The paper presents a series of special issues, celebrating Turing's unique impact on mathematics, computing, computer science, informatics, morphogenesis, artificial intelligence, philosophy and the wider scientific world. Alan Turing (1912-1954) was a British mathematician who made history. Turing is widely considered to be the father of Computer Science and Artificial Intelligence. He was highly influential in the development of computer science, providing a formalisation of the concepts of “algorithm” and “computation” with the Turing machine, which played a significant role in the creation of the modern computer. Already in the 1930s he had defined the concept of the universal machine, which underpins the computer revolution. In 1945 he was a pioneer of electronic computer design. But Turing's true goal was the scientific understanding of the mind, brought out in the drama and wit of the famous “Turing test” for machine intelligence and in his prophecy for the twenty-first century.

Keywords: Turing machine, Algorithm, Artificial Intelligence, Computing

1 Alan Turing and the creation of Computer Science and Informatics

Certainly, today we ask: What is Computer Science (CS)? What is Informatics? What is Information Technologies (IT)? Today, one can undoubtedly say that Informatics, Mathematics, and Computer Science are “scientists” who have contributed to a rapidly developing Information and Communication Technologies (ICT), in addition to other sciences and areas: Automation, Electronics, Electrical Engineering, Telecommunications and Communications, etc. In this context, the modern computer invention was made possible by the emergence of new science and products:

- Computer Science and Cybernetics1;
- Languages and Algorithms;
- Devices Input/output;
- Memory and storage environments.

Computer Science history preceded the time of digital computer occurrence. Before 1920, the term "computer" referred to a person who performed calculations (an official one). The first researchers in what was to be called Computer Science, such as Alan Turing (1912-1954) (the British mathematician, logician and computer scientist), Alonzo Church (1903-1995) (American mathematician and logician who made major contributions to mathematical logic and the foundations of theoretical computer science), and Kurt Gödel (1906-1978) (Austrian

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1 The roots of the cybernetic theory: "Ștefan Odobleja (1902–1978) was a Romanian scientist, one of the precursors of cybernetics. His major work, Psychologie consonantiste, first published in 1938 and 1939, in Paris, established many of the major themes of cybernetics regarding cybernetics and thinking systems ten years before the work of Norbert Wiener (1894-1964) was published, in 1948.", www.bu.edu/wcp/Papers/Comp/CompJurc.htm, Nicolae Jurcau.
mathematician, logician and philosopher; friend to Einstein, John von Neumann and Morgenstern), were interested in the computational problem.

Informatics has become a science because it uses methods, techniques and tools for investigating their own objects and processes that define and operate systems. Informatics treasure is the result of scientific knowledge and research from a symbiosis of other sciences (mathematics, cybernetics, microelectronics, physics, chemistry, etc.), and the methods and techniques, and it uses special devices (computers, computer systems) to process information and knowledge you need to interpret them, transform them and use for communication [7].

Mathematics is the oldest of the exact sciences and Computer Science (Informatics). It emerged and developed as a science in the second half of the 20th century (after 1960, when modern computer had already emerged – designed for the Hungarian mathematician John von Neumann (1903-1957) and developed theories, methods and techniques of data processing /information), being the newest one. It is even today that John von Neumann’s EDVAC Report 1945 (The John von Neumann Architecture of Computer Systems, http://www.wps.com/projects/EDVAC/) is still recognized as valid.

The Centenary of Alan Turing

"There isn't a discipline in science that Turing has not had an impact upon." Turing Centenary Advisory Committee (TCAC), http://www.turingcentenary.eu/.

Figure 1. Logo of The Alan Turing Year – CiE 2012 (UK)


Alan Mathison Turing (1912-1954) was a British mathematician who made history. Turing is widely considered to be the father of Computer Science and Artificial Intelligence. He was highly influential in the development of computer science, providing a formalisation of the concepts of "algorithm" and "computation" with the Turing machine, which played a significant role in the creation of the modern computer. Already in the 1930s he had defined the concept of the universal machine, which underpins the computer revolution. In 1945 he was a pioneer of electronic computer design. But Turing's true goal was the scientific understanding of the mind, brought out in the drama and wit of the famous "Turing test" for machine intelligence and in his prophecy for the twenty-first century.

Note 1: His breaking of the German U-boat Enigma cipher in World War II ensured Allied-American control of the Atlantic. But Turing's vision went far beyond the desperate wartime struggle.

Note 2: Turing worked from 1952 until his death in 1954 on mathematical biology, specifically morphogenesis. He published one paper on the subject called The Chemical Basis of
Morphogenesis in 1952, putting forth the Turing hypothesis of pattern formation. His central interest in the field was understanding Fibonacci phyllotaxis, the existence of Fibonacci numbers in plant structures. He used reaction–diffusion equations which are central to the field of pattern formation. Later papers went unpublished until 1992 when Collected Works of A.M. Turing was published. His contribution is considered a seminal piece of work in this field. Source: http://en.wikipedia.org/wiki/Alan_Turing.

To mark the 100th anniversary of Turing's birth, the Turing Centenary Advisory Committee (TCAC) is coordinating the Alan Turing Year, a year-long programme of events around the world honouring Turing's life and achievements. The TCAC, chaired by S. Barry Cooper with Alan Turing's nephew Sir John Dermot Turing acting as Honorary President, is working with the University of Manchester faculty members and a broad spectrum of people from Cambridge University and Bletchley Park.

On 23 June 2012, Google featured an interactive doodle where visitors had to change the instructions of a Turing Machine, so when run, the symbols on the tape would match a provided sequence, featuring "Google" in Baudot-Murray code.

The Turing Award

The Turing Award: The Turing Award is widely known as the “Nobel Prize” of computing. It is an annual award given since 1966 by the Association for Computing Machinery to: “an individual selected for contributions of a technical nature made to the computing community. The contributions should be of lasting and major technical importance to the computer field”. The award receives financial support from both Intel and Google and includes a $250,000 monetary component.

“Gödel's incompleteness result is widely regarded as the most remarkable achievement of 20th century mathematics, although some mathematicians say it is logic, not math, and others call it the fundamental result of theoretical computer science (reformulated by Turing in 1936), a discipline that did not yet officially exist back then but was effectively created through Gödel's work. It had enormous impact not only on computer science but also on philosophy and other fields.” Jürgen Schmidhuber's Page (http://www.idsia.ch/~juergen/goedel.html).

In Romania the following events were held for Turing's birth centenary:

- The 7th International Conference on Virtual Learning will take place in BRASOV, ROMANIA-Europe, during 2-3 November, ICVL 2012 - Special edition dedicated to "2012 Alan Turing Year" (www.icvl.eu);
- The 10th national Conference on Virtual Learning will take place in BRASOV, ROMANIA-Europe, during 2-3 November, CNIV 2012 - Special edition dedicated to "2012 Alan Turing Year" (www.cniv.ro);
- Web page dedicated to "2012 Alan Turing Year" by M. Vlada www.unibuc.ro/prof/vlada_m/turing/ (Fig. 2);
- UNICO Project, June 25-26, 2012, Children's University Romania. "We are the Future" - The European Children's Universities Network - EUCU.NET) - www.unico.org.ro; Workshop “From Turing Test to Artificial Intelligence” by M. Vlada (Fig. 3,4).
3. Anul 2012 “Anul Alan Turing”

- **ALAN TURING** (1912-1954), născut la 23 IUNIE 1912 în Anglia, a fost un matematician, logician, criptanalist și informatician britanic.
  - părintele informaticii moderne, este omagiat de GOOGLE, pe 23 IUNIE 2012, printr-un logo interactiv.
  - a inventat mașina Turing, bazată pe lucru cu cifrele 0 și 1, care a formalizat conceptul de algoritm și calcul. 
  "Oricine tastează un calculator, oricine deschide o foaie de calcul sau un program de procesare a textului lucrează pe o formă de mașină Turing”. 

Ref.: [http://www.unibuc.ro/prof/vlada_m/turing/](http://www.unibuc.ro/prof/vlada_m/turing/)

![2012 THE ALAN TURING YEAR](image)

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**Figure 2.** Web page “Alan Turing Year” [www.unibuc.ro/prof/vlada_m/turing/](http://www.unibuc.ro/prof/vlada_m/turing/)

**Figure 3.** Slide Workshop “From Turing Test to Artificial Intelligence”, UNICO
Alan Turing's 1950 paper, (Computing Machinery and Intelligence, Turing 1950) and the Turing test suggested in it are rightly seen as inspirational to the inception and development of AI. However, inspiration can soon become distraction in science, and it is not too early to begin to consider whether or not the Turing test is just such a distraction.”, Blay Whitby 1997 , http://www.sussex.ac.uk/Users/blayw/tt.html

One conclusion that is implied by this view of the history of AI and Turing's 1950 paper is that for most of the period since its publication it has been a distraction. While not detracting from the brilliance of the paper and its central role in the philosophy of AI, it can be argued that Turing's 1950 paper, or perhaps some strong interpretations of it, has, on occasions, hindered both the practical development of AI and the philosophical work necessary to facilitate that development.

