CYBERSPACE
From NOW to TOMORROW

An evolutionary
CYBERNETIC POINT OF VIEW

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FOUNDATION OF CYBERNETICS

GENERAL SYSTEM THEORY
Charles Babbage
Every thing as a system

SYSTEM AND FEEDBACK
Norbert Wiener
To obtain a desired behaviour (a   control)
from a SYSTEM (machine and animals)
feedback is required

INDICATION ACT
Spencer Brown
To start a System Behaviour
an indication ACT is required (today: a click!)

WHERE CONTROL AND COMUNICATION

ORGANIZED SYSTEMS
Companies
Automated sytems

BIOLOGICAL SOCIAL AND NATURAL SYSTEM
..as well as human beings
Collective entities

NETWORK OF DATA AND SYSTEMS
Populations
World wide Sytems.. web
Nations..states
Political..Legal organizations
SCIENCE AND TECHNOLOGY

with their LIFE CYCLE and
SUPER ORGANIZATIONS

To DESCRIBE CYBERNETIC SYSTEMS

NATURAL LANGUAGES

Mathematics and logic
Specialized description languages
Fuzziness
Automata and Cellular Automata
Neural Nets (Mc CULLOCH and PITTS.)
Hypertext languages
Computer Simulations
Analog and Physics modeling

To MODEL UNKNWOUN ENTITIES
METAPHOR ARE REQUIRED..

Natural Phenomena are the source of
modelling: metaphors !

Difficulties: THE COMPLEXITY

Number of parts

AUTONOMY (CONCURRENCY)

WORKING TOOLS FOR CYBERNETICS

ALAN TURING THEORY of COMPUTATION
 INFORMATION THEORY
 AUTOMATA THEORY

PROGRAMMING
   logic oriented
   object orientation (system oriented)
    functional programming
    evolutionary programming..
    electronic circuit theory

 DISCRETE AND CONTINUOUS SYSTEMS
CONCURRENCY
  CA. PETRI, CAR TONY HOARE

RESULTS FROM CYBERNETIC TECHNOLOGIES

GLOBAL SYSTEM FOR

data
communication
computation

GLOBAL FEEDBACK SYSTEM

GLOBAL ACCESS SPACE

GLOBAL AUTOMATION SPACE

POTENTIALLY AVAILABLE TO EVERY BODY

WHAT FOR THE REAL WORLD?

WORLD WIDE COMMUNICATION AND COMMERCE (WEB)

LARGE HUMAN COMMUNITIES
based on common interest

NEW CHANNELS FOR ACTIVE CONTROL ACTS
on companies
government
populations
POSSIBLY ACTIVATED BY SMALL GROUPS

EMERGENCE OF EXTREMELY
LARGE SERVICES SYSTEMS ..HOW?

THE WEB INCREASES VISIBILITY
increases visibility ..
increases competition ..
the cost of producing services increases..
prices for unit service decreases..

......

COMPANIES ARE FORCED TO INTEGRATE
A positive feedback forces
that process again and again..

This is what happened for
INFORMATION RETRIEVAL services. .(google..)
.. And this in NOW HAPPENING WITH
EVERY SERVICE TO MAN ..!

HOW WAS SUCH TREMENDOUS GROWTH POSSIBLE ?

ELECTRONIC..
   photonic
      micro nano..today
      molecular electronics
S/W TECHNOLOGY
   New Algorythms

   ......

DECREASING DIMENSIONS has allowed:
 .INTEGRATION
      billions of components
      out from a single production act
 .INCREASE OF SPEED
      not far from picoseconds
 .DECREASE OF POWER CONSUMPTION
      green electronics
 .DESIGN AUTOMATION

AND WHAT ABOUT LIMITATIONS?
      predictions have been constantly
      bypassed by technologies..

MINIATURIZATION FOR GROWTH
SUSTAINED BY THE MARKET
MOORE LAW

DIMENSIONS *of electronic components*
   decreases exponentially in linear time..
   speed increases accordingly
THE NUMBER *of electronic components*
   increases more than exponentially
   with linear time
THE POWER CONSUMPTION

   reduces as a consequence..

THE PRICES

   of electronic components are reducing
   dramatically
EVOLUTIONARY INTEGRATION
   seems predictable

But

PLANT COSTS FOR PRODUCING
ELETRONICS INCREASE
TREMENDOUSLY...

and so..

THERE IS A NEED FOR A CHANGE OF
TECHNOLOGY..

In order to maintain continuity in growth!

NANO TECHNOLOGIES ARE THE PROMISE!

FORCES GOVERNING SOCIETY

SOCIETY *is a collection of* ENTITIES

Neglecting many details
ALL entities can be characterized by :

KNOWLEDGE

PRODUCTIVITY   COMPETITION

Or THE BERMUDA TRIANGLE: T

Society can be seen as a

SEA OF BERMUDA TRIANGLES..

where life is difficult..

The triangle suggests all possible uses of relations among vertex ..

KNOWLEDGE to   COMPETE
PRODUCE

COMPETITION to PRODUCE
KNOWLEDGE

PRODUCTIVITY to COMPETE
KNOWLEDGE

And

BERMUDA TRIANGLES
are composed by other
BERMUDA TRIANGLES..

