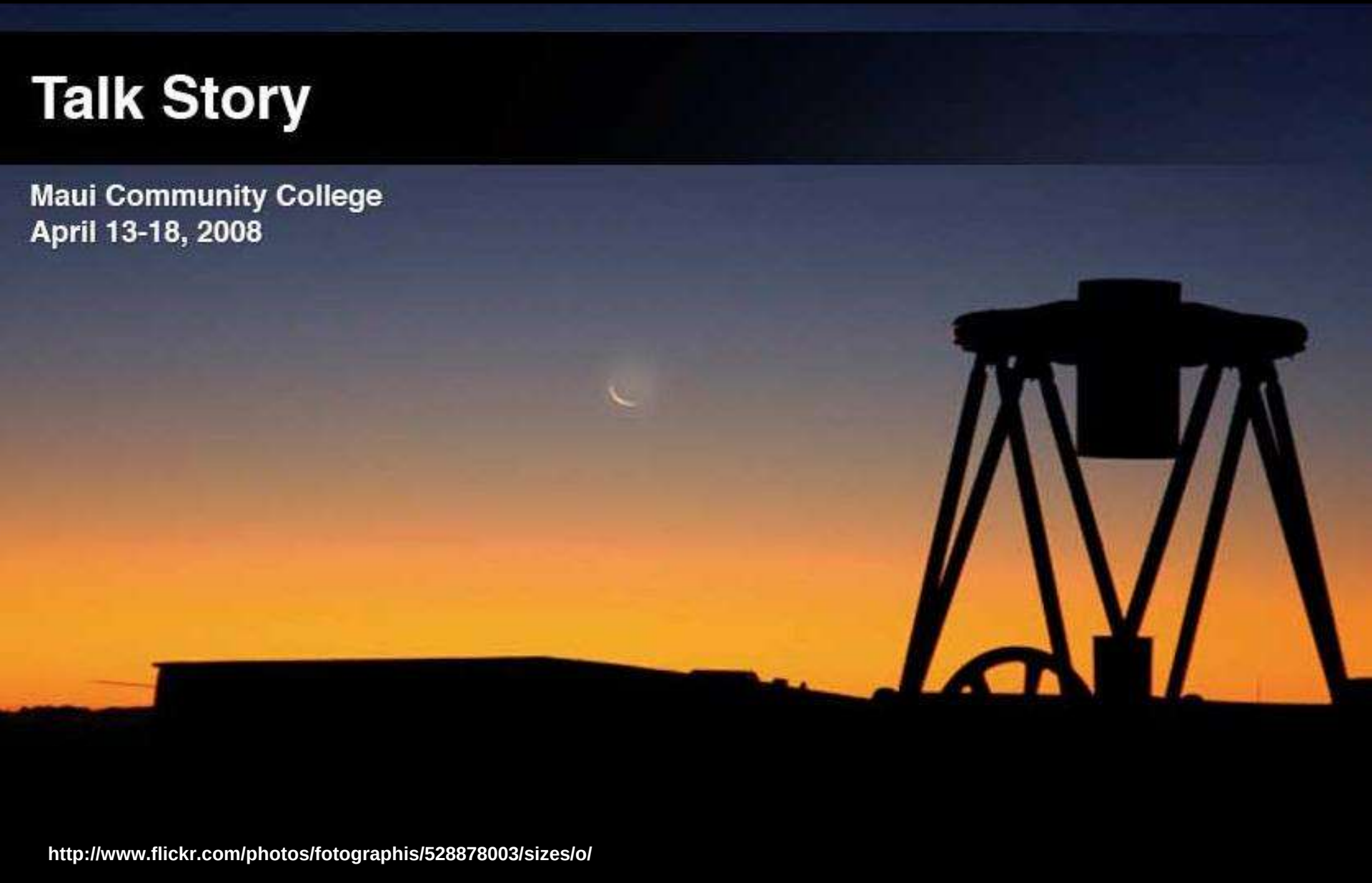


http://www.flickr.com/photos/fotographis/528878003/sizes/o/

Talk Story

Maui Community College
April 13-18, 2008



http://www.flickr.com/photos/fotographis/528878003/sizes/o/

“I do not think Maui is any different than the mainland…post industrialization has placed greater demands on math and education.”

