

Citizen Cyberscience

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UN Institute for Training and Research
University of Geneva

“All for science, and science for all”

Citizen Cyberscience:

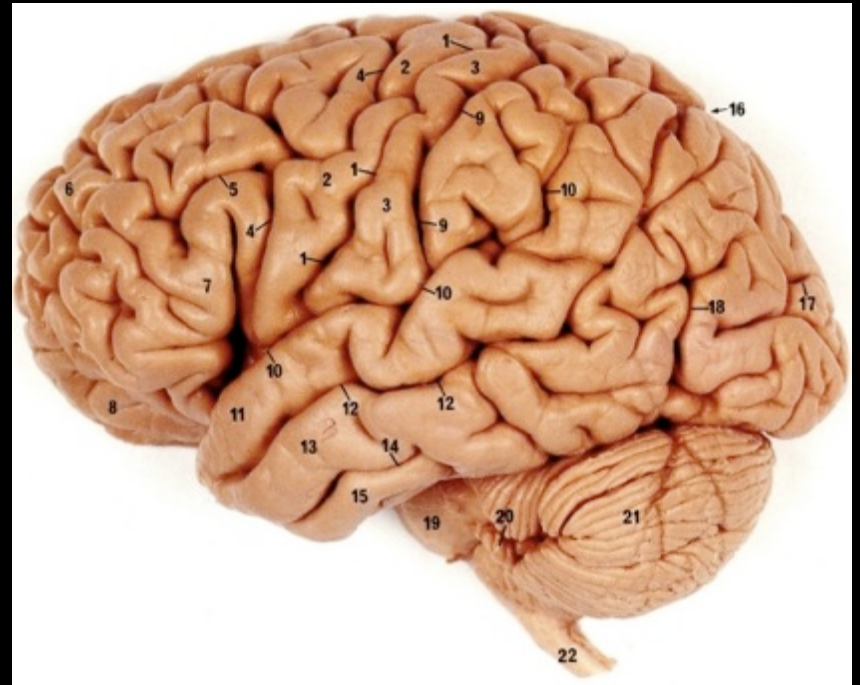
The largest scientific resource on the planet



2bn



5bn



7bn

$$V_{\text{internet}} > 1 \text{ C/s}$$



Citizen Cyberscience:

