**notes** *"the future is not what it used to be"*     Santa Fe Institute, September 2009

I'm not sure if Bela Nagy, the organizer, is a fan of Yogi Berra's, but:

"The future ain't what it used to be"

*summary*     *Our predictions are* **statements about ourselves.** *Predictions reveal the author's model of the universe. And therefore, philosophy matters. We look to culture to understand, to translate, how viewpoints are formed and how collective viewpoints impact change.*

*Predictions are most useful as a data gathering component of* **decision making,** *however extrapolations and overconfidence often lead to errors. In selecting variables to consider, time although used frequently, is not necessarily the most illuminating. How much time is one willing to spend when evaluating a decision? As a thought experiment one could build a simulation of the planet, to decide what to do. However ultimate accuracy could only be guaranteed by "running the clock" twice.*

**Revolutions emerge from the urge,** *not from moral obligations. Real change is the summation of quantum effects.*

**Axioms** *are the sum of predictions/strategies/forecasts/scenarios, in other words a guiding viewpoint. Actions are decisions executed. After every action, occurs an opportunity to reevaluate the axioms upon which such actions were based, and the environment the actions were conducted within. A new axiom can be formed, guiding the next action. A complex adaptive system.*

**Meaning and comfort** *are similar. Familiarity and repetition can provide both meaning and comfort in ones life. Deep meaning can be found by understanding the order in the universe, which provides a sense of comfort, a sense of knowing ones place. Comfort provides space while taking the risk of creativity. Meaning is found afterwards.*

**Outliers and extremes** *are important when understanding phenomena across multiple scales, because they influence phase change transitions. Catastrophist study these. Uniformitarians do not find these helpful, when understanding phenomena within a phase, zone or context because outliers and extremes do not influence operational, incremental change.*

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**monday, 14 september 2009:**

Santa Fe Institute: small and high quality is good.  It doesn't appear that much has changed on first glance since 1995, which is actually quite pleasant... futurism aside.  Small events, good people, make for great discussions.  I wonder if SFI can "cyber-ize this experience."

Hopes, worries and expectations, not helpful framing of the future... too religious, not scientific.  "To challenge long-held assumptions" is a more fun approach.

*Joseph Coates*

*overview & history*

The quantification of America began during the Civil War, and has typically been advanced by wars, but has nevertheless generated **huge amounts of data that enables predictive models.**  The best thing about the Venture Capital industry is that it forces creatives to make a business plan, which is in itself a type of a prediction.  Three fundamentals to the human endeavor:

- We have the **capability to see the future,** whether it is 5 or 50 years ahead, with enough clarity and confidence that it is useful for planning.
- We have the **ability to intervene** in the evolving future to make the undesirable less likely and the desirable more likely.
- We have the **potential to use those capabilities** to anticipate and influence the future.

| term | duration of analysis |
|------|---------------------|
| tactics | short term |
| strategies | medium term |
| foresight | long term |

This type of strategic foresight will never be hard data driven science, but it can still have systemic documentation and clarity.  This is the opposite of using any technology as "black boxes" to obfuscate the thinking, or the process.  The **goal of any exercise is to "change people's minds"**...  To what? it doesn't matter, but the process gets them thinking and the change initiated is always better than an un-thinking status quo.  A single minded futurist is really only an advocate.

Discontinuities and continuities... social change of values, new science, etc.  As societies develop, people consistently: eat more meat, drive more autos, utilize more IT, incur more travel & tourism.  And leisure is dependent upon the type of one's work.

Typical failures are caused by:

- inability to grasp new options (handicapped by one's worldview)
- too regulated
- untested enthusiasm of the inventor

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- lack of attention to secondary effects
- lack of framework to comprehend too many choices

Can we increase our ability to predict? It would take time, money and the will of the educational system to increase the number of students with deep analytic capabilities and unconstrained viewpoints of the possibilities. **What is the payoff: decisions or studies?**

Areas of focus for massive change ahead:
infoTech • genetics • materials science (nano) • energy • brain sciences

*Bela Nagy*
*performance curves*

Working on a more accurate understanding of performance curves than the often cited, but factually inaccurate, Moore's Law. The misperception is caused by: limited data sets, a viewpoint of "fitting the data" to regression lines, and too restricted set of variables. Predictor variables have usually been considered in time, however production volume can be a more effective means to understand the situation.

Various technologies also go through periodicities, where they "ramp and camp" only to start again. Phase change situations have to be accommodated with larger data sets to understand the underlying processes that contribute to major technological shifts. The **substitution of the time variable, by a production volume variable,** generates a more useable, in depth knowledge of the effect of change. Similarly, in choosing the appropriate variables, there are ways of removing the need to "guess" at probabilities assigned to different scenarios. Thus avoiding unnecessary guesswork.

"For every technology solution there is a non-technology solution." J.Coates... Bela also showed great charts: on the cost of DNA sequencing relative to production, where the costs went back up as the production volume slowed; and the "error mountain."

*Peter Bishop*
*academic forecasting*

Discussed the academic version of scenario forecasting. Generally using 'S' curves, and then an agglomeration of 'S' curves, forming a meta-pattern 'S' curve. A few side thoughts/ comments here: in the military terms like **"will, must, should"** are used in the context of the office, and terms like **"may, might, could"** are used in the context of the field. This was in a discussion about the urgency to make decisions, versus the luxury of time allocated for decision-making. Basically the difference between a universal axiom, and a particular action.