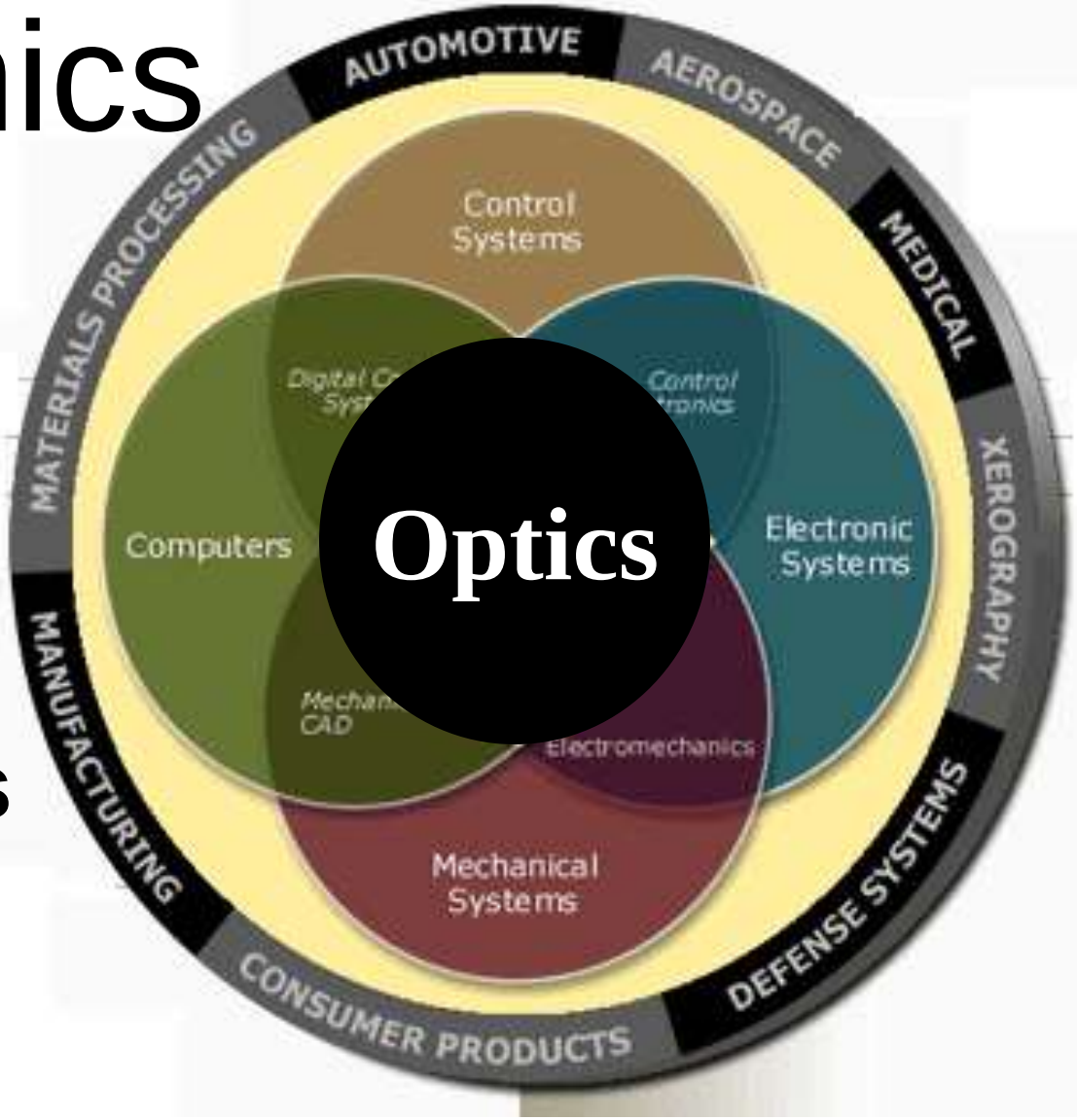
–Rose Yamada, elder

rigor = old knowledge--*the fundamentals.*

“I am looking at the intersection of these technologies—where they overlap.” --Mark Hoffman, ECET Program Coordinator, MCC

Mechatronics

The synergistic combination of **mechanical engineering, electronics, control systems and computers.**



