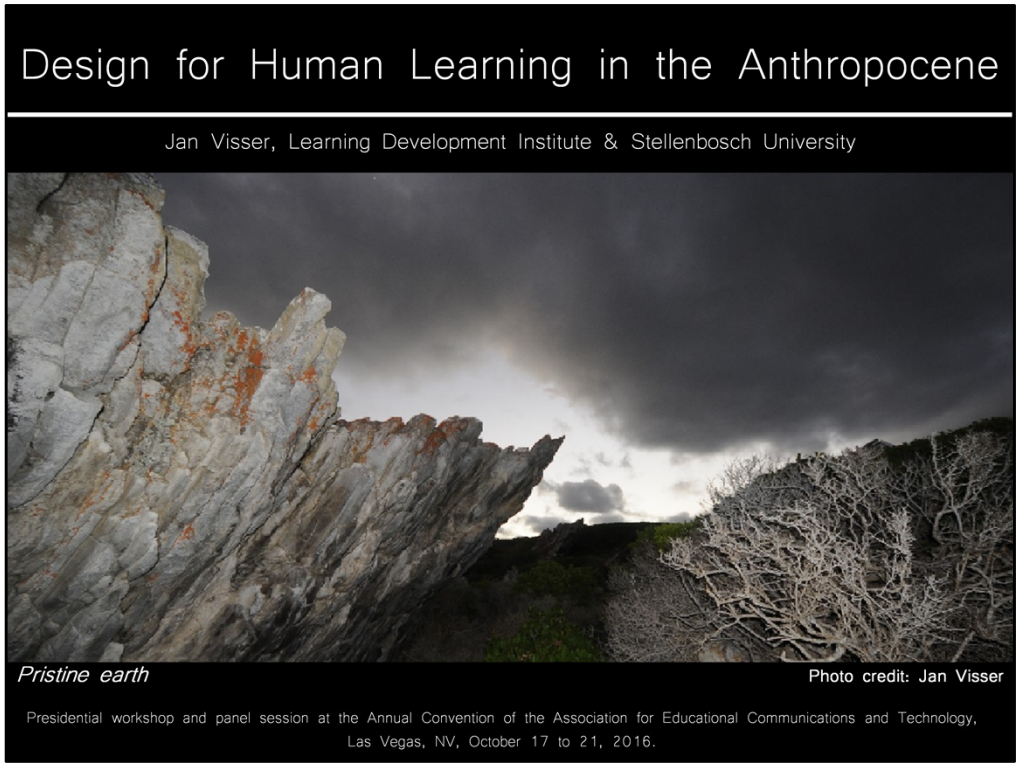
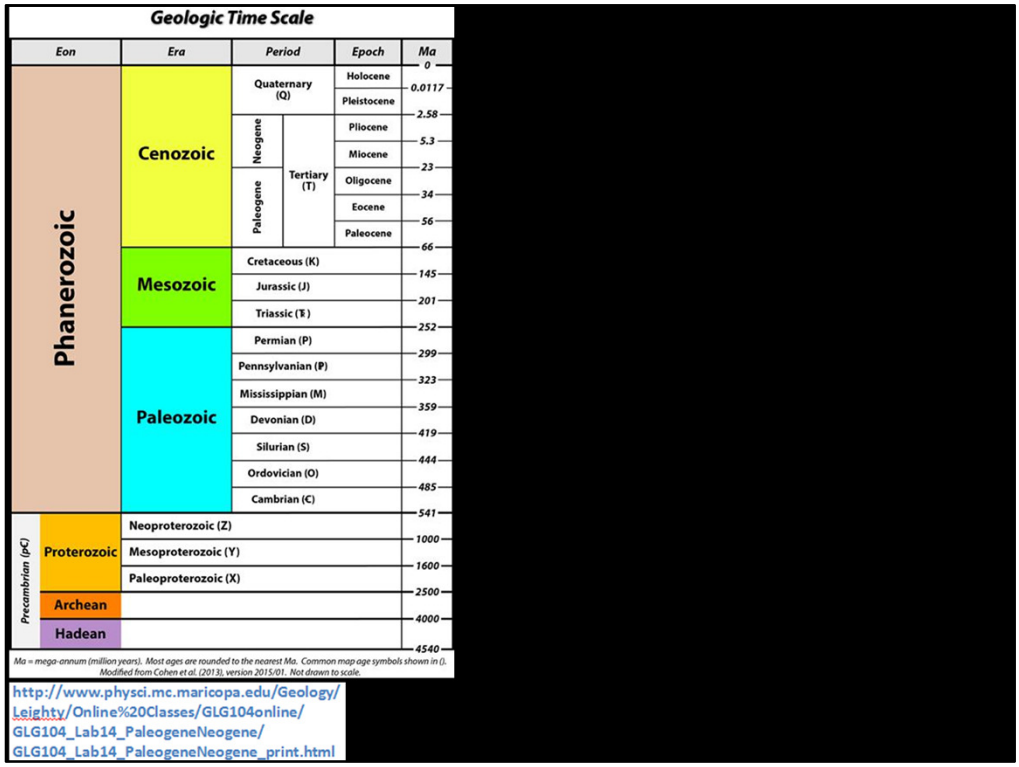



