

Flexibits, Community Events, and  
Facilitated Involvement  
Sunday, Oct. 3, 2:00 - 3:15 pm Session OR001  
ASTC 2010

- Joe Andrade, University of Utah, USA
- Stephen Pizzey, Science Projects, UK
- Ian Russell, Interactive Science Ltd., UK (via Skype)
- Mary Anter, The Leonardo, USA
- Joe Andrade, Jacob Hansen, Hugh Bollinger,  
The Leonardo, USA
- Discussion and 'gifts'
- Summary and Perspectives

**faces of BIOTECHNOLOGY**

**LUMYAI CHIV**  
 COMPANY: WORLDHEART CORP.  
 TITLE: ELECTROMECHANICAL TECHNICIAN

**JEN HAJJ**  
 COMPANY: HAWKWATCH INTERNATIONAL  
 TITLE: EDUCATION DIRECTOR

**DALLAS HANKS**  
 COMPANY: UTAH STATE UNIVERSITY & BLUE COW INC.  
 TITLE: BIOENERGY ASSISTANT MANAGER, CEO

**ALDO MARTINEZ**  
 COMPANY: USANA HEALTH SCIENCES  
 TITLE: MANUFACTURING SUPERVISOR

**CHRISTINE ROBERTS**  
 COMPANY: WORLDHEART CORP.  
 TITLE: LEAD MANUFACTURING TECHNICIAN

**WHY I BECAME INTERESTED IN THIS FIELD**

**HOW I GOT HERE**

**FUTURE CAREER GOALS**

**stemworks: BIOTECHNOLOGY**  
 An essential program of the Leonardo

Video interviews and banners available at: [www.theleonardo.org/stemworks](http://www.theleonardo.org/stemworks) then scroll down and click!

# Faces of Biotechnology – a Career Initiative

- Faces of Biotechnology was stimulated by the popular Faces of Science posters throughout the Oregon Museum of Science and Industry: [www.omsi.edu](http://www.omsi.edu)



# Flexhibits, Facilitators, and Community Events - On Line all the time

- The Leonardo's Flexhibits include direct wireless internet (via a mi-fi 3G system) so facilitators and participants can instantaneously respond to curiosity, comments, and questions.
- Facilitators and participants can instantly access current and new resources, for example: [www.abigpicture.info](http://www.abigpicture.info)

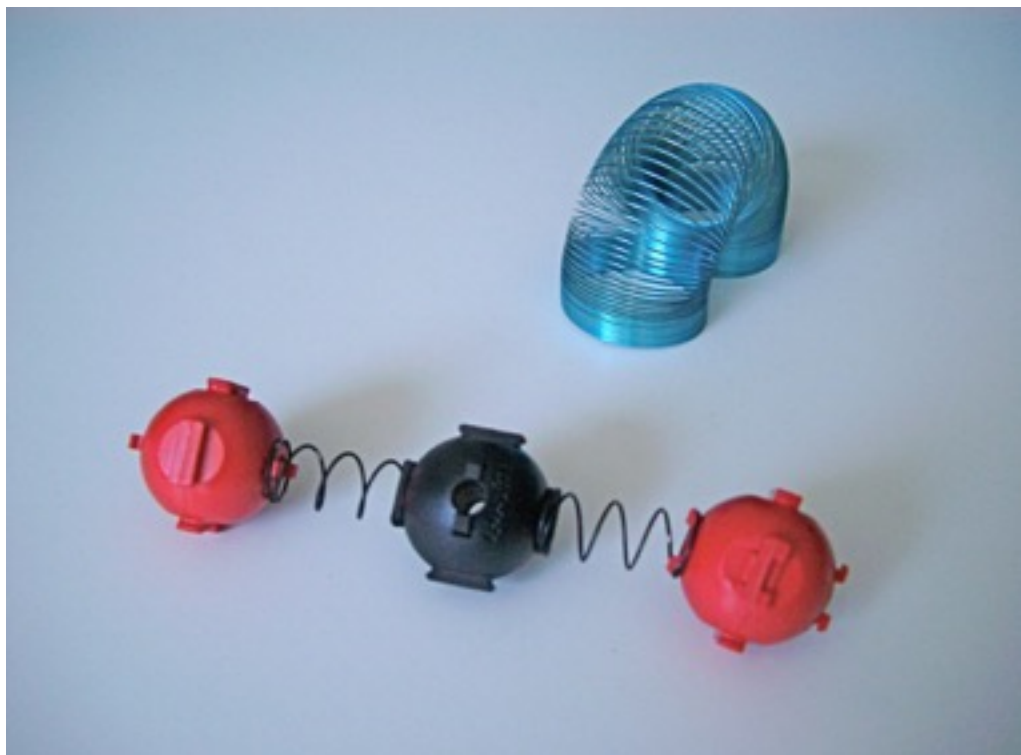
# Jacob Hansen, Hugh Bollinger, PhD, consultants to The Leonardo, USA

- Jacob is a Univ. of Utah Bioengineering graduate with extensive experience in web-site design and development (Drupal, etc.), web interactivity, and energy activism.
- Hugh is a PhD ecologist with 35 years experience in plant biotech and now with scientific imagery and visualization.