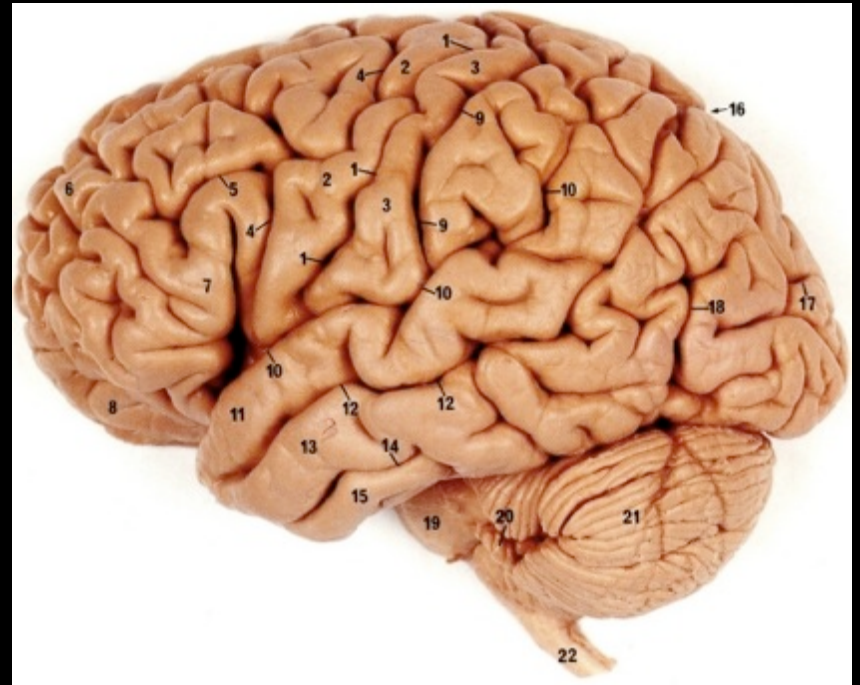
A range of approaches



Volunteer
Computing



Volunteer
Sensing



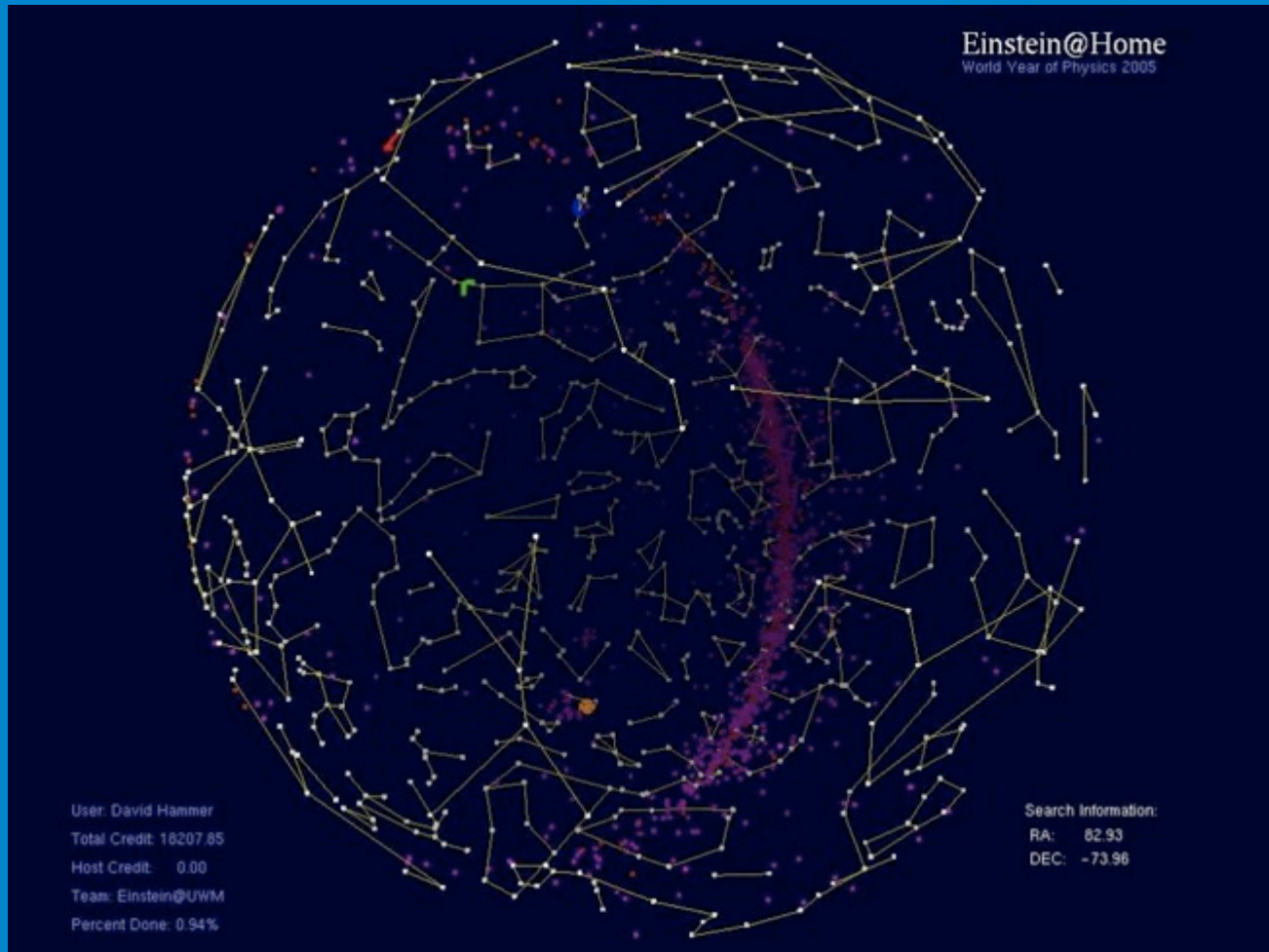