Mechanical, Aerospace, and Nuclear Engineering Departments at RPI

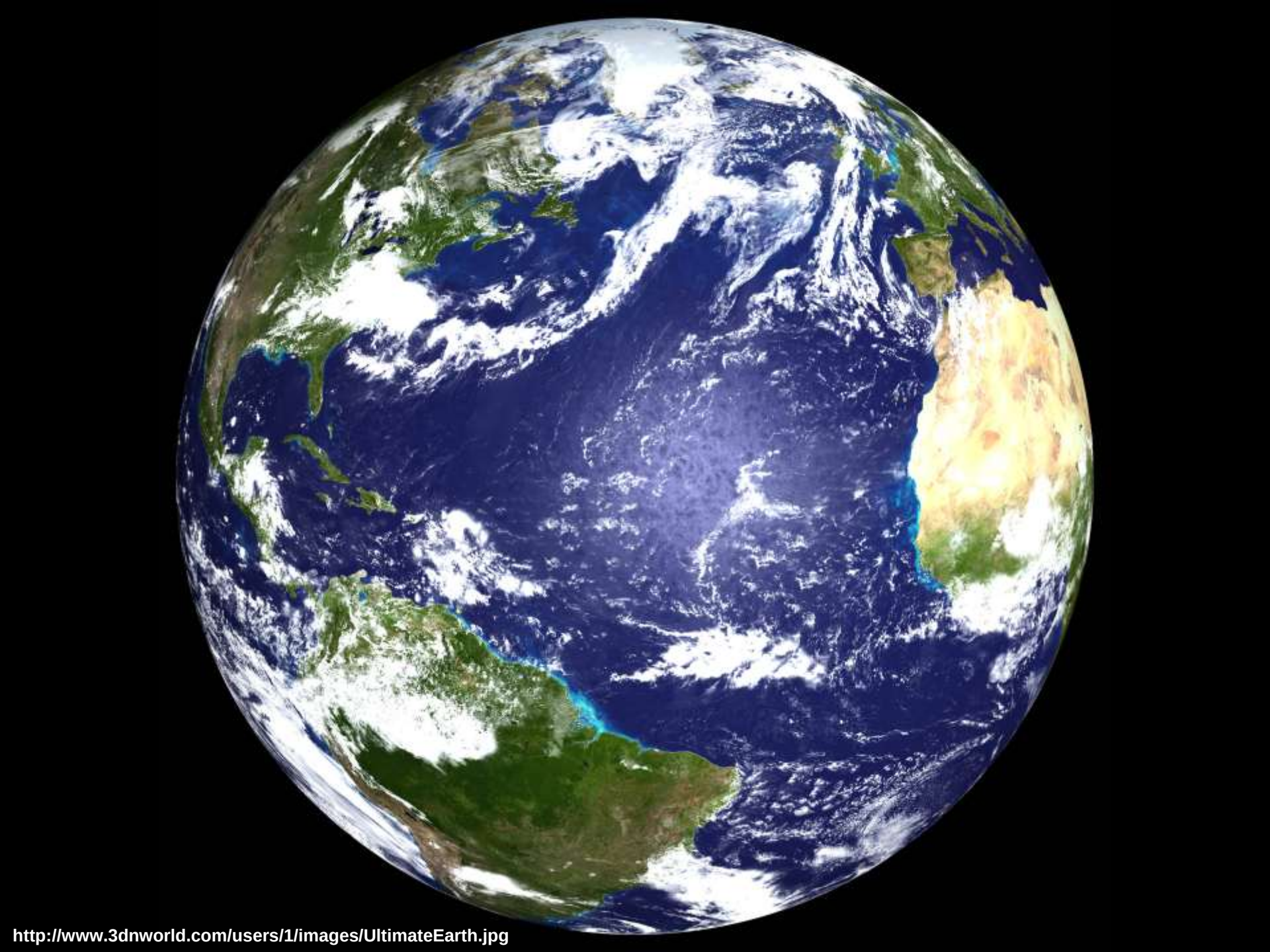
relationships =

systems.

Opto-Mechatronics Technician

Hawiian Translation

“Ahupua’a”



http://www.3dnworld.com/users/1/images/UltimateEarth.jpg

“Ahupua’a”

Integrated, holistic system

PACIFIC DISASTER CENTER

Fostering Disaster-Resilient Communities

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PHFO: HST Apr 18 06:47 | GMT Apr 18 16:47
HIGH SEAS FORECAST