In a self similar
FRACTAL STRUCTURE..

Where
LIFE'S DIFFICULTIES
force
COLLABORATION

With the use of CYBERTECHNOLOGY
for the vertex of the TRIANGLES..!

Today

KNOWLEDGE *is almost* TECHNOLOGY

PRODUCTIVITY *is almost* AUTOMATION

COMPETITION *is almost* COMMUNICATION

FEEDBACK actions
      are the MARKETING observations..

MOORE LAWS
      improve the VERTEX of the triangles

And many TRIANGLES *disappear*
      others appear or Integrate

WHERE WE ARE NOW : 1

THE WEB *has extended offering of products..*
PUBLICITY *is mandatory to survive*

Concentration results in
VERY LARGE COMPANIES

To protect from misuse of WEB *offering..*
NO MORE WIDE WEB *is appearing*

The integration of any TRIANGLES
Is similar to integrated ELECTRONICS and has tremendous
KNOWKLEDGE/PRODUCTIVITY/COMPETITION

BIG fish eat SMALL fish ..

WHERE WE ARE NOW : 2

CLOUD COMPUTING

. extremely large sets of computers
. capable of supplying future needs
. Oriented to more focussed communication

ARE EXTENDING THEIR PRESENCE!

The DISAPPEARING *nano* COMPUTER
imbedding Network of Things
are being considered

TABLETS: light small computer accessing
DATA
COMPUTATION
COMMUNICATION
for the SINGLE HUMAN *easily in* CLOUDS
are introducing new Metaphor

EFFECTS OF NEW TECHNOLOGIES

WITH CLOUD and NANO
Energy reduction

WITH PHONE *and* TABLET *on* CLOUD
Owned data always with their USER
Global video conferences

WITH CLOUD
ACCESS instead of OWNERSHIP
as with book and multimedia

REVOLUTION IN MARKETING AND TEACHING
Focussed marketing
Need for new brand

WEB OF THINGS

CRISIS: a PICTURE

MOORE LAWS:
.extends consequence in all fields of economy.
.contradiction small vs /large increases
.marketing will become more aggressive
.Every Entity will be in CLOUD..
    even legal social medical learning.. CARE

FOCUSSED OWNERSHIP WILL MODIFY SOCIETY

INDIVIDUALS will Search a new style of life

WHAT AGAINST CRISIS

LARGE CLOUD COULD INTRODUCE COLLABORATION.

In all human activity

In a better relationship with management political systems

For a low cost better society

New finance systems for every one..

RESOURCES against CRISIS

REQUIRED to survive ..
                to design a better society ..
                        to decrease public debt..
                                for an ethic style of life..
                                        for a happy life
Some ingredients are needed.

LEADER'S understanding
                reality as well as technology
                culture
                people and communities

TRANSPARENT MODELS
        OF ALL THE BEHAVIOUR OF SOCIETY
    FOR EVERY BODY

WHAT WE HAVE NOW for a better
use AGAINST CRISIS

NOW ICT MOBILE AND CLOUD (as
described)

NOW VIRTUALITY

NOW COLLABORATION

NOW NEW SOURCE OF ENERGY

NOW inspected: VIRTUALITY

HAS TO DO WITH:
   virtual worlds (even games)
   artificial worlds
   virtual teaching and simulation
   virtual copies of every thing
   virtual money
   extended reality
   virtual presence

VIRTUALITY *is a behaviour of* SYSTEMS
   as interpreted by man ..

VIRTUALITY *makes it possible*
   efficient state superposition..
   working models of people
   multi presence in clouds..

NOW: THE COST OF VIRTUALITY 1

Every project of a SYSTEM
is a VIRTUAL COPY *of that System-*

MIND MODELS *are* VIRTUAL *copies*

PROJECTS are used to implement
 real copies..
            Implementation is real work
            requires physical resources
            and may have a high cost

NOW: THE COST OF VIRTUALITY 2

DESIGNing *certainly requires resources*
         essentially cultural resources ..
         that society has yet paid..

   VIRTUAL SYSTEM *as well as* PROJECT
         are the final states of a design process..

   THE DESIGN HAS A COST...
   ITS FINAL STATE

      has an arbitrary cost .. possibly little

NOW COLLABORATION

CONFLICTS are every where
                  they represent
CONTRADICTION

Solving CONFLICTS
    is winning CONTRADICTION
COLLABORATION IS REQUIRED!

EXAMPLES OF COLLABORATION
    work division
    resource condivision
    multiple optimization
    social multiplexing (avatar multipresence)

NOW COLLABORATION
        is DISTANT COLLABORATION
        mail video conferences
        life in clouds
        collaboration tools..
                to *reduce cost and pollution..*

NOW ENERGY RESOURCES

A NEW SOURCE OF
  LOW COST CLEAN ENERGY (CO2 less)
  IS AVAILABLE!!!
(commercially soon)

ROSSI FOCARDI (Bologna University)
  following many others..
  Have made it possible.!

INDUSTRIALIZATION
  in GREECE AND USA HAS STARTED
  The firs beneficial will probably be
  pour countries

A BIG NOISE WILL REACH US..

COLLABORATION
  BETWEEN RICH AND POOOR
  IS MANDATORY..NOW.. IMMEDIATELY..