Probing the Archeology of our Future History
Media, Platforms, Portals

OZONE Birds of a Feather – August 2004

Charles Ostman

Senior Fellow - Institute for Global Futures

NanoElectronics & Photonics Forum Chair

Senior Consultant – Strategic Synergy Group

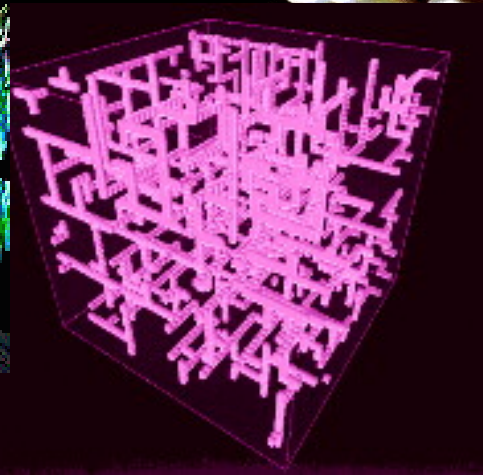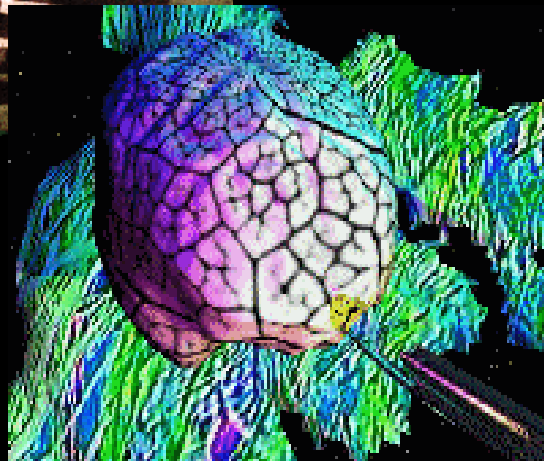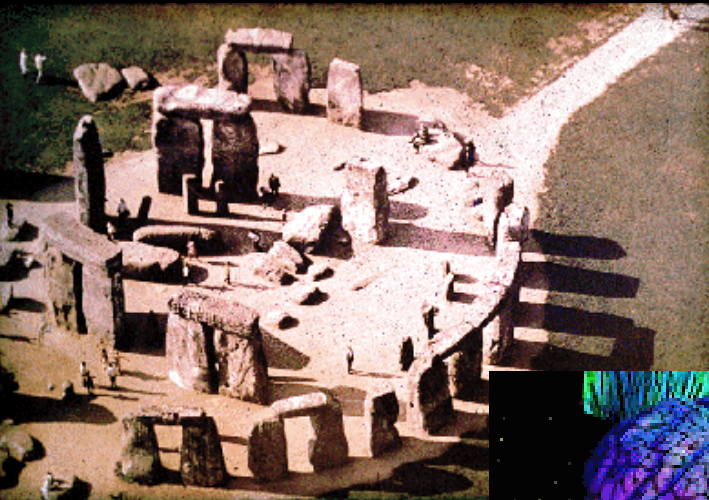tel 510 549 0129   email charles000@aol.com

http://www.technofutures.com/charles1.html

4/23/2010

Nano Electronics & Photonics Forum

SSG THE STRATEGIC SYNERGY GROUP

INSTITUTE FOR GLOBAL FUTURES

The Next Evolutionary Increment
Hybrid Forms of Consciousness -

Paleolithic <> Realtime <> Precognitive
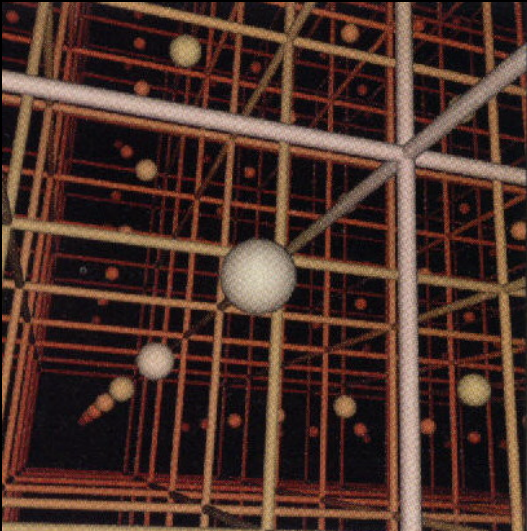

4/23/2010

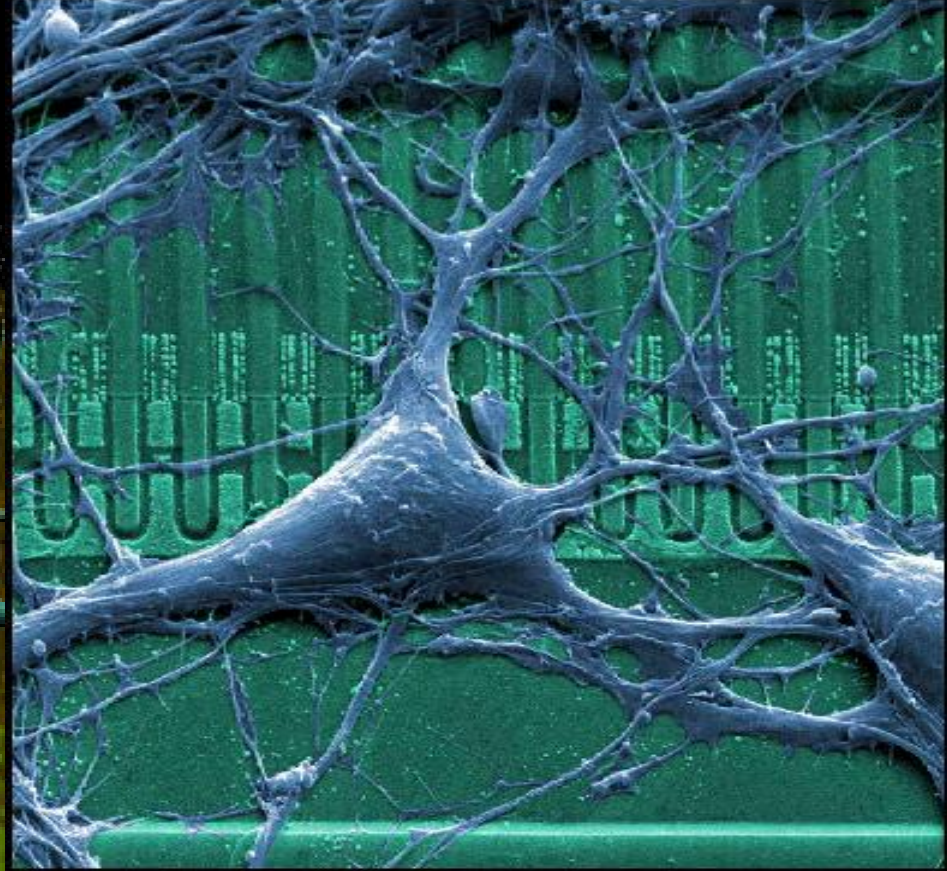# The next Evolutionary Increment
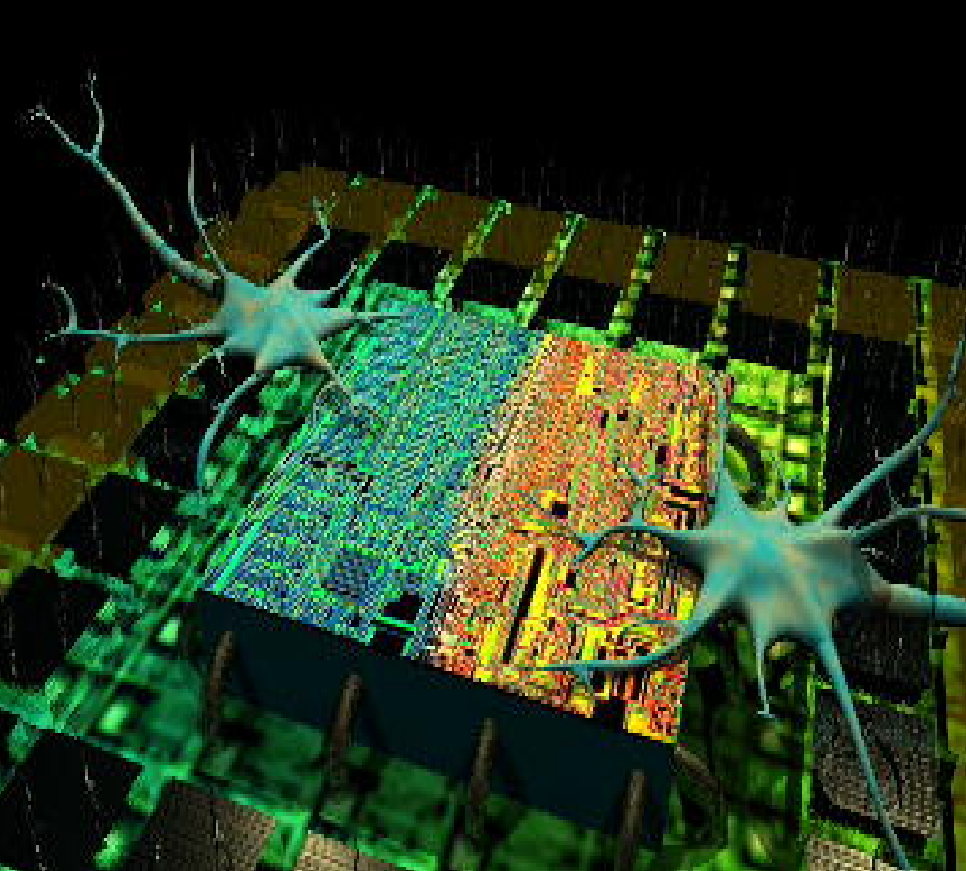## Hyperdimensional Access

- Transition from 4D spatio-temporal cognition to n-dimensional quantum cognition
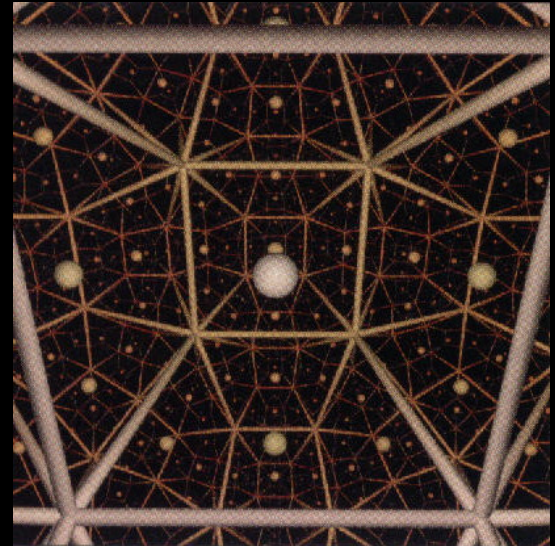
The next Evolutionary Increment
Hyperdimensional Awareness

New observations have smashed the old view of our universe.
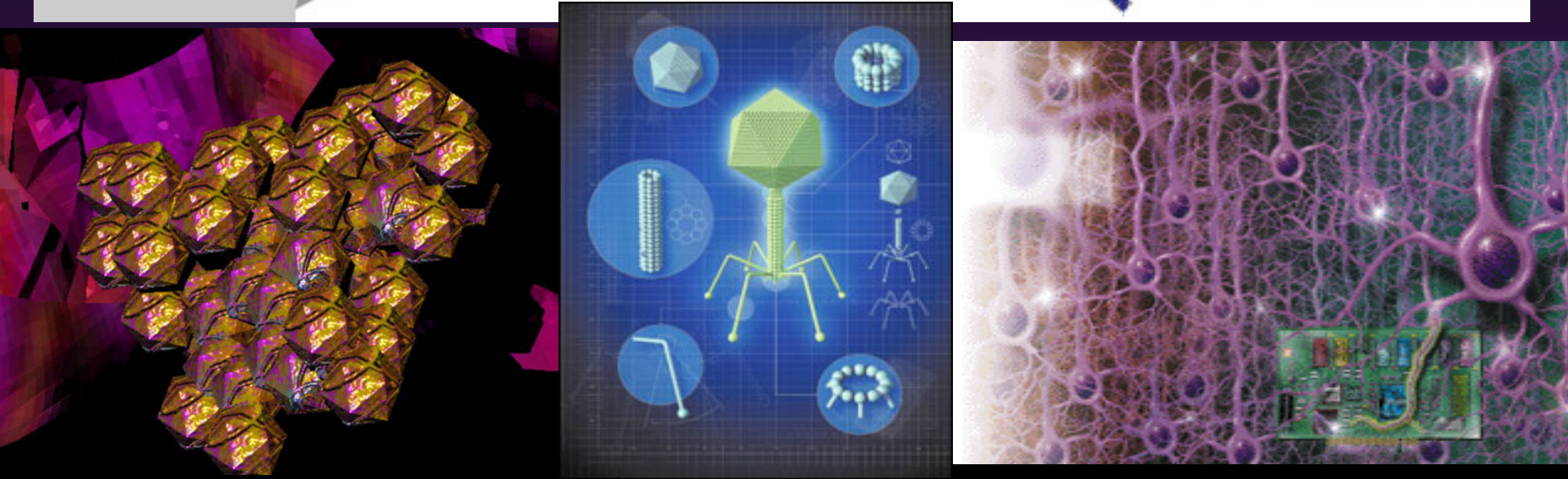
What now?

The Evolutionary Eventhorizon where the threshold

boundary point between the real and the virtual, the organic and the

synthetic, has become seamlessly infused into an ever evolving symbiosis

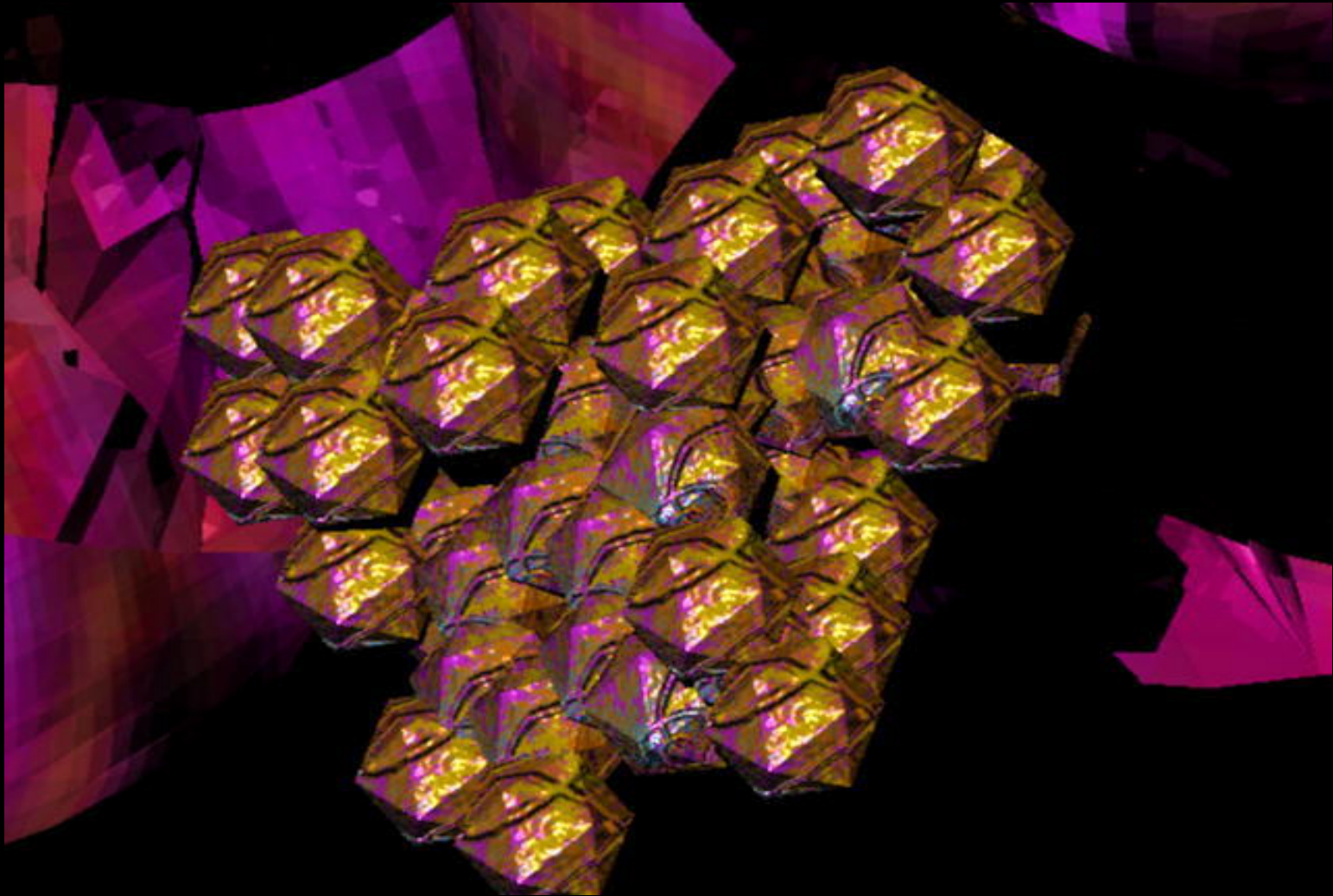of our own creation, and what evolves henceforth.

The Evolutionary Evanthorizon where the threshold

boundary point between the real and the virtual, the organic and the

synthetic, has become seamlessly infused into an ever evolving symbiosis

of our own creation, and what evolves henceforth.

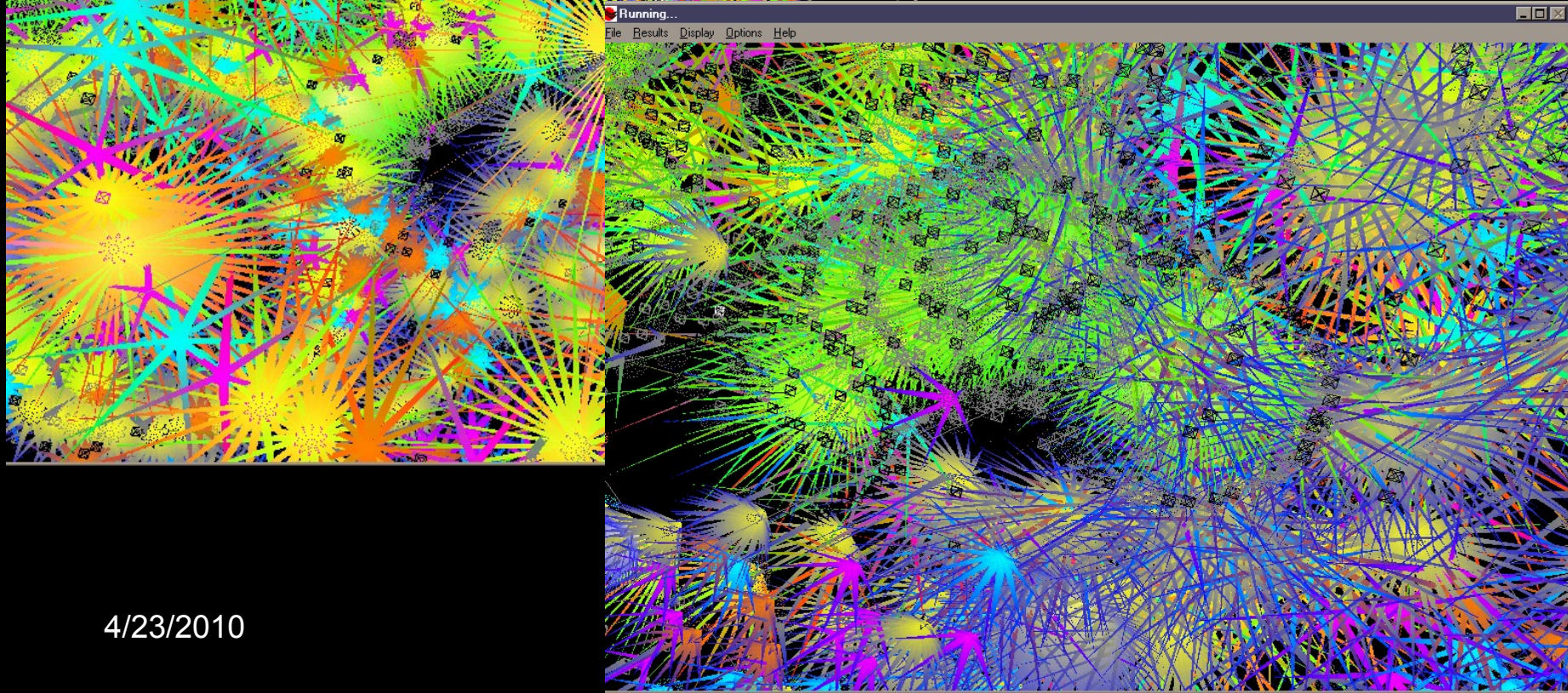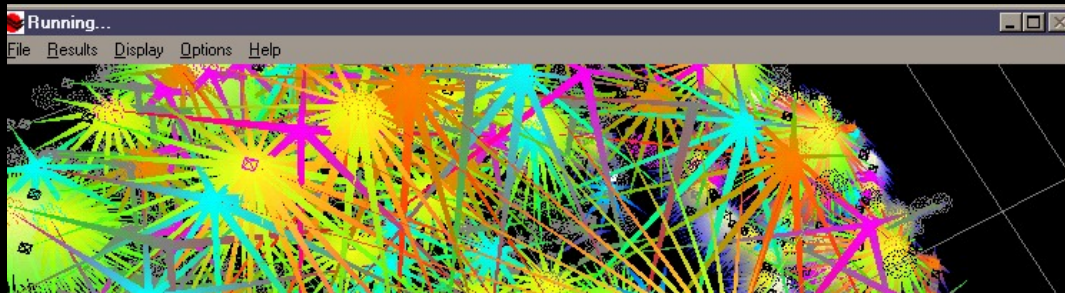# Apparent Lifeforms on Demand - the Next Emergent Process Deliverable

