

Interdisciplinary IEEE Unit Proposal: ICT Operation

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Abstract — The all effort in research, development, manufacturing and implementation in the field of ICT (Information and Communication Technologies) aims to trouble-free use and operation. Experience in university education, SW and HW R&D, highly available reliable and secure systems, application development, consulting and management has led to cognition of a necessity of the integrated interdisciplinary approach to the trouble-free operation of ICT, as such approach can bring positive inspiring and synergy effects. That's why a new IEEE Unit has been approved as a platform for supporting such approach. This strategy paper explains that concept in brief.

Keywords — IEEE, IEEE structure, IEEE unit, ICT operation, interdisciplinary approach.

I. INTRODUCTION

The IEEE's web site states that "IEEE is divided into ten geographic regions worldwide. Within those regions are more than 330 local sections and over 1,700 technical chapters that unite local members with similar technical interests".

From another point of view, IEEE contains 38 (or 39) Societies that cover a wide range of technical interests as given in the Fig. 1.

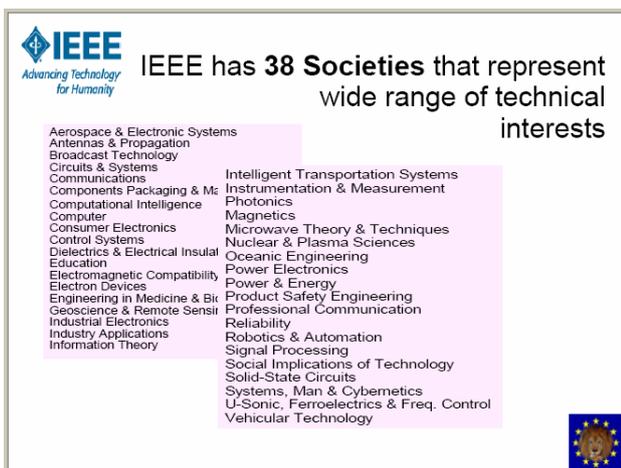


Fig.1: Societies of IEEE.

Any regional section may contain Chapters fulfilling the needs of the members in their specific geographical area

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and fields of their interests. Chapters may be connected also to one or more Societies as reasonable for the professional interests and activities of their members. In addition, also virtual networks can be formed as web-based communities of individuals.

This strategy article explains in brief reasons and content of the proposed new unit of IEEE structure devoted to interdisciplinary integrated approach to the topics of causes of problems and their disclosing, predicting, removing and preventing in ICT operation, which is being created in Kuwaiti Section of IEEE.

II. MODEL OF MAN-MACHINE SYSTEMS

In some abstraction point of view we can see the dynamic operation of a man-machine ICT system as a multidimensional space where each of the n parameters or dimensions of the system is represented as an axis of a multidimensional space:

$$\mathbf{O} = (\mathbf{a}_1, \mathbf{a}_2, \mathbf{a}_3, \dots, \mathbf{a}_n)$$

Every possible state of the system, or every allowed combination of values of the system's parameters, represents a point in that multidimensional space, which can be interpreted also as an event. Then, behavior of the system can be seen as some sets of those points or "generalized trajectories" in that multidimensional space. Let's note, that some points are normal or welcomed while some other ones are unwanted, forming incidents or problems and their fixing.

The axes of such multidimensional system can be understood e.g. as:

- Relations to the actual moment
- Character of events
- Scope character of events
- Origin character of events
- Originator character of events
- Severity character of events
- Time and many others.

For a given purpose, usually it is not necessary to deal with all parameters of the system. So, it is practical to define sub-spaces with parameters being important for that given purpose, like it is given e.g. in the 3D sub-spaces in the Fig. 2 below.