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*Jordan Greenhall*

*current cultural evolution*

Discussed the impact of cultural evolution coming our way.  Events not things, shape our understandings... Strategies are what events can do/achieve... and evolution explores the event space, exploiting chance and optimizing strategies.  Meaning is formed in three areas:

- biological events
- experiential events
- symbolic events　　　　　　　this is forming an axiom, forming a viewpoint

Our model of how things work, can (incorrectly) attempt to impose actions on the world. Awareness of culture, recognizing itself as culture in the moment, is a phenomena of the 20-30 somethings.  A self-referencing, or a self-serving vanity, in the context of a statement of how one is super-aware?  This leads to the Zizek line that "irony is the ultimate form of a critique of ideology", or kids these days think the system is a failure, meaning that the system is not what is says it is.  This has revolutionary potential.  KIds always have energy and ignorance... that's why revolutions emerge.

How does this relate to time-scale of prediction, and degree of control of a prediction (engineering versus complex system learning?)... Quantification is necessary to do good work, however it is embodied in one's attitude and clarity.  Poorly used data can also lead to projections out to nonsense. **Understanding culture is a method to qualify viewpoints of change.**

*Joe's day one summary*

Prediction and Forecasting. Not to be confused with 'arm waving' versus numerical data. The latest quantitative predictive modeling, appears to be limited to predicting movements with in a zone of innovation. Quantitative predictions of phase changes in the evolution of technology, would predict forces that put LTCM, Lehman Brothers & GM out of business. Models do not exist, yet, that can predict these complex forces.

two classes of thinking:
"long term" expansive plausible scenarios to structural changes
"short term" consolidative solutions to engineering proposals
There exists a search for scale/hierarchy/nesting/control in the prediction of increasing completeness.  Simultaneously, the increasing complexity in the world, makes predicting with completeness even more difficult.
**Therefore accurate predictions operate in a steady state of "human time horizon."**
This can be seen in lifestyle products: people will always be willing to spend a small

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percentage of income on certain types of gadgets.  Two side notes about current societal trends, which are dangerous to consider, but nonetheless:

- irony is an indication of the lack of belief in societies operating principles… this from those 30ish aged people
- proactive try anything 'superficialness' from those 20ish aged people, can lead to the revolution: they are willing to pay to be in a new 'group' (digital gaming cultures)

A notion was made that science fiction is typically negative: boys aggression, etc. Wall-E was not. By moving the date out to a preposterous 700 years, it avoided the "accuracy/plausibility" problem. Yet it's ideas could come to pass within 80 years.

Global Warming is a threat directed at human-selves. Why? It is the fear that we are not in control, that is the impetus for the notion that we have wrecked the planet.  **Fear is not a good motivating principle for ethical actions.**  Fundamentally Climate Change is not a threat… why is it not possible to envision the year 2080 like this:

- fewer people
- way less energy used
- way less physical objects
- way more velocity of operation

all facilitated by radical and massive phase transitions in:

- CERN/new philosophy
- bioengineering
- computation/simulation
- nano/materials

One note on presentations:

there was a great paper which laid out a basis for using a common terminology, or language, to discuss foresight. This is highly useful when teaching a class. However in the context of very diverse expertise, we can't even agree on what we are looking at: cosmology, paleontology, the economy, or signal processing. Therefore, one presenter telling the others which words to use, and what they are to mean, by necessity was a failure.

A better strategy would have been to present many examples with consistent terminology, no matter how rudimentary (likely to be student work), which demonstrated the value of using his recommended terminology.

animate...

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**tuesday, 15 september 2009:**

Leftover thoughts from the day before:

*"ignorance/knowledge of the Other is the traumatic core of the subject"*    Zizek

*"irony is the ultimate form of critique of ideology"*

*"radical individualism serves as justification for the unfettered power of corporations"*

    this is the logical conclusion of 'divide and conquer' the masses

*Anna Salamon*    Presented a subjective Bayesian analysis tool, where opinions are put into analysis.  The result is a precise way of quantizing personal beliefs according to some structure, some determination of right and wrong.  Looking towards an intelligence explosion, where intelligence means: concepts that would help us understand

- traditions and the division of labor
- institutions of science
- life transformed planet

Intelligence can be all things humans have added. In 1983-1999 Howard Gardner lists eight intelligences as linguistic, logic-mathematical, musical, spatial, bodily kinesthetic, naturalist, interpersonal and intrapersonal.  Based on the idea that "knowledge gives leverage," any such explosion will expand humans potentials: from human intelligence to humanity level intelligence.  The **fear is that Artificial Intelligence,** as an optimization process, would eliminate the need for humans.  This fear could be addressed from many angles, but was not: "look! it's like this..."

Unfortunately, the tool as presented implies that the singularity idea is valid, regardless of diverse viewpoints.  It's a false validation model for two reasons: one it's based on "opinions of users of the tool" which have no bearing on scientific development, and two it assumes maintaining human control... or die.  The falsity is a binary choice that humans have: "there are no second chances, either the world is destroyed, or not." Today we know that even nuclear war is not binary... Despite the web based-tool generating data, this did not appear to be science.

theuncertainfuture.com

*Alfred Hubler*    digital batteries                     3-in-1 presentation

                        digital wires

                        atomic scale neural nets

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Because **atomic scale neural nets** operate at the speed of light, and are smaller than biologically driven brains, they have the potential to operate a billion times faster and on less energy. True: human brains do not encode info digitally, but they operate in a similar manner. It is not an exact comparison. The simulation was of "self-assembling particle swarms" forming a one dimensional network, which grows in jumps and always has 22% endpoints.