Volunteer
Thinking

Volunteer computing

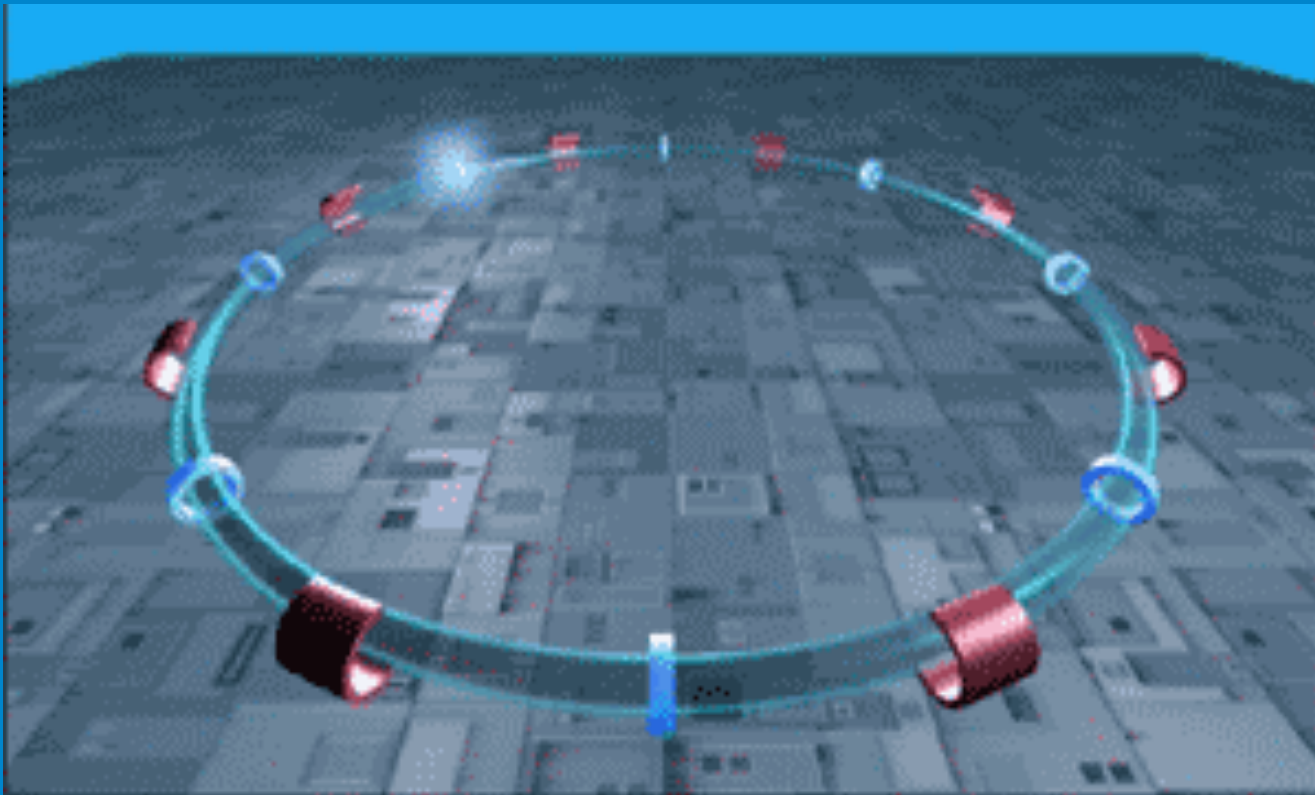
1999: SETI@home >1M CPU



Einstein@home: pulsar discoveries (Science)

