CYBERSPACE
From NOW to TOMORROW

An evolutionary
CYBERNETIC POINT OF VIEW

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GALILEO TELESIO ACADEMY
July 2011
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 COMMUNICATION

ORGANIZED SYSTEMS
   Companies
   Automated systems

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

NETWORK OF DATA AND SYSTEMS
   Populations
   World wide Systems.. 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 (M. CULLOCH and PITTs.)
  Hypertext languages
  Computer Simulations
  Analog and Physics modeling

To MODEL UNKNOWN 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 ELECTRONICS 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

FOCUSSSED 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
COLLABORATION

CONFLICTS are everywhere; they represent CONTRADICTION

Solving CONFLICTS is winning CONTRADICTION; COLLABORATION IS REQUIRED!

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

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 first beneficial will probably be
  pour countries

A BIG NOISE WILL REACH US..

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