



# **International Conference Quality and Dependability**

**The 16<sup>th</sup> Edition**



**PARTENER  
GOLD**

## **CCF 2018**



**Sinaia, Romania  
September 26<sup>th</sup>-28<sup>th</sup>, 2018**

**Dan STOICHIȚOIU   Ioan C. BACIVAROV   Vidosav MAJSTOROVIĆ**

*Editors*

# **QUALITY and DEPENDABILITY**

## **PROCEEDINGS**

**of the**

**16<sup>th</sup> International Conference**

**on**

**Quality and Dependability**

**Sinaia, Romania**

**September 26<sup>th</sup>–28<sup>th</sup>, 2018**

**ROMANIAN SOCIETY FOR QUALITY ASSURANCE  
2018**

*The Romanian Society for Quality Assurance, a professional, non-governmental and non-profit association from Romania, is actively involved in promoting the quality culture nationwide, by the means of conferences, seminars, forums, symposia.*

*The Conference on Quality and Dependability CCF 2016, organized by The Romanian Society for Quality Assurance at every 2 years, is part of the circuit of the successful international conferences, opinion unanimously expressed by the participants to the previous editions.*

*Every edition of the conference enjoys the presence of many officials and personalities, distinguished guests and well-known specialists nation- and worldwide, representatives of the business and academic environment.*

*The topics approached highlight new information, trends, ideas and concepts, which are essential for a market-driven functional economy.*

### **CCF – A TRADITIONAL CONFERENCE**

The first National Conference on Quality and Reliability (CCF '86), took place at Hotel 'Teleferic' from Poiana Brasov, in 1986, with the occasion of the organisation of the Central Reliability Group of MIEt. It was then decided that this conference should become a tradition.

Therefore, the second edition of the Conference took place at the premises of 'Minerva', 'Diana' and 'Afrodita' hotels from Baile Herculane, in 1988.

The Romanian Society for Quality Assurance took over this tradition, by organizing the third edition of the Conference at Hotel 'Roman' from Baile Herculane, in September 1995.

The fourth edition took place in Sinaia on the 2<sup>nd</sup>-3<sup>rd</sup> of October 1997, and the fifth edition CCF '98 was organized in the period 28<sup>th</sup> – 30<sup>th</sup> of October 1998, in Sinaia as well.

The sixth edition of the Conference CCF '99 was organized in 1999, the 22<sup>nd</sup> – 24<sup>th</sup> of October, at Hotel 'Sport' from Poiana Brasov, and in 2000, between 27<sup>th</sup> – 29<sup>th</sup> of September, the seventh edition was organized, at Hotel 'Palace' from Sinaia.

The eighth edition of the Conference, CCF 2002, was organized at the Casino from Sinaia, in the period 18<sup>th</sup>-20<sup>th</sup> of September 2002 and it enjoyed the presence of distinguished guests from abroad and well-known specialists from Romania.

The last editions of CCF – the ninth, (29<sup>th</sup> of Sept. – 1<sup>st</sup> of Oct.2004, Hotel Mara, Sinaia), the tenth (27 – 29 of September 2006, Casino Sinaia), the eleventh (24 - 26 of September 2008, Casino Sinaia), the twelfth (22 – 24 of September, Casino Sinaia) and the thirteenth (5 – 7 of September 2012, Complex Doina, Neptun) enjoyed the presence of distinguished guests from abroad and well-known specialists from Romania and were a real success.

The event that marked 27 years since the first CCF conference was organized at Sinaia, at Palace Hotel and the exceptional participations of Mr. Alex Ezrakovich (Australia), Abdessamad Kobi (France), Michele Cano (Scotland) have to be mentioned. The XIV<sup>th</sup> edition of the Conference brought a special event in the first day – Wednesday, the 17<sup>th</sup> of September – The EFQM Open Doors Day in Romania, organized by SRAC and EFQM and with the participation of Grundfos Romania and the Hungarian Association for Excellence.

The 15th Jubilee Conference was held at the Palace Hotel in Sinaia from 14-16 September, with many guests of honor.

This year, the event marks 32 years since the first CCF conference and will take place in Sinaia at Palace Hotel. This year, also, honor guests like Isaac Sheps (Israel), Alessandro Birolini (Switzerland), Vidosav Majstorovic (Serbia), Steli Loznen (Israel), Pedro Alves - IQNet, etc. are invited.