Earth started to come into being almost 4.6 billion years ago. Cooling down and formation of a more or less reliable crust still took hundreds of millions of years. Emergence of earliest forms of life may date back to 3.8 Ga, marking the beginning of the evolution of life. Only some two to three million years ago the first members of the genus *Homo* appear on the scene. Human history as we know it, as it relates to the colonization by *Homo sapiens* of the different continents, goes back to some 50,000 years ago. It changed the face of Earth dramatically.

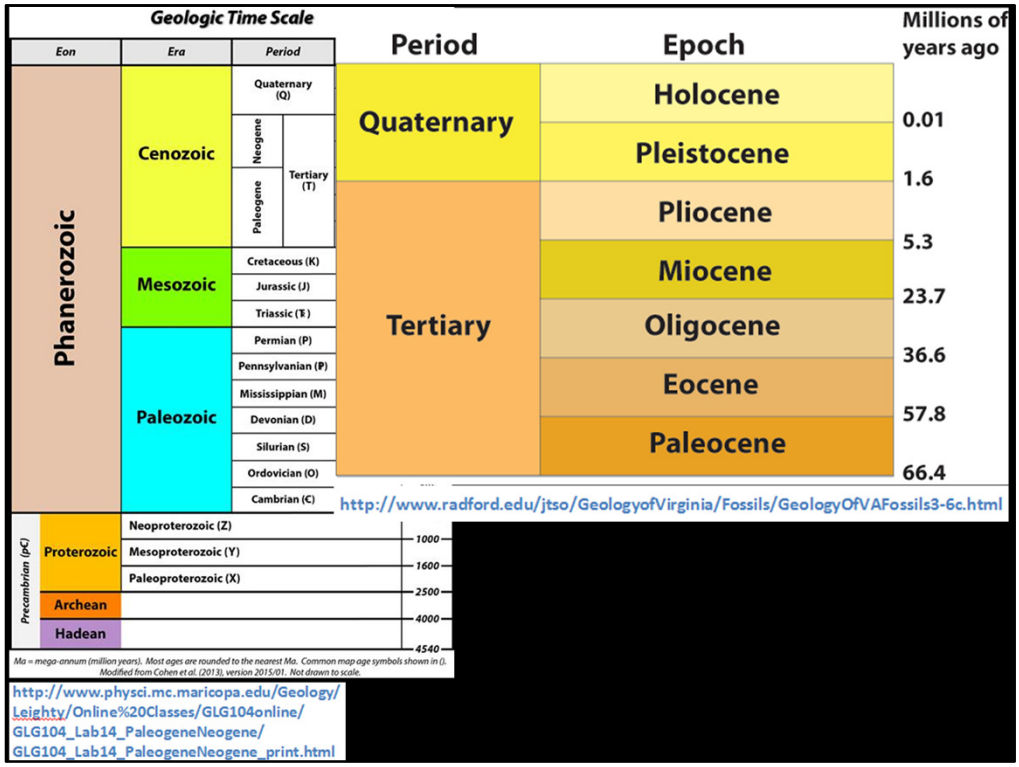
Consequently, Earth didn't always look like what we see now. One is reminded of this long ago past when, while being alone, one stands in awe of geological formations like the ones depicted in this slide. I took the photograph at the southernmost tip of Africa, the continent from where we are believed to have originated.

More detail at https://en.wikipedia.org/wiki/History_of_Earth and https://en.wikipedia.org/wiki/Timeline_of_the_evolutionary_history_of_life.


