Editorial

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As we enter the third issue of the CSI Transactions on ICT, I thought it would be a good idea to reminisce about the six parts of the transactions we started with. The six part organization was based on the premise that ICT based systems are increasingly becoming part of all critical infrastructure. In fact, citizens of this planet consider the entire cyber space as a critical infrastructure, as everyone's life is dependent on it in one way or the other. We are living in an information society and the "quality" of information sought by users is on the rise. Obviously, research and development will have to reflect the aspirations of the contemporary information society. The researchers have to constantly strive to generate new knowledge, progressively convert them into affordable technologies, and engineer them into products or services that are natural to all of us in daily life. This, I believe, is an ongoing process and ever-expanding one. This will also be changing in tune with our increased and deeper understanding of basic science.

There is a continuum in advances made in physics to the sophistication that is getting entrenched in end-use of ICT based systems. Rapid advances in Physics are enabling new device technologies to gain ground; phrases such as "integrated photonics and semi-conductors" for chip design is becoming pervasive to integrate sensor functions, optical switching functions, and optical transmission functions with computing. The impact of such development is tremendous. We will soon witness dramatic changes in systems for communication that perform at terabit speeds, systems to measure and monitor for healthcare diagnosis and personalized therapy, systems that predict land-slides

in hilly terrain, and so on. Each one of these systems will face challenges such as *limiting power consumption*, *limiting cost* and *maximizing distance covered during transmission*, while maintaining highest possible security. Moreover, miniaturization is moving towards nano levels. Quantum information systems are waiting on the wings. We need to worry about the architecture of these systems at all levels keeping functions, reliability, availability, performance, and cost in mind.

All these developments mean that we will have very powerful compute chips that contain 1,000 cores or more as CPU power. Harnessing such power will be a grand challenge for computer science community. Perhaps, the entire gamut of software development of the past may have to be re-invented to optimally to use the opportunity presented by the modern developments in devices. Besides, data generated from the field—be it an experiment using physics, chemistry, or biology, sensors collecting parameters about galaxies or observations from human genomes—is reaching scales of the order of petabyte. Sheer movement of these data in and out of processors, coupled with a few meaningful calculations as a part of a model is an herculean task. On the top of it all, providing programming convenience is an insurmountable task. Revisit to paradigms of programming to exploit modern architecture is a tremendous effort in itself. Software design for functional completeness and faults is taken for granted. Performance guarantee, reusability, reliability, dependability, and security are the main challenges for the software designers today.

In the backdrop of such "change", focus on *architecture and systems* makes fantastic sense. When coupled with *software design and performance*, it reflects the enormity of the problem. When the whole effort is viewed in the context of *cyber security*, it turns out to be "*manna from*

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heaven” for designers, engineers, and technologists. They can now conquer the computing ecosystem holistically and effectively with the help of “domain experts” and theoreticians. We see the demonstration of such “coming together” off and on in various works reported on big science and big data. Lot more needs to be done. Use of ICT *in education* is increasingly getting personalized demanding an array of “atomic” learning modules that can intelligently, automatically and seamlessly regroup themselves based on the user requirement. Of course, presence of metadata will enable the process. Health research and health care add to this list; *health research* poses the big data challenge and *healthcare delivery* poses the immersive interaction challenge. *Agriculture* raises issues related to sensors deployment and models that are used in operations as well as prediction. All these technology triggered opportunities and application driven challenges have to be *economically* realized and *optimally managed* when

deployed in *practice* as technology environments in an enterprise. During such a process demands are placed on *computational sciences*. CSI Transaction on ICT covers it all. It is time that we start focusing on each section as a special dedicated issue.

March 2014 issue of CSIT will focus on architecture and systems. June 2014 will focus on software design and performance. September 2014 will focus on cyber security. December 2014 will focus on education, health, and agriculture. March 2015 will focus on economics, practice, and management. Finally, June 2015 will focus on computational science. This will also pave the way for handing over the *full editorial* responsibility to the respective editors-in-chief, while I remain as a silent support in the background. The editor-in-chief of the section concerned with the focal theme and I will jointly edit these special issues. Perhaps, I can intensify my efforts to submit my best work in the coming years to CSIT, setting an example.