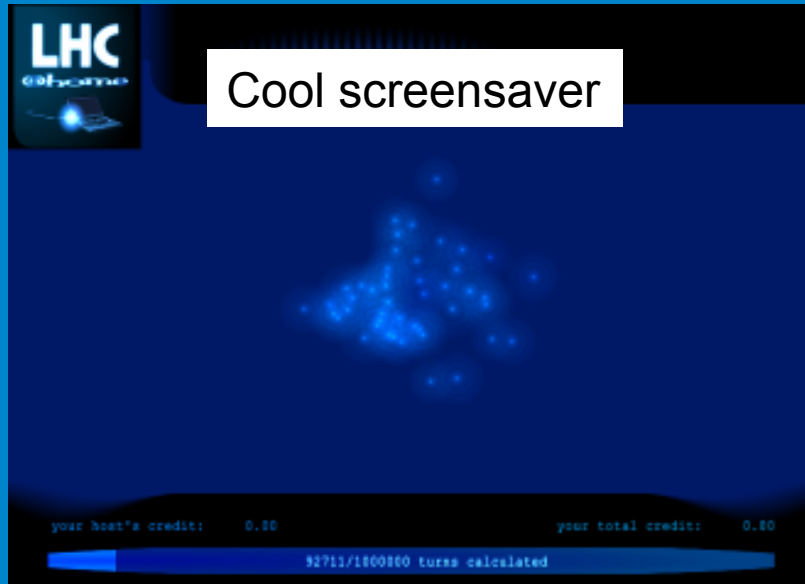


LHC@home for accelerator design (2004)
LHC@home for particle physics (2011)



Why do volunteers participate?