Picture credit: http://www.nasa.gov/image-feature/nasa-captures-epic-earth-image




http://www.physci.mc.maricopa.edu/Geology/Leighty/Online%20Classes/GLG104online/GLG104_Lab14_PaleogeneNeogene/GLG104_Lab14_PaleogeneNeogene_print.html

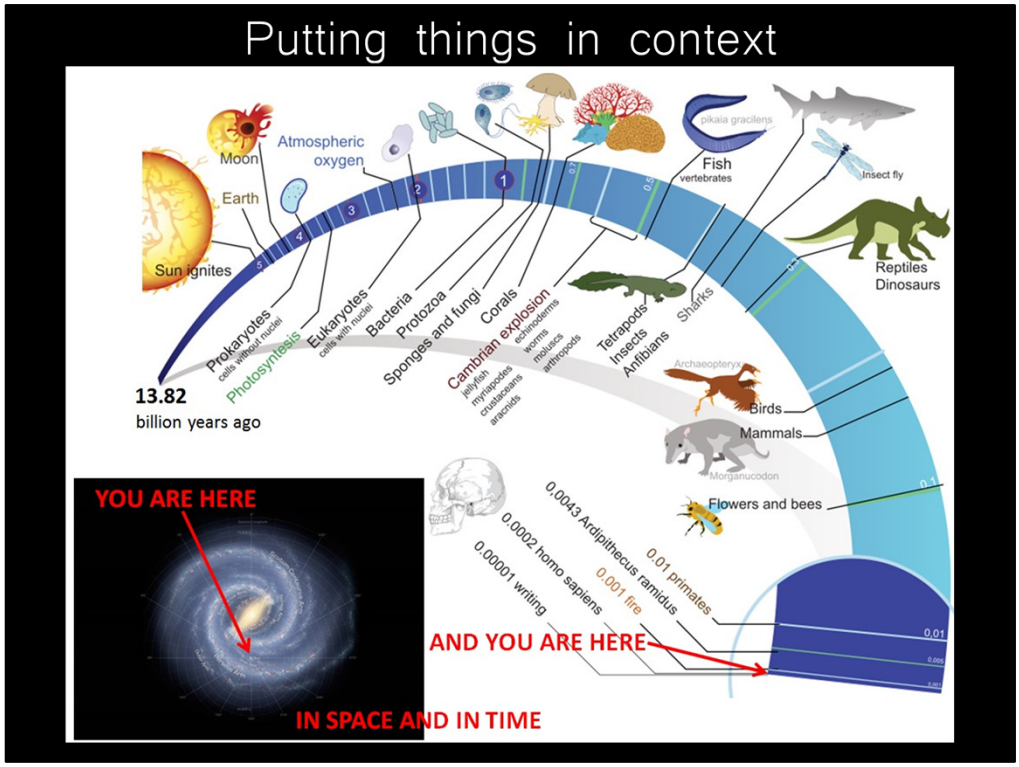

Geologic Time Scale
Eon
Era
Period
Phanerozoic
Cenozoic
Mesozoic
Paleozoic
Quaternary (Q)
Neogene
Paleogene
Tertiary (T)
Cretaceous (K)
Jurassic (J)
Triassic (Ŧ)
Permian (P)
Pennsylvanian (P)
Mississippian (M)
Devonian (D)
Silurian (S)
Ordovician (O)
Cambrian (C)
Precambrian (pC)
Proterozoic
Archean
Hadean
Neoproterozoic (Z)
Mesoproterozoic (Y)
Paleoproterozoic (X)
1000
1600
2500
4000
4540
Ma = mega-annum (million years). Most ages are rounded to the nearest Ma. Common map age symbols shown in (). Modified from Cohen et al. (2013), version 2015/01. Not drawn to scale.
http://www.physci.mc.maricopa.edu/Geology/Leighty/Online%20Classes/GLG104online/GLG104_Lab14_PaleogeneNeogene/GLG104_Lab14_PaleogeneNeogene_print.html
Period
Epoch
Millions of years ago
Quaternary
Tertiary
Holocene
Pleistocene
Pliocene
Miocene
Oligocene
Eocene
Paleocene
0.01
1.6
5.3
23.7
36.6
57.8
66.4
http://www.radford.edu/jtso/GeologyofVirginia/Fossils/GeologyOfVAFossils3-6c.html