## COMMITTEES

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## USEFUL INFORMATION

### Registration of participants:

- **Tuesday, 25.09.2018, starting with 17<sup>00</sup>**, in the lobby of Palace Hotel
- **Wednesday, 26.09.2018, starting with 9<sup>00</sup>**, in the lobby of Palace Hotel ,CCF 2018 Secretariat

### Coffee breaks:

- **Between the 26th – 28th of September 2018**, coffee breaks will take place in the lobby of Palace Hotel

### Gala Dinner:

- **Thursday, 27.09.2018, 20<sup>00</sup> – Hotel Palace**

### • SECRETARIAT:

**Lorena CHIRIȚĂ, Margareta ZAHARIA, Tudor MĂRUNȚELU, Bogdan IVAȘCU**

The CCF 2018 Secretariat will be open daily at Palace Hotel, between 9<sup>30</sup> – 16<sup>00</sup>.

## ***Welcome Message***

*The primary objective of the **16th International Conference on Quality and Dependability CCF2018** is to provide an international forum for the dissemination of recent information and scientific results in these modern domains.*

*As traditionally, **CCF2018** is organised by the **Romanian Society for Quality Assurance (SRAC)**, under the aegis of several important international organisations in the field.*

*We are proud to mention that this edition of the conference has the scientific endorsement of the Institute of Electrical and Electronics Engineers – **IEEE** (Romanian section), the world's leading professional association for the advancement of technology, too.*

*The **International Conference in Quality and Dependability – CCF** is now a well established **brand of excellence** among the international scientific meetings in the inter-disciplinary field of **quality and dependability** (reliability, maintainability, safety & security).*

*It is interesting to mention that the **CCF** conference was listed as the 3rd longest running conference in the quality and dependability field in the international specialized assessments.*

*The International Conferences in Quality and Dependability – CCF conferences have a long tradition among the specialists of the field. That's why, we consider useful to remember the main moments that marked the evolution of **CCF** – from a national scientific meeting to an important international conference in the field.*

*The first National Conference on Quality and Reliability – **CCF '86**, organised by the Central Reliability Group of MIEt, took place at Poiana Brasov, in 1986. It was then decided that this conference should become a traditional national scientific event in the field. Therefore, the second edition of the Conference, **CCF'88** took place at the premises of 'Minerva', 'Diana' and 'Afrodita' hotels from Baile Herculane, in 1988.*

*After the political changes of 1989, **SRAC** took over this tradition, by organising the third edition of the Conference – **CCF'96** at the Hotel 'Roman' from Baile Herculane,*

in September 1996. The fourth edition of the conference – **CCF'97** was organised in Sinaia, while the fifth edition – **CCF'98** was organised in Sinaia too, at the 'Holiday Inn' hotel. **CCF'99**, the sixth edition of the conference took place at the Hotel 'Sport' from Poiana Brasov.

The seventh edition of the conference – **CCF2000** was organised at the Hotel 'Palace' from Sinaia in the year 2000; it was a scientific meeting with a wide international participation and, as a consequence, it was decided that the further editions of **CCF** should be included in the circuit of the international conferences in quality and dependability and organised every two years. The national journal "**Quality – Access to Success**" and the international journal "**Qualite-Forum Scientifique**" were launched during **CCF2000**, in the presence of the Editors-in-Chief of the two publications.

The next **CCF** scientific meetings, namely the eighth edition of the Conference – **CCF2002**, organized at the Casino of Sinaia, as well as the ninth edition – **CCF2004** – organized at Hotel Mara in Sinaia were unanimously considered as important international scientific events in the field of quality and dependability.

The 10<sup>th</sup> edition of the conference **CCF2006** – organized at the Casino Conference Hall from Sinaia – was an anniversary one. More than 70 papers were presented by specialists in the field from 10 countries: Argentina, Australia, Belgium, France, Great Britain, Greece, Moldavia, the Netherlands, Switzerland and Romania, too. A special session of **CCF2006** marked the centenary of the International Electrotechnical Commission (IEC).

During the 11<sup>th</sup> International Conference on Quality and Dependability – **CCF2008** specialists from 13 countries, including Australia, Belgium, France, Great Britain, Italy, India, Maroc, Moldavia, the Netherlands, Portugal, Switzerland, Tunisia and Romania presented at Sinaia their points of view in more than 60 papers.