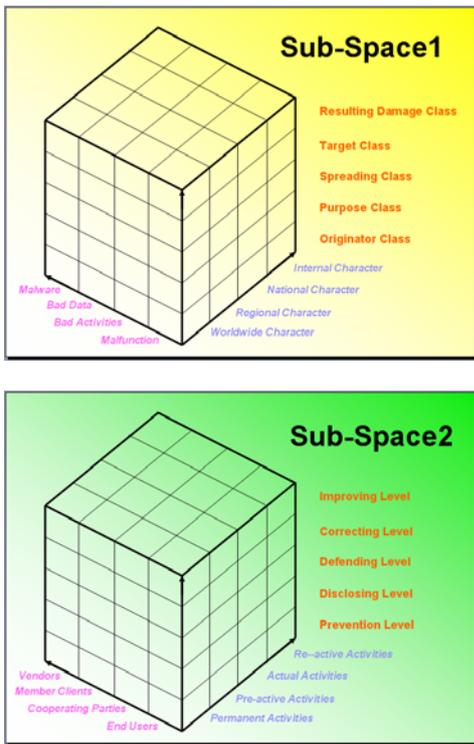


Fig.2: Examples of 3D sub-spaces.

III. GOALS AND POSITION OF NEW UNIT

The purpose of the New IEEE Unit is to contribute to the higher level of trouble-free ICT use and operation both on the same level of the use and operation and in all levels of the life-time cycle as given in the Fig. 3 below, i.e. in the both vertical and horizontal meanings of the different subjects supported.

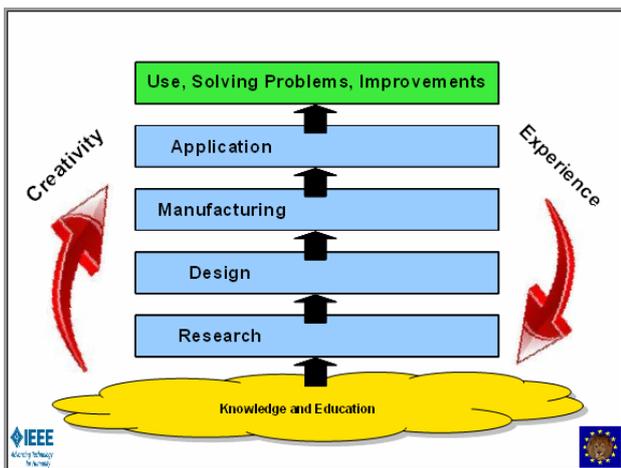


Fig.3: Levels of the ICT life-time cycle.

In other words, that the New Unit aims to help in interchanging information, knowledge, experience, skills and the best methods, practices and means for improving ICT use and operation, providing experience feedback for the all stages of the life-time cycles of ICT and education for the human environments as given in the Fig. 4 below.

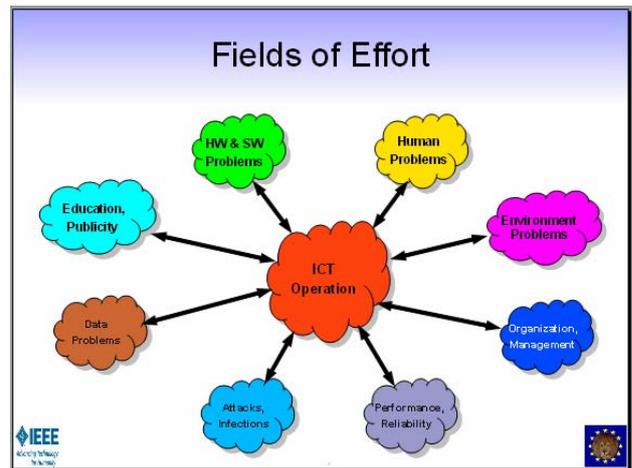


Fig. 4: Fields of Effort of the Unit proposed.

The all fields should be seen in their relations to all time-relating stages as shown in the Fig. 5 below.