# Anthropocene

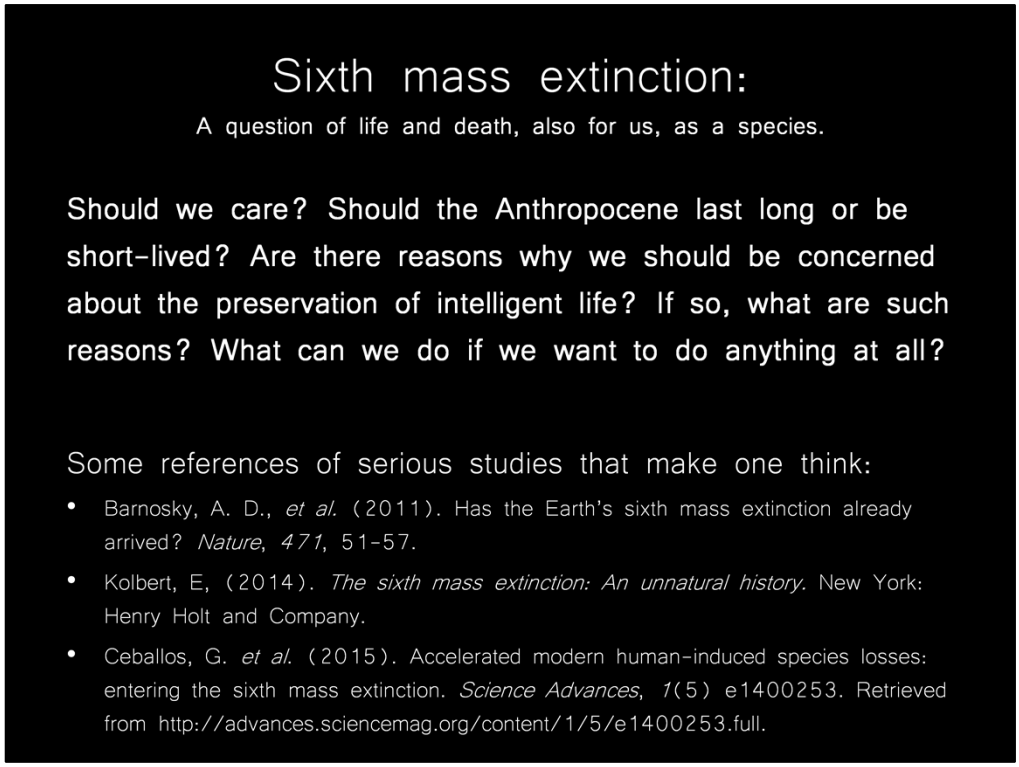
Name for new geological epoch proposed by Paul Crutzen and Eugene Stoermer in 2000.

Anthropos (ἄνθρωπος) means man, human being, humanity.

Proposed start: late 18th century. (1784: James Watt's steam engine.)