# Bonds, Springs, Energy: CO<sub>2</sub>'s molecular nature

A STEMWorks kit with a Slinky and a CO<sub>2</sub> 'molecule'

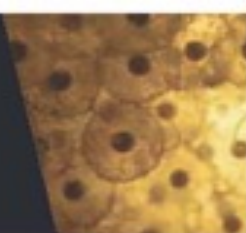


On-line animation:

[http://co2.utah.edu/  
co2tutorial.php?  
site=7&id=4](http://co2.utah.edu/co2tutorial.php?site=7&id=4)

The goal is co-learning via engagement and empowerment

FREE to the first 8 questions/comments!



## Teaching Guide: Bonds, Springs, and Energy

Contains: A Slinky and a CO<sub>2</sub> 'molecule'

Springs exist, like a Slinky – hold it vertically and get it to resonate. Molecules, like CO<sub>2</sub>, are atoms bound together by spring-like bonds. Hold the black Carbon atom and gently oscillate it – see the bonds vibrate (the red atoms are oxygen).

Springs resonate at different frequencies. Think of guitar or piano strings – their resonances move air molecules and produce tones or sounds.

Different molecules require different but specific energies to excite the resonance of the bonds – the molecular springs. These specific energies are the 'absorption spectrum' of the molecule – its molecular 'fingerprint'.

CO<sub>2</sub> resonates in the infrared part of the overall energy spectrum – the part responsible for heat energy, so CO<sub>2</sub> is a greenhouse gas. There are other greenhouse gases, but CO<sub>2</sub> is the major man-made one. Watch it resonate at: <http://co2.utah.edu/co2tutorial.php?site=7&id=4>

CO<sub>2</sub> in the atmosphere is good for us, up to a point. Civilization developed while CO<sub>2</sub> was about 250 parts per million (ppm) - a mild climate conducive to human civilization.

About 150 years ago, Man 'discovered' coal and oil, and began burning fossil fuels for energy needs. Burning means reacting a fuel containing carbon with oxygen, creating water, CO<sub>2</sub>, and heat.

The industrial revolution has now produced and emitted so much CO<sub>2</sub> that we are up to over 400 ppm – that's a lot more CO<sub>2</sub> molecules in the air, all absorbing heat. So our comfortable planet is getting warmer (Global Warming), resulting in climate change with severe and very unpredictable climate disruption.

The solution: make less CO<sub>2</sub> by burning less fossil fuel! CO<sub>2</sub> above about 350 ppm results in severe glacier/ice melting making the oceans more acidic (when CO<sub>2</sub> goes into water, it makes it more acid, like carbonated drinks), and results in other climate changes. Now Earth's atmosphere is already at 400 ppm and rising very rapidly.

We can't change the CO<sub>2</sub> molecule to make it absorb less energy, nor can we easily store, hide, or 'sequester' it. The only effective solution is to make much less of it, meaning using less energy (less burning) and getting our energy



# Flexhibits, Facilitators, and Community Events - 'Facilitators' as co-Learners

- The Leonardo's Facilitators are not 'Explainers' or 'Educators', but *co-learners*
- They must be well informed, have wide interests, and be able to easily relate to and connect with the comments and questions generated by the client. They must be aware of today's and yesterday's newspapers and events.
- Our facilitators must be 'da Vinci-like' in their interests, curiosity, attitudes, and approach, and they **MUST** know what they do not know - and be enthusiastic about co-learning.



# What are They?

- Explainer
- Docent
- Facilitator
- Motivator
- Explorer
- Learner
- Guide
- Creator
- Inventor
- Engager

Counselor?

Therapist?

Advisor?

Other?

# Goals and Values

- Truth
- Honesty
- Objective
- Realistic
- No BS
- No hypocrisy
- Substantive
- Technotainment?
- Superficiality? Triviality?

# Steve Schneider - at AAAS 2010 last February:



“Know thy  
audience

Know thy self

Know thy stuff”

Steve Schneider  
died July 19, 2010

See his book: *Science as a Contact Sport*

KNOW what you are talking about:



# Words, Titles, Semantics send a strong message

*Mark Twain said:*

“The difference between the *almost right* word and the *right* word is really a large matter.”

He is also reported to have said:

“If I had more time, I’d write shorter books.”

Meaning ... be concise, succinct, brief, clear.

**“Words must mean something.”**

***Barack Obama***

# YOUR TURN!

Reward: A STEMWorks kit with a Slinky and a CO<sub>2</sub> 'molecule'