Cool screensaver



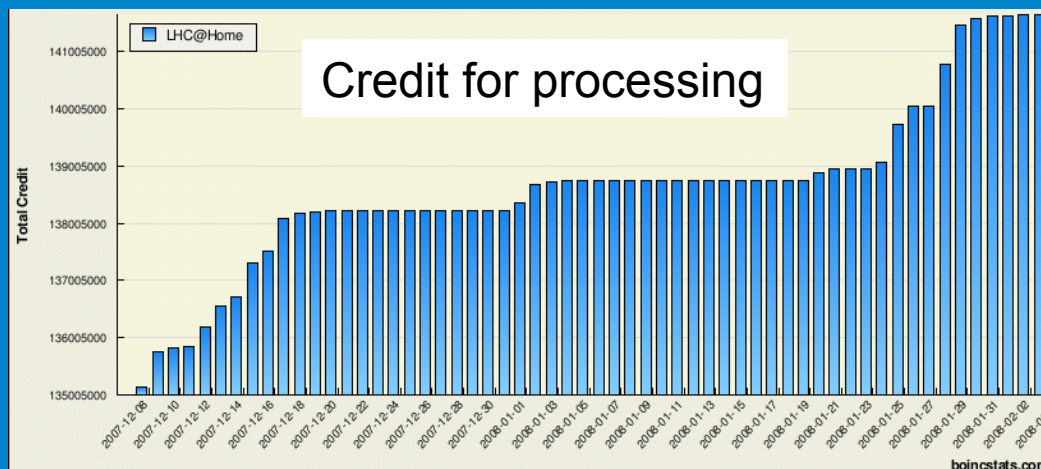
Message boards

Message boards : LHC@home Science - Mozilla Firefox

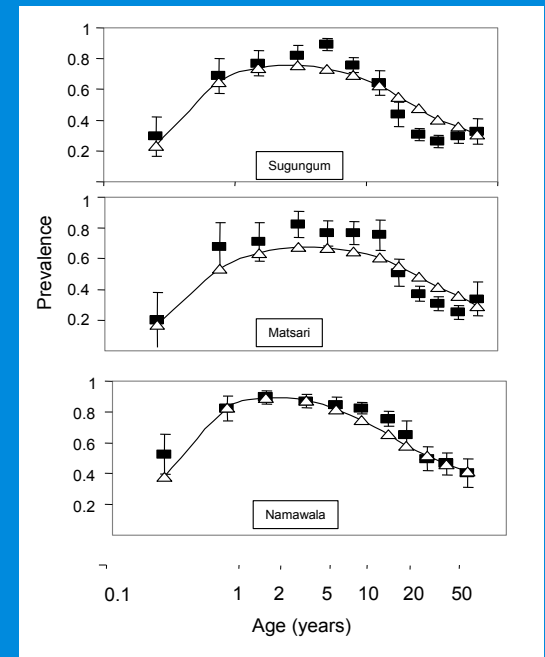
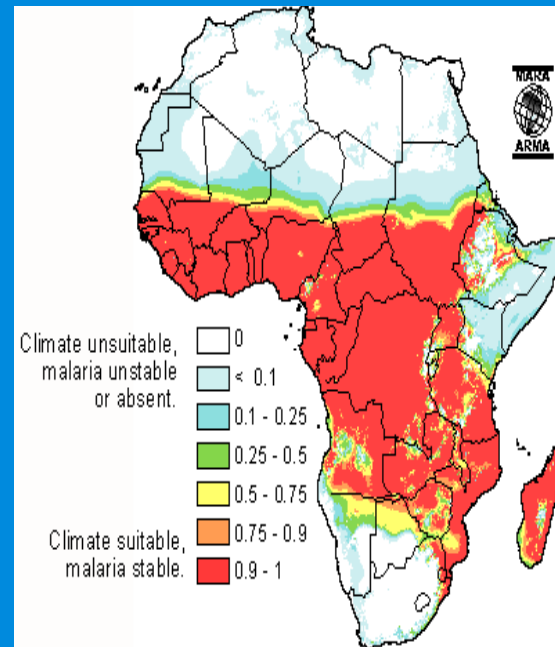
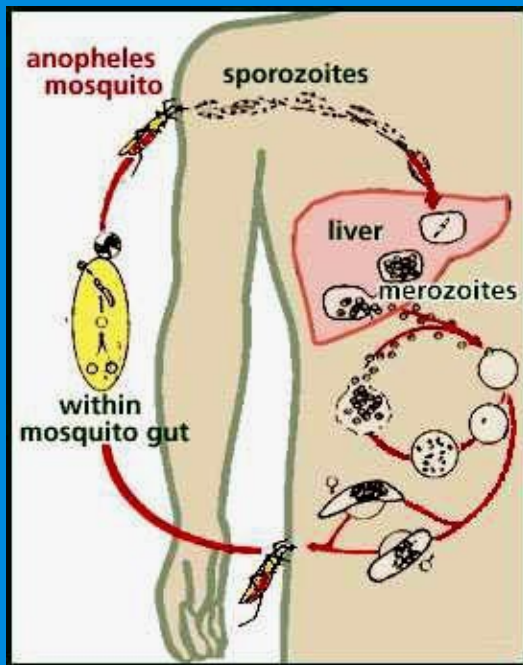
*UK boffins sniff for Higgs			226
CAST - Cern Axion Space Telescope made from LHC spare parts.	1	Alex	143
This website details the ATLAS detector.	2	Alex	178
LHC and Muon??	7	ric	503
:	11	PoorBoy	481
Does 'protwelve' WU refer to tuning of magnet twelve?	5	Alex	349
[R] Physics special magazine issue	1	leaden	112
About the status report	3	Arnaud	246
What exactly do we Calculate?	2	gyxvi	335
great link about the LHC	1	Guido, Waldenmeier, Remember	188