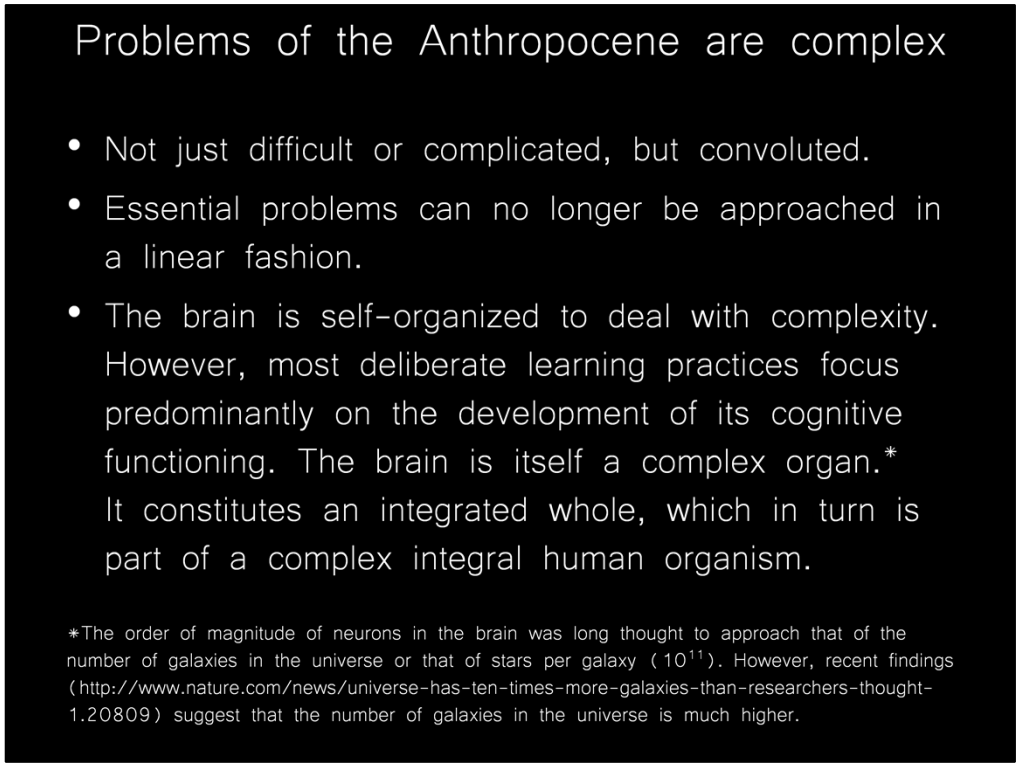



We live in a four-dimensional world



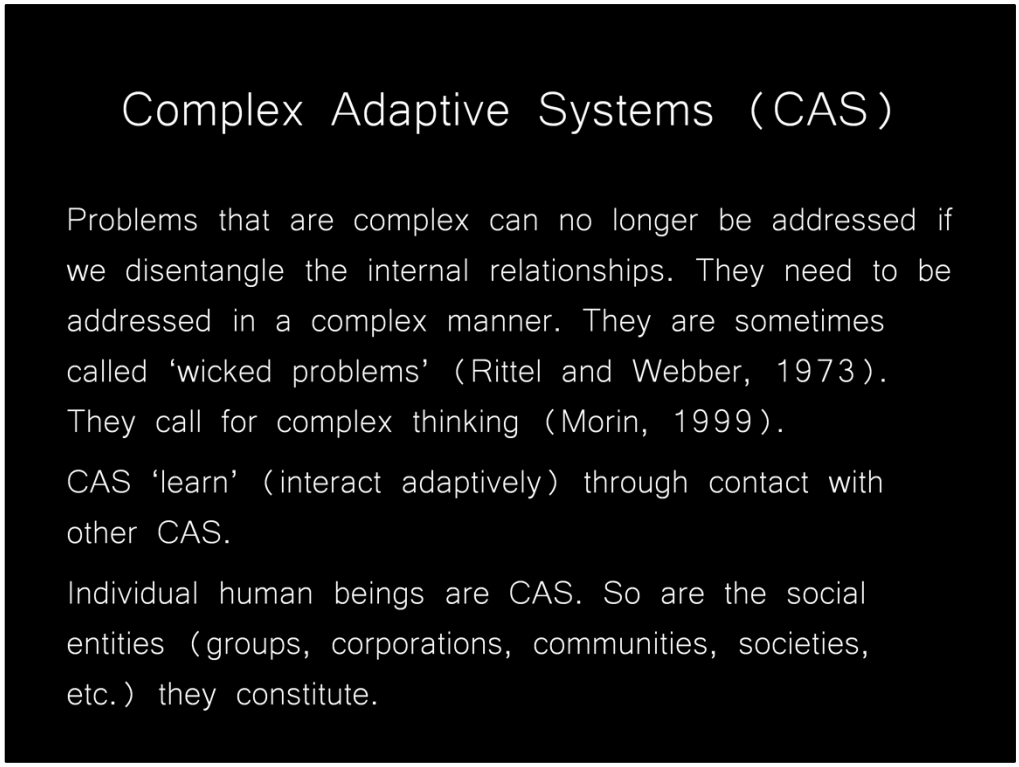

Just the tip of the iceberg of increasing evidence that we may be in trouble.

Pertinent questions must be asked.




"Complexity results from the inter-relationship, inter-action and inter-connectivity of elements within a system and between a system and its environment. Murray Gell-Mann, in "Complexity" Vol. 1, No. 5, 1995/96, traces the meaning of complexity to the root of the word. Plexus means braided or entwined, from which is derived complexus meaning braided together, and the English word "complex" is derived from the Latin. Complexity is therefore associated with the intricate inter-twining or inter-connectivity of elements within a system and between a system and its environment." (See http://web.mit.edu/esd.83/www/notebook/Complex%20Adaptive%20Systems.pdf; the quote is referenced to Eve Mitleton-Kelly, "Organisations as Co-evolving Complex Adaptive Systems," British Academy of Management Conference, 1997).

A recent study (https://www.theguardian.com/science/blog/2012/feb/28/how-many-neurons-human-brain) puts the number of neurons in the brain at 86 billion, thus challenging the long-held belief. Nonetheless, the number of brain neurons remains impressive.




A Complex Adaptive System (CAS) is an "Entity consisting of many diverse and autonomous components or parts (called agents) which are interrelated, interdependent, linked through many (dense) interconnections, and behave as a unified whole in learning from experience and in adjusting (not just reacting) to changes in the environment. Each individual agent of a CAS is itself a CAS: a tree, for example, is a CAS within a larger CAS (a forest) which is a CAS in a still larger CAS (an ecosystem). Similarly a member of a group is just one CAS in a chain of several progressively encompassing a community, a society, and a nation. Each agent maintains itself in an environment which it creates through its interactions with other agents."
"Every CAS is more than the sum of its constituting agents and its behavior and properties cannot be predicted from the behaviors and properties of the agents. CAS are characterized by diffused (distributed) and not centralized control and, unlike rigid (mechanistic) systems, they change in response to the feedback received from their environment to survive and thrive in new situations. In inanimate world many phenomenon (*sic*) behave as CAS, such as fashion trends, stock markets, traffic jams." (See http://www.businessdictionary.com/definition/complex-adaptive-system-CAS.html.)

References:

* Horst Rittel and Melvin Webber (1973). Dilemmas in a General Theory of Planning. Policy Sciences 4 (1973), 155-169. Retrieved from http://www.uctc.net/mwebber/Rittel+Webber+Dilemmas+General_Theory_of_Planning.pdf.
* Edgar Morin (1999). Seven complex lessons in education for the future. Paris, France: UNESCO. Retrieved from http://unesdoc.unesco.org/images/0011/001177/117740eo.pdf.

# Change is no longer what it used to be

The urgency for us to change with the change we crearte (adaptive interaction) had been noted in 1964 in a major literary work:

*Come gather 'round people*
*Wherever you roam*
*And admit that the waters*
*Around you have grown*
*And accept it that soon*
*You'll be drenched to the bone*
*If your time to you*
*Is worth savin'*
*Then you better start swimmin'*
*Or you'll sink like a stone*
*For the times they are a-changin'.*

Source: Dylan, B. (1964). *The times they are a-changin.* New York: Columbia Records.

## We must talk. What can we do? What should we focus on?

**Main focus: Design for learning.**

We must thus ask ourselves questions about

- the nature of design,
- current design practice in our field,
- tendencies (if any) of impending change,
- desired main focus of design (learning or instruction or whatever else), and
- prospects for our own adaptive involvement.

## Six questions

1. What do we actually mean when we use the word **design**? (What is the nature of design thinking and what is needed to foment true design thinking [not the kind of design thinking that characterizes much of what instructional designers habitually do]?)
2. Can (and should) we think of **human learning** as something that concerns more than the mere acquisition of skills (attending, for instance, also to attitudinal development and reflection on values and ethical issues)?

## Six questions

3. What about **habits of thinking and dispositions of the mind,** such as the passionate desire to understand (science) and create (art)?
4. Should we stick to the mantra of the original instructional design tradition that our focus should always be on **reaching learning goals effectively and efficiently along the shortest route possible, avoiding any redundancy in the instructional process**? What are the hidden assumptions regarding human existence and human development that lie behind this notion? Do we see a mismatch between the kind of humanity we need for life in the Anthropocene and what actually results from current design practice?

## Six questions

5. Let us not forget that our **research tradition** builds on and feeds back into design practice we may no longer feel comfortable with. Should it change? If so, how?
6. Should we continue to think of **technology as "design for instrumental action"** (Rogers' words)? Is it really just about instruments?

## Six questions

1. What do we mean when we use the word design?
2. Is learning just about acquisition of skills or should it include attitudinal development and reflection on values?
3. What about habits of thinking and dispositions of the mind, such as the passionate desire to understand (science) and create (art)?
4. Should we stick to the mantra to reach learning goals effectively and efficiently along the shortest route possible, avoiding any redundancy?
5. Are we still comfortable with the established research tradition?
6. Should we continue to think of technology as a "design for instrumental action"?

# Design for Human Learning in the Anthropocene

Jan Visser, Learning Development Institute & Stellenbosch University


http://www.learndev.org/HLA.html