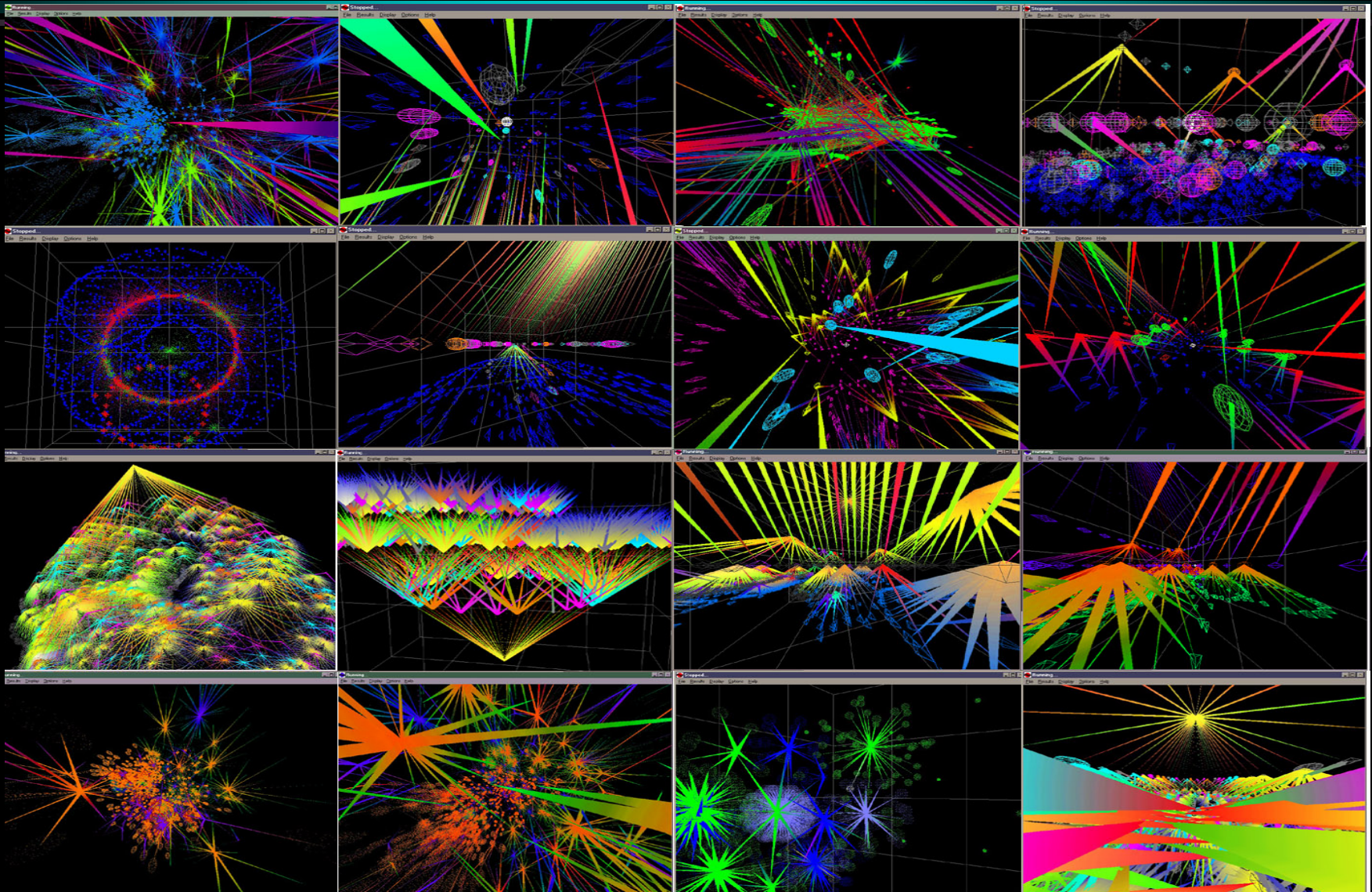# Apparent Reality on Demand - the Next Emergent Existence Deliverable

SYNTHETIC PLEASURES

4/23/2010

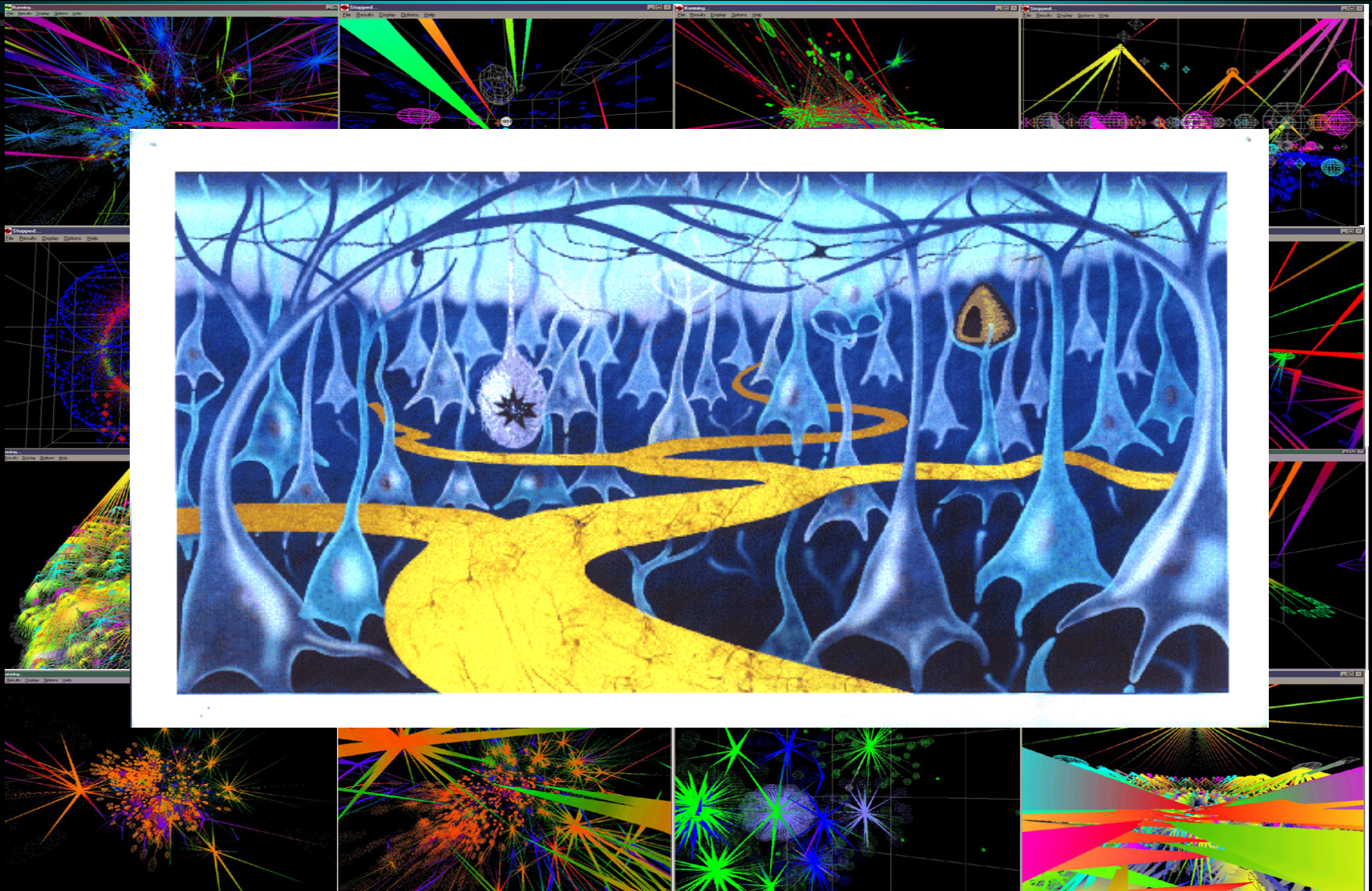# Existence Navigation – Media, Platforms, Portals

4/23/2010

Existence Navigation – Media, Platforms, Portals

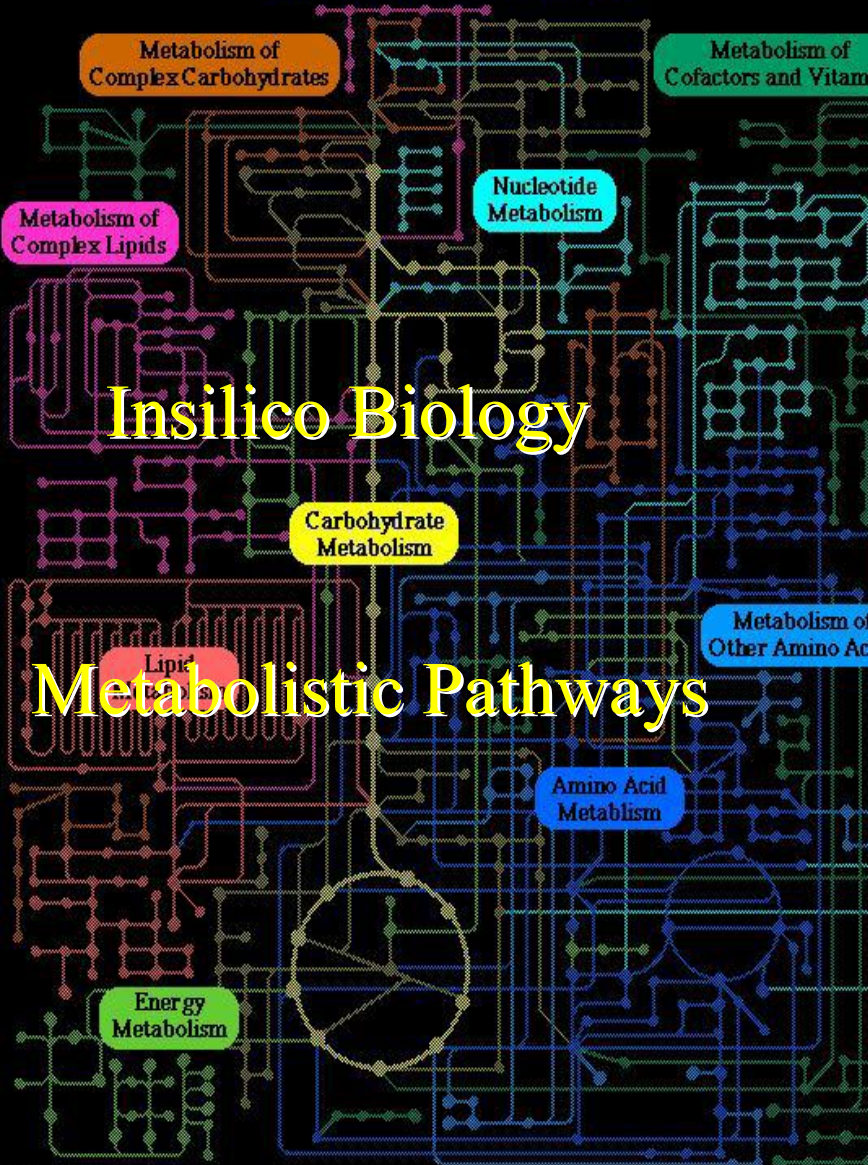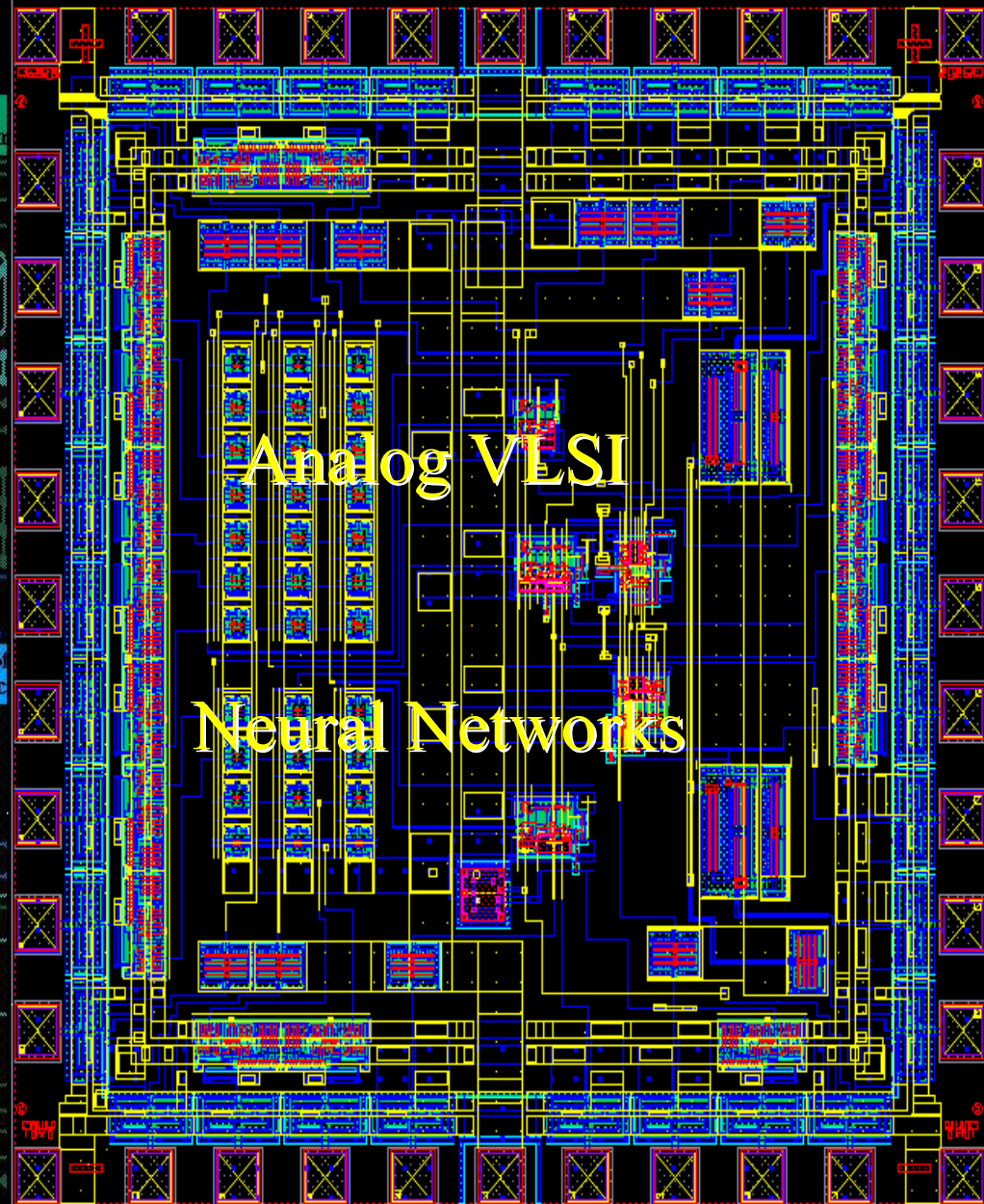# Existence Navigation – Media, Platforms, Portals

Process Convergence > Existence Convergence

METABOLIC PATHWAYS

Metabolism of Complex Carbohydrates

Metabolism of Cofactors and Vitam

Nucleotide Metabolism

Metabolism of Complex Lipids

Insilico Biology

Carbohydrate Metabolism

Lipid

Metabolism of Other Amino Ac

Metabolistic Pathways

Amino Acid Metablism
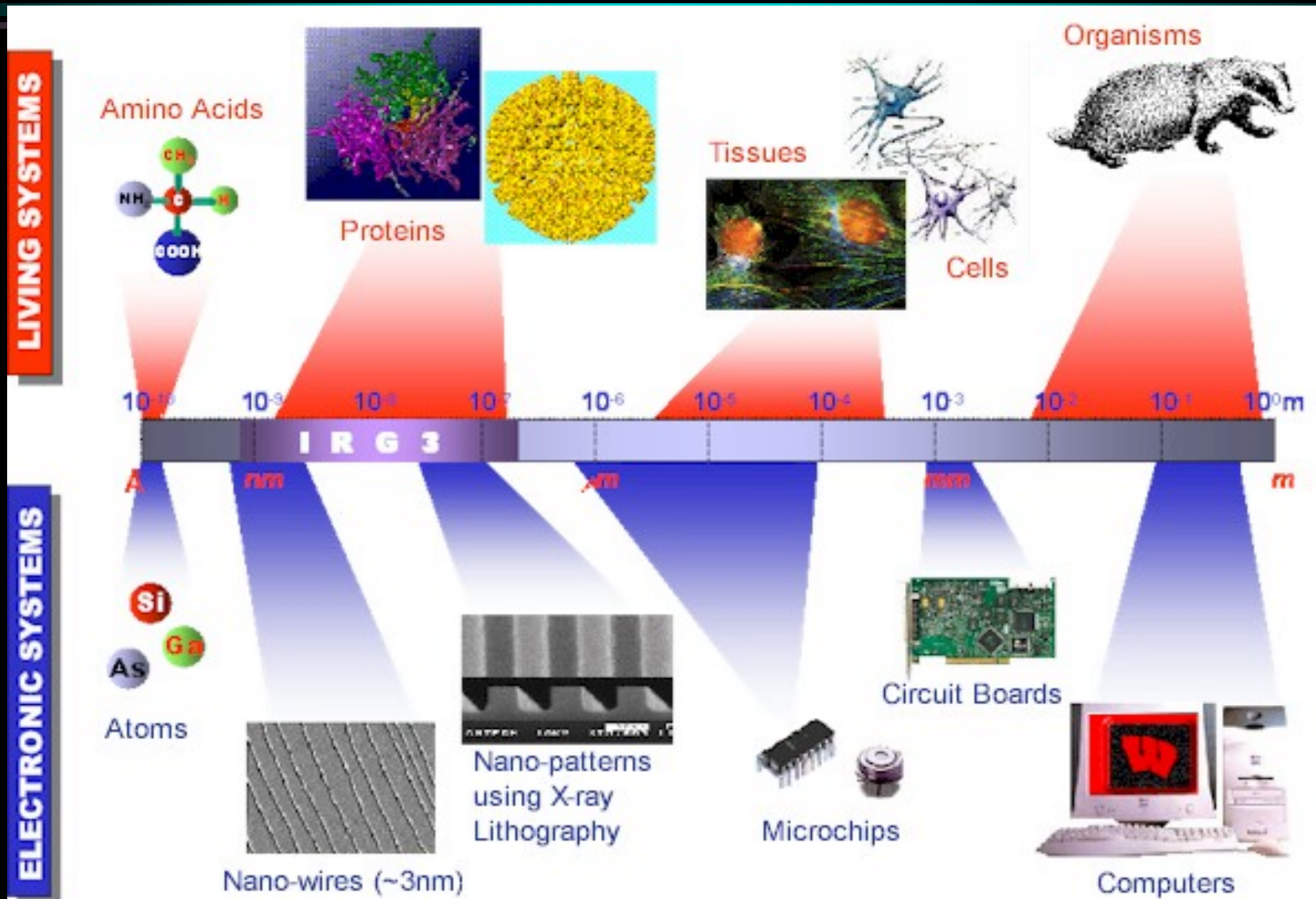
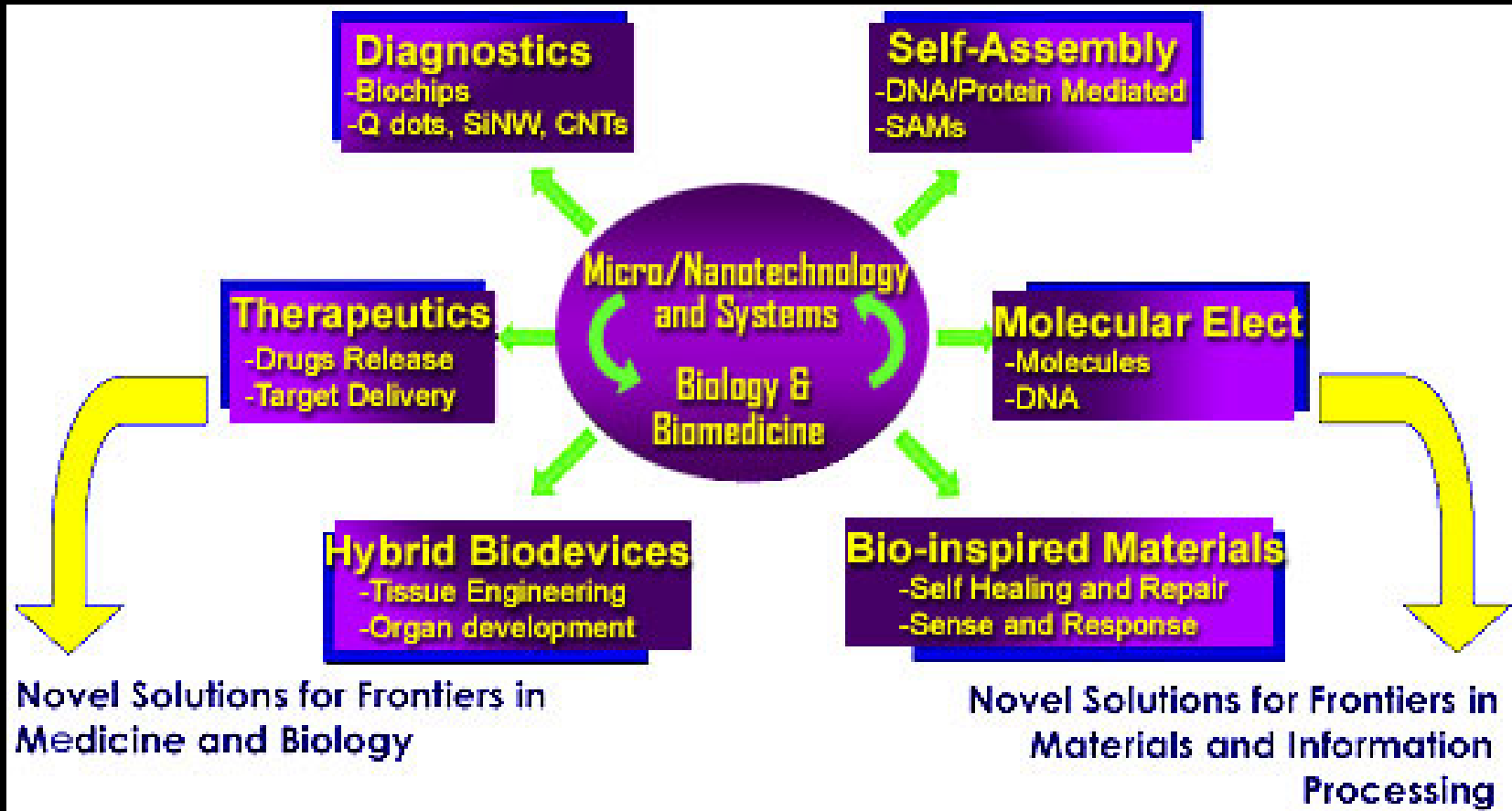**Analog VLSI**