The special session "A homage to Joseph M. Juran (1904-2008)" organized at the beginning of the conference represented a tribute to the great "Guru" of quality of Romanian origin **Joseph M. Juran**, the "father" of the modern quality management who passed away at the beginning of 2008.

A special session marked the 15<sup>th</sup> anniversary of the **Romanian Society for Quality Assurance (SRAC)** – the main organiser of **CCF** conferences, too.

More than 50 papers authored by specialists from Australia, Belgium, Czech Republic, France, Great Britain, India, Maroc, the Netherlands, Switzerland, Tunisia and Romania were presented during the 12<sup>th</sup> International Conference on Quality and Dependability – **CCF2010** organized at the Casino Conference Center from Sinaia.

The participants at **CCF2010** had the special opportunity to meet Professor Emeritus **Alessandro Birolini**, a remarkable specialist in the field – considered as a Reliability Guru – who presented an invited conference. During **CCF2010** was launched – in world premiere – the 6th edition in English of the monumental book of Prof. Birolini **Reliability Engineering: Theory and Practice** – published by Springer Publishing House and considered by the specialists in the field as a veritable "Bible of Reliability".

*During the 13<sup>th</sup> International Conference on Quality and Dependability **CCF2012** – organised for the first time in a beautiful area of the Black Sea, at **Neptun International Conference Center**, specialists from 13 countries, including Australia, Belgium, France, Great Britain, Italy, India, Maroc, Moldavia, the Netherlands, Portugal, Switzerland, Tunisia and Romania presented their points of view in more than 50 papers.*

*The special guest of the 13th International Conference on Quality and Dependability – **CCF2012** was Mr. **Gianluca Mule**, Senior Manager of the well-known **European Foundation for Quality Management – EFQM** who presented the EFQM Excellence Model. The EFQM Excellence Model is the most popular quality tool in Europe, used by more than 30,000 organizations to improve their performances.*

*During the last day of the conference the evolutions and the perspectives regarding the management, engineering and certification of quality and dependability in Romania and abroad were analysed as a part of the special session **ISO 9000 Forum** – a session that marked the 25<sup>th</sup> anniversary of this famous international standard. This session celebrated the 20<sup>th</sup> anniversary of the **Romanian Society for Quality Assurance (SRAC)**, the main organiser of **CCF** conferences, too.*

*During the 14<sup>th</sup> International Conference on Quality and Dependability **CCF2014** – organised at the Palace hotel from Sinaia, specialists from Belgium, France, Great Britain, India, Israel, the Netherlands, Serbia, Switzerland, Turkey and Romania, too presented about 60 papers.*

*The first day of the conference brought to the attention of the participants an event with an important international impact: **The EFQM Open Doors Day in Romania**, organized by **SRAC** and **EFQM** and with the participation of Grundfos Romania and the Hungarian Association for Excellence.*

*The **CCF 2014** conference was organized in a special year for quality: the anniversary of nine decades from the first control chart introduced by the quality guru Walter **Shewhart** in 1924, which launched the statistical process control and the quality improvement. This moment, considered as the birthday of the modern quality, was the point of departure of an interesting CCF debate concerning the evolutions and the future of quality.*

*During the 15<sup>th</sup> International Conference on Quality and Dependability **CCF2016** – organised at the Palace hotel from Sinaia, specialists from Belgium, France, Great Britain, India, Israel, the Netherlands, Serbia, Switzerland, Turkey and Romania presented about 60 papers.*

*The special guest of conference was Professor Emeritus Dr. **Alessandro Birolini** from Polytechnic Institute (ETH) Zurich, Switzerland, the famous European “Guru” in Reliability, author of the best-seller **Reliability Engineering**, a true “Reliability bible” – printed in 10 editions. He presented a tutorial on the reliability of technical systems and introduced the Chinese edition of this book, which will be published by Springer Publishing House.*

*Other important international experts that participated in **CCF2016** and presented interesting points of view were Dr. **Isaac Sheps** and Dr. **Steli Loznen**, from Israel.*

*A special attention was given in the frame of **CCF2016** to the requirements and implementation of the revised standard **ISO 9001:2015**. As a result of an intensive work of the ISO TC 176, the revised standard ISO 9001:2015 was released in September 2015. This moment was considered by several experts in the field as „beginning of a new era development of quality management systems”.*