Three types of mathematics attempted to model behavior: random something, minimum spanning distance, & propagating front model. It turns out the least expected and simplest model predicts most accurately: minimum spanning distance. When modeling highly complex systems, frequently used network becomes most efficient.

**Digital batteries** (re-conceived capacitors) store energy efficiently and in extremely dense arrays compared with any existing technology. Today, capacitors have not been optimized for storing energy. Nano materials would be used to withstand the extreme structural conditions.

Analog wires have been remarkably stable when coupled with human management, although accidents happen regularly. **Digital wires** are notably easier to manage. Digital wires can also compute information... they can perform "conservative computation" which does not require "throwing away" energy when a state is switched from on to off, like current computational paradigms.

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No system is unstable to ramified structures.  The network is unpredictable.  **Perceptions... machines with understanding.  Understanding is the ability to translate.  And computer programing languages are fast approaching the english language.**
Complexity increases as machines translate: look-up tables, to rule based translations, to context dependent knowledge systems.  Then what?  Drum roll... and anthropocentric fear takes over: "do we have evidence of these behaviors in the real world?"
answer: "yes, in those ball bearings!"

*Doug Erwin*    Spoke about Uniformitarianism and Catatrophist scenarios of the future.  Beginning with the Colorado River water apportionment which was based on a Uniformitarianism view point from the 1920's which has turned out to be a literal "high-water" mark for the River... resulting in major problems because the implications make all legal agreements are unenforceable.  **Outliers are important.**  They are the complement to steady-state analysis.  Uniformitarianism is a short term/scale tool.

The value to uniformitarianism is: implicit assumption of science predictability, equivalent to induction, spatial/temporal invariance.  It is uniformity of rates that typically causes errors.  Darwin assumed there were no long term secular trends because it simplified the work.  Now we can see many "punctuated equilibriums."

- There were 5 billion passenger pigeons, but only two in the fossil record.
- really three earths: one with oxygen 550m; one with oceans rich in iron & sulfur 2.5b; and then neither oxygen nor oceans
- only 40 million years ago, the $CO_2$ levels were significantly higher than our worst projections today
- carrying capacity idea was originated when looking inside a test tube, and erroneously extrapolated out the the planet as a whole

Types of errors in projecting:

- substantive uniformitarianism
- methodological uniformitarianism
- unwarranted extrapolation
- inadequate data– compounded when humans confuse time-scale differences
- failure to see/recognize secular trends

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Many make the assumption that species adapt to their environment, but equally important is that people adapt the environment to fit their selves.  And yet we have to make decisions everyday...  What is the new data for the future?

- universal data for a network (axiom)

- particular data for an action

These two sources may assist in identifying variances from extrapolations: finding phase changes.  Zizek points to a similar notion where "The logic of prescription (politics) unites two features which a Western 'liberal logic of compromise' cannot grasp, appearing mutually exclusive:

1.) prescription is divisive (imposing an axiom);

2.) and simultaneously universal (acting according to a universal axiom).

An example is Jose Luis Rodriguez Zapatero upon his 2004 victory as Spanish Prime Minister, did not posit equality for women as a goal to be gradually approached, instead he simply appointed women to half the posts in the cabinet.  **The status quo fears any axiom as totalitarian.**

The limit to predictability is our actions: universal, empirical data streams inform our axioms; and particular, local, contextual data informs our actions according to those axioms.  This is how we avoid poor extrapolations... separating out the purpose and origin of the data: in the same regime, extrapolate away, but negotiating between regimes extrapolation is error prone.

Obstacles to thinking: be brash!  maybe disasters are therapeutic?

What happens if one anticipates a disaster?

• attempt to change contributing factors  (when have time to observe)

• if not possible, forget causes, find interventions  (when no time to observe)

Again we are acknowledging time: short term or long term actions.  Basically, can one act and reevaluate the effect of the actions? or is there no more time for reevaluation?

On climate change, we should be careful about our implicit assumptions.  The plants have been through way worse.  Plants and abuse... we don't need a Gaia Hypothesis: its not the plants, its the services provided by plants.  Which, such services could be provided in other ways, by smarter agents.  "Life has gone through this before."  True, humans may not

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persist, but life will go on.  As a resistance to disenchantment the following statement was offered: "There are symbiotic reasons for humans to coexist with more intelligent agents."

At which point fear took hold, and formed a binary question:
**Where is your allegiance, to humans or intelligence?**

Also: Murray Gell-Mann's 80th birthday celebration...
Murray recalled briefly **how messy things are when in the middle of a challenge.** He recalled a colleague (Dirac?) who had the equations showing the existence of the positron(?... i'm not a physicist), but simply didn't have the courage to state it in a paper. Murray's point was to "write it up, publish it, and move on!" but certainly don't shy away from putting forth the idea.

A similar point has been made by Steve Jobs, it is perfectly logical in hindsight.  But at the time it is blurry and confused, which is actually the time of opportunity. Ideas should be well formulated, and submitted to the real world for funding/approval/profit/evaluation what ever one's criteria of success is... and then move on!