Done

Credit for processing



MalariaControl.net: modelling the epidemiology of malaria in Africa



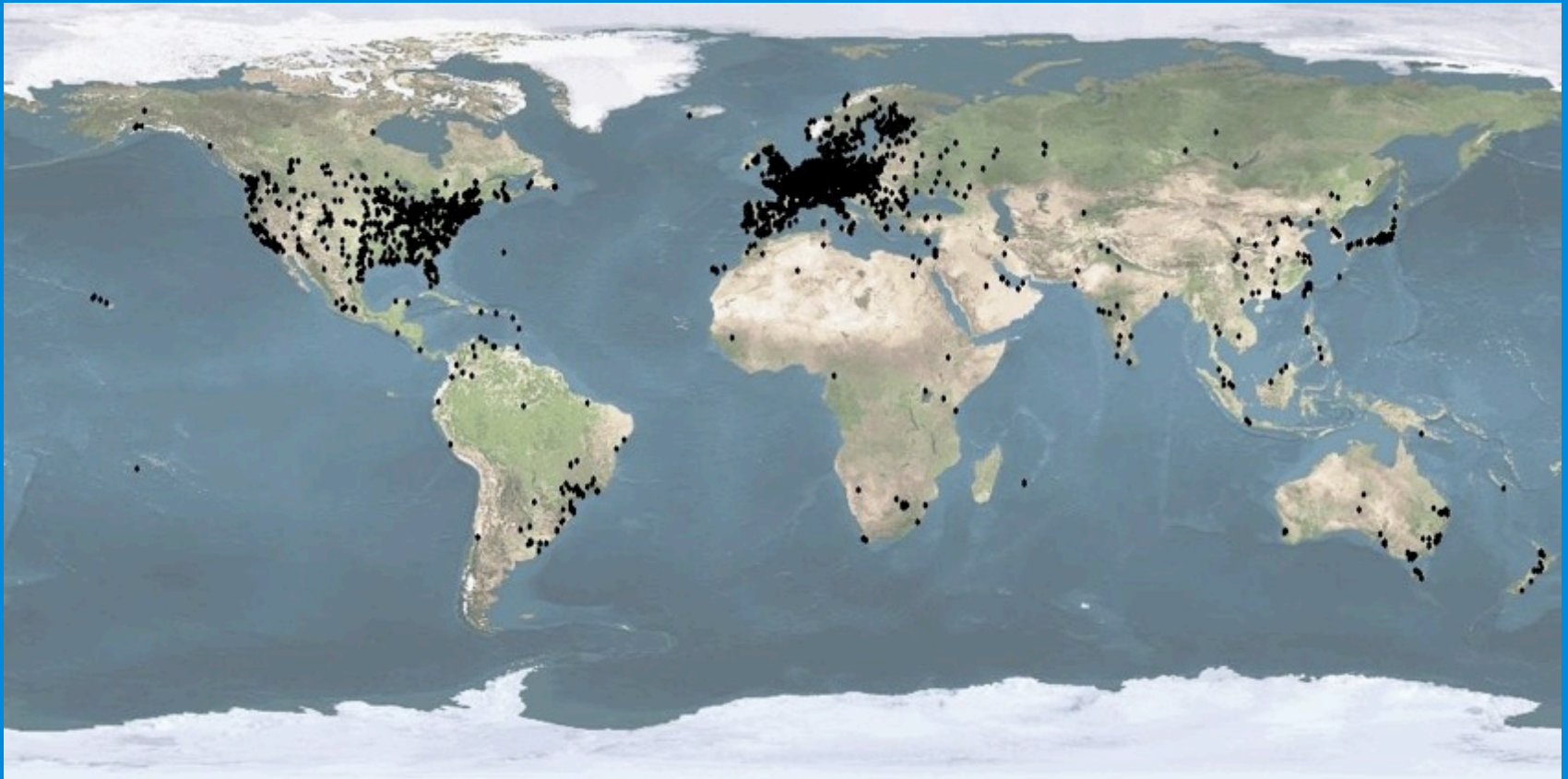
Real impact on investment



STI model predictions of vaccine cost-effectiveness:

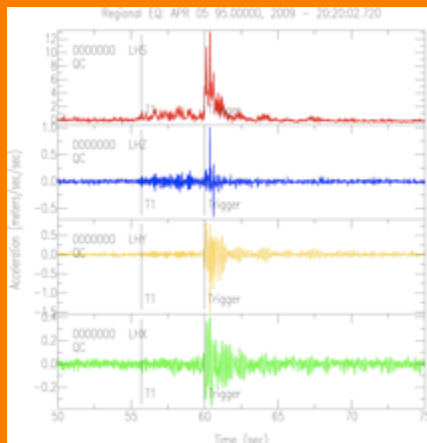
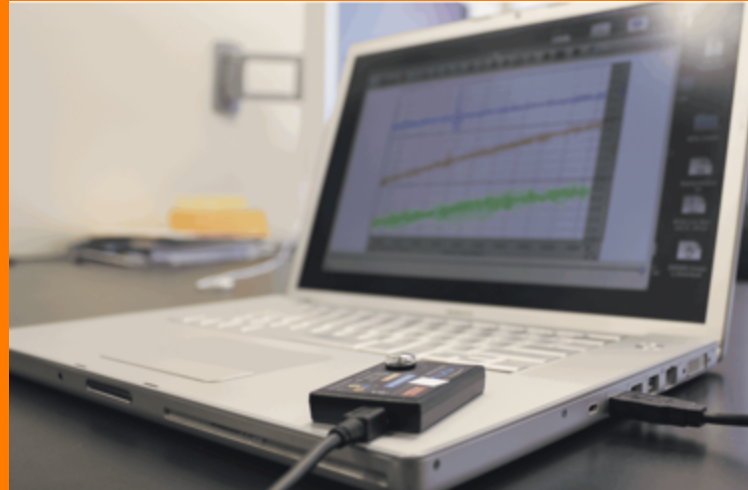
- \$1 - \$10 per dose with 52% efficacy
- \$4.73 - \$34.43 per fully-immunized child
- \$450 - \$3,500 per death averted
- \$12 - \$96 per disability adjusted life year
- \$2.7M - \$19.8M per year for Mozambique