PHFO: HST Apr 18 05:49 | GMT Apr 18 15:49
HAWAII RAINFALL SUMMARY

PHFO: HST Apr 18 05:47 | GMT Apr 18 15:47
OFFSHORE WATERS FORECAST FOR HAWAII

PHFO: HST Apr 18 05:42 | GMT Apr 18 15:42
HAWAII AREA AVIATION FORECAST

PHFO: HST Apr 18 05:17 | GMT Apr 18 15:17
FIRE WEATHER PLANNING FORECAST FOR HAWAII

PGTW: HST Apr 18 04:36 | GMT Apr 18 14:36
TROPICAL CYCLONE WARNING

Partnerships

» View

Hawaii Emergency Contacts

» View

PDC Updates | Disaster News

Auto-refresh in 13:53

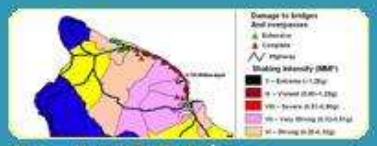
Ongoing

PDC Teams Up with Leo Wrobel of b4Ci to Offer Two-day Seminar
Famed author and PDC present "Disaster Recovery Planning: Communications and Critical Infrastructure" in two cities

08-Apr-2008

April is Tsunami Awareness Month in Hawaii
To be prepared, you must know both your risk and how to react to a warning.

PDC Solutions



Hawaii HAZUS Atlas

Preparing for Earthquakes in the State of Hawaii

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» 2003 - 2004
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relevance = currency to the *world*—past, present and/or future.

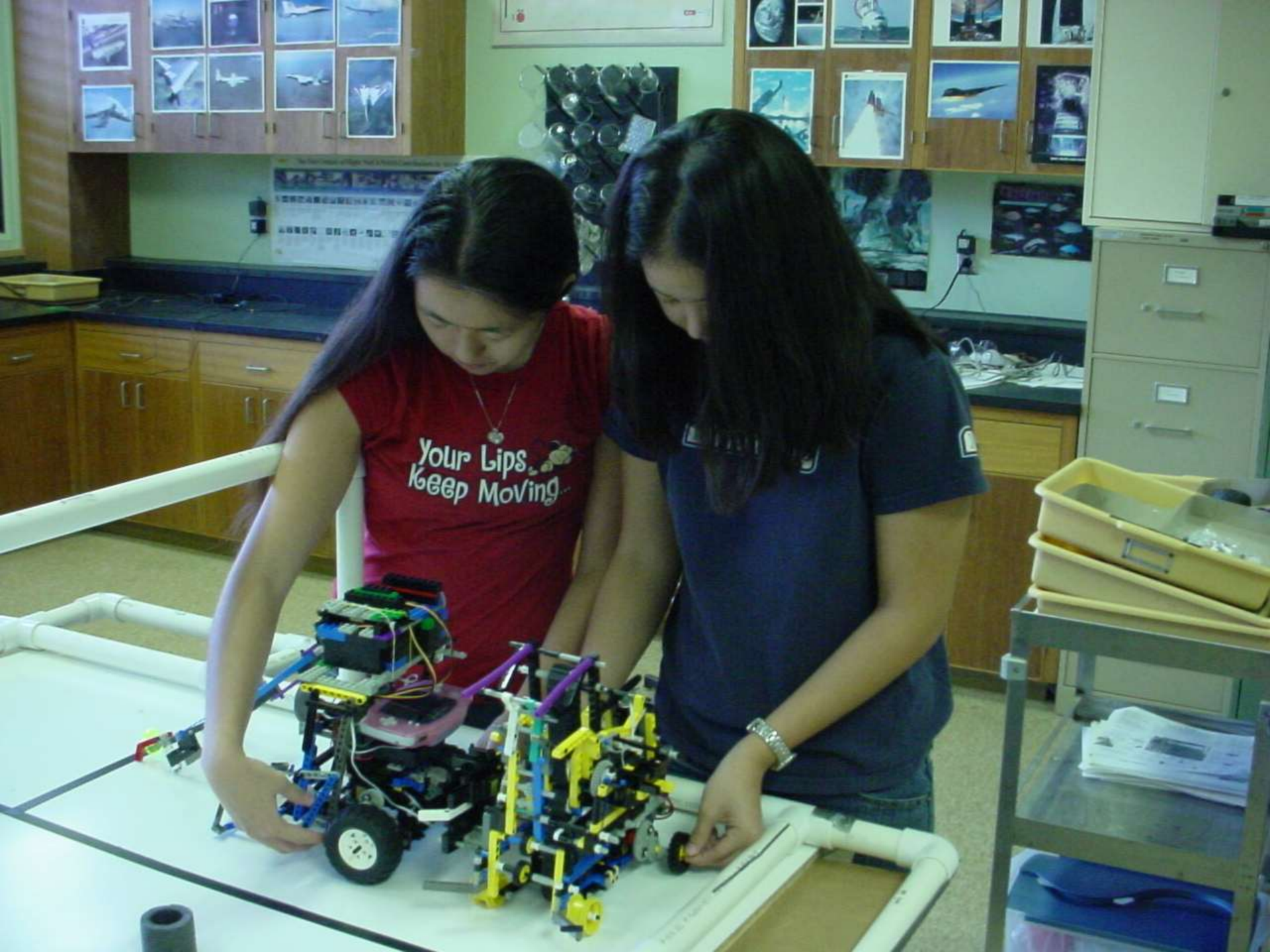
“If the end goal is innovation, creativity, problem solving, critical thinking… We can not continue to look at the world through a pin hole.”