2 Computer Science, Informatics and Information Technologies

In the past, Computer Science (CS) and Informatics were considered to be two identical terms. Today, the terms are different in meaning. The general public sometimes confuses Computer Science with Informatics or Information Technologies (IT). Computing (information and knowledge processing) has changed the world and continues to influence nearly every aspect of our lives, including medicine and health care, business and finance, education and training, science and technology, politics and government, and entertainment. Computer Science is the study of the theoretical foundations of information and computation and of practical techniques for their implementation and application in computer systems.

"Informatics studies the application of information technology to practically any field, while considering its impact on individuals, organizations, and society. It uses computation as a universal tool to solve problems in other fields, to communicate, and to express ideas." Dennis P. Groth, Jeffrey K. MacKie-Mason, Why an Informatics Degree?, Communications of the ACM, feb. 2010.

Computing and information technology play an increasingly pervasive role in our daily lives. Informatics is based on recognizing that the design of this technology is not solely a technical matter, but must focus on the relationship between the technology and its use in real-world settings. That is, informatics designs solutions in context, and takes into account the social, cultural and organizational settings in which computing and information technology will be used (see Fig. 5).
These aspects of computer science form the core of informatics: software engineering, information retrieval and management, programming languages, human-computer interaction, computer-supported collaborative work, ubiquitous computing, privacy and security, and the effects of technology on society. At its periphery, informatics touches upon many different disciplines, including management, digital arts, visualization, economics, social science, cognitive science, organizational computing, medical informatics, game technology, and many others”.

Department of Informatics, University of California, Irvine (Source: www.informatics.uci.edu/).

3 About the first electronic computers

First in the world

- **1946**: first electronic computer on a large scale, general purpose, fully operational, ENIAC (Electronic Numerical Integrator and Calculator), funded by the U.S. military, used to calculate artillery ballistic tables, designing the hydrogen bomb and so on; To June 30, 1945 be published famous John von Neumann's report entitled First Draft of 1a Report on the EDVAC (EDVAC - Electronic Discrete Variable Automatic Computer), Moore School of Electrical Engineering, which contained 43 pages. **John von Neumann** - brilliant mathematician - is attracted to the project since 1944 ENIAC [4](Ref.: http://www.brown.edu/Research/Istrail_Lab/pages/von_neumann.html. NOTE. John von Neumann: The Scientific Genius Who pioneered the Modern Computer, Game Theory, Nuclear Deterrence, and Much More.)

![Diagram of Computer Science, Informatics, and Information Technologies](image)
Neumann is widely regarded as the greatest scientist of the 20th century after Einstein. Born in Budapest in 1903, John von Neumann grew up in one of the most extraordinary of Scientific Communities.

- **1949:** computer EDSAC (Electronic Delay Storage Automatic Computer), first electronic computer fully equipped, operational, with programs stored.
- **1951:** UNIVAC I computer, the first commercially successful electronic computer, derived from BINAC (Cost $250,000, were built 48 systems!).
- **1952:** first commercial computer IBM 701 Electronic Data Processing Machines.

**First in Romania**

- **1957:** CIFA 1, Romanian computer, from Bucharest, conducted at the Institute of Physics of the Academy, Magurele (engineer Victor Toma), Romania is the 8th country in the world to build such a computer and two of the former socialist countries after the former USSR [Draganescu]. Followed: CIFA-2 with 800 tubes (1959), CIFA-3 for the Computer Center of the University of Bucharest (1961), CIFA-4 (1962).

**Note.** During the Cold War, between 1967-1970, Romania has received three IBM systems from IBM subsidiary in Vienna. In that time have built several such systems. For capitalist countries such a system cost $250,000, and the socialist countries (was embargoed at the time) cost $658,000 (Ref. prof. dr. Ion Vaduva, was director of Computer Center University of Bucharest-CCUB). Romania has purchased three IBM System 360: one for Electronic Computing Center "Tractorul" Brasov (UTB), one for CCUB (Computer Center University of Bucharest) and one for Computer Center of ASE Bucharest. I knew the CCUB system was gift but this year I found it was purchased. Today, Apple's iPhone 5 cost $399 for a 64GB version. Mention that Apple logo is inspired by Alan Turing's life.

**References**