*Companies' management must provide the necessary resources and are required to prove the competence of their quality specialist staff. The revisions of ISO 9001 and ISO 14001 as well as the new occupational health and safety standard ISO 45001, introduced a range of new features. These issues were discussed in several papers presented at the conference, as well as in the roundtable on the “Economic impacts of certification”.*

*The previous conferences in quality, reliability and maintainability organised in Romania in the last three decades have contributed to the promotion in our country of new ideas and methods in quality and dependability.*

*We are sure that **CCF2018** will constitute a new qualitative step in this process.*

***Quality and dependability** have become today undeniable strengths contributing to the development of companies, small businesses or large multinational groups. Their application in different organisations must be the result of research and partnership among industry, academia and business. This conference can contribute to the dialogue between the main actors of the quality and dependability world.*

*The points of view of well-known specialists in the field from Romania and several other countries will allow to establish a realistic image of the national and international evolutions and of the perspectives of these modern fields.*

*The dynamic political and economic evolutions in Europe during the last decades increased the importance of **quality**, now considered as a strategic tool and a determining factor for the development and enhancement of Europe's global competitiveness.*

*The new **EU's Framework Programme for Research and Technological Development – FP7** and the forthcoming one- **FP8**, can be considered as a major tools to support the creation of the **European Research Area (ERA)**. The main topics of **FP7** and **FP8** and some representative projects, especially those in quality and safety/security fields will be analysed in the frame of this conference.*

*The international scientific meetings, such as **CCF2018** is, could be a contribution to this objective, by reviewing the state of the art, experiences, and new trends in the relevant scientific areas.*

*Several presentation of **CCF2018** will be dedicated to the evolutions in the European quality on the European scene during these last years, as well as to the national evolutions in this field. The **real** integration of Romanian economy in the unified European structures is an impossible endeavour unless the severe requirements on quality based on the EU's standards are meet.*

*Several organisational, research and educational programs and initiatives in the **quality and dependability** (esp. safety/ security) field were developed in Romania in the last years, and they will be certainly analysed in the framework of this conference.*

*Under the conditions of the actual world economic crisis, the debates of **CCF2018** will try to give an answer to the following question: could be the optimal managerial and technical strategies based on quality and dependability an advantage for companies in their effort to overcome this economic crisis?*

*We are honoured by the participation in the 16th International Conference on Quality and Dependability - **CCF2018** of well-known specialists in the field – academics, managers, practitioners and researchers from **France, Israel, Portugal, Serbia, Switzerland, and Romania**, too. Their points of view, presented in about 40 papers will be of great interest to the participants at **CCF2018**.*

*Among the topics proposed to the specialists by the International Scientific Committee during the 16th International Conference in Quality and Dependability CCF2018, we could mention the following ones:*

- ❑ *Systems of Management: developments, evolution, standardisation (ISO 9000, ISO 14000, ISO2200, ISO 27000, OHSAS 18001 a.o.);*
- ❑ *New approaches: social accountability management (SA8000) and ethics management;*
- ❑ *Integrated Systems of Management;*
- ❑ *Service quality management (education, health care, tourism, banking system, etc.) and evaluation of customer satisfaction;*
- ❑ *Business Continuity Management (BCM)*
- ❑ *Accreditation (certification bodies, laboratories, personnel) and certification (quality systems, products and services);*
- ❑ *Voluntary product certification;*
- ❑ *Total Quality Management, Six Sigma, quality management tools;*
- ❑ *Modern control and conformity assessment techniques;*
- ❑ *Conformity assessment in the mandatory area;*
- ❑ *Modern approaches in dependability, resilience and evolvability;*
- ❑ *Reliability (mathematical tools; design; predictive, experimental and operational reliability; reliability of human factor);*
- ❑ *Maintainability (maintenance management, preventive and corrective maintenance techniques, RCM)*
- ❑ *Education and training in quality and dependability.*
- ❑ *Computer-aided study in quality and dependability*
- ❑ *Quality, reliability and security in the IT&C industry*
- ❑ *Legislation and standardization in quality and dependability*
- ❑ *Social, juridical and economical implications of quality and dependability.*

*The special guests of the 16th International Conference in Quality and Dependability **CCF2018** will be important international experts in the field, namely:*

- *Prof. Dr. **Vidosav D. Majstorovic** from University of Belgrade, well-known Serbian expert in quality management;*

- **Dr. Isaac Sheps** – Convener of ISO/TC 176/SC2/WG25 (working group for revision of the ISO 9004);
- **Dr. Steli Loznen**, Israel – Convener of IEC/TC 62/SC 62A/MT29 & WG14 (working group for preparing the international standards for medical electrical equipment used in medical practice).