Most volunteers not in Africa



Volunteer sensing

Quake Catcher Network: volunteer seismic detection and science




Epicollect: vets in Kenya survey >100,000 animals with Google Mobile phones



Volunteer thinking

Foldit: compete online to fold proteins ("gamers beat scientists")



The screenshot displays the Foldit game interface. The central area shows a 3D protein structure with various colored segments (green, blue, red, yellow) and a glowing blue aura. The interface includes a top right panel with competition rankings, a bottom left toolbar with actions like 'Shake Sidechains', 'Wiggle Backbone', 'Clear Locks and Bands', 'Reset Puzzle', and 'Mouse Help', and a bottom right 'Pull Tool' button.

Rank: 41 Score: 7054
47: Human Fyn

▼ Group Competition

#	Group Name	Score
1	Window Group	9168
2	Truman College	9166
3	Street Smarts	9164
4	The Lone Folder	9162

▼ Player Competition

#	Player Name	Current	Best
1	ccarrico	-	9168
2	charlesabrams	-	9166
3	zzaltz	-	9164
4	ferzle	-	9162
5	Ninning	-	9158
6	Thor	-	9158

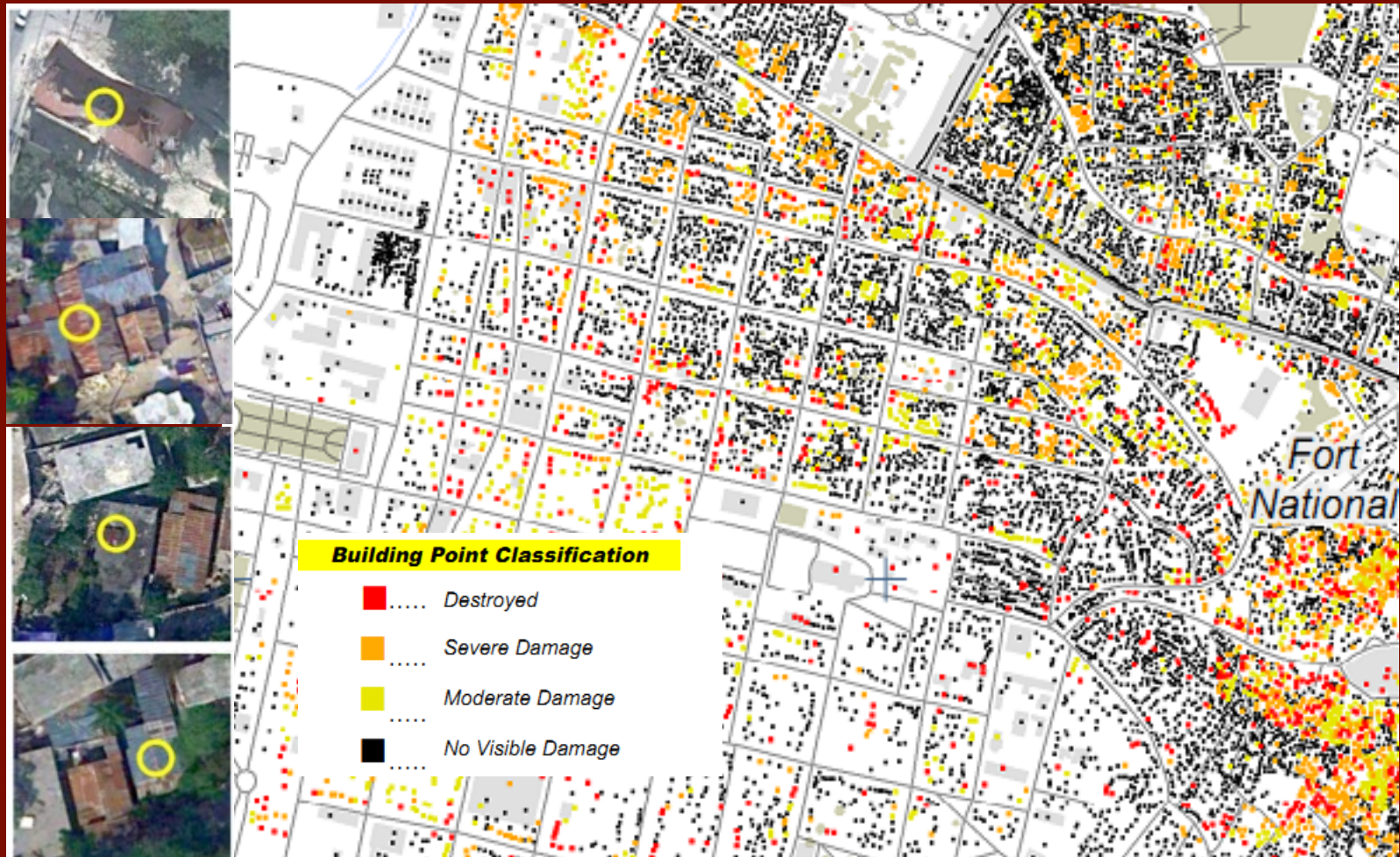
