Laudatio di Alan Kay

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Back to 1975
- April: end of the Vietnam War
- June: UK votes yes in a referendum to stay in European Community
- November: Juan Carlos becomes king of Spain after death of Francisco Franco
- World population: 4 billion
Altair 8800 is released

Bill Gates and Paul Allen develop a BASIC program for the Altair 8800. They form a company called Microsoft.
Time Sharing

A technique that allowed several people to share a single computer, accessing it through teletypes.
Prevailing Attitude

- machines were fast and people slow
- *time-sharing* was the suitable solution to serve many slow people with a *single fast machine*
People wrt computers

- People had to adapt to the need of computers
- People had to learn languages conceived for computers, not for the human mind
- Submitting tasks to computers was laborious and error prone
- Computers were conceived to process data, not to interact with people
Still …

Using computers was challenging and fascinating
Computers had to keep running
Idle computer
Inverting the Man-Computer Relationship

- Required extraordinary imagination and bravery
- Required rethinking the computer architecture
Computers were indeed slow and inadequate to sustain the rhythms of information handling that people are capable of.
High Data Rates

- Display pages of text at high resolution
- Images and pictures, audio, video and animations
- Fast scrolling and search
- Sharing of information
- Interaction with others in real time through a network
1975 - Pisa

- Conference to celebrate 20 years of computer research in Pisa
- Organized by prof. Ugo Montanari, of the IEI, directed by prof. Gianfranco Capriz
- Alan Kay, invited by Luigia Carlucci and Mario Aiello, presented the paper “Personal Computing”
The DynaBook Concept
Kay’s Personal Computer

- A quintessential device for expression and communication
- Had to be portable and networked
- For learning through experimentation, exploration and sharing
New Technologies Required

- Graphics
- Networking
- Media handling
- Signal processing
- Interactivity
Long process

- Took about 30 years to fulfill
- Alan Kay and his colleagues have the merit to have indicated the direction
- Fundamental steps already present in the Alto design:
  - Special graphics support (BitBlt)
  - Object-oriented design
Current PCs are equipped with dedicated graphics processors.

Capable of generating 3D animation in real-time.

Dedicated Media and Communication Processors handle audio/video and high speed networking.
One Laptop Per Child

- For the $100 laptop a processor was chosen which integrates CPU and GPU into a single chip
OLPC Geode Processor

Clock Module
- System PLL
- CPU PLL
- ROYCE PLL

GeodeLink™ Memory Controller (GLMC)
- 64-bit DDR SDRAM

GeodeLink™ Control Processor
- Power Management
- Test/Debug
- Companion I/F

Security Block
- 128-bit AES
- True Random Number Generator

Optional: EEPROM on package

CPU Core
- 64 KB L1-cache
- 64 KB L1 D-cache
- TLB
- 128 KB L2 cache

Graphics Processor (GP)
- BGL Engine
- ROP Unit
- Alpha Compositing
- Rotation BGL
- 1 KB LUT

Display Controller (DC)
- Compression Buffer
- Palette RAM
- Timing
- Graphics Fiber/Scaling
- HW VQA

Video Processor (VP)
- Video Scalar
- Video Mixer
- Alpha Blender

Graphics

GeodeLink™ Interface Unit 1 (GLIUX)

TFT Controller/Video Output Port (VOP)

Video input Port (VIP)
Alto: The Interim DynaBook
A Drawing Program
Turtle Graphics
Picture Animation
Music Composition
Key User Interface Concepts

- **Direct Manipulation**
  - with the mouse
  - point-and-click
    - Object-verb metaphor
    - Select, then act

- **What You See Is What You Get**
  - graphics, text, and media in the same document
SmallTalk

- An object-oriented programming language
- Inspired by Simula, SketchPad and Logo
Fast forward to 2007
Personal Computer in the hands of billions of people is one of the major contributions of Informatics to our society.
- Dedication of thousands of people
- Producing innovations and bringing them to fruition
- in one of the most dynamic industrial sectors
- Based on the scientific metaphor of communities which discuss, compete and share results
- Open Source Community
It was not inevitable
Grosh's Law

- Computer performance increases as the square of the cost:
  \[ P = C^2 \]
- Hence, bigger computers are better.
- 1965, by IBM's Herbert Grosch.
Moore’s Law

- Transistors densities **double** every two years at the **same cost**:
  \[ T = 2^{y/2} \]
- In other words, in computing **smaller** is **better**.
Grosch wrong, Moore correct

- Moore: $100 per chip
- Grosch: $3,000,000 per chip
Metcalfe’s Law

- The value of a network is proportional to the square of the number of its nodes:
  \[ V = N^2 \]
OLPC networking

How to provide networking in countries where there is no telecommunication infrastructure?
Hopping through the pond
OLPC built-in wireless
“Over the last 30 years, using Moore's Law and Metcalfe's Law, we have gone from zero to 1 billion people on the Internet. Social networking is proliferating and evolving. New collaboration modes are disrupting science, media and politics – for the better, I think.”
Inspiration
Luca Cardelli

- 2006 AITO Dahl-Nygaard Price for his contribution to the theory and practice of object-oriented languages
- He participated to the design of Structured-Object Oriented Machine which influenced his:
  - abstract ML machine
  - Amber
SMOM

MULTIPROCESSING IMPLEMENTATION OF A HIGH-LEVEL MACHINE LANGUAGE

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We present a high-level machine language called SMOM. It is a conventional
zero-address machine language containing several high-level functions for
defining and manipulating data types. Though SMOM does not allow parallel
Alan Kay’s legendary quotes

“The best way to predict the future is to invent it!”

- Alan Kay
Steve Jobs keynote on iPhone

“People who are really serious about software should make their own hardware.”

- Alan Kay
Special traits of Informatics

- Not limited by physical and material constraints
- Offers the possibility of creating anything one can imagine
- Even entire new worlds (e.g. Second Life)
Computer Science will never end to surprise while there are imaginative people willing to undertake new challenges.
Nicholas Negroponte and Alan Kay propose one such grand challenge:

a $100 laptop for all children
Priorities

- In a globalized world where different cultures and societies confront each other and the problems of sustained development have become explosive, a top priority emerges:

Education
“Building Peace is the work of education, politics can only avoid War.”

– Maria Montessori
Emmanuel Todd’s empirical truths:

- in countries where the level of education is higher, the rate of birth decreases
- no two democratic states with a high degree of freedom and culture, have ever entered war with each other.
Alan Kay dedication to developing tools for learning, discovering and sharing knowledge transcends a purely scientific and technological context.
Kay proposes us a dream and a hope

That people enlightened by knowledge might form peaceful communities where wealth, exchanges and knowledge will flourish
We wish to Alan Kay that his commitment towards the people of all the world and of all ages will succeed.
● Valentina Conte. La Nazione