*Sir Chris Llewellyn Smith*          Gave a general talk on the basics of the standard model and what we are looking for with the Large Hadron Collider.  Accuracy of this statement is in question:  all of the four forces gravity, nuclear, electromagnetism & weak (last two are related), are due to the exchange of particles.  Both Doyne Farmer and Alfred Hubler agree: the standard model of quantum mechanics needs to be overturned to make progress.  It is likely that everything is a wave or a particle... no strings.

*Joe's day two summary*          where are your allegiances:
to intelligence, or, to homo sapiens?

There appears to be an oncoming force: the explosion of intelligence. This will emerge due to the diffusion of computing resources- in both machines and humans, at an exponential rate. Many people refer to "The Singularity" as the point when computation machines

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achieve more than a single human brain, which should happen well before 2050. Information, computation, intelligence… software programing is quickly approaching the interface of the English language. Tools are already able to assist and add to human intelligence.

Oddly, there was so much focus on "technology" in the computer sense, that there was never a discussion of the speciation of humans into another more complex life form… even if it is genetically engineered.

But wait, there's more: Alfred Hubler- 3 radically profound ideas which are highly plausible, if not outright ready for implementation.

- digital wires
- digital batteries
- atomic neural nets

There exists the possibility to switch power lines and batteries from analog to digital signals. Both yield huge efficiencies and manageability savings. Atom level structures of vast neural nets can also be created, functioning not dissimilar to the human brain: learning, strengthening, etc. but faster and a billion times more dense than a human brain… Also such computation is "conservative computation" in that energy is not thrown away: currently memory chips throw away energy when switching from the on state (0) to the off state (1), generating heat.

All three of these radical potentials shrink the physical size of our currently used technologies by orders of magnitudes, while simultaneously increasing the functioning performance. These are not considered in discussion of "singularity" but nonetheless possess huge ramifications on human activities.

question asked: is there an example of this kind of behavior in the real world?
AH: "yes, in those ball bearings!"

Yes this is a threat. Another in a long line of scientific pronouncements, discoveries, or conclusions that pushes human beings further and further from the center of a universe of meaning.

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Doug Erwin- better extrapolations

KT: 66.5 million years ago +/- 20,000 years, a 10km diameter asteroid hit the Yucatan Peninsula.

Catastrophist and Uniformist have battled in paleontology. The key is to be aware and note, the outliers, the extreme data which supports the consistent data in the middle. Most money spent on climate change only goes to understand the last 10,000 years, but $CO_2$ levels were way higher just 40 million years ago.

Bad extrapolation example: "carrying capacity." The idea of carrying capacity began by looking at cells in test tubes. Then it was extrapolated out to the entire planet! There are way too many scales and complexities as obstacles to such linear extrapolations.

At which the discussion dissolves into everything about, but not directly stating, how each person gets meaning out of their work/universe… "friendly AI", "disasters can be therapeutic!", "optimization within an environment", "but humans may not persist", "where's the data?", "data can't tell us these things", "everything rapidly changes, but this object will remain, and I will give it to my child", etc.

Maybe, the current problem is the "monetization of science" where ideas are only pursued because of some perceived financial utility. Whereas, as Murray Gell-Man operated, the pitbull instinct of chasing an idea to it's logical conclusion, is a more primal urge than working for money. Great inventions emerge from the quest, not from the rewards.
And the primal urge, is not regulated by ethics or global warming, it doesn't care if it is useful, or what the end goal is. Except survival, which is so general, it is not a constraint on seeking new strategies in the state space.

~ presentation notes
never make definitions, because in form, it is attempting to tell people what to think

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**wednesday, 16 september 2009:**

*"... is an art and we would like to make it a science."*     are you sure?

Bela Nagy

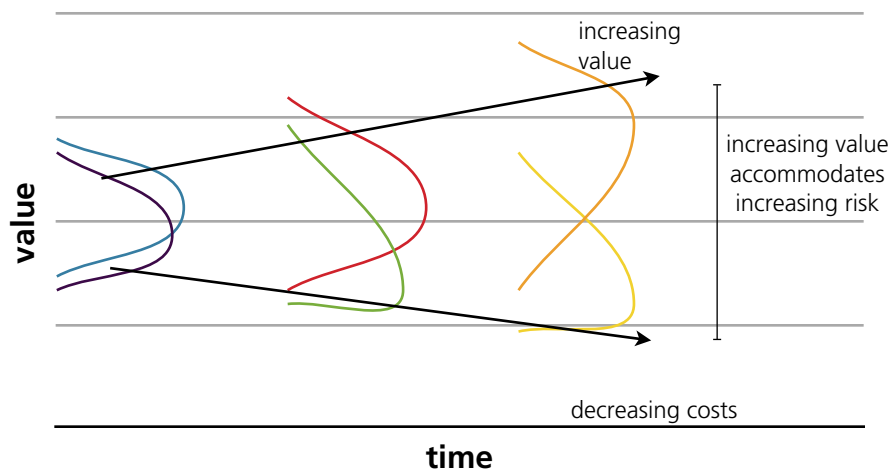random notion: comfort provides space for taking the risk of creativity.

meaning is similar to comfort, except it comes later in time.

*Scott Mathews*     Boeing has a two tiered approach to the enacting their future: **tactics and strategy**

Strategies are long term, tactics are short term, and strategy shapes tactics and tactics benefit from strategies. Mergers and Acquisitions are a separate "gap-filling" one time decision. Further clarifications: Tactics are well-practiced, immediately actionable, focused on quality, have a NetPresentValue, can be measured with utility metrics, small cone of uncertainty. Strategy by contrast, designed to a new target market, have risks that the company is willing to bear, have hurdles, failure rates in R&D, rare spin-offs from failed R&D efforts.

Following is a chart depicting a means of allocating and managing R&D funds on projects. The notion is that in the beginning a case is made for how an effort will achieve a payoff. As each phase of the effort is complete, reevaluations are made and hopefully increasing value can be found, otherwise if costs rise and value decreases, than the effort may be terminated.

— **costs**   — **value**   — **costs@t2**   — **value@t2**   — **value@t3**   — **costs@t3**



Control structure is "positive feed forward based on expectations/predictions. In the real

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world, there are times when have to "wing it" because the pace is too accelerated to wait for feedback.  Scott searched for a means to find the limits of predictability:

<u>uncertainty principle</u>                          <u>incompleteness theorem</u>

physical world                          logical world

Where any limit, and even any prediction, has to be able to incorporate these two aspects of the real world.  Oddly, my understanding of Boeing from the outside (additional sources) is that there are too many "ideas" developed in R&D, and too few engineered solutions. Which can lead to a collapse... the company is so profitable (running a monopoly of sorts), that it can fund excessive amounts of "pie in the sky" R&D theorizing, feeling good about itself and its "futuristic credentials."  Psychologically this is because people like the fun of science fiction, but not the drudgery of engineering real world solutions.  And fundamentally, this stems from leaders with a lack of vision.  Steve Jobs is not running Boeing, but maybe Rick Wagoner is... ouch.

*Robert Lempert*        Described a tool for assisting decision makers.  A clear connection between long term consequences and short term actions, makes long term decisions more likely. In contentious public debates, focusing on actions rather than outcomes is more profitable. Often multiple scenarios leads to "he said, she said" circulatory futility.

Oddly, the probability of a scenario's occurrence drops out of the equation, eliminating contentious debates about different viewpoints of future probable outcomes.

The tool develops an "efficient frontier" of good strategies, which are based on actionable steps taken today.  Then once understood, probabilities can be estimated for the strategies most likely to be enacted.  This is related to Zizek's: posit a universal axiom, and then act on it, not to reach a goal, but simply as a guiding principle, open to new guiding principles. These are incremental steps to radical change.  This is valuable because quite often there are **specific points in time when action is possible,** moments of action, even if a decision maker wants an enduring policy.

Best counsel: if you think _x,_ you can do _y._  But if you think _q,_ you can do _w._ Interestingly both Scott and Robert are capturing, or attempting to capture time: **"how urgent is it?"**  This implies in a sense, that prediction is truly a sub-discipline, a component of, decision making.

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*John Smart*    Over 100 slides and an intermission.

purpose "to live more balanced lives"            — interesting, irrelevant, and not irreverent

Described his belief in "single source" artificial intelligence... oddly, humanity remains "as is."

From Zizek's "Resistances to Disenchantment":

> "... obscurantism is the intention of keeping truth and meaning together.  Can we discern a dimension of truth outside meaning... Global capitalism precisely is truth without meaning.  Religious strategy is to contain the scientific Real within the confines of meaning, by being the "guardian of life" (any form of life), by erecting barriers to create meaning."

Blinded by an overarching, comprehensive, optimizing, truth-viewpoint of the universe, intended to create meaningful engagement in one's life, to create a new cognitive mapping that can replace a "religious meta-story"... **obscurantism has enabled the trading of religion for a "singularity."**

*Mark Pagel*    Humans have been speaking for 150,000 years.  Number of languages has been reduced from 12,000 to 7,000 today.  Daniel Webster created an "American English" by changing the subtitles of spelling: colour became color.  The most frequently used words in human speech, also happen to be the most consistent across all languages: **2, 3, 5, "I," and who.**  Between 12,000BC and 5,000BC languages evolved and in a sense, words act like genes, creating families of languages. It is the simple utility of function, that enables these stable patterns to form across so many widely varied cultures and timeframes.

*day three summary*    "… is an art not a science, and we would like to make it a science" –but why?

is meaning the same as comfort?

Perhaps a bit of fatigue setting in, but my mind wandered today. For some reason, I continued to see any person speaking as a representation of their "worldview" more than the substance of what they attempted to communicate. I kept returning to Zizek's thoughts about Fear and Anxiety.

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Even these folks, smart and futuristic as they might appear, have ultimate concerns about
their personal futures. Maybe it is to be expected: the obscene underside of their futuristic
ways, is a dread about the speed of change. There exists a qualitative difference in character
between a person who simply has the urge to create/solve/understand or be in the state of
"flow", and others, whose enthusiasm obscures their deep fear and anxiety. Murray Gell-
Mann's work was in a state of flow, willing to take the risk and postulate about a new
particle as yet unseen… and unfathomed.

Saved by a great presentation about how languages evolved between 12,000BC and
5,000BC. Tonight Mark Pagel gave a talk on his thoroughly developed work, which he knew
very well, and presented in a few, simple & slightly entertaining slides. Words act like genes:
2, 3, 5, I & who; are used frequently across millennium by people speaking every language,
and are remarkably stable. It is the simple utility of function, that enables these stable
patterns to form across so many widely varied cultures and timeframes.

Corporate internal investment strategies:
emergent values in innovation (engineering) process
can we identify the limits of what is predictable, and not, on corporate portfolio
management?

scale based from reactive quick tactics, to proactive stable strategies.
public policy guidance:
decision support tools
in contentious public forums, scenarios can create problems- better strategy is to focus on
multiple actions that can be taken.

this is because scenarios depend on some estimate of "probability of occurrences"…
focusing on actions creates an efficient frontier of good strategies.
Also, this avoids needing probabilities until the actions are understood better.
always provide tradeoff curves to the client: if you think/do x, y is outcome

evo devo
"to live more balanced lives"
became an entertaining expose about one person's worldview

**animate...**

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~ presentation notes

if one must make a "definition" then simply describe why a difference needs to be made.

never, press your host (or anyone): "SFI should research…" (what I think is important, is the

unstated supplement), or "I should tell you this…" (you need to know what I know, is the

unstated supplement)

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**thursday, 17 september 2009:**

*Jessika Trancik*  Carbon density and carbon intensity is not sensitive to populations and efficiency... **Any policies are selecting technologies:** price on carbon, guaranteed markets, R&D money.  Solar power's limitation is that it can't be transmitted efficiently.  Even a really high short term carbon tax won't really effect much carbon change... it may provide money for research, but it won't change carbon levels.

**"real artists ship"**

In the messiness of the middle of the process, predictions, formulas get in the way... it becomes a crisis where decisions have to be made.  When will the "climate crisis" hit?  We will know when decisions start being made quickly.  Learning to ship just comes down to action and results:
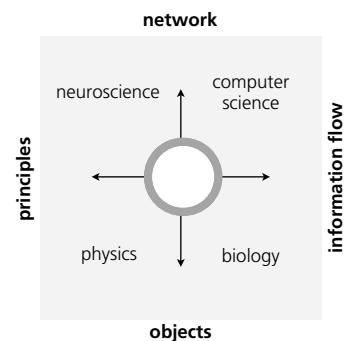
1. Write down what you want to achieve.
2. Pick a firm (but realistic) deadline.

**axiom**
(universal guideline)

3. Come up with a plan to put into action that can be broken down into clear, measurable steps (milestones).
4. Just do it.

**action**
(particular intervention)

*Luis Bettencourt*  "So many singularities, so little time"

 Creating models of how the brain computes has moved from a mystery, to a well defined scientific problem.  "Human social algorithm" $10^{11}$ neurons and $10^{15}$ synapses are very slow because operates at electro chemical speeds (atomic scale neural nets will operate at the speed of light, thus a billion times faster).  We need a **theory of synthetic cognition** which would include:

- representation: a hierarchy of features
- invariance: group sets of features
- identification: match to known and recall items
- evolution: learn at all levels– theory to object semantics

Rough ideas to the right  —>

current unanswered question:  "what is the purpose of sleep for the operation of the brain?"
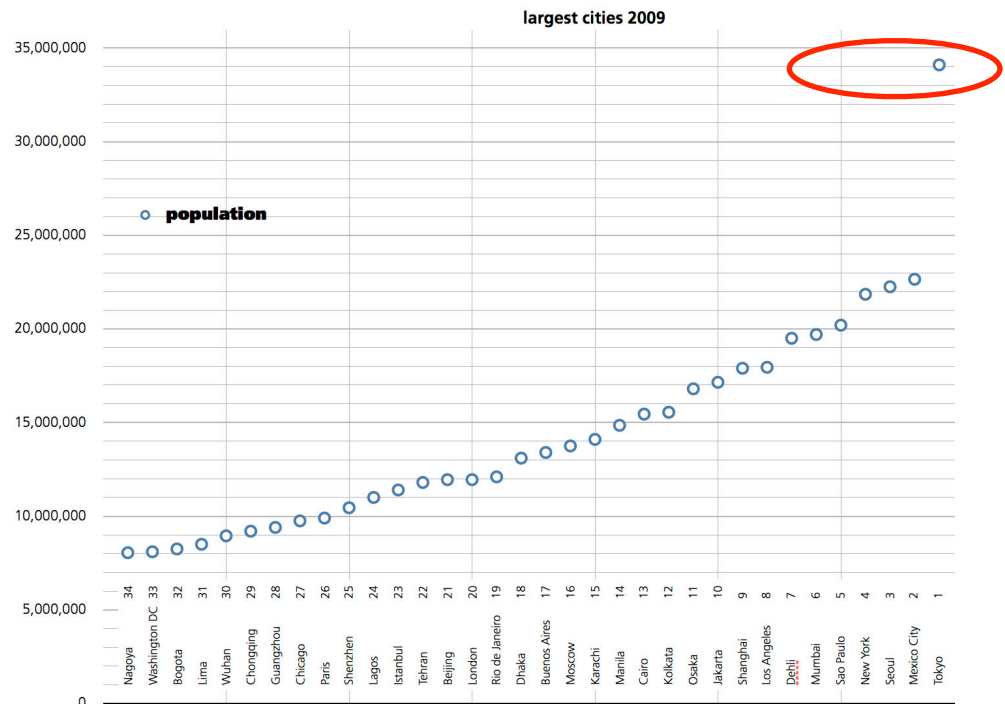


Sleep re-sets, re-opens, the possibilities of the neural network pathways.  Without sleep, would nature have evolved such pathways to be hardwired?

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Learning algorithms of images is improving (face-recognition in iPhoto).  Yet real progress will ensue with more information: moving from images to movies with audio.  We are finally reaching the point where huge amounts of data sampling will enable significant gains in learning.  It is notable that software programing languages are becoming closer to... the english language.  Thus reducing the barrier between humans and technology.

Jump to Cities:  for every doubling in population, there is a 15% increase in productivity.  Same with income per capita (and crime as well?).  A corollary is that if we can't solve the problems of living together in mega cities, we won't grow.  These are not architectural issues, but organizational issues.  Today's mega cities are on the leading edge of solving problems of living together without allowing crime to run rampant.  Is there a limit to size growth, ie. if bigger cities always have more wealth, then we need bigger cities?  It may turn out to be similar to heart rate vs. body size; at a certain point there are structural problems that can't be overcome.  **The question is what might those structural limitations to growth be for cities?**



largest cities 2009

So of the 34 largest cities 19 are on or near Asia.  This is why economic power is shifting from West (Europe and North America) to East: they have larger cities.  Such a data based

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viewpoint would yield the following conclusion:  the West is losing economic power because cities have stopped growing.  This has occurred due to lower birth rates, less economic opportunity, and a cultural reluctance to live in megacities (over 20 million population).  The example of reluctance is the cultural bias to preserve old means and methods of living, the "slow cities" movement, huge expenditures on preserving old infrastructure, limited spending on new massive infrastructure which would enable growth, the lack of cultural support for large families.

Cities are a "people selector process:" basically selecting for people who can live and thrive in a place with a population of over 20 million.

*Doyne Farmer*          Motivations… why are people here?  Consulting to government or businesses, pure curiosity, science and/or philosophy.   Basically **to search for patterns that are universal.**  In a side note of interest: Jules Verne was a technophobe, protesting against bicycles!

Regarding the singularity: population growth will stop following exponential growth, we will achieve computational human cognition but it may be quite different than human intelligence.  In essence, specialization is the "rule of intelligence."  The Gatica scenario: we always want our children to be better, faster, smarter.

Curiously there is no time lag reduction between invention and innovation over the last 200 years…  this may be one limitation: humans ability to incorporate new concepts, culturally and intellectually.

"We can see the future, we can intervene in the future, we have a moral obligation."  2 out of 3… Doyne surprised me with the last one.  I disagree.  Let's look for the value in predicting/forecasting…
- better than the null hypothesis
- scenarios versus absolute forecasts: how to score & perception of probability
- similarities and differences with neoclassical economics
- can we quantify the usefulness of Uniformitarianism?
- is there such a thing as systematic scenario generation?

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thoughts permeating the summary discussion:

Our ability to forecast is increased with better tools, and decreased with the increasing complexity of the universe, thus enacting a steady-state situation where we work harder to predict, and achieve the same results in time relative to our human condition.

Religion... at what point of **intelligence accumulation,** does it dematerialize into simply supporting the dislike of others?  Science and knowledge gained by studying these systems will eventually yield hard core reasons/ramifications of our actions, for all moral obligations. Therefore **in the future moral obligations will become obsolete.**  And this in turn, will change the rules of War.  This **axiom** is based on the observation that moral obligations have been decreasing for millenniums, as **science has demonstrated casual links.**  Thus, high quality scientific research demonstrating causality, reduces warfare.  This statement can become personally meaningful, if one chooses to find meaning in their work.  In other scenarios people don't find meaning in their work but are simply compelled, or have the urge, to look for answers, to search and to tinker.

Reducing moral obligations, while terrifying to some, actually rests on high quality science demonstrating causality.  Thus hanging onto historic moral obligations, to save humanity with modern science, doesn't make logical sense.  We don't need futurology/prediction to become a science, we need more causal links between behaviors and effects.  And notably, behaviors have a direct relationship with time in two modes: iterative experiences, and the urgency of acting.  Again, ethical technology is simply decision-making based on causal-behavioral logic.  Better causal understanding of our behaviors, enables us to make productive actions.  Focused on self and actions which can be made by one's self.

Without moral obligations, how does trust and cooperation develop?  These behaviors emerge because the causality from actions is agreed upon by default, by logical proof. Perhaps making nation-states as a means for organization, obsolete.  Understanding becomes power, or leverage.  But understanding is simply identifying the causality.

Alfred Hubler:                    *"By doing my job, I am predicting my future."*

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_Daniel Schrag_      Discussed the anthropocene era...   from WIkipedia:

The term Anthropocene is used by **some** scientists to describe the most recent period in the Earth's history. It has no precise start date, but may be considered to start in the late 18th century when the activities of humans first began to have a significant global impact on the Earth's climate and ecosystems. This date coincides with James Watt's invention of the steam engine in 1784.[1] Other commentators link it to earlier events, such as the rise of farming. The term was coined in 2000 by the Nobel Prize winning atmospheric chemist Paul Crutzen, who regards the influence of human behavior on the Earth in recent centuries as so significant as to constitute a new geological era.

Use of this concept as an official geological concept gained new support in early 2008, with publication of two new papers supporting this idea.[2]

Some people questioned Dan Schrag's conversion from scientist to politician with his appointment on Obama's science board.  The data as presented was skewed in favor of creating fear and alarm at the changes and there was little mention of what we can do about it.  Indeed the title of the talk was: "Twilight of the Anthropocene: The Fate of Civilization in the Face of Environmental Destruction."  So it assumed it's all over, and makes it sound like another major geologic era, which is ridiculous to call 150 years a major geologic era.

But his talk did inspire fear and awe at the collapse of our world coming soon! Overstatements lead to counter-overstatements:  "Oil is simply another renewable resource: we can pump $CO_2$ back into the earth and over time produce more oil."  Which is true and, if technologically we can adjust the timescale, it might prove useful.

_day four summary_      _an axiom about the future:_

**knowledge gained about complex system behavior makes moral obligations obsolete by 2070.**  Moral obligations are represented by the thinking that "one should do" something… 'one' can be a human being or an intelligent machine.

reasoning:

- iterative prisoners dilemma proves cooperative behavior is most successful

- common global enemy in climate change

- religions dematerialize into simply "the dislike of Others"

- both sides in war can't have the "moral high-ground," yet they both believe they do!

- moral obligations in human lifestyles have been steadily decreasing, ever since science
     began demonstrating causal links circa 1500's

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- the urge to do something based on available information, opposed to an decision-less act
    where one "should do" something, according to an outdated constellation of
    structures, is the only ethical way to act in the radically, rapidly changing future.
- terrifyingly for some, this requires lots of high quality, data driven science, with no time for
    hand waving adventures
- trust and cooperation between agents increases dramatically with greater knowledge of
    the complex parameters behind behaviors

On a lighter note, the evening talk by Dan Schrag seriously defined humanity's common
enemy: climate change. The Iraq Invasion, will seem like a mildly stupid mistake by
comparison. What is interesting is how a global decision was enacted leading to the Iraq
Invasion, and by comparison, how or when will global decisions be enacted upon regarding
global climate change.

Perhaps global consensus is a farce, but unilateral decisions could force other players into
the game: tariffs on goods made which consume carbon, would force other countries into
producing products with lower emissions.
and lastly for some fun- Alfred Hubler made a great comment
*"by doing my job, I am predicting my future"*
This was in the context of a conversation about effective teaching where, **education is
providing a motivational frame for the student to learn.**  A student thinks the teacher
knows them, and would not want to disappoint the teacher. Classes are captive audiences,
forced to focus.
It is rude to surf web in class- so Alfred engages all students by having classes in the
computer lab, thus removing the prohibition.
toodles…
and tomorrow: game playing!

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**friday, 18 september 2009:**

How does a research organization increase the depth of both theory and practice... how to produce something while being theoretical?  Both and.  Similarly, depth and breadth of ideas and work.

_Luciano Oviedo_    Organized attendees into three groups hypothetically playing each of the institutions offering research assistance to corporations.  Strengths, weaknesses opportunities and threats were discussed of the following three organizations:

Media Lab/MIT

CANet/Northwestern

BizNet/SFI

Surprisingly, the most successful Media Lab, was not necessarily seen as valuable: to far out in the pie in the sky.  By contrast Northwestern is barely known as a possible corporate collaborator. Need for collaboration is due to reduced "pure science" research in corporate R&D.  This results in a highly biased corporate research agenda.  Boeing sees SFI as "just another consultant."

about SFI:        _"we feel comfortable here, find meaning here"_

customers:    biz, gov, academics, labs

product:    good science others overlooked or are ignorant of

purpose:    explore vacant space between disciplines

culture:    disciplined to keep focused on quality science

niche value:    has multiple, integrated and expansive viewpoints

offerings:    a couch, asylum, for ideas unwilling to be entertained elsewhere

SFI is not about predigested materials.  Working papers full of latest research, have kept me integrated and motivated over the years.  It provides effective resonance to ideas needing prompting.

Discussion flows into IP-rights.  In all domains, corporate IP legal departments prohibit sharing of information, data, results... including willingness to participate at SFI when other corporations are present.  Clearly hard to do science when forced to sit on one's hands.
Axiom: **find data showing at the rate of change in future, IP will become**

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**superfluous, as the rapidity of change, makes copied ideas obsolete.**  The notion here is that Intellectual Property has been introduced to "maintain a revenue stream after the product has been introduced to the market."  Therefore, as the rate of change increases, there is no longer a revenue stream to be maintained... nor is there a reason to support the legions of legal bureaucracies necessary to slow the pace of implementing new products/ideas.

SFI's success depends upon maintaining excellent quality, highly diverse science.  The comfort and cross-fertilization of ideas, happens best, when there is strong solid, causal science and a place that is expansive for thinking.  **Causal and expansive.**  People leaving not energized, would be SFI's downfall.

- document success stories of corporate collaboration
- foster SFI, BizNet, External Professor collaboration
- SFI is not TED: might not need a database of lectures... yet, perhaps as replacement of
  working papers? Not really, needs to be event based.
- broaden type of business network industry: insurance, pharmaceutical, health care,
  consumer products?

end with a question, that has no answer, but might prompt a better formulation:

_"in the context of climate change, should silicone be used for computation, or solar panels?"_

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**reflections september 2009:**

missed concepts       - speciation through biogenetic manipulation to advance beyond humanity

- urgency of decision-making

- fab@home multiplication of robots

- idea economy ?

- unconditional basic income

- autos without wheels... significantly lowering the cost of infrastructure

books       The Parallax View (Short Circuits), by Slavoy Zizek

       Joe's notes of Zizek on the web

Jacquard's Web: How a Hand-Loom Led to the Birth of the Information Age, by James

       Essinger

Pueblo Revolt of 1680, by Andrew Knaut

The Nature of Technology, by Brian Arthur