--Dr. Warren Hitz, Kamehameha Schools

“Hoʻohanalima”

“Ho’ohanalima”

Learning by doing

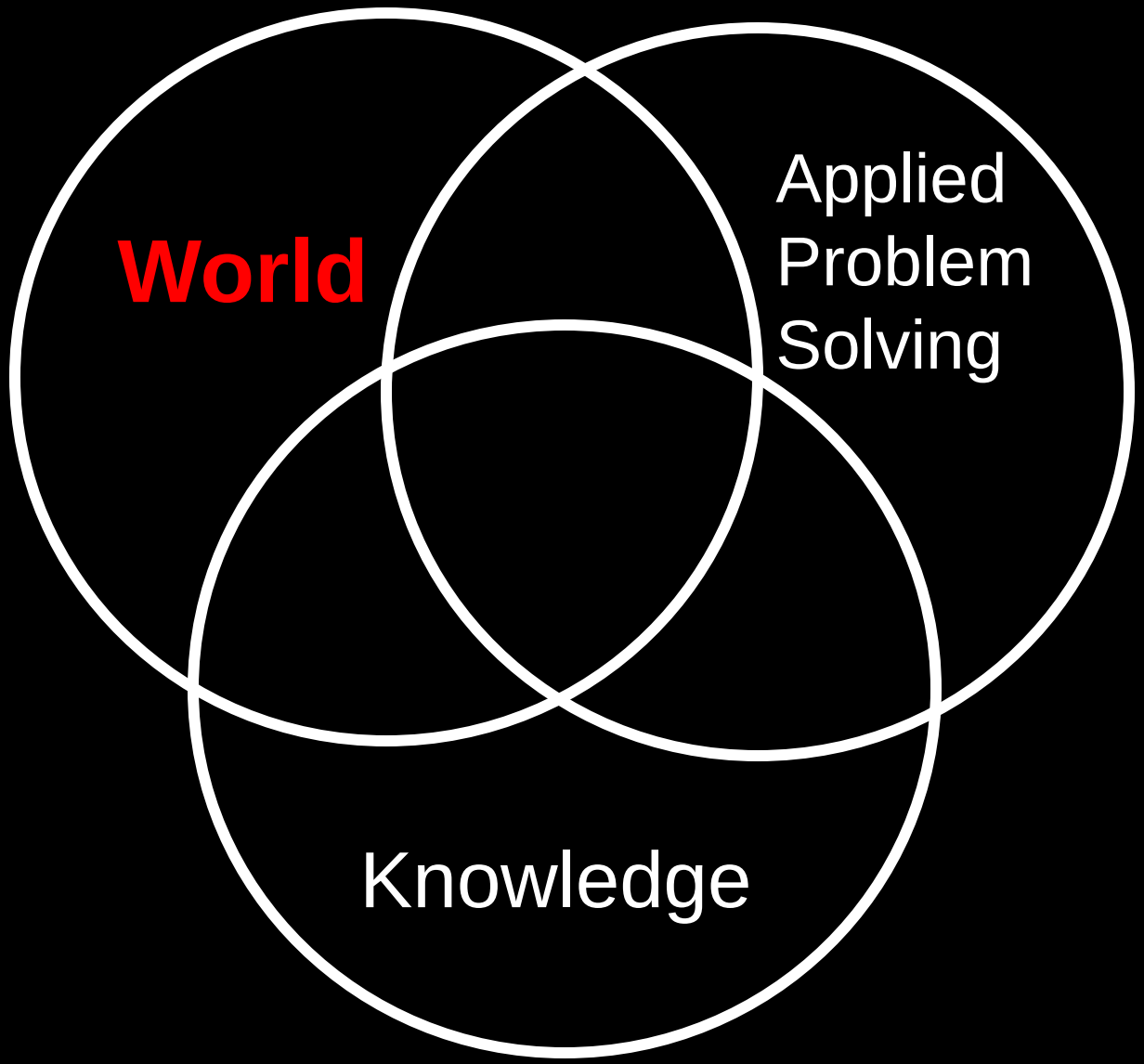

Your Lips
Keep Moving...

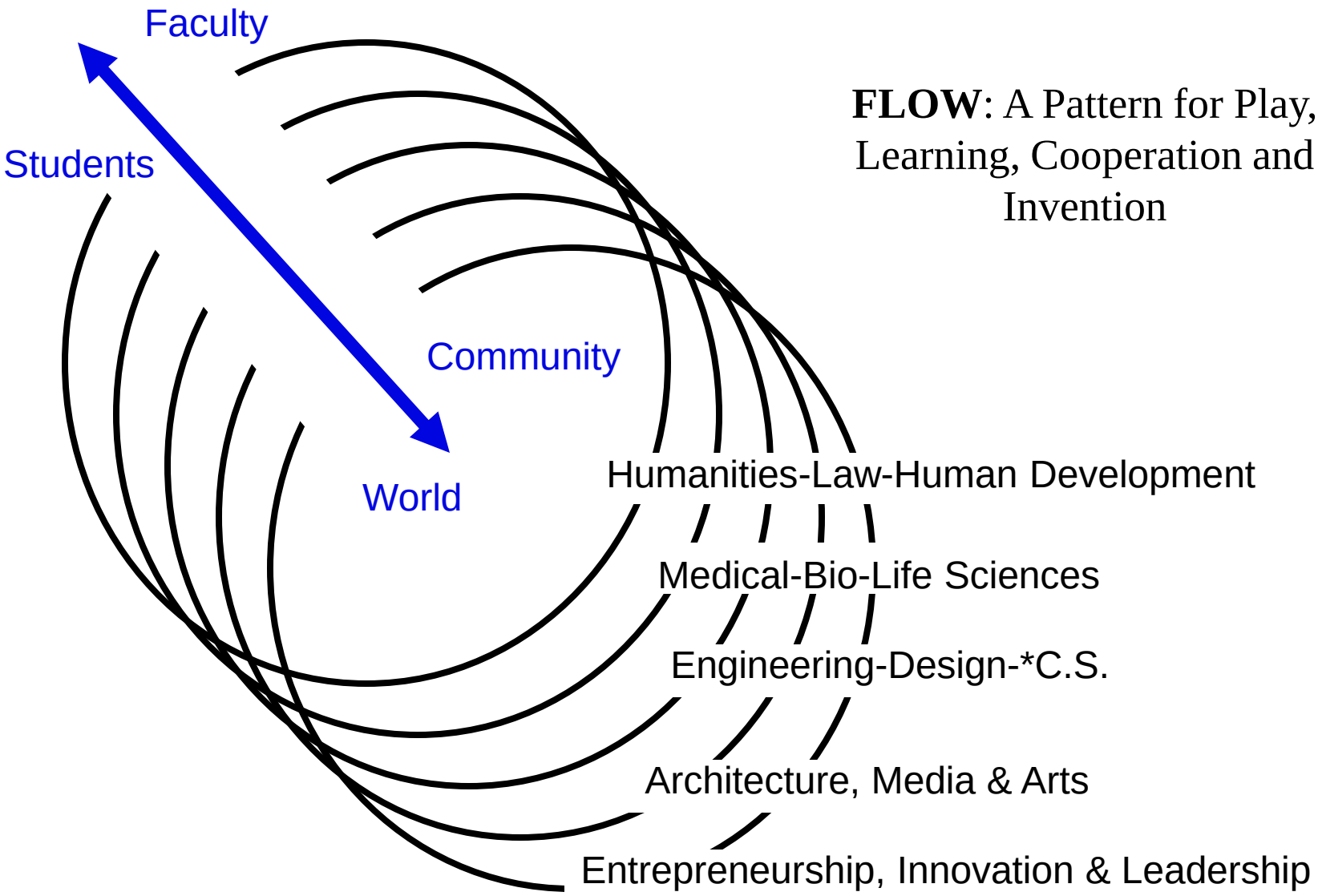
Environmental impact study during the reconstruction of Koie'ie Fishpond located in north Kihei– Kihei Charter School

Opihi Population Health Assessment Research Study– Kihei Charter School

Waipulani Longitudinal Algae Research Project – Kihei Charter School

The key missing literacy of the 21st century is transdisciplinarity.