Neural Networks

Energy Metabolism

01100 4/30/97

Levels of Scale / Complexity
Existence Enhancement as a Commodity Enterprise

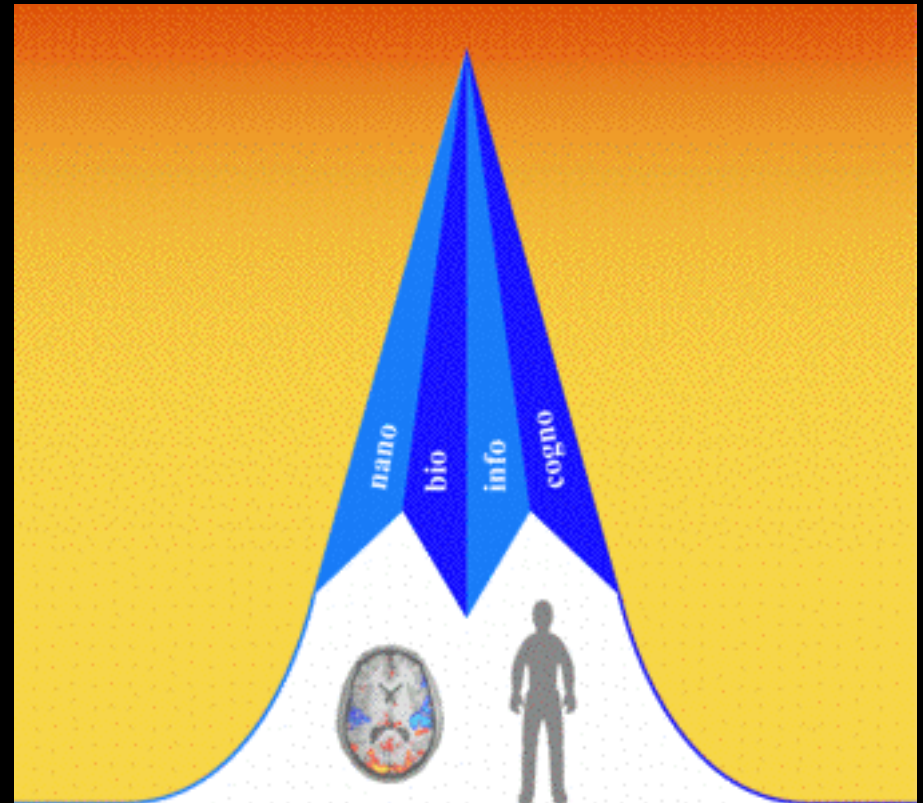# Existence Enhancement – Nano Bio Info Cogno Tech Convergence

The Emergent
Infotech / Biotech / Nanotech / Cognotech
Operational Ecology

NBIC Conference

Converging Technologies

for Improving Human
Performance:

Nanotechnology,
Biotechnology, Information
Technology and Cognitive
Science

NSF/DOC-sponsored report

http://www.wtec.org/ConvergingTechnologies

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NBIC Paradigm
Future arenas of Advanced Materials, Integrated Systems, Adaptive Process Morphology

- "Smart" autonomous artificial entities, distributed sensors, intelligences

- Self healing / adaptive adaptive materials, systems, networks

- Integration of humans and autonomous intelligences
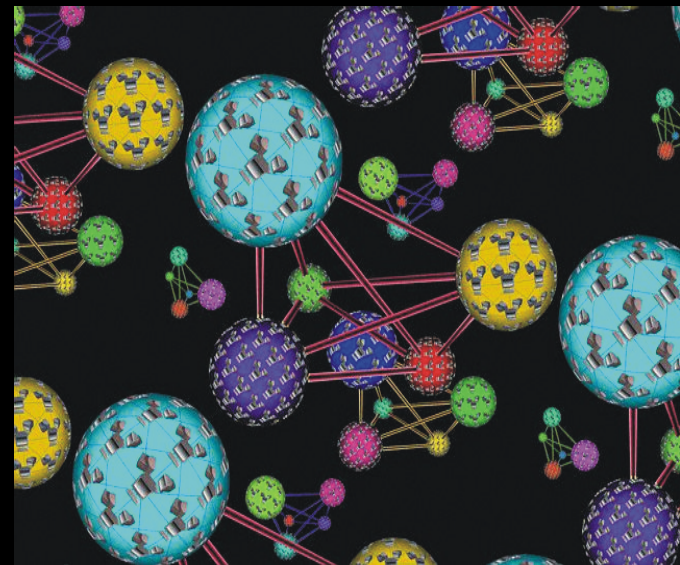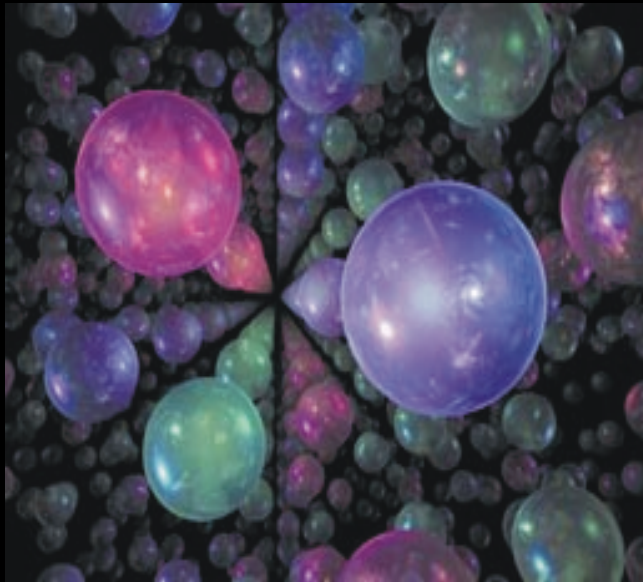
NBIC Paradigm
## Future arenas of Advanced Materials, Integrated Systems, Adaptive Process Morphology

- "Smart" autonomous artificial entities, distributed sensors, intelligences

- Self healing / adaptive adaptive materials, systems, networks

- Integration of humans and autonomous intelligences
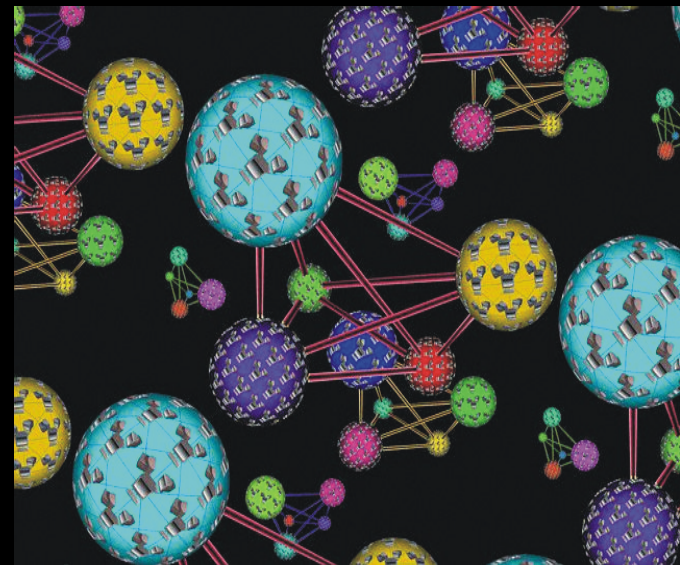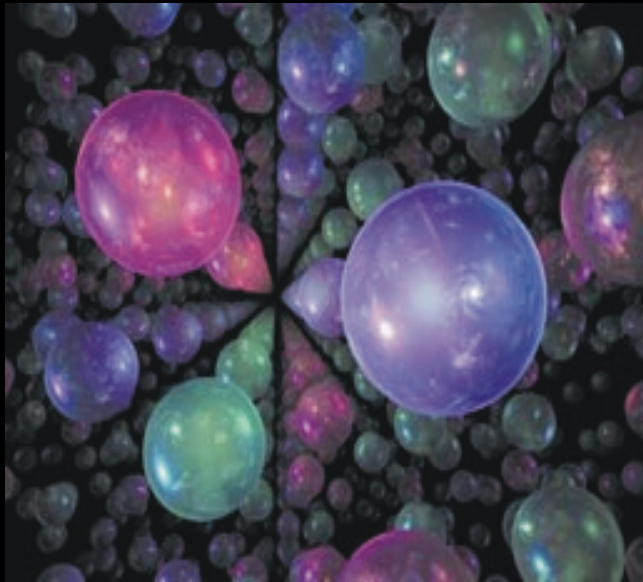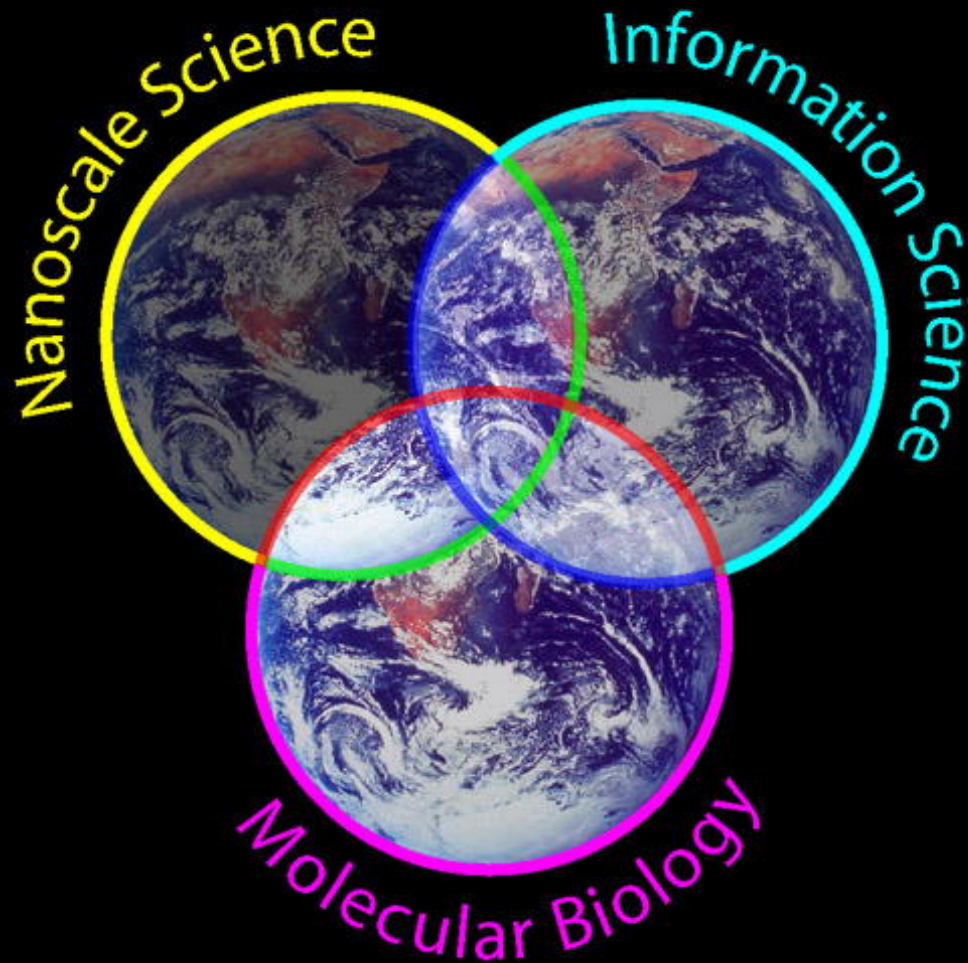
Soldier of the Future – Define "Soldier"

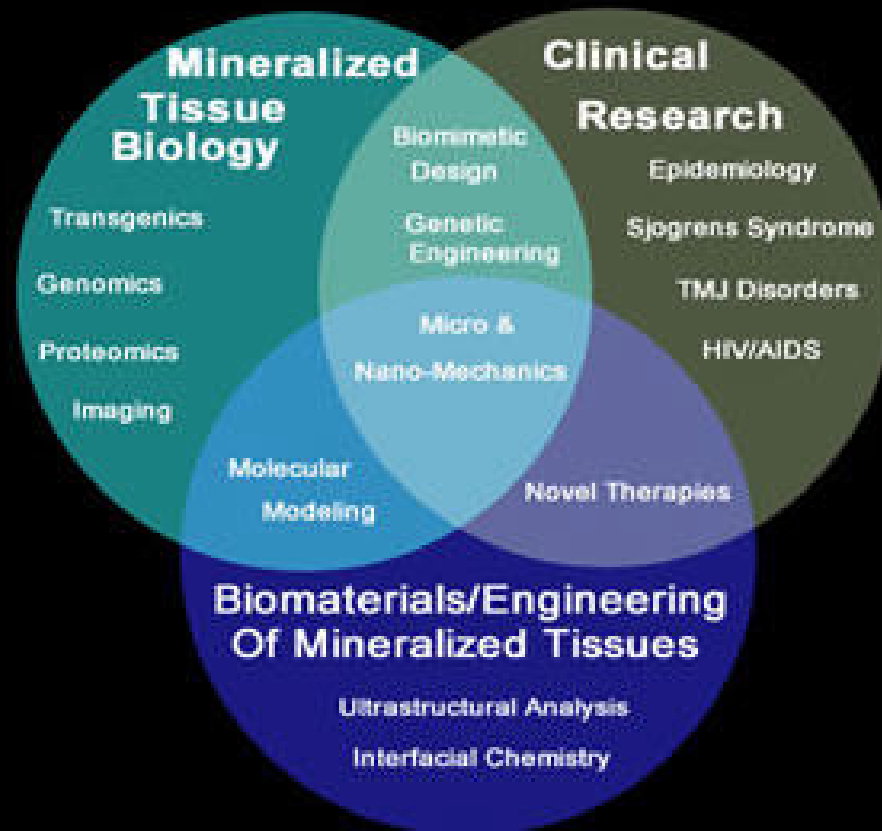- *Institute for Soldier Nanotechnologies*

http://www.aro.army.mil/soldiernano/

4/23/2010
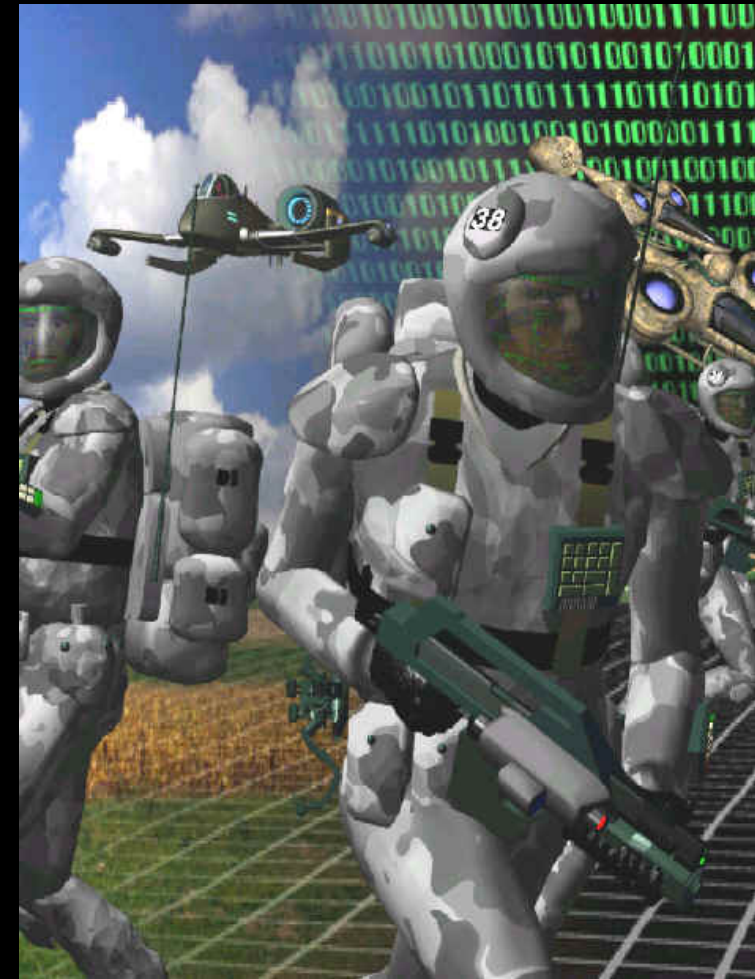
The Infotech / Biotech / Nanotech Convergence
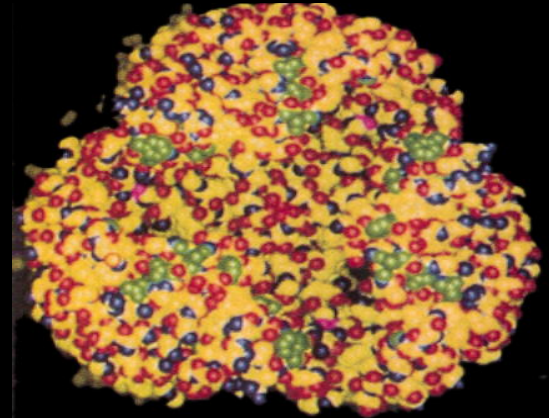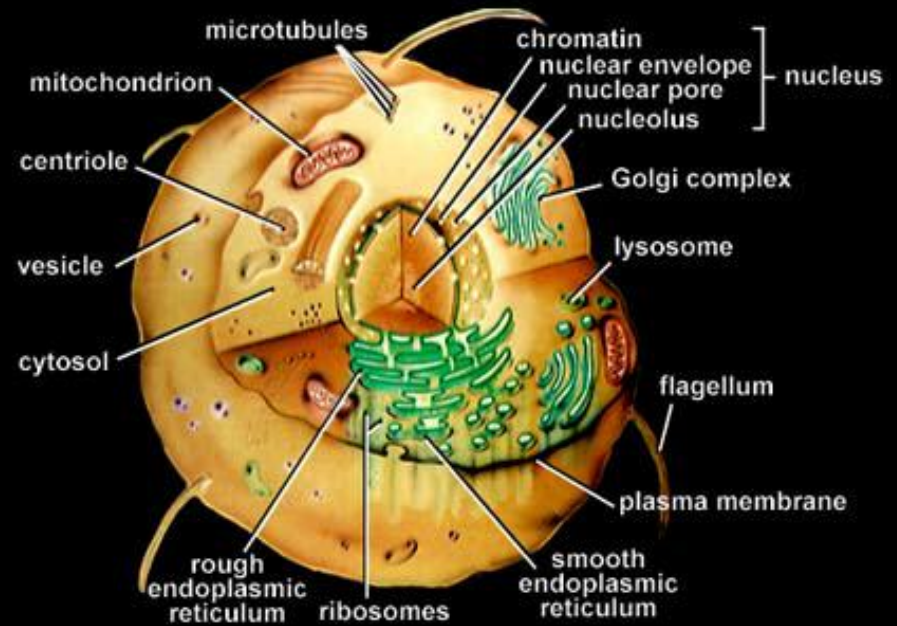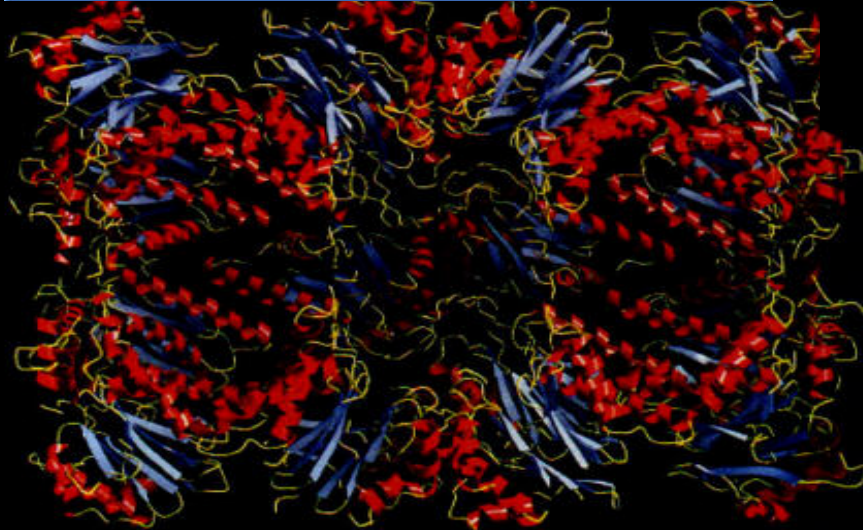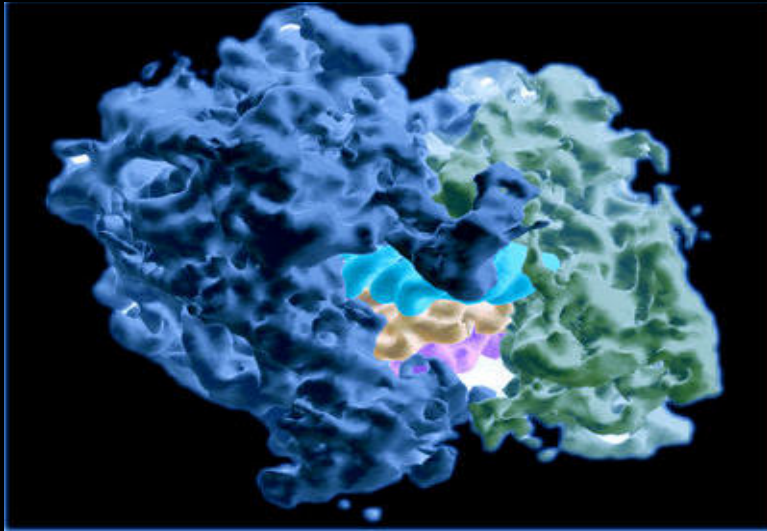## NNI - National Nanotechnology Initiative

4/23/2010

The Infotech / Biotech / Nanotech Convergence
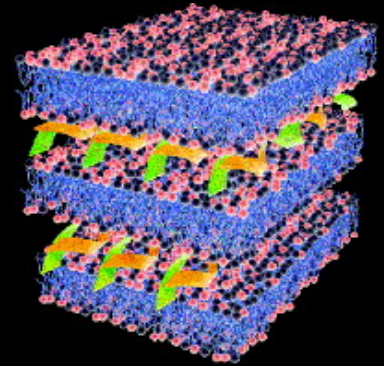# Synthetic Biology Manifestation

Nature's Nanofoundries

Biology as a mechanism for material production, patterning, and fabrication

Key Properties:

Photonic

Electronic

Mechnical

Chemical

} ⟶

Living Systems as Biofoundry

↓

Genetic Magnification

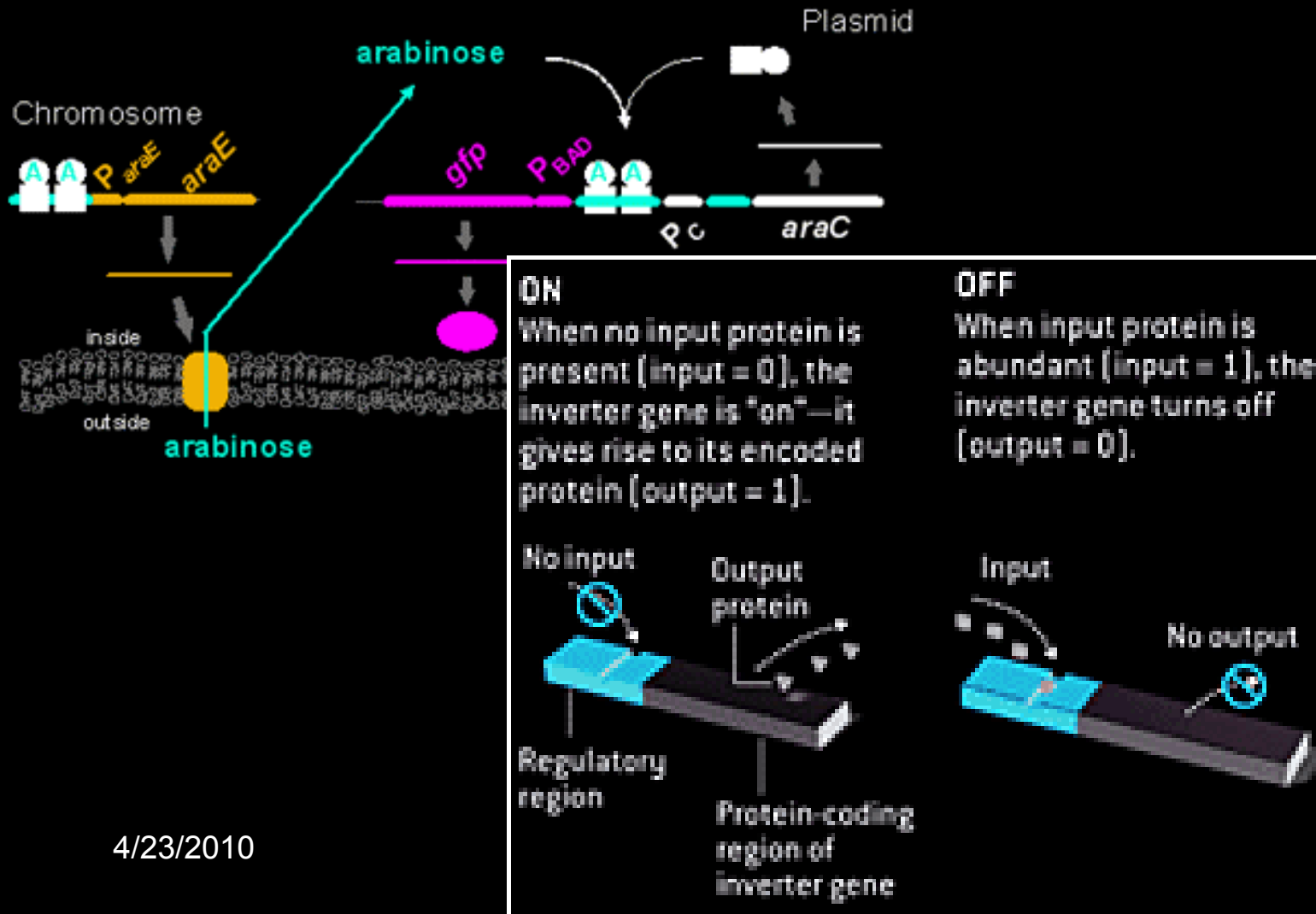↙   ↘

Dynamic Agent   **Controlled Replication**

↓   ↘

Material Patterning / Structural Systems   **Materials Harvest / "Biocomponents"**
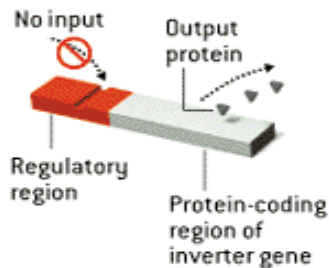
Genetic Circuits – Nanobiological Logic

Plasmid

arabinose

Chromosome

P_{araE} araE   gfp P_{BAD} araC

inside

outside

arabinose

ON
When no input protein is present (input = 0), the inverter gene is "on"—it gives rise to its encoded protein (output = 1).
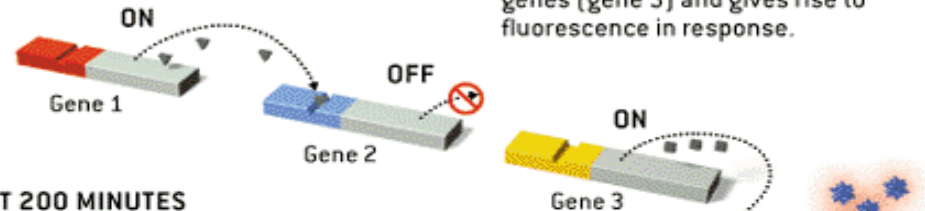
OFF
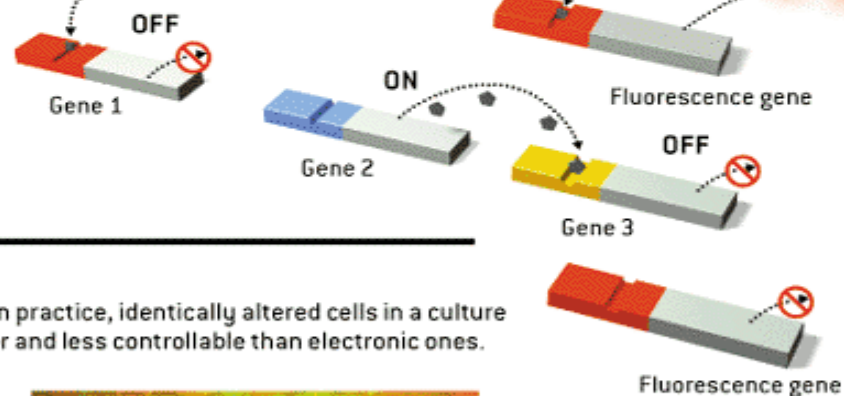When input protein is abundant (input = 1), the inverter gene turns off (output = 0).

No input

Output protein

Input

No output

Regulatory region

Protein-coding region of inverter gene

4/23/2010

HOW A GENETIC PART WORKS

Assemblies of genes and regulatory DNA can act as the biochemical equivalent of electronic components, performing Boolean logic.

A COMPONENT

A biochemical inverter performs the Boolean NOT operation in response to an input signal, in the form of a protein encoded by another gene.

ON

When no input protein is present (input = 0), the inverter gene is "on"—it gives rise to its encoded protein (output = 1).

OFF

When input protein is abundant (input = 1), the inverter gene turns off (output = 0).

No input Output protein Input No output

Regulatory region Protein-coding region of inverter gene
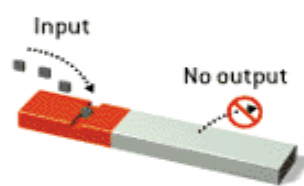
A CIRCUIT

One simple genetic circuit connects three inverters, each of which contains a different gene (gene 1, 2 or 3). The genes oscillate between on and off states as the signal propagates through the circuit. The behavior is monitored through a gene (*far right*) that intercepts some of the output protein generated by one of the inverter genes (gene 3) and gives rise to fluorescence in response.

AT 150 MINUTES

ON
Gene 1
OFF
Gene 2
ON
Gene 3

AT 200 MINUTES

OFF
Gene 1
ON
Gene 2
OFF
Gene 3
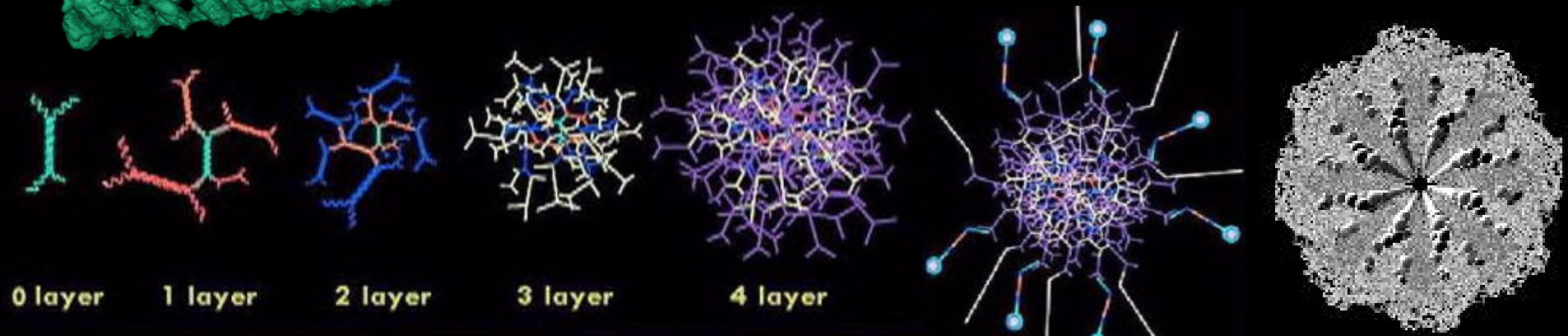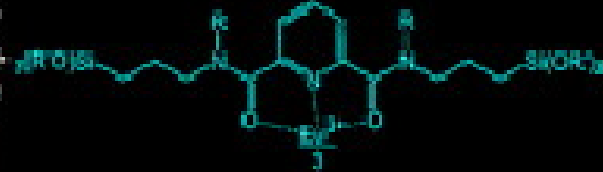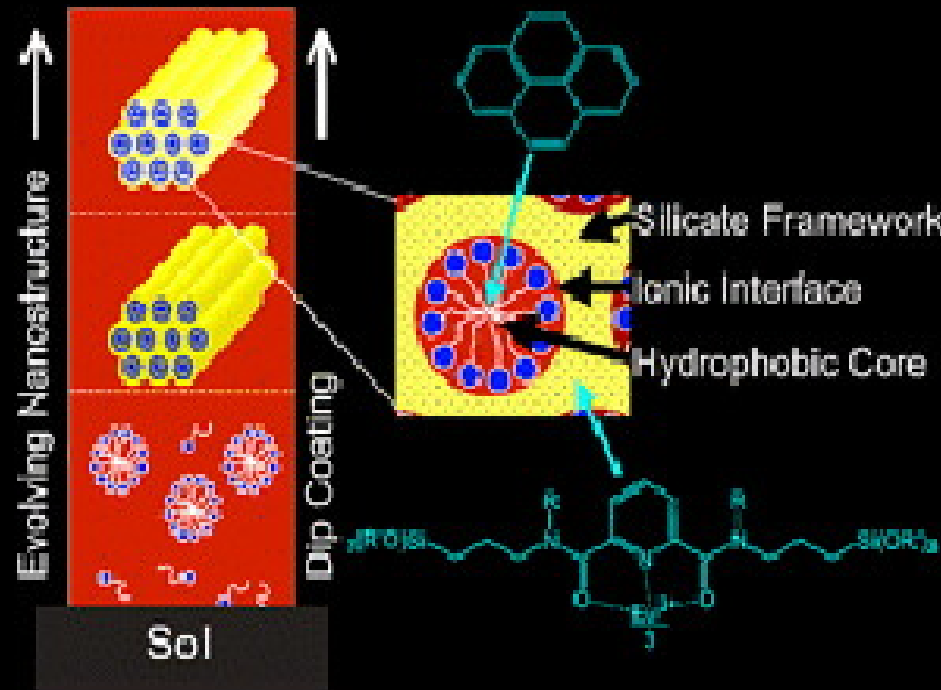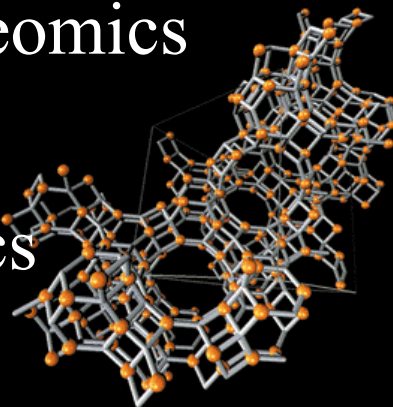
Fluorescence gene

Fluorescence gene

A CIRCUIT IN ACTION

Cells containing such a circuit blink on and off repeatedly (*graph*). But in practice, identically altered cells in a culture (*photograph*) blink at varying rates, because genetic circuits are noisier and less controllable than electronic ones.

Brightness of a single programmed cell

Fluorescence (arbitrary units) vs. Time (minutes)

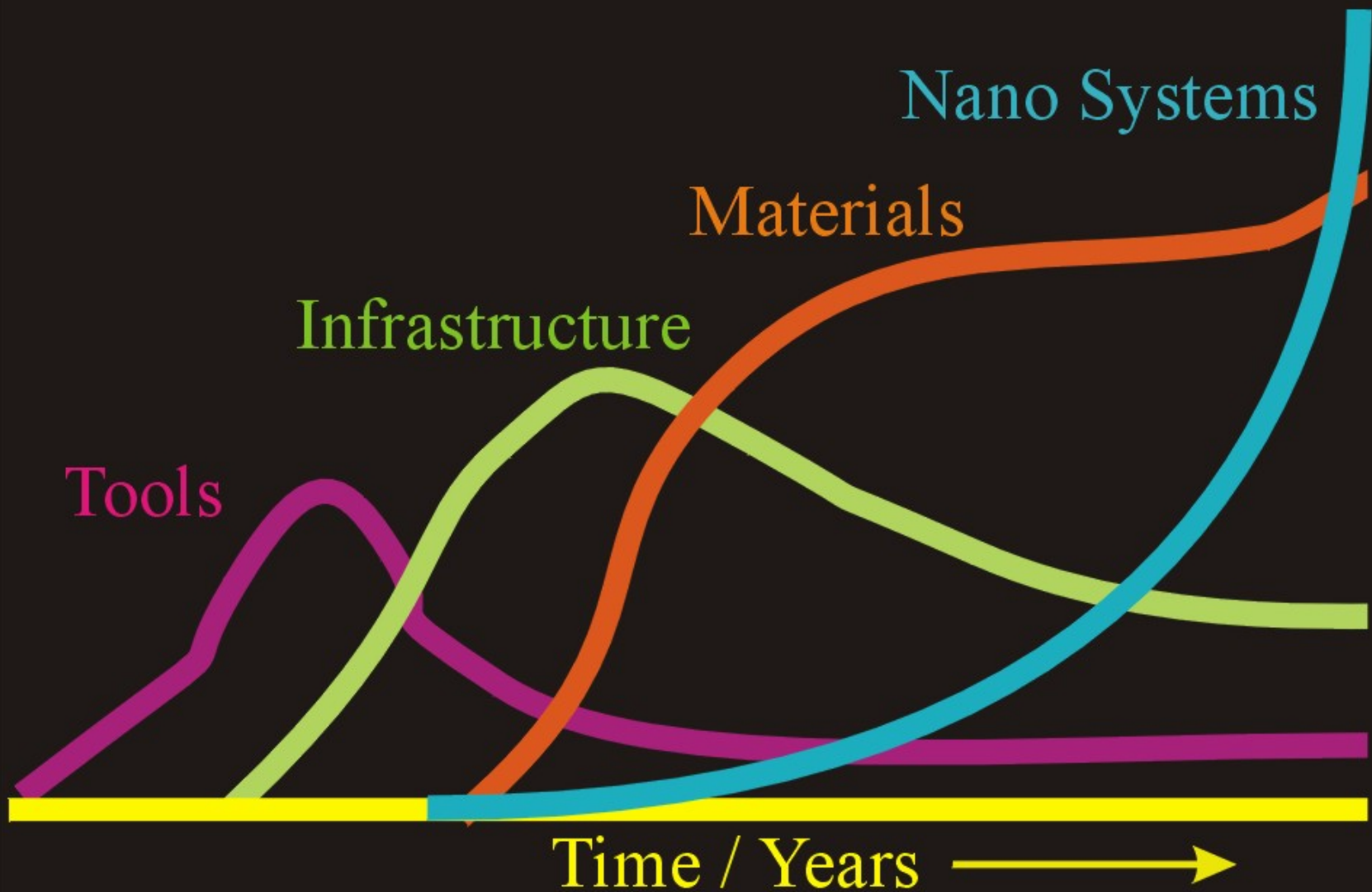BRYAN CHRISTIE DESIGN (*top*) ; LUCY READING (*graph*); MICHAEL ELOWITZ (*bottom right*)
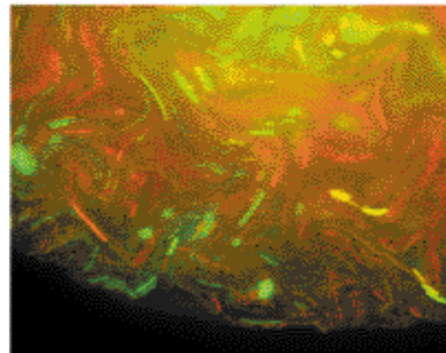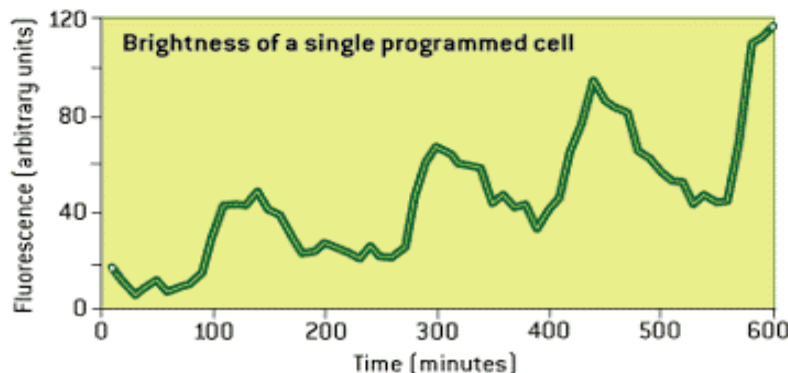
Molecules as Tools –
Not Just Endproducts
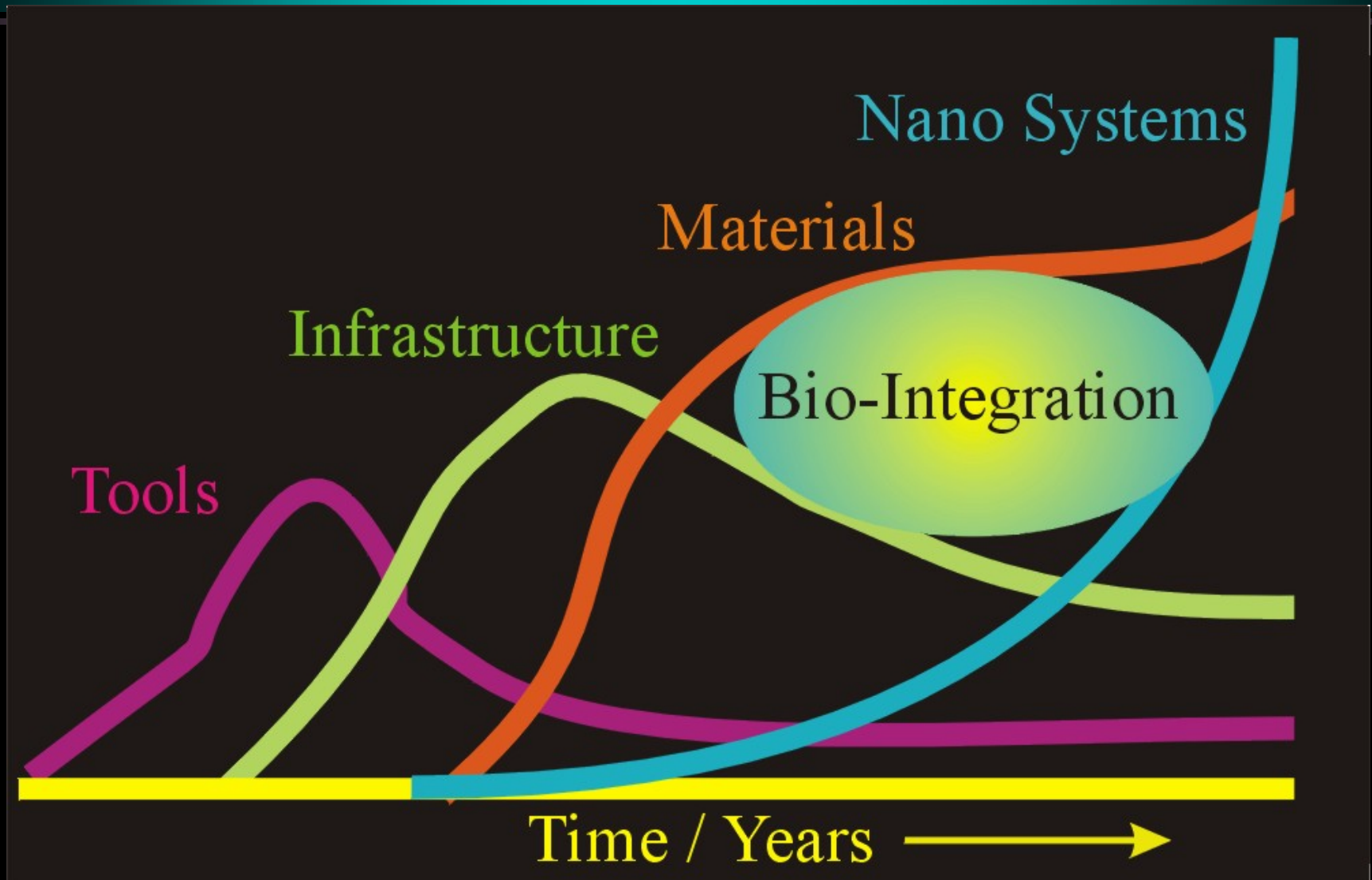
- Nanotubes - carbon, polymer, protein, etc.
- Structural proteomics
- Dendrimers
- Organometallics
- Zeolites

Silicate Framework
Ionic Interface
Hydrophobic Core

Evolving Nanostructure

Dip Coating

Sol

0 layer   1 layer   2 layer   3 layer   4 layer
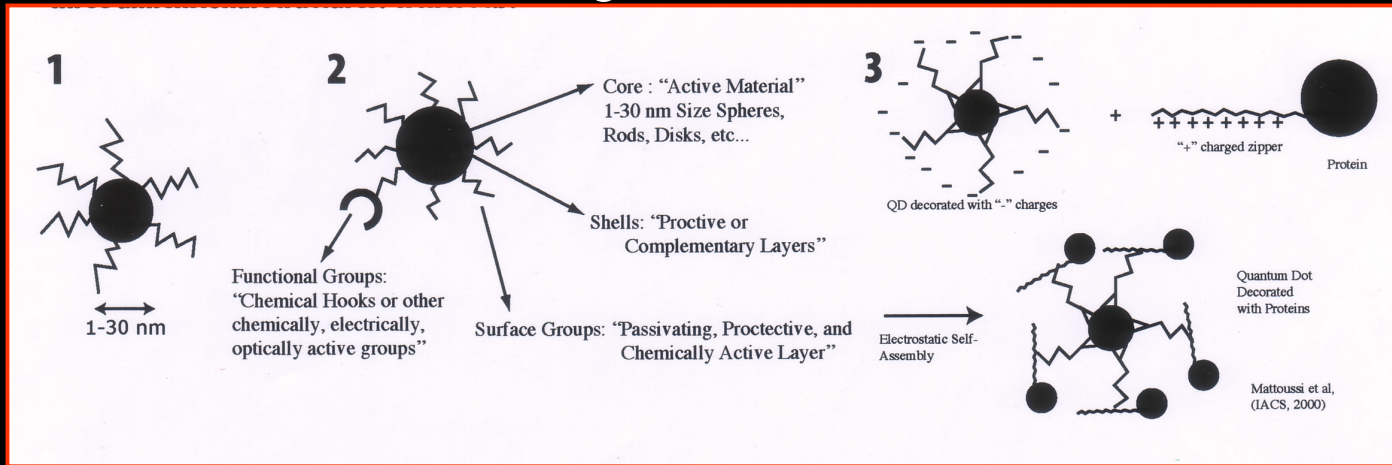
The Nano-Industrial Development Stream

The Nano-Industrial Infrastructure Development Stream

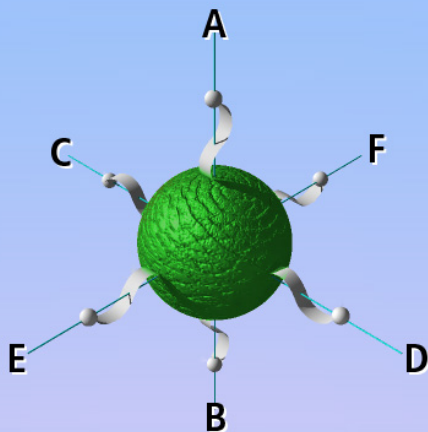# Objective: Improved Processes for Manufacturing High Precision Functionalized Nanostructures

Present strategies for nanofabrication

Target future nanofabrication goals
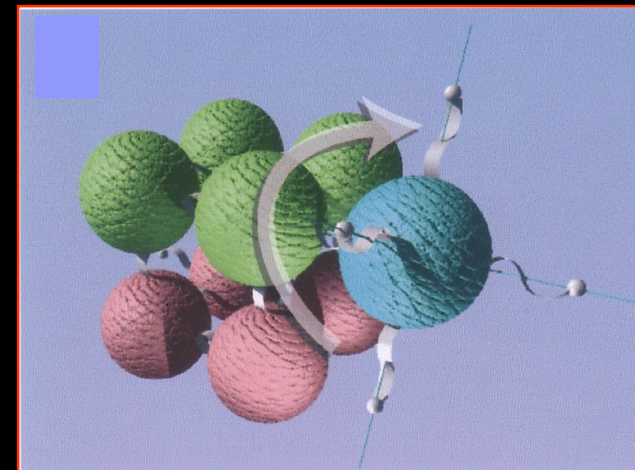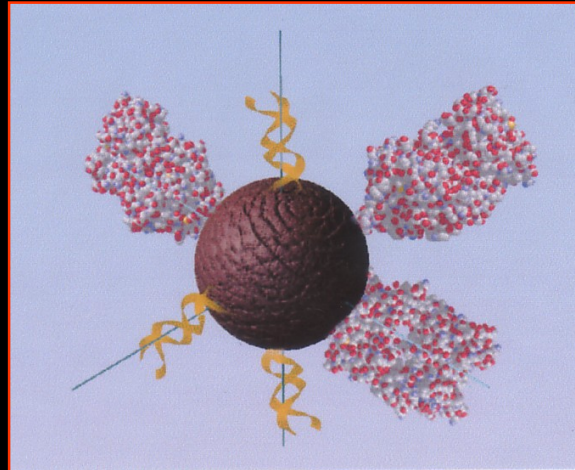
20 nanometers

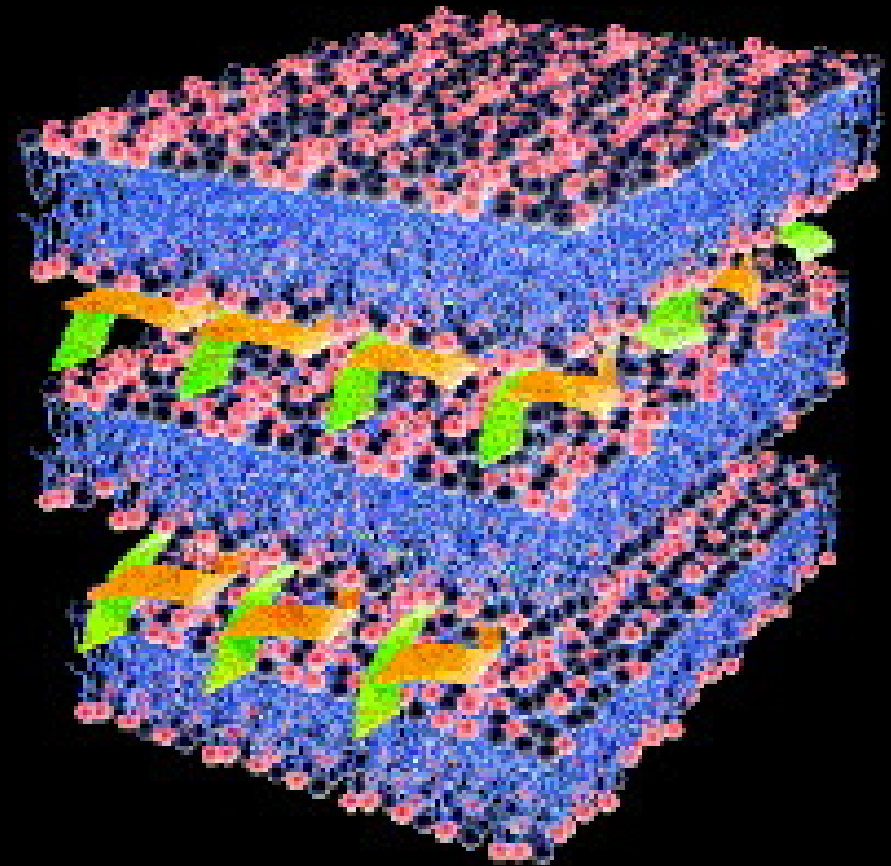# Heterogeneous Integration Process for Micro/Nanofabrication – Synergy of Top-Down with Bottom-Up Processes

Michael Heller - Nanogen

Structural Proteomics - Proteomic Assembly

4/23/2010
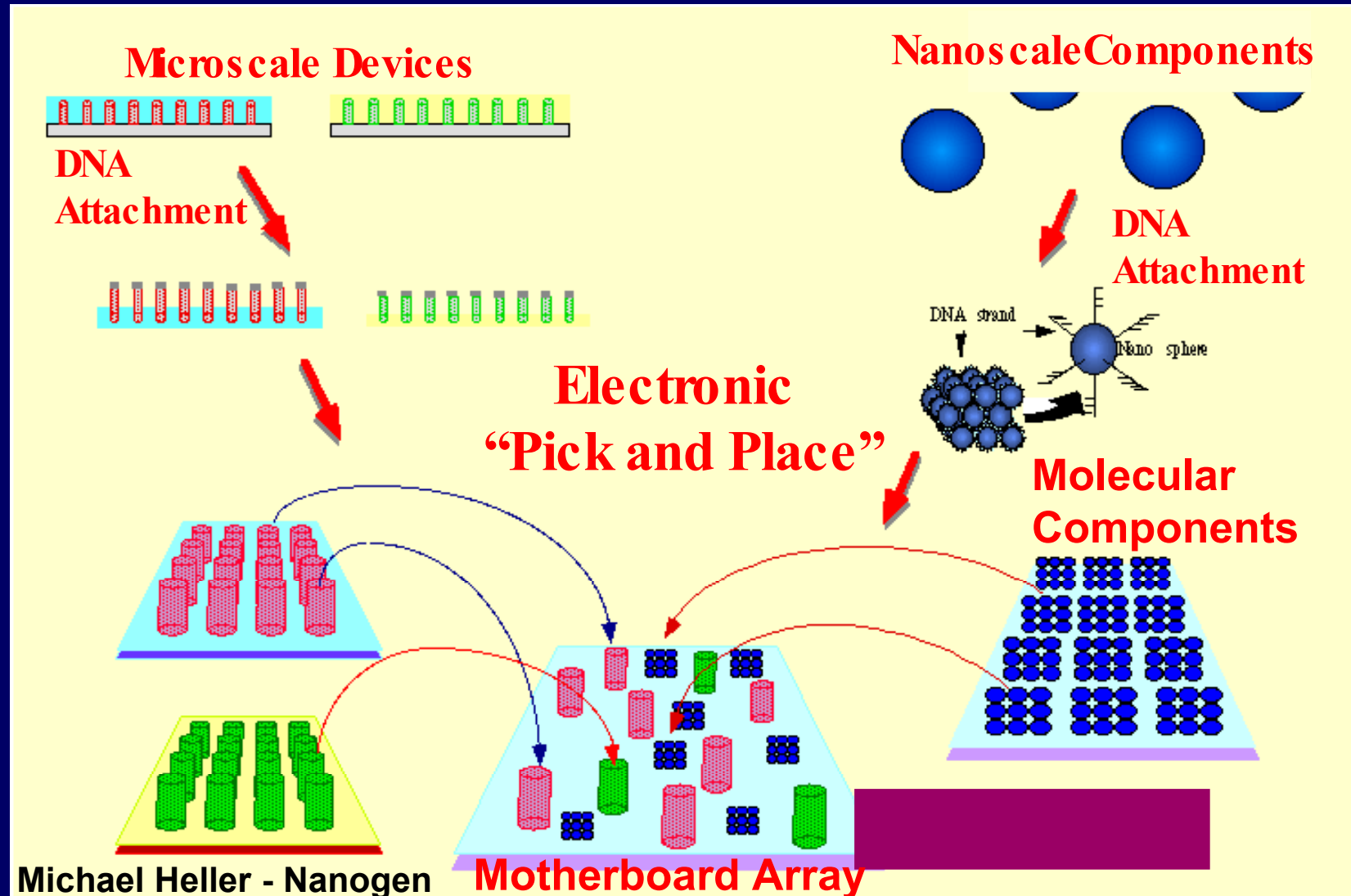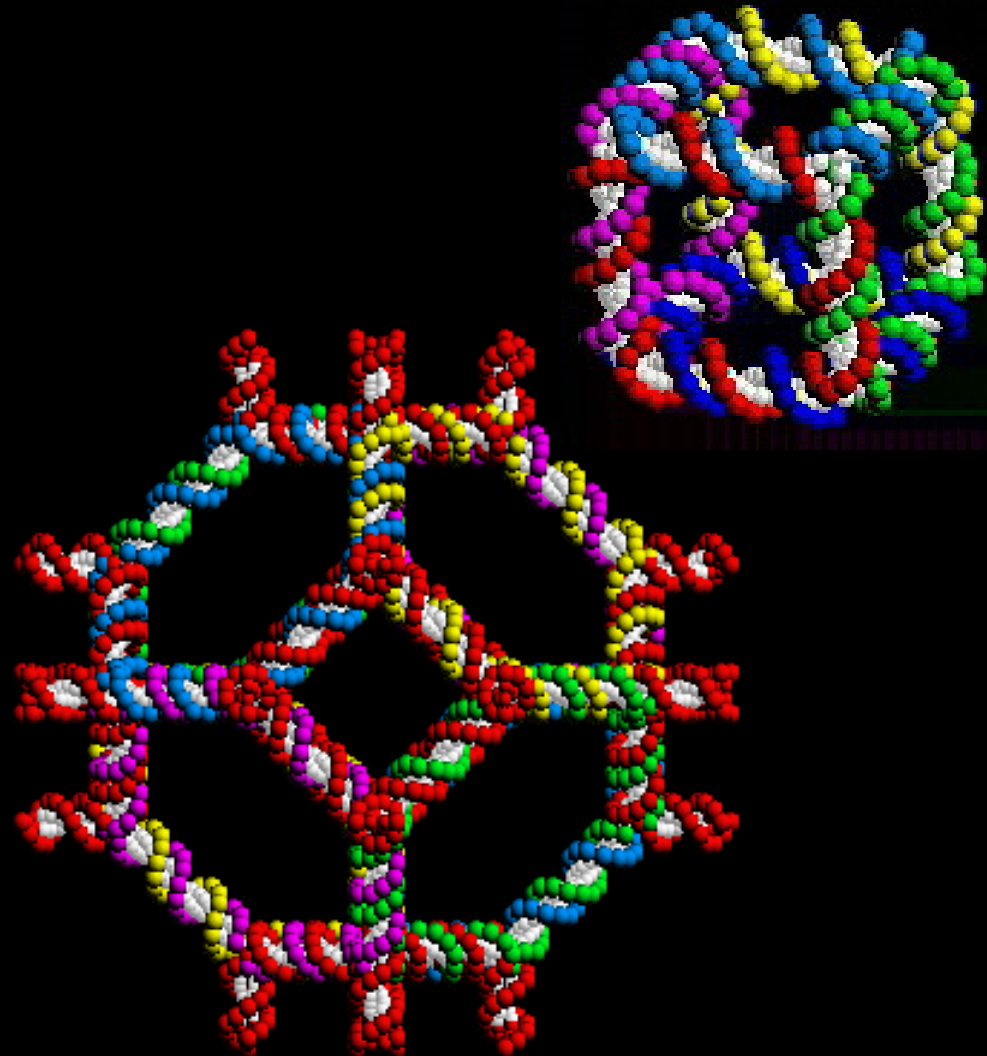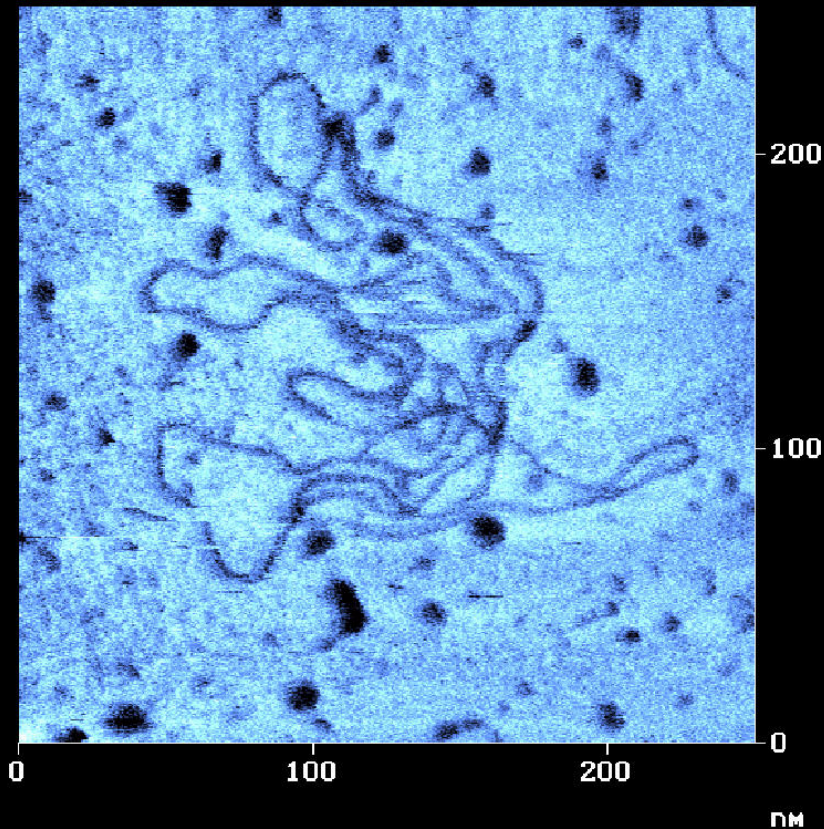
Structural Proteomics - Proteomic Assembly

Structural Proteomics - Proteomic Assembly

Y₂

Y₁

C₁

C₂

X₁

X₂
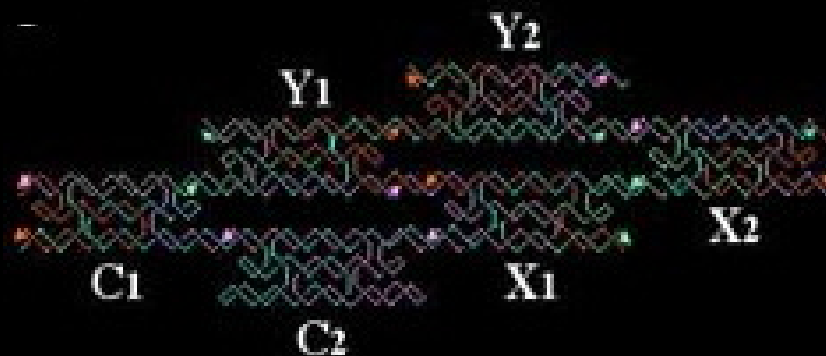
Structural Proteomics - Proteomic Assembly

Modify Proteins

fiber adhesion site (red)

tails to cargo binding site

catalytic site for ATP hydrolysis

neck and mechanical linkers
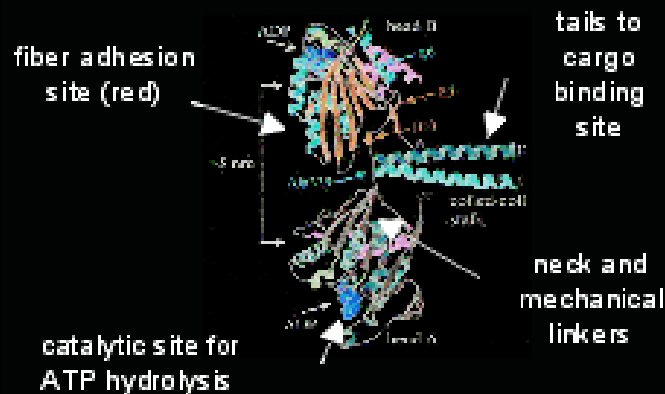
Assemble Fiber Networks
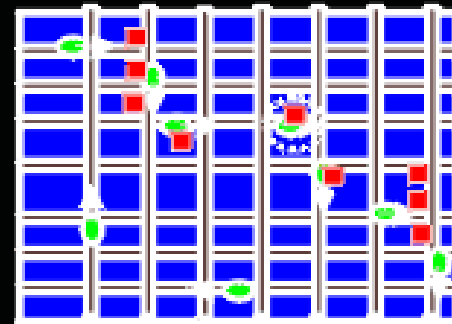
Monitor Protein Function

Activate Proteins
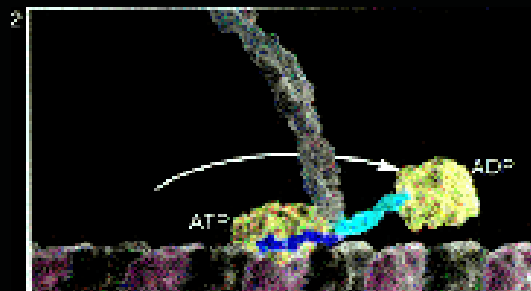
In-Silico Biology –
Schematic Engine of Biological Systems
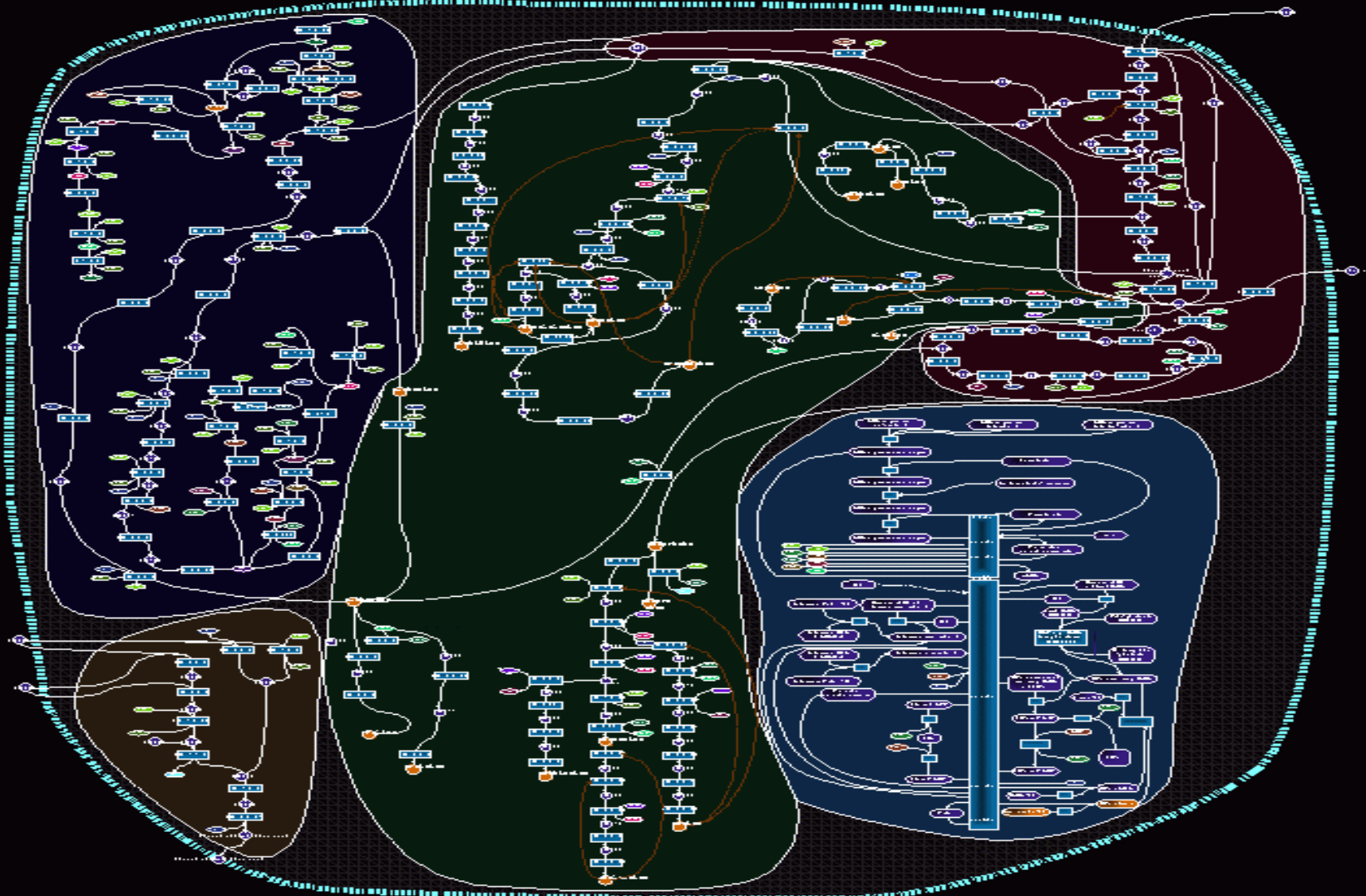
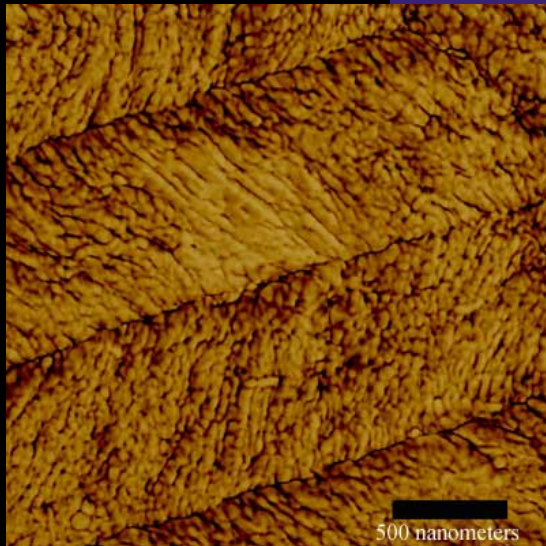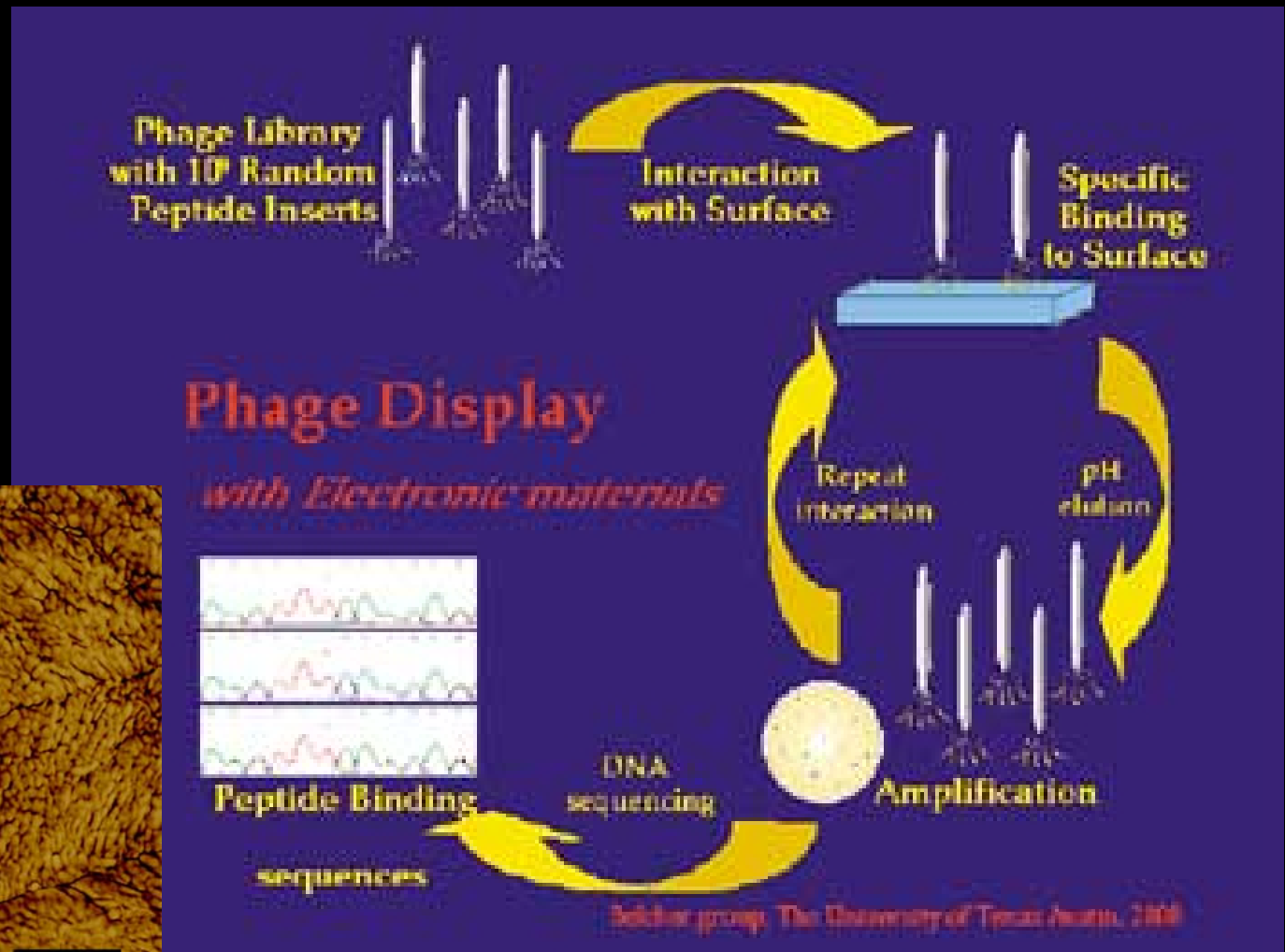# Novel Hybrid Nanostructured Materials
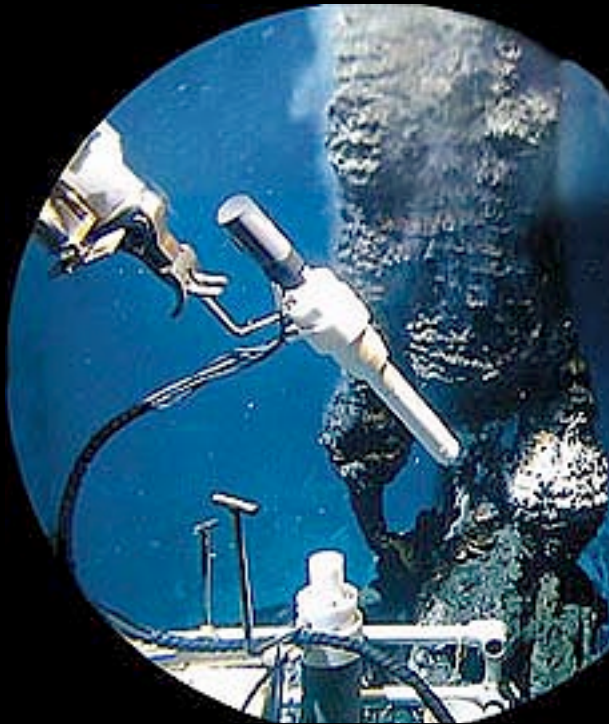# Nanobiology as a mechanism of access
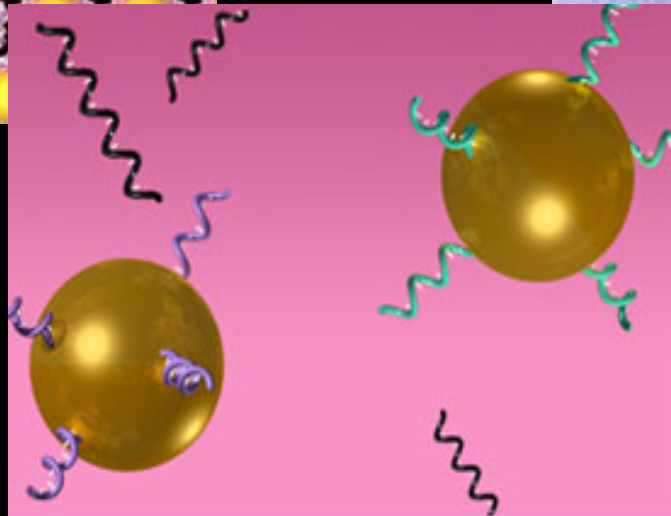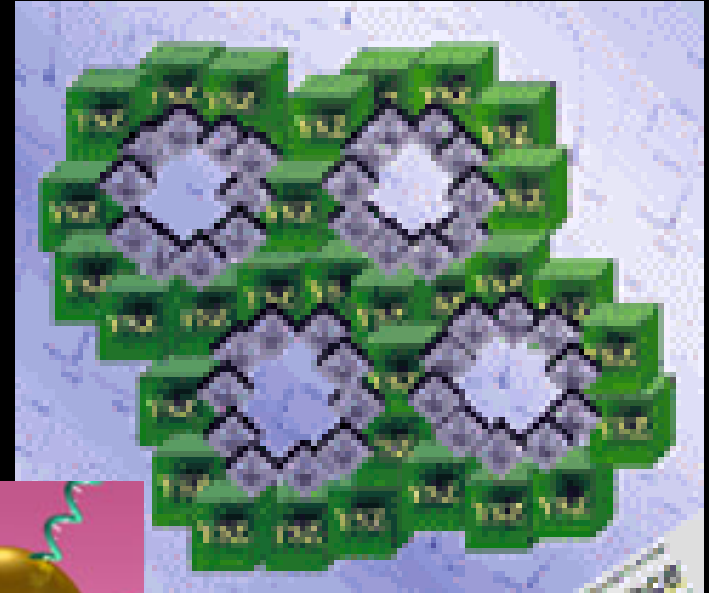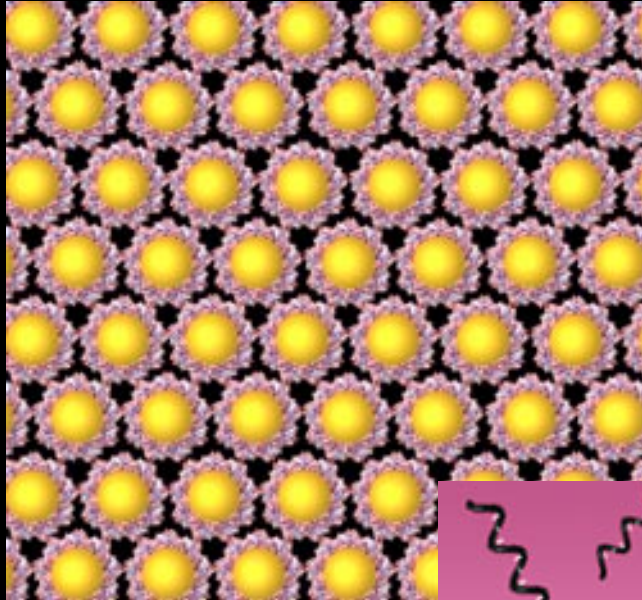
Define Foundry - Future

- Extremely diverse range of materials
- Highly adaptive, polymorphic
- Just as Needed Fabrication

0

500 nanometers
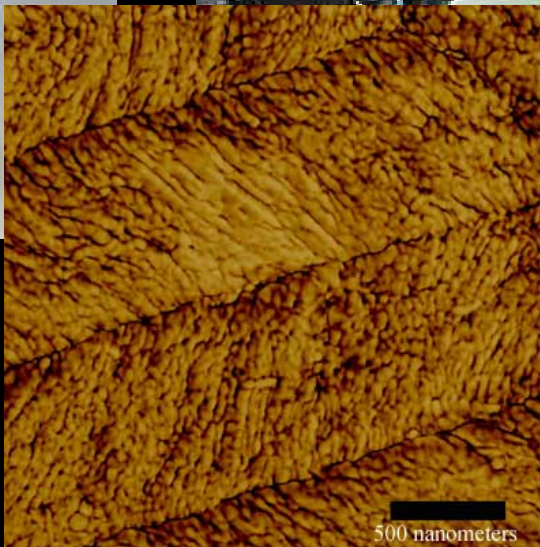
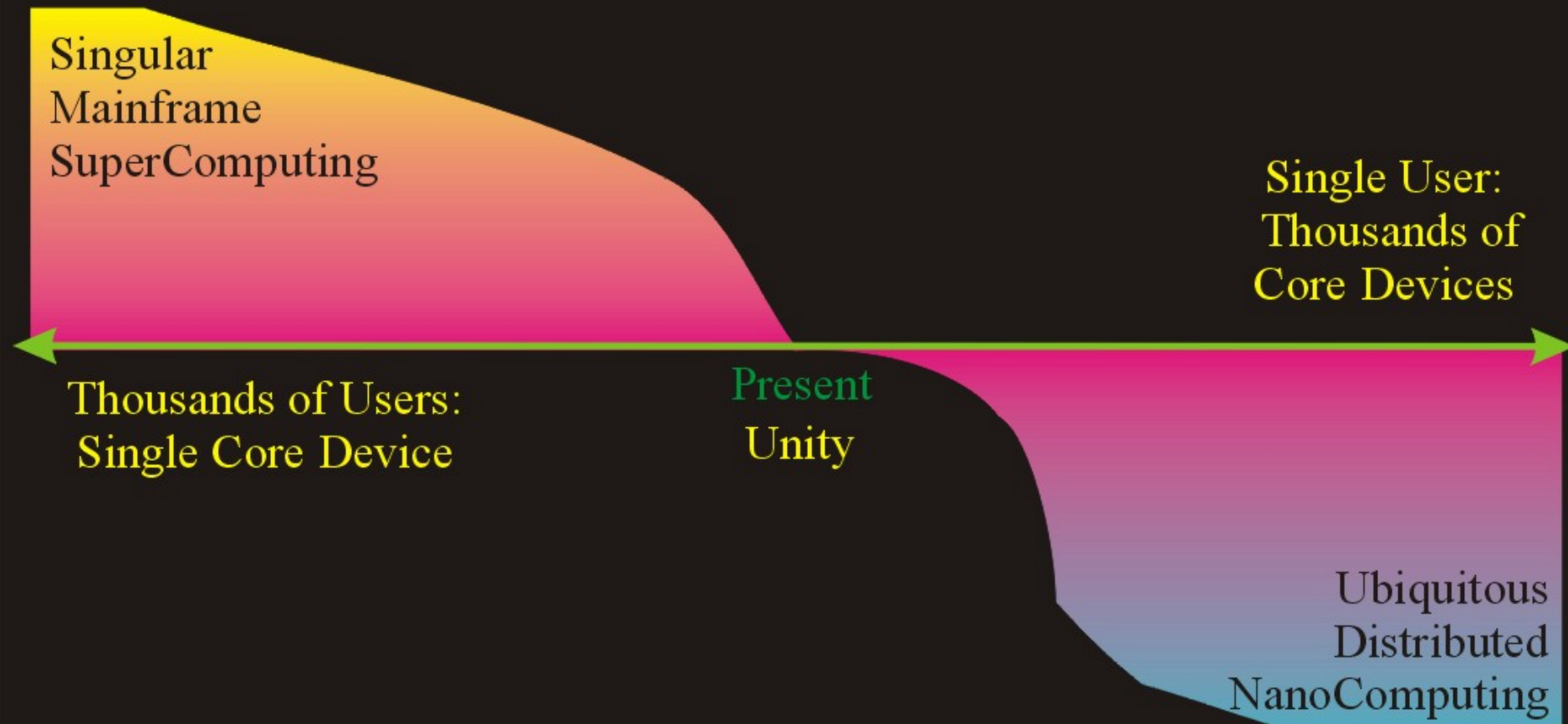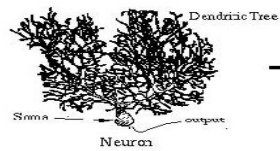# Define Foundry - Future

Define Life – What are the Parameters?
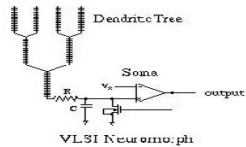
Process Dynamics of the Evolutionary Eventhorizon

Designed Evolution   Restoration & Healing   Augmentation

Present   Transition   Future

Augmentation   Cognition Enhancement   Parallel Processing Capacity
Physical Enhancement   Complexity Management
Extended Life Productivity

NanoComputing - Integration of Sensing, Cognition, Computing, Communication

Singular Mainframe SuperComputing

Single User: Thousands of Core Devices

Thousands of Users: Single Core Device

Present Unity

Ubiquitous Distributed NanoComputing

Designed Evolution
Nano Bio Info Cogno
Example Implemenation Cycle

Natural Neural Network Modeling

Co-Evolved Hybrid Human Organism / Intelligence

Cogno Nano Bio

Nano Bio

Hybridized Synthetic DNA

Complex Self Evolving Neural Network Modeling

Nano Bio Info
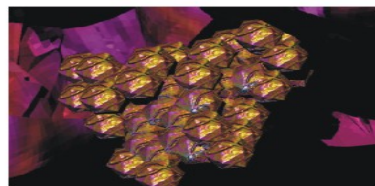
Nanobiological Neural Network Systems
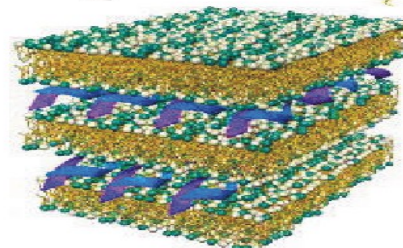
Complex Proteomic / DNA Computing Systems

Nano Bio Info

Structural Proteomics DNA "circuits" & devices
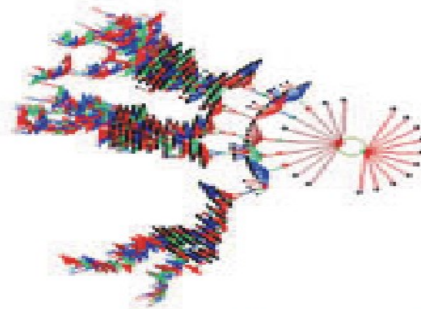
Nano Bio Info

Metascale Genomic Modelling / Engineering

Nano Bio Info

Evolutionary Proteomic Modeling / Synthesis

Co-Evolution with Emergent Intelligences
Genetic / Biophysical Enhancement
Accelerated Environmental Adaptation
Extended Longevity & Functionality
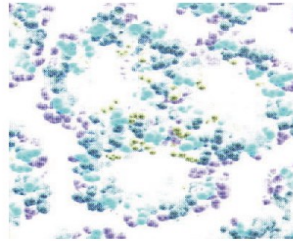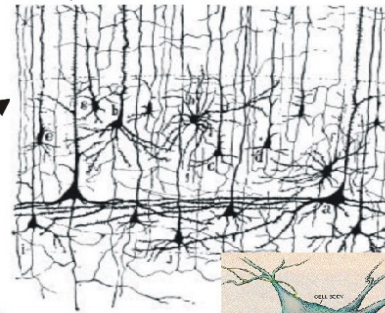
Biocompatable Molecular
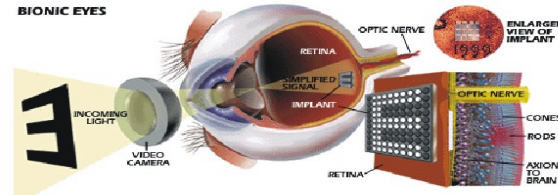Surfaces / Interface

BIONIC EYES
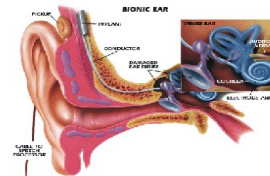
Complex Integrated Biodevice /
Functional Restoration

Nano
Bio

Biodevice / Implant
System Interface

Nano
Info
Bio

Neural
Mapping

Nano
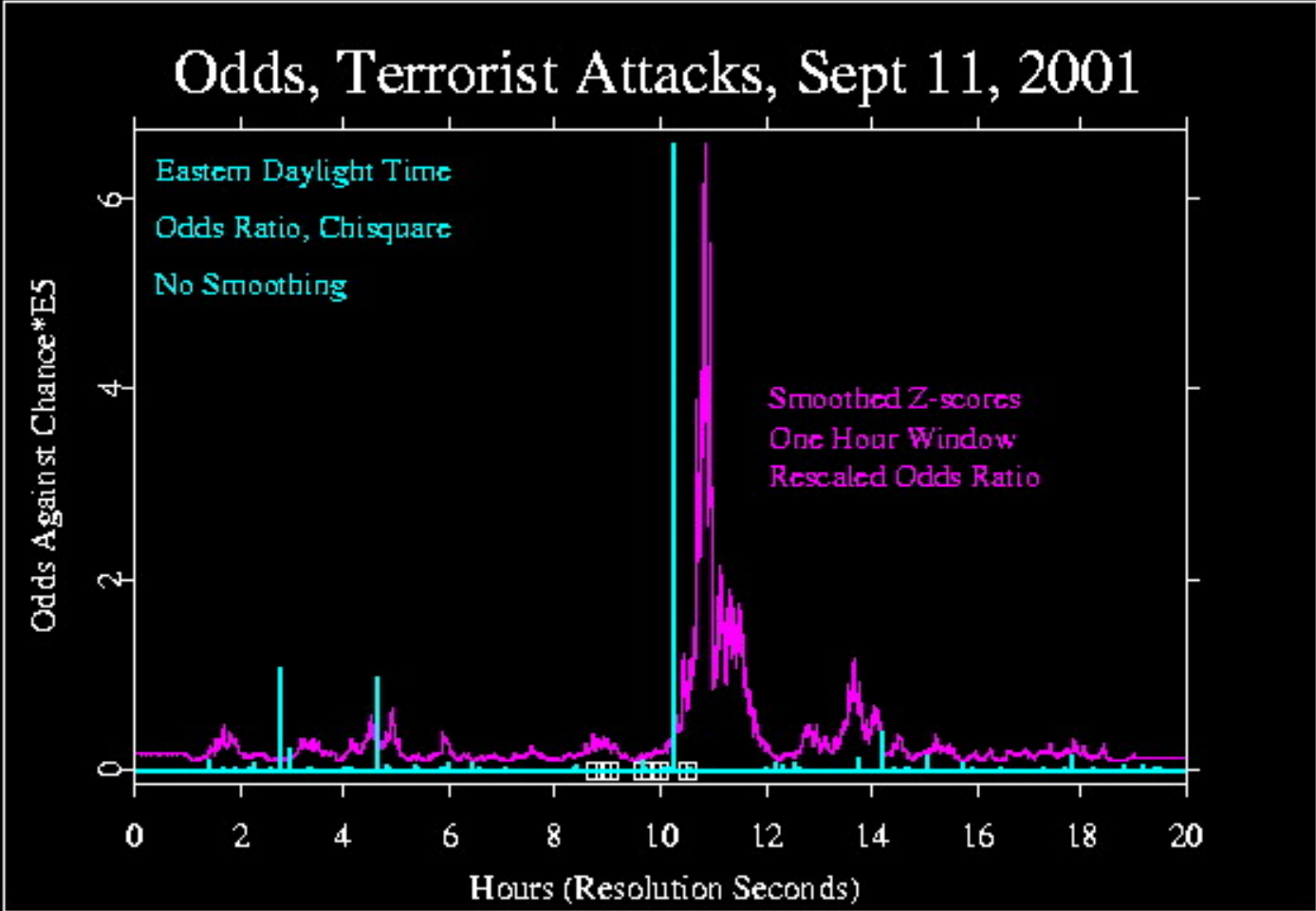Cogno
Bio

Extended Sensory Capacity
Intellectual / Cognitive Capacity
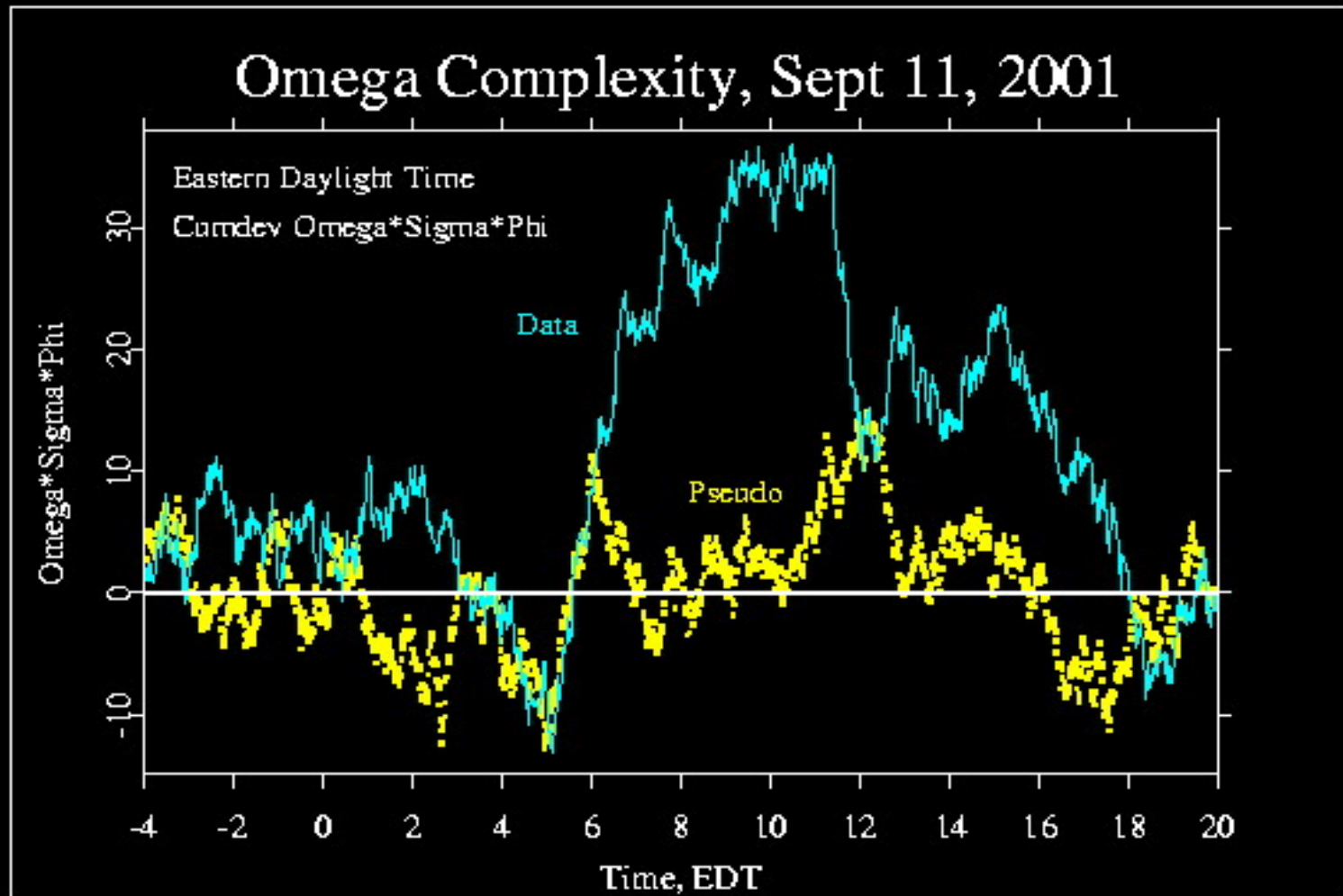Strength, Endurance Attributes
Extended Longevity
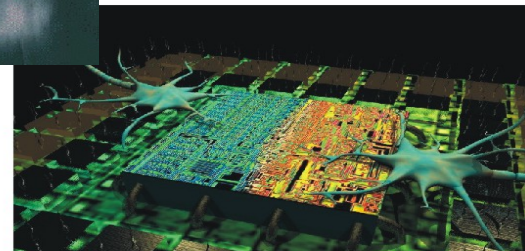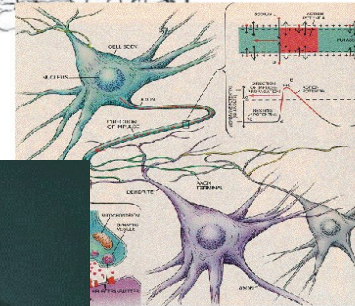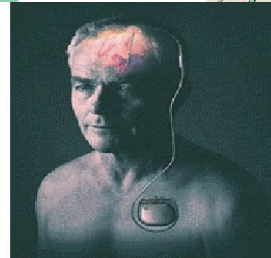
Cogno
Nano
Bio
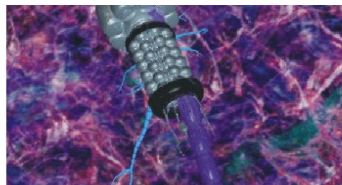
Cellular / Neural Repair

Cellular / Neural Interface

Microtubulin / Neural Quantum Interface Infrastructure

Dendrite

Dendritic Spine/Synaptic Receptor

Nucleus

Membrane

Axon

Microtubule

Microtubule Associated Protein
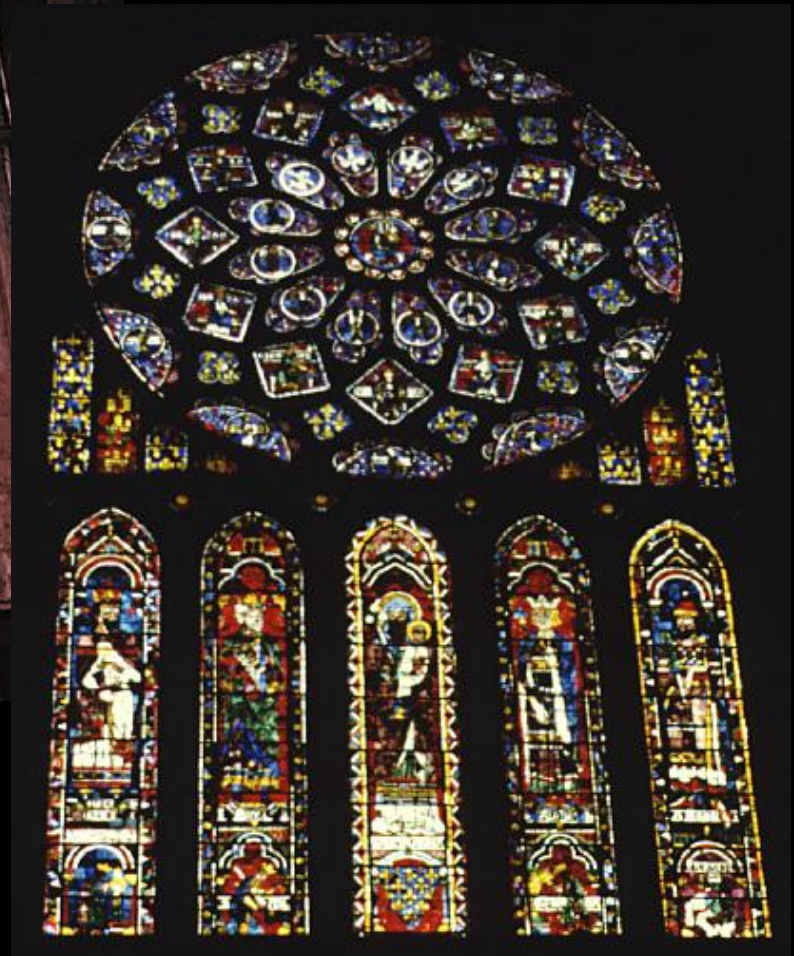
Tubulin 6 nm

2 conformations

4 nm

13

Evidence of Potential Entanglement Field Artifacts of Quantum Domain State Phase Transitions Affecting RNG Datastream Statistical Variants – Mass Mental Syncronicity Event Correlation
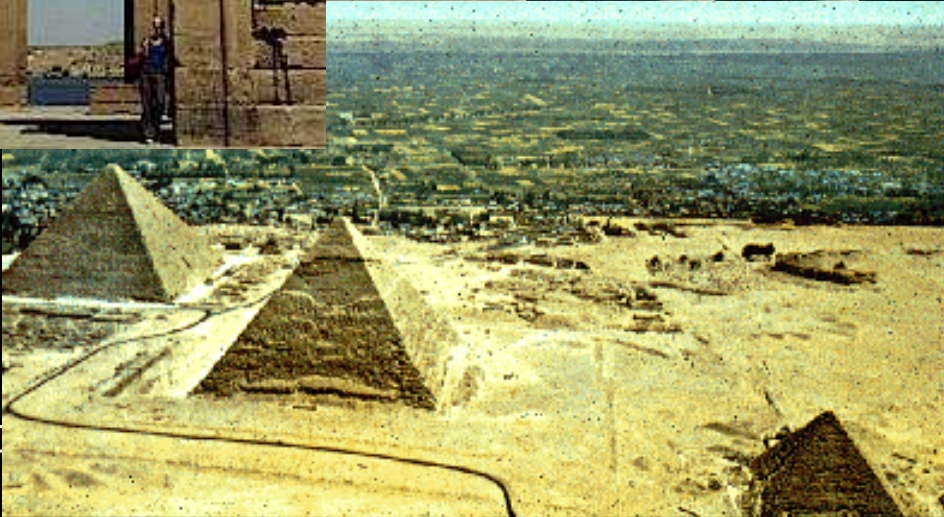

Odds, Terrorist Attacks, Sept 11, 2001

Evidence of Potential Entanglement Field Artifacts of Quantum Domain State Phase Transitions Affecting RNG Datastream Statistical Variants – Mass Mental Syncronicity Event Correlation
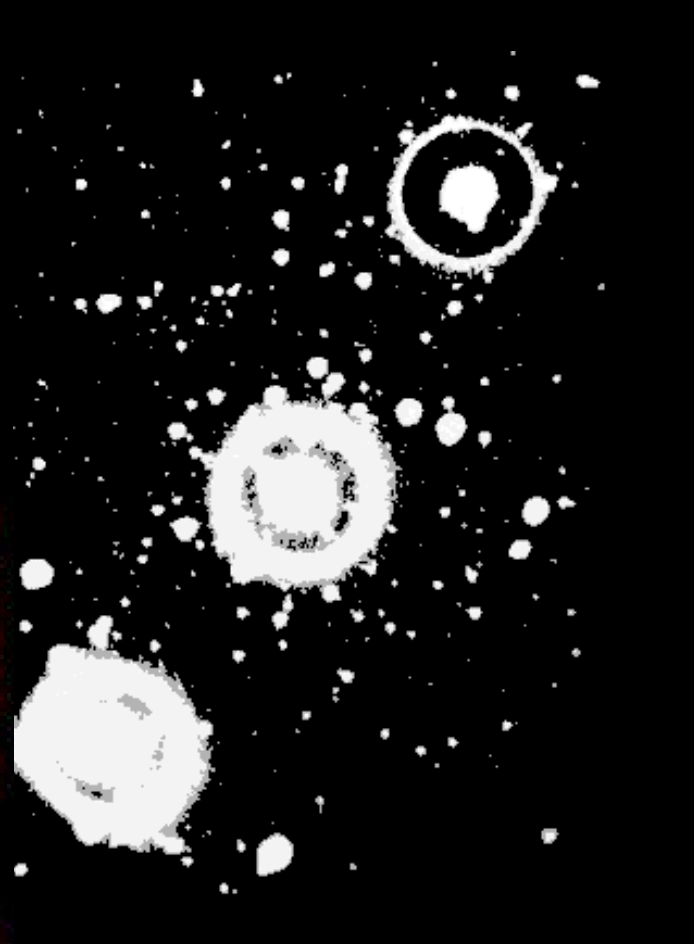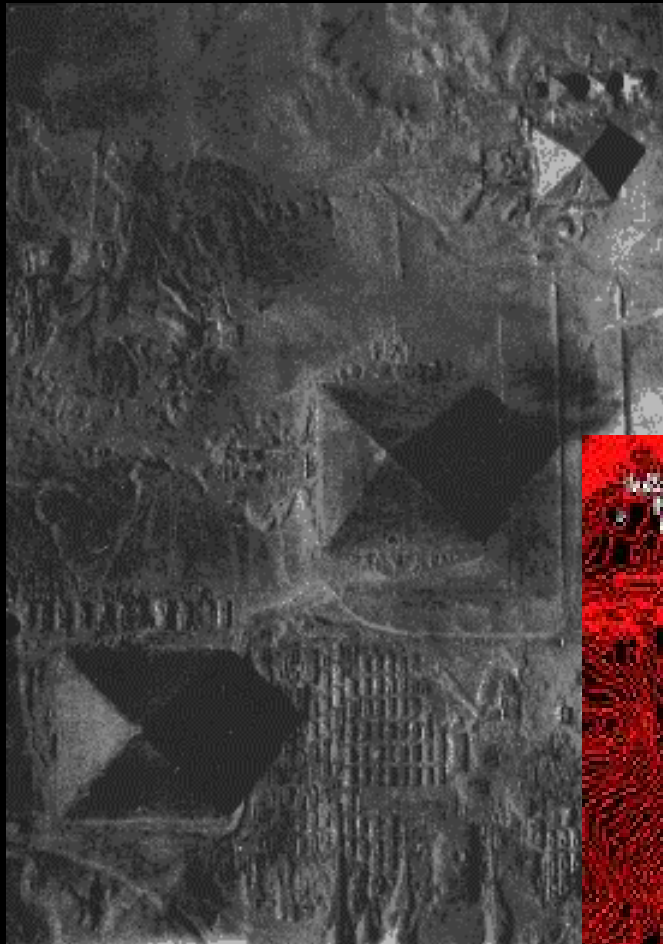

4/

Existence Navigation – Media, Platforms, Portals

Existence Navigation –
Media, Platforms, Portals

Existence Navigation – Media, Platforms, Portals

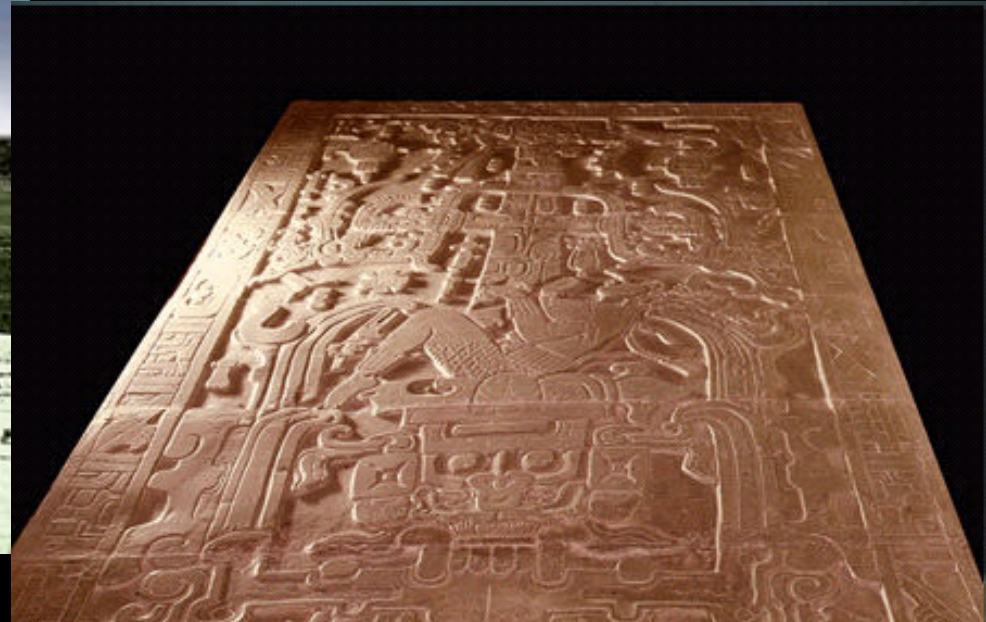4/23/2010

Existence Navigation – Media, Platforms, Portals

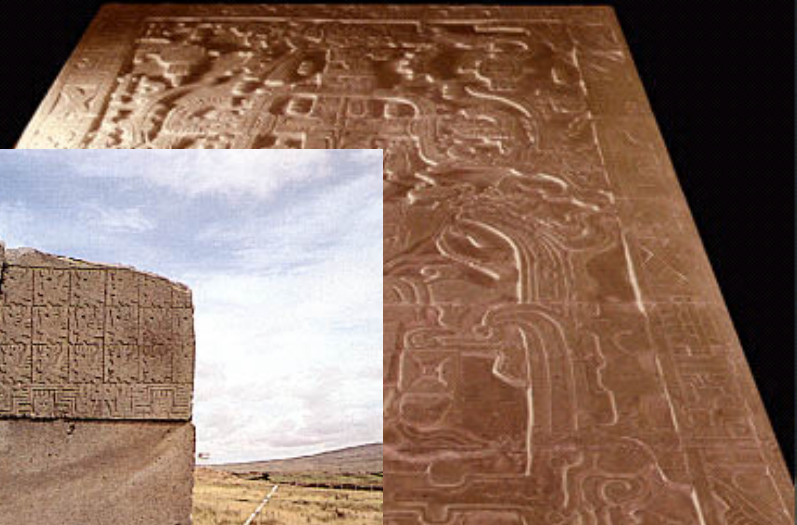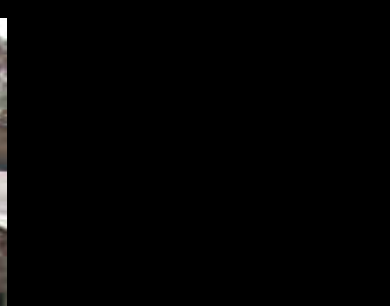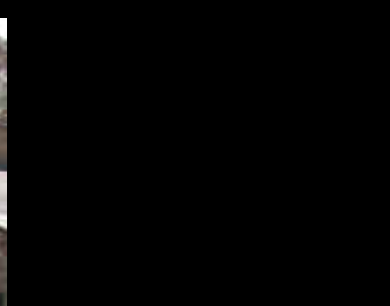# Existence Navigation – Media, Platforms, Portals