► Chat

Shake Sidechains Wiggle Backbone Clear Locks and Bands Reset Puzzle Mouse Help

► Actions ► History ► View ► File

Pull Tool

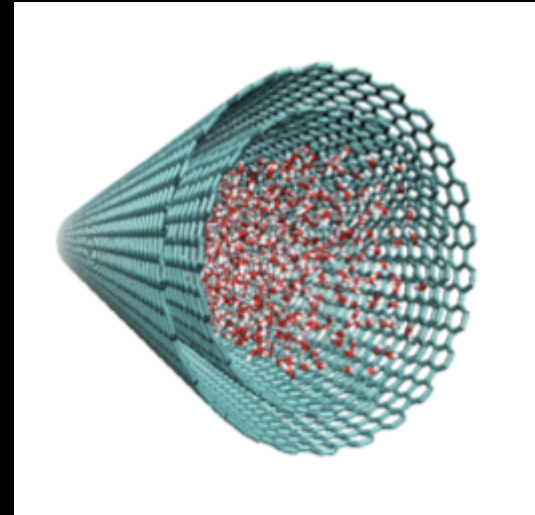
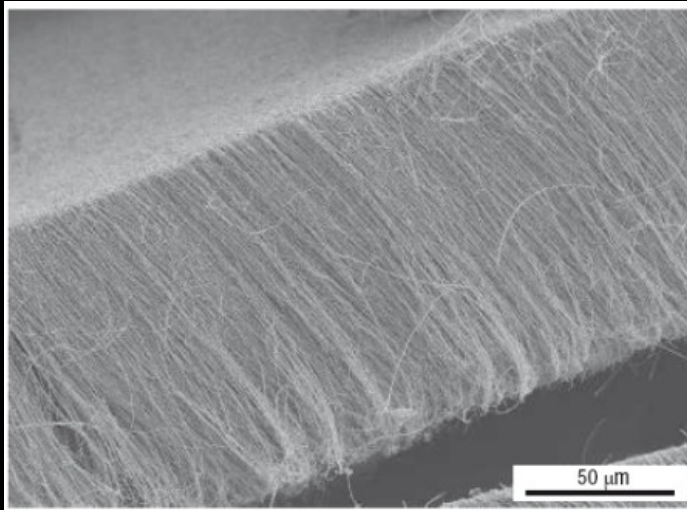
Cybermappr: experiments in volunteer damage assessment (Haiti earthquake)



Citizen Cyberscience

For and **by** the developing world

Computing for Clean Water



Project with Tsinghua, IBM World Community Grid

- 1) Simulating enhanced water flow through nanotubes
- 2) Accuracy at low v needs large samples ($\sim 10^5$ CPU-years)
- 3) IBM WCG projects preloaded on Sony Vaio in US

Hackfest in Beijing with Mozilla



2011: Brazil, S. Africa, India & S.E. Asia



The 7 myths of citizen cyberscience

- It doesn't produce real science
- It won't work for my science
- Nobody will be interested in my science
- You can't trust results from ordinary people
- It is energetically hugely wasteful
- It doesn't really engage people in science
- One day we will run out of volunteers

$$V_{\text{internet}} > 1 \text{ C/s}$$