FLOW: A Pattern for Play, Learning, Cooperation and Invention

Indian River State College Current and Emerging Pattern Languages

*C.S. - Computer science


IRSC


MIAMI
MIAMI
IRSC


IRSC


IRSC


IRSC

TEAMS Model Schools

Systems of Systems

- High degree of faculty interaction across disciplines and grades (systems)
- Integrating CTE, Arts and Academics (systems)
- Learning laboratories and worldly experience with industry-standard tools, processes and problems (systems)
- Emerging P-20 systems (P-20) -- Sequenced, integrated and transferable courses HS to CTC to University (systems)
- Transdisciplinary culture (systems) Context and frame for learning is real world, purpose driven and action oriented.

Here is further information presented in the chat box of the webinar:

Read Jim's essays written during the summer of 2010 for Edutopia on TEAMS

The Path to Innovation: Technology, Engineering, Arts, Mathematics and Science (TEAMS) Integration (Part 5 of 5), 8/24/2010
TEAMS Model State: The Ohio Arts Integration and STEM Initiative (Part 4 of 5), 8/20/2010
Case Study: TEAMS Model School - Clark STEM Magnet in Glendale, CA: Part 3 of 5, Edutopia, 8/13/2010
The TEAMS Model: Unifying Arts, Academics, and Career and Technical Education: Part 2 of 5, Edutopia, 8/6/2010
Connecting STEM and Arts (TEAMS) to Spur U.S. Innovation: Part 1 of 5, Edutopia, 7/20/2010

How can we understand where technology is going?

What are the key requirements of 21st century jobs?

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The Bellwether Sounds - The Role of CTE in S.T.E.M. Education, by Jim Brazell, Consulting Analyst, The Schriever Institute, August 2008, Volume 1, Issue 2

When our predecessors stood at the edge of the world and gazed at Sputnik orbiting, they did not respond with a narrow focus on science and mathematics. The vanguard of military strategy-education, strategic weapons and technology forecasting-responded by advocating the expansion of military training, education, and learning to include unified classical and technical education.

Brigadier Gen. Robert F. McDermott, the founding dean of the U.S. Air Force Academy was the first teacher to use a computer to teach astronauts space physics. A student of classical education from the K-12 Latin School in Boston-to-Harvard, McDermott built the U.S. Air Force Academy programs on the integration of technical, scientific and mathematical education with classical studies such as philosophy, history, economics, and the arts.

Gen. Bernard A. Schriever, who gave the famous “space speech” prior to the launch of the Sputnik, and Francis X. Kane of the U.S. Air Force supported McDermott’s pursuits. The last survivor, Kane, who is president of the Schriever Institute, continues to advocate the importance of both technical and academic learning in his speeches about Mars and the imperative for an American educational renaissance to support human development necessary for the mission.

This renaissance, according to Kane, focuses on the integration of academic disciplines, the integration of thinking and doing in real world contexts, the integration of vocational and academic practice, and the integration of a global perspectives and languages into US curricula. Kane points out that competition is important; however, if there is to be hope for peace and prosperity-not to mention colonization of Mars-global collaboration will work hand-in-hand with technological innovation.

Here is further information presented in the chat box of the webinar:

Read the full article

The Bellwether Sounds - The Role of CTE in S.T.E.M. Education, by Jim Brazell, Consulting Analyst, The Schriever Institute, August 2008, Volume 1, Issue 2

http://www.nsba.org/SecondaryMenu/TLN/UsefulInformation/STEMInformationandResources/JimBrazell.aspx

Emerging Technologies & Strategies for Jobs, Education, and Communities

How the future works today.

JIM BRAZELL
jim.brazell@radicalplatypus.com

How Can We Better Serve You?

Whether you are joining us live or watching the recorded version of this webinar, please take 1 minute to provide your feedback and suggestions.

http://www.questionpro.com/t/ABkVkZIOXE



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Emerging Technologies and Strategies for Jobs, Education, and Communities

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February 11: Minority Males – The Invisible Men

March 11: Energy Utilization Technologies

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debra.annon@domail.maricopa.edu



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