Existence Navigation – Media, Platforms, Portals

Existence Navigation – Media, Platforms, Portals

4/23/2010

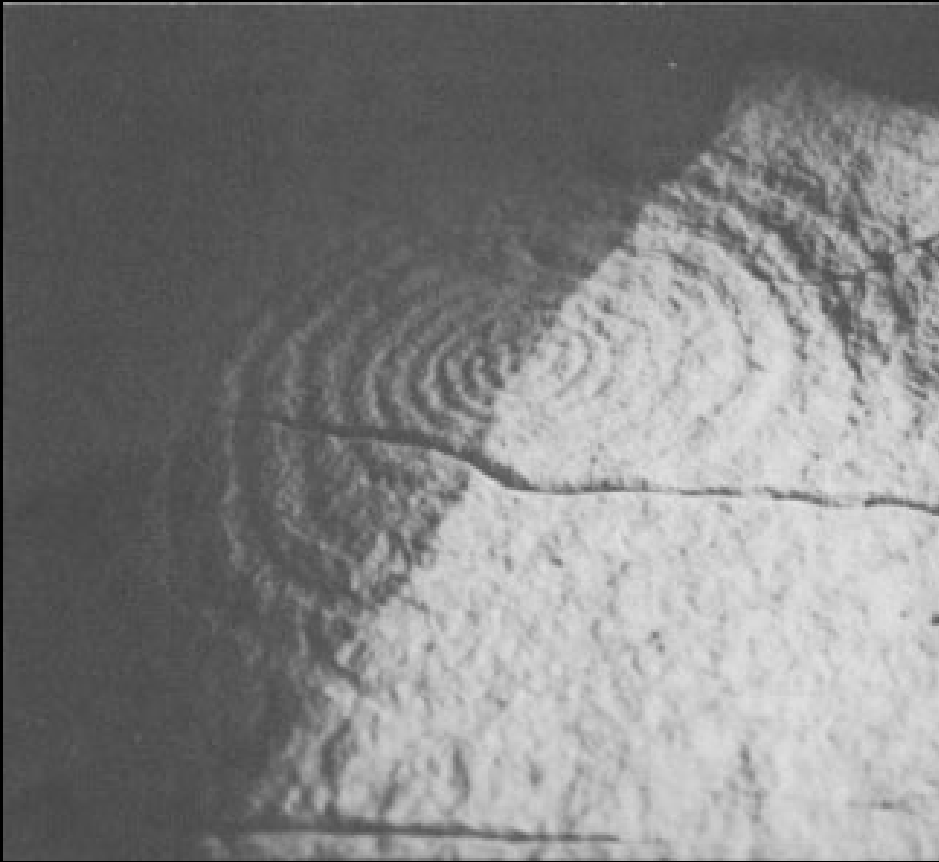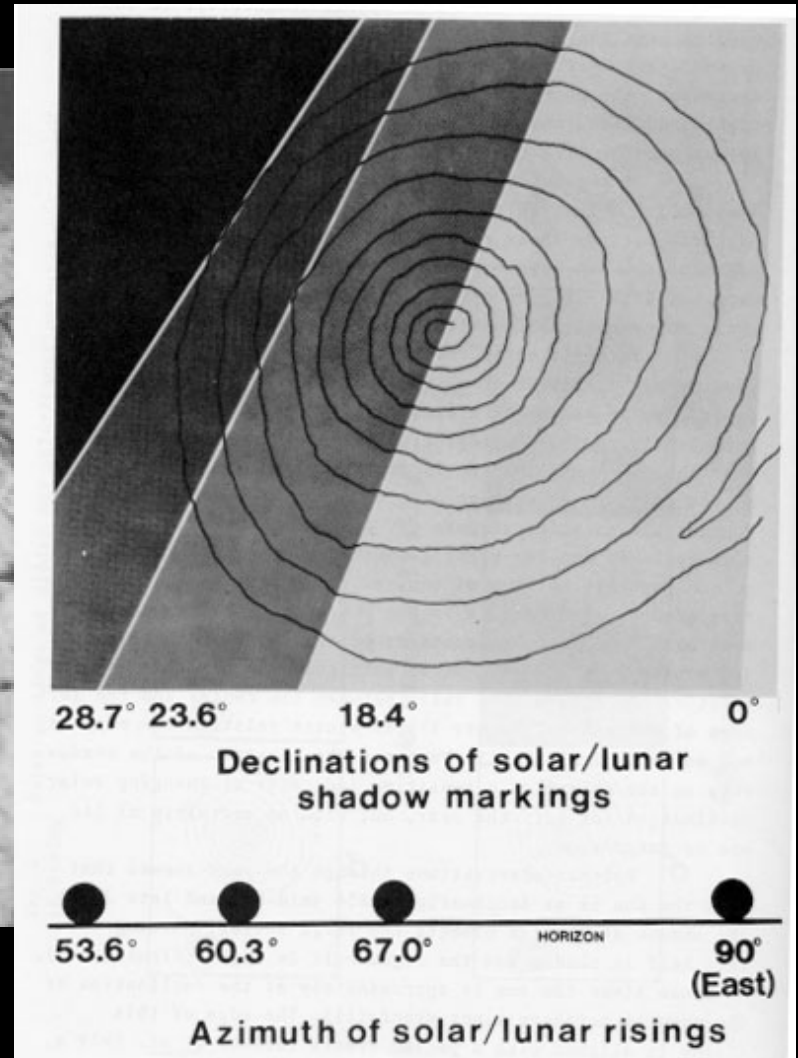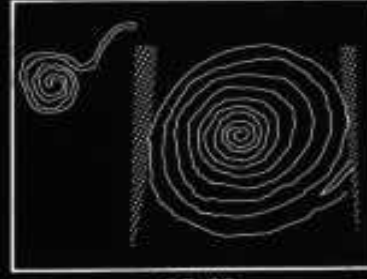# Existence Navigation – Media, Platforms, Portals

Declinations of solar/lunar shadow markings

28.7° 23.6° 18.4° 0°

53.6° 60.3° 67.0° HORIZON 90° (East)

Azimuth of solar/lunar risings

Existence Navigation – Media, Platforms, Portals

Solar markings at midday

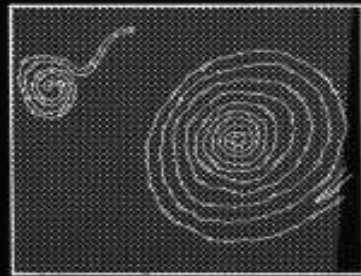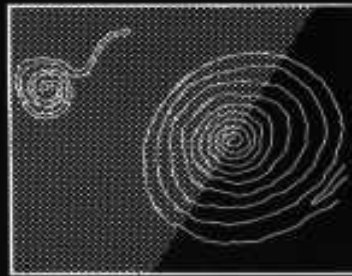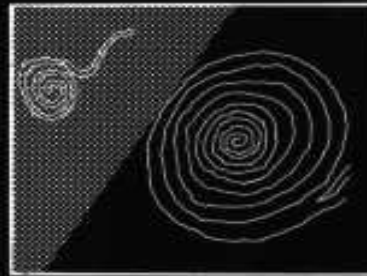| 0° EQUINOX OR MID-POSITION OF THE SOLAR/LUNAR CYCLES | +23.6° SUMMER SOLSTICE | −23.6° WINTER SOLSTICE |

Solar/lunar markings at rising

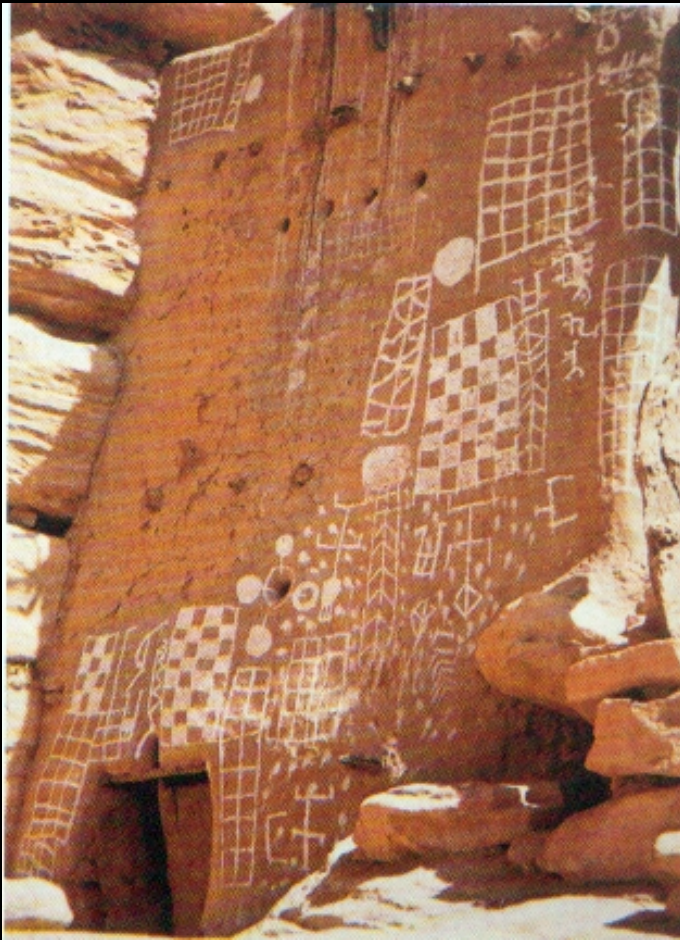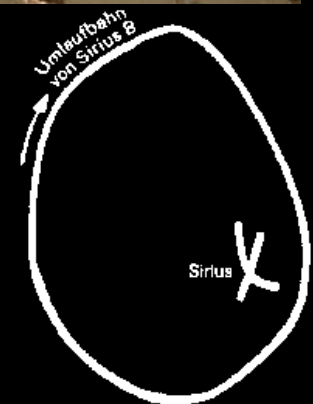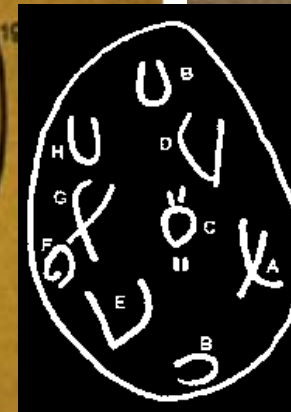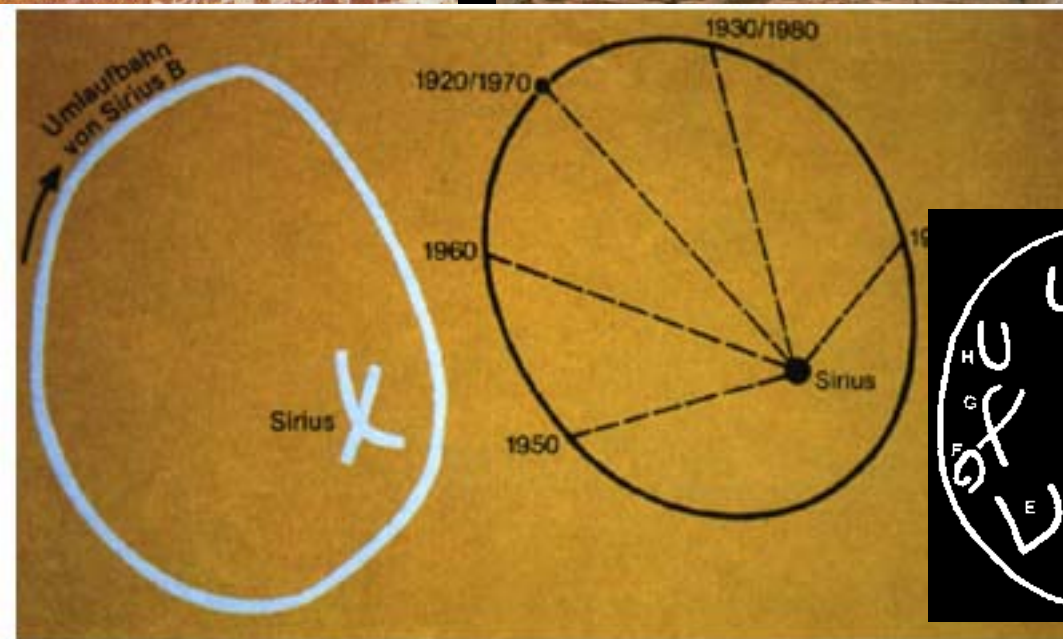| 0° EQUINOX OR MID-POSITION OF THE SOLAR/LUNAR CYCLES | +18.4° MINOR STANDSTILL OF THE MOON | +28.7° MAJOR STANDSTILL OF THE MOON |

Existence Navigation – Media, Platforms, Portals

Existence Navigation – Media, Platforms, Portals
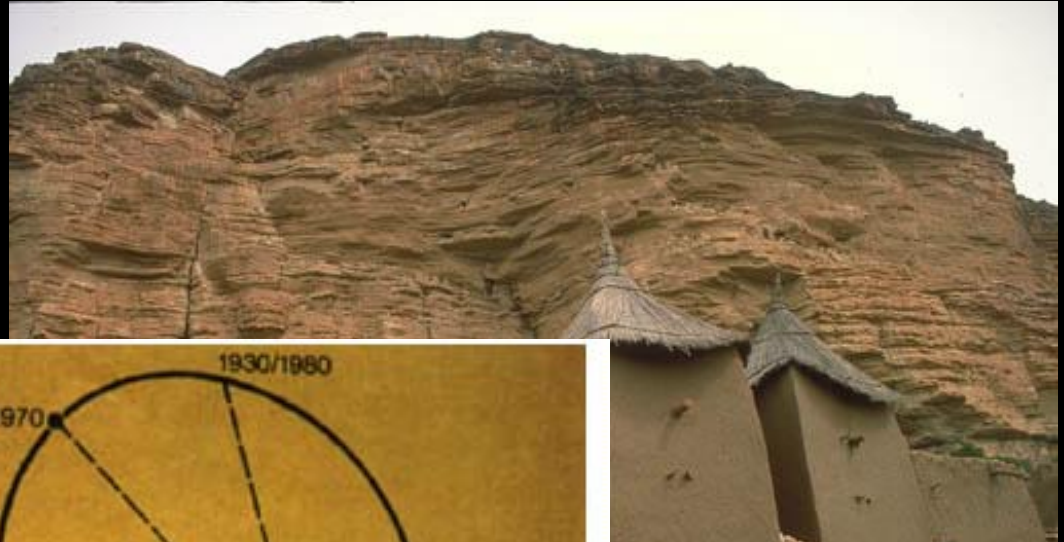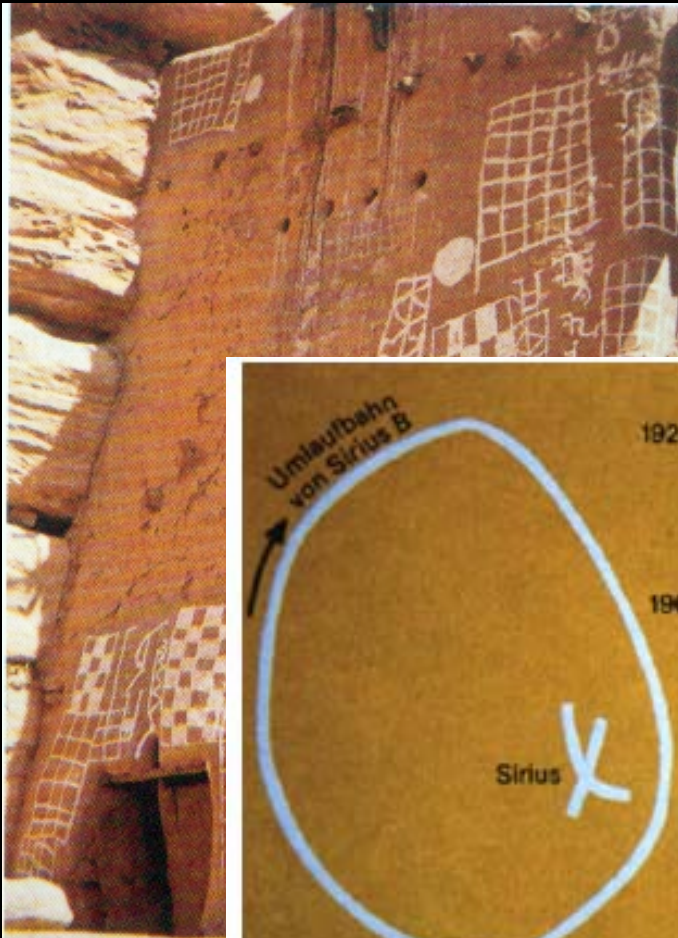
Darstellung der Umlaufbahn von Sirius B um Sirius A: Links eine Skizze der Dogon, rechts die Position des Sirius-Begleiters im Zeitraum zwischen 1920 und 1990.

Existence Navigation – Media, Platforms, Portals
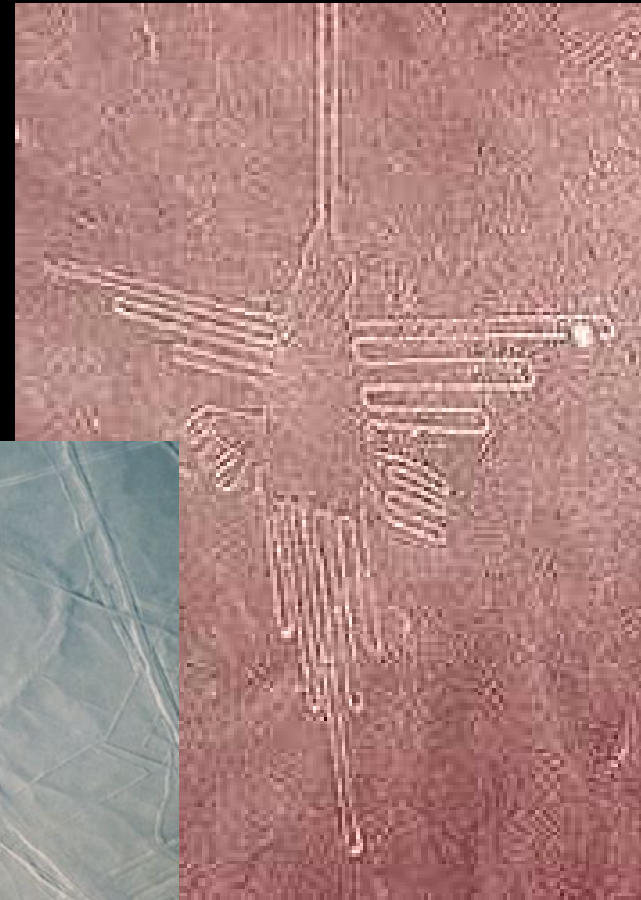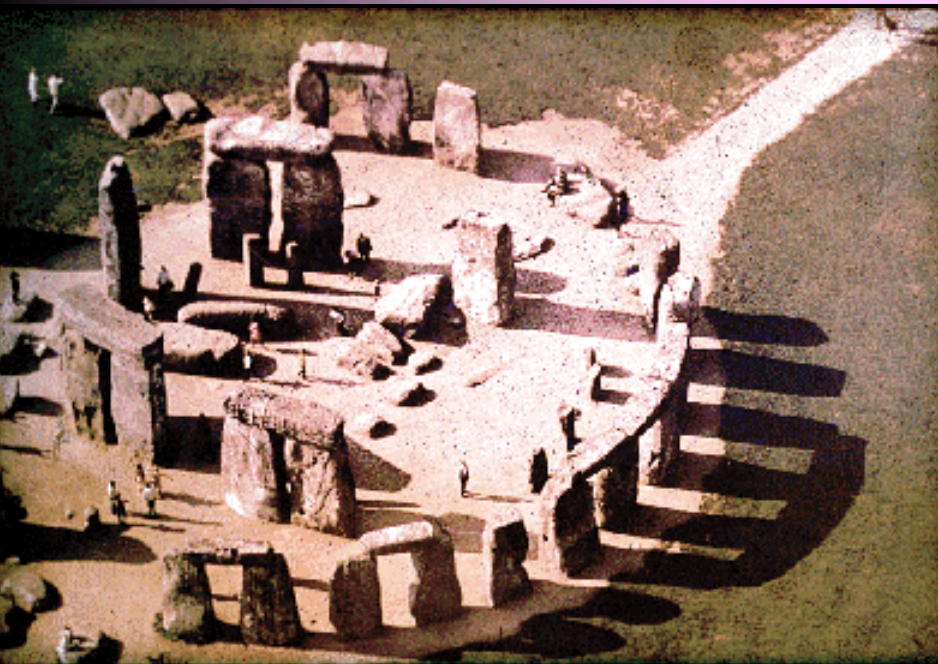
Existence Navigation – Media, Platforms, Portals

Existence Navigation – Media, Platforms, Portals

Existence Navigation –
Media, Platforms, Portals

The Message . . .

Existence Navigation – Media, Platforms, Portals

The Message . . .

- Respect for all Living Things
- Respect for the Planet as a Living Thing
- Respect for the Cosmos as a "Living System"