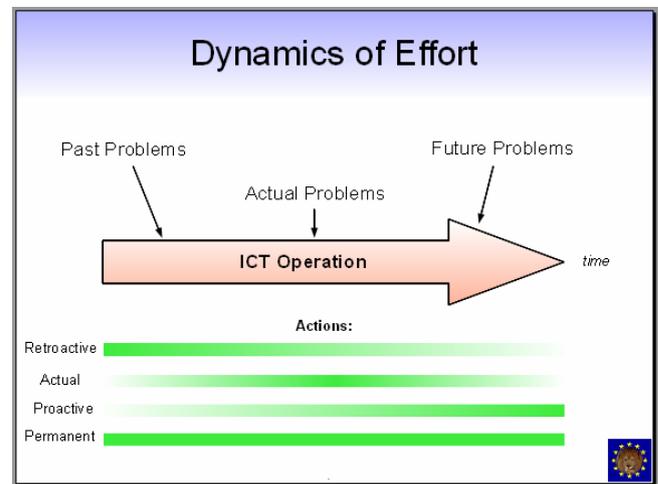


Fig. 5: Dynamics of the effort.

Here, the four types of activities should be recognized and followed:

- Pro-active
- Post-active
- Actual
- Permanent.

Those activities should deal with events categorized as the

- Past
- Current
- Future.

Such approach defines the above categories for different means like methods, activities, tools, roles and human subjects. It is important that for each entity the all principles as above should be intentionally investigated and implemented as possible, with the accent to the pro-activity (predictability) and preventing problems.

IV. MULTIDISCIPLINARITY

The theme of trouble-free ICT operation touches many different discipline fields. It is reasonable to deal with them integrated way, because such approach can generate

synergy effects and bring better operation of ICT systems. In general, the ICT operation problem can grow from the two main sources:

- Technically based threats
- Human-based threats.

The both of those roots of problems in ICT operation consist of different partial fields as it is given in the Fig. 6 and Fig. 7 below.

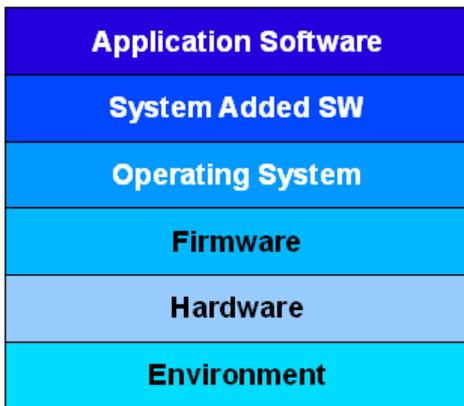


Fig. 6: Roots of Technically Based Threats

The technically based threats categorized as Environment of ICT can include e.g. high temperature, poor power quality or outage, high humidity, dust etc. Hardware threats can include failures or malfunction of devices or other means used e.g. for communications, firmware threats can include bugs, damaged contents, incorrect versions, threats in Operating Systems, System Added Software (like e.g. databases, compilers, protocol handlers etc.) and Application Software can consists of bugs, incompatible versions, missing patches, incorrect configurations, vulnerabilities etc.



Fig. 7: Roots of Human-based Threats

The human based threats categorized as Organization can include undefined or overlapping responsibilities, managing threats can include inconsistent or contradictory orders, mistakes in access policies, unreasonable requirements causing problems in other organizational units etc. Treats created by staff include incorrect use of ICT, insecure behavior, ignoring warning messages sent

by ICT and many others. Threats coming from the guests can include security risks, misusing ICT means, unwanted manipulations etc. Threats coming from the actual human society include attacks, creating malware, thefts of identities and secure information, spamming etc. The next human generations can not create actual threats but they need to be considered in order to educate children and youth to morality and moral behavior towards ICT which will limit future threats.

Those all roots of the threats for ICT operation should be dealt in different fields of ICT operation (as given in Fig. 8.) integrated way with accent to pro-activity everywhere.

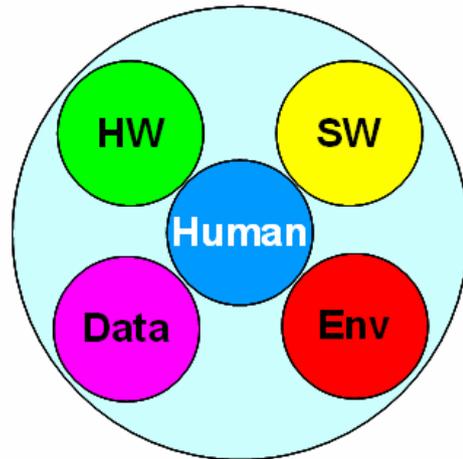


Fig. 8: Multidiscipline Integrated Approach

As it implies from the decomposition above there are many topics to be followed by the New Unit, both from theoretical and practical fields, but in all cases they should be seen from the operation points of views in any sense of their relations to any parameters of the multidimensional nature of the operation. There are some examples given in the following Fig. 9 below:

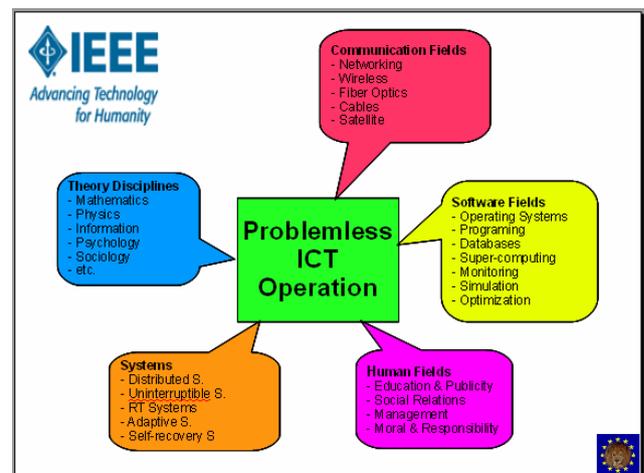


Fig. 9: Topics to be followed by the new Unit.

V. CONCLUSIONS

In the past there were many original advanced systems and features implemented in Kuwait for automated ICT operation, as monitoring, multi-way alerting and messaging, problem prediction, 2D & 3D visualizations, live maps and charts, speech alarms, remote detecting infections, predicting of different natures, mass dynamic multi-view watch dogs, analyzers and problem solving experts also in high-performance clusters with fast and highly redundant databases and others.

In order to illustrate, that the strategy given in this article is based on real experience and real results, some of the results are listed in the References of [1] – [10] below. They and others have created real knowledge and experience basements for the works and information exchange supposed in the new IEEE Unit. It is believed, that it could become a seed of a new multidisciplinary integrated pro-active movement for systematic achieving the trouble-free ICT operation.

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REFERENCES

- [1] L. Tovarek, "Fault-tolerant Multi-ISP Kernel," in *Proc. World Multiconference on Systemics, Cybernetics and Informatics*, Orlando, FL, USA, 2001, vol. 1, pp 114-120.
- [2] L. Tovarek, "Contribution to Building Computerized Society", Research memorandum, Kuwait, 2002
- [3] L. Tovarek, "Fault-tolerant Error Alerting System", Patent Pending, Kuwait, 2004.
- [4] L. Tovarek, "X.25 Monitoring and Supervising System for ATM Network", Qualitynet, Kuwait, 2003
- [5] L. Tovarek, "LTTOOLS – Complex Support System for ISP Operation", Qualitynet, Kuwait, 2005
- [6] L. Tovarek, "Wireless Support for In-site Solving Problems", Research Memorandum, Kuwait, 2006.
- [7] L. Tovarek, "Building CERT-like Unit", *Presentation for CAIT by Net Telecom Consultants*, Kuwait 2008.
- [8] L. Tovarek, "System for Predicting Threats", Patent Pending, Kuwait, 2009
- [9] L. Tovarek, "MOCCA – Monitoring, Alerting, Predicting, Provisioning and Expert Support", MOC, Kuwait, 2010.
- [10] L. Tovarek, "New Chapter in IEEE Kuwaiti Section", Research Memorandum, Kuwait, June 2010.