FOREWORD

Károly Kondorosi

MODEL EVERYWHERE

In a January morning when the Editorial Board was sitting and planning the next issue of the journal "Informatika" I heard the sounds of worry there: only a few of the papers will be related closely to informatics, others were coming from different scientific areas. It is not a surprise in an institution with wide range educational portfolio in technical sciences. I don't see any reason for worry, but let us get a bit closer to the problem.

What is informatics at all? Is there a widely accepted definition, which could be considered as a common point of scientists?

An experimental definition I tried to give years ago at a conference along object-oriented thinking was the follows:

"Informatics is a field of professional knowledge and skills, subjects of which are:

- *the information itself (nature of it, metrics for it, representations, data-information-knowledge triplet etc),*
- *operations on the information (processing, transferring, extracting, storing etc),*
- *tools and systems for executing operations on the information (computers, computer systems, hardware, software etc),*
- *operations on such tools and systems (analysis, design, implementation, maintenance etc)."*

The most relevant reaction to my definition was (from a respectable professor of computer science) as follows:
"Long time ago participants of a mathematicians' conference were asked to close themselves into a room till they reach agreement in definition of mathematics. Some days later they came out and announced the result: Mathematics is the science deals with things mathematicians usually deal with."

Finally, informatics is used at least with two meanings. In a closer sense it covers methods and tools of information-processing by computers. In a broader sense, it is all about information.

As we look around in our world, it seems to be evident, that computer technology increases the significance of the information and places it into a central position at a lot of field of the everyday life. More and more domains apply informatics in both on-line and off-line way. Just consider that e-banking, e-commerce and other e-s become part of our everyday life, and just see the results of medical sciences based on statistical analysis. Other domains are less penetrated with informatics yet. Perhaps it is better to avoid denominating such fields now, but the question is interesting: what is missing there, computers with appropriate software, or something else. The answer is certainly something else, namely the clear and stable concepts of the domain or in other words the widely accepted common domain-models are missing.

We could learn from computerization of different domains that the process is a strong interaction. As you start a project and Information Technology (IT) people start thinking together with domain experts, the IT-way of thinking will show the lack or the failures of domain-models. On the other hand, IT people also must learn new models from domain experts which ones could seem to be strange at first, sometimes less deterministic, not exhaustive, inconsistent, but IT as well as domain experts can refine them together.

Let me draw the readers' kind attention to a paper of Jeannette Wing with the title Computational Thinking[1], where she represented a universally applicable attitude and skill set for everyone, not just computer scientists.

One of the key factors causing the power of computational thinking is modeling. Our two fundamental tools are abstraction and decomposition to solve complex problems. It means that we have to construct several models at different level of abstraction and from different points of view reflecting different aspects. In the case our models are exact and formal we have the chance to apply automatic methods to transform them into a hardware-software system.

[1] Jeannette M. Wing: Computational Thinking; CACM vol. 49, no. 3, March, 2006, pp. 33-35.

Another important factor is that typical model-patterns have been crystallized as IT solutions were being developed during the years. These patterns are mostly portable from one domain to the other.

That is why I can discuss my colleagues in the editorial board: do not worry, informatics is present everywhere. An exact professional domain-model contributes more to the IT solution than an amateur program or an irrelevant specification of a computer-configuration does. Similarly, it is also a contribution when someone shows the applicability of a well-known IT solution in a new domain.

Well, after this introductory brooding over the nature of informatics let us survey the content of this issue.

You can read more and get deeper knowledge on modelling and on the model-based development in IT from an excellent paper of a respectable expert of the topic.

3D visualization is a dynamically evolving area of computing. The basis is also modeling, modeling of geometry in this case. The industrial application of this technique opens new dimension in validation of product-plans as soon as the early phase of development.

Nowadays' exciting topic is the wider and wider application of drones, which are small unmanned flying objects for military, industrial or private purpose. The necessary background of constructing such equipments is the coexistence of high level technology in different fields like mechanics, aerodynamics, automatic control, telecommunication, sensor technology etc. Many of these fields are part of informatics in a broader sense.

Managing and visualising of huge amount of data is also a hot topic in IT. Subject of the next paper is the effectiveness of a software displaying content of a biomedical database. PhysioBank is a large and growing archive of well-characterized digital recordings of physiologic signals and related data for use by the biomedical research community. Community people have free access to databases and can analyse them with their own algorithm. In our context the usual purpose of this analysis is to find relevant models for these recordings and their meaning in biomedical domain.

The next paper deals with a classical theoretical problem, with multi-valued, namely three-valued logic. Authors propose two new operation groups that make some calculations easier. Just remember, that early databases applied base 3 in encoding. It is also interesting, that using a cost function, where the cost of number-representation is proportional both with the number of position (length of a number) and with the base (the number of possible digit-values), the optimal base arise ***e*** (2,73...), and the cost of base 3 is lower than that of base 2.

And what about the next? "HEAT PROPAGATION DYNAMICS IN THIN CLASSICAL SEMICONDUCTORS". Is even this one related to informatics anyway? Why not?
First, till now semiconductor technology is the basic technology of computer hardware. Second, thermal behaviour of semiconductors is an important aspect of chip-design. We need models for description of thermal behaviour, and that paper gives a mathematical model for that purpose. It can serve as a basis of simulation in a computerised chip-technology.

Finally, the last paper deals with a hot topic of IT namely with the cloud computing. Cloud computing is a new trend of service-oriented computing, where the key concepts are virtualization, interfaces, service-level agreements (SLAs) etc. The paper is a good survey on the fundamental concepts, and on the practical problems we have to face as we want to move our applications to the cloud, or we want to maintain an infrastructure as a cloud.

Enjoy this issue with open mind and find the models everywhere.