An important part of the first day of **CCF2018** will be dedicated to the **IQNet Association – The International Certification Network**. Two important officials of the organization – namely Mr. **Alexandru Stoichitoiu**, the IQNet President and Mr. **Pedro Castro Alves**, IQNet Managing Director – will present the structure and the services offered by this important international association.

**IQNet** services provide an international passport to global recognition and worldwide market access. It is important to mention that the **IQNet** approach simplifies International certification process and reduces associated costs.

**IQNet**, through its international network, is the preferred provider for global certification services and assessments, with a focus on management systems: (a) with global resources and capabilities; (b) leading in integrity and competency: accredited by more than 40 accreditation bodies; (c) serving in all business and social sectors; (d) offering to customers a large variety of innovative, value adding services.

Special emphasis will be given during **CCF2018** to the problems of: Certification and Accreditation; Quality, Security and Risk Management and Analysis; Dependability Modelling and Evaluation of Technical Systems; Environmental Management; Quality Assurance in Education a.o.

Sessions with these topics are included in the program of the conference.

The conference program also provides a roundtable on “Quality Culture, Quality Policy and Economic Implications of Certification”, as well as two book launches.

A wide selection of papers presented in the frame of **CCF2018** will be included in the **Proceedings** of the conference, entitled “**Quality and Dependability**”.

Some representative papers presented during **CCF2018** are included in a special issue of the journal “**Asigurarea Calitatii – Quality Assurance**” dedicated to the 16th International Conference in Quality and Dependability, too.

Finally, we would like to thank all the authors who submitted their work, the members of the organising committee, and all those who contributed to the Conference with their efforts and support.

Special thanks to the members of the **International Scientific Committee** of **CCF2018**, prestigious personalities in the field from 10 countries, who made up an equilibrated and high-level scientific program for **CCF2018** and reviewed the submitted papers under severe time constraints; their names are mentioned in these Proceedings.

We hope that the **16th International Conference in Quality and Dependability – CCF2018**, organised in a beautiful area of the Carpathians Mountains, at **Sinaia**, will be a both stimulating and enjoyable forum in which to share current results and trends in quality and dependability.

*We invite you to enjoy the presentations, panels, the technical and tourist visits over the three days of this conference and to participate to the fullest this international event gets underway.*



**Dr. Dan G. STOICHITOIU**  
*General Chairman of CCF2018*



**Prof. dr. Ioan C. BACIVAROV**  
*Chairman of the International  
Scientific Committee of CCF2018*

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# **The Role of Quality Services in the Assistance Offered by Regional Export Centers. Study Case for Romania**

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## **Abstract**

Regional exports centers are considered a new body of experience developed by trade support organizations in different countries and regions. The literature related to these centers indicate that they are consistent for initials or even developed exporters in a certain region, unable to reach a level of market knowledge and intelligence to be successful on the foreign markets. Since 2017, under the Romania-Swiss Cooperation program there were created two export centers, one in Ploiesti and the other one in Bacau, both operating besides the Chamber of Commerce and Industry. From the beginning of the center activity, a number of 40 companies from the furniture industry as well as from the organic products area are assisted in the elaboration of export strategies and in supporting promotional events. From all integrated services where the program was active, one of the most important aspects was related to the quality Management infrastructure and certification, as a major market access obstacle on the foreign markets. In this regard, most of the managers in the group identified that certification and the quality issues may be a major barrier to export. This paper examines the evolution of these centers and their importance in terms of quality management based on the findings through the interests of managers of these two fields organic farming and furniture. The main conclusion of the study indicates that companies under the program understood better the aspects of quality management and certification as an essential access market issue. On the other hand, capacity building in terms of management control and the complex relation between quality certification, standards and branding will remain for most of the managers a crucial issue where the EBCs will have to deliver more quality services.

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# Impact of Standardization in the Development of Management Systems

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## **Abstract**

Sistemele de management s-au dezvoltat într-un ritm rapid în ultimul timp. Inovațiile tehnologice în sistemele de management au schimbat lumea afacerilor și organizațiile au fost nevoite să se adapteze la actuale teorii. În cele ce urmează vom privi înapoi la istoria recentă a sistemelor de management pentru a identifica evoluția standardelor internaționale în acest domeniu.

**Keywords:** standard, standardizare, ISO

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# Organizational Quality - Guidance to Achieve Sustained Success. The New ISO 9004:2018

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## **Abstract**

The success factors of organizations are developing continuously and every few year's new success factors are added to the complex demanding and ever-changing competitive environment in which organizations operate. There is no doubt that the primary focus of an organization should be to achieve higher satisfaction of its customers by implementing rigorous processes to continuously improve its products and services quality - but in the current competitive environment this is not enough to achieve sustained success. Organizations have to move from Product Quality to the next level of Quality of an organization by implementing an effective and efficient management system that is led by top management and is focused on the organization ability to meet the needs and expectations of its customers and other relevant interested parties, over the long term as the way to achieve sustained success of the organization. While ISO 9001:2015 focuses on providing confidence in the organization's products and services, the new standard ISO 9004: 2018 is focused on providing confidence in the ability of the organization to achieve sustained success. In this paper Dr. Isaac Sheps who is the convener of ISO TC176/SC2/WG25 responsible for the revision of the ISO 9004 standard demonstrates the need for the above described development in quality and management systems.

**Keywords:** Quality, Management, Organization, ISO 9004, Quality of an organization, Sustained success

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# An Advanced Research on ISO Certificates Number

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## Abstract

Business standardization developed intensely in the second decade of the 21st century. In the end 2016 (31st of December) there were: (i) 1,644,357 certificates to ISO 9001, 13485, 14001, 16949, 22000, 27001, 50001, 22301, ISO 20000-1, ISO 28000 and ISO 39001 in the world, whereby 1106356 certificates were to ISO 9001, and 346189 were to ISO 14001. Total number of standardized management systems (SMS) that is being followed by a certificate is eleven and the last to be monitored is ISO 39001 Road traffic safety (RTS) management systems -- Requirements with guidance for use. Our research in this paper refers to the definition and determination of the integrated index of business standardization. This parameter can be determined for one or more SMS, at the level of the world, continent, region or country are. This is a qualitative analysis of the application of SMS. This index has four elements, namely: (a) number of certificates per thousand inhabitants, (b) number of certificates contribution to "creating" hundreds of thousands of euros GNP, (c) number of certificates per GNP inhabitants, and (d) number of certificates per thousand employees. Based those parameters we determine integrated index of business standardization. The paper presents an analysis of this index of the Western Balkans Countries, for past ten years and prediction, also for next ten years.

**Keywords:** ISO, Certificates, Business standardization, Index, Analysis, Impact

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# Considerations on the Credibility and Added Value of Certification and Accreditation Processes

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## Abstract

ISO 9001 is an excellent reference that can help organizations to develop an effective QMS. The effectiveness and the efficiency of QMS certification are based on the credibility of the certification process. But commercial considerations and incompetence or indifference on the part of a CB (certification body) result in poor-quality certification and the eventual lack of credibility of the whole process. With the proliferation of CBs and the absence of adequate control by ABs (accreditation bodies), the certification process in general has been discredited, especially in developing economies. Industries don't see value addition in the certification, and some of them have lost faith in the standard itself. ISO and the IAF recognize the problem and have initiated corrective measures. It is hoped that, in time, industries will begin to look upon QMS certification as a value-added exercise and the ISO 9001 certification process will regain some of its lost glory. This paper includes relevant data on the history and most important today's challenges and issues (with proposed possible solutions) of certification and accreditation processes in Romania.

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# Romania's Organisations are Needing the Best Practices and the Credibility of National/ European Awards for Quality or Excellence

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## Abstract

The European Foundation for Quality Management, EFQM, was founded in October 1989 when the CEO/Presidents of 67 European companies subscribed to its Policy Document and declared their commitment to achieving EFQM mission and vision. In 2000, the <Joseph M. Juran> Romanian Quality Award was launched in Bucharest, under the administration of the “<Joseph M. Juran> Romanian Quality Award” Foundation (established formally in February 1999, through a project developed by the first author and financed by EC). In February 2001, the first winners of <Joseph M. Juran> Romanian Quality Award were presented to the public. All winners received also a message signed by Joseph M. Juran. The <Joseph M. Juran> Romanian Quality Award (JMJ-RQA)– whose criteria are representing the “Romanian Model for Excellence” – was intended to represent the highest Romania's recognition, at national level, of managerial competence. It is based on the former EFQM European Model for Excellence, i.e. on the European Quality Award criteria, applied in Europe till 1999, as the European model of Total Quality Management (TQM). During years 2001-2009, the JMJ-RQA was won by 32 different organisations based in Romania. Unfortunately, for many new reasons, after 2009 and till today, it was not more possible to organise thr JMJRQA competitions. In addition, during years 2002-2006, no Romanian candidate organisation was found enough able to earn the EFQM Award for Excellence. However, some hopes to overcome these challenges were later generated by the founding in 2017 of the new association TEAM 4 EXCELLENCE, in Constanța, managed by the second author. This paper introduces - from historical and professional insider's perspective - the most important facts, challenges, issues and outcomes of these surprising Romanian evolutions, during over 28 years of EFQM operation.

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# Risk Management, Challenge or Good Practice?

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## Abstract

Using referential ISO standards of management systems, the author makes a succinct and schematic commentary on the issue of risk management as a challenge or good practice. The article is illustrated with a flow chart for the application of risk and opportunity-based thinking and a scheme that includes the stages of risk-based and opportunity-based thinking. In conclusion, a risk-management plan is presented that solves the implementation stages of risk-based thinking, such as: establishing treatment actions, planning for the integration and implementation of actions, implementing actions and assessing their effectiveness.

**Keywords:** risk management, ISO 9001, ISO 14001, ISO 31000, ISO 45001, risk and opportunity - based thinking

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# **HACCP System Integration (Hazard Analysis And Critical Control Points) According to ISO 22000:2018, In Risk And Opportunity Approach, According to ISO 9001:2015**

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## **Abstract**

Aparitia unei noi versiuni a unui standard este un eveniment care provoaca neliniste atat printre organizatiile care il aplica cat si printre auditori si consultanti. De aceea, bazandu-ma pe experienta acumulata si pe o viziune practica si simpla in abordarea riscurilor, am creat aceste modele care sper ca vor folosi utilizatorilor enumerati mai sus. De asemenea, chiar daca metoda HACCP este arhicunoscuta, o reimprospatare a pasilor de urmat, tinand cont de schimbarile aduse de ISO 22000:2018, consider ca este binevenita.

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# **Risk Management, From Impartiality, to Business Orientation**

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## **Abstract**

Acest articol face o analiză a cerințelor referitoare la riscuri din cadrul documentelor de referință pentru activitatea organismelor de certificare și a modului în care se aplică în prezent managementul riscului în aceste organisme. În final, se propune un mod de abordare a managementului riscului specific acestor organisme prin prisma orientării către afacere.

**Keywords:** risc, oportunitate, gândire bazată pe risc, imparțialitate, afacere, management

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# Challenges of Migration From OHSAS 18001 to ISO 45001

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## **Abstract**

Acest articol prezintă câteva dintre noutățile aduse de noul standard ISO 45001:2018 și punctează atât aspectele care ar trebui avute în vedere de organizații pentru implementarea acestora, cât și de auditorii de terță parte pentru auditarea acestor noi cerințe.

**Keywords:** sănătate și securitate ocupațională, comunicare, implementare, audit

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11. Politica SRAC privind recunoasterea auditorilor conform ISO 45001:2018

# **The Audit of Organizational Culture Regarding Food Safety / Quality And Food Safety**

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## **Abstract**

When non-conforming products are identified at reception, the regular/ well known measure is to additionally assess the management system, as the most likely method to identify the root causes that lead to supplying non-conforming products. The same logical approach leads to using as referential for this assessment the same standards/verification schemes implemented by the supplier or some structurally comparable referential, ignoring the fact that the supplying of nonconforming products indicates beyond any doubt the failure of the interface implemented by the supplier, known as management system. Thus, at the level of the whole food chain, a considerable number of second-party audits are performed, but they, in fact, have no capability to identify the root causes that lead to supplying non-conforming products, since these audits are outside the considered assessment criteria. The assessments (internal or third party) of the conformity with the standards/verification schemes of quality and food safety management systems promoted by ISO or recognised by GFSI, follow, for each clause (in the case of schemes which require accreditation according to ISO 17065) or for each causal chain of clauses (in the case of schemes which require accreditation according to ISO 17021, ISO 22003) a classical logic assignment as “true” or “false”, that leads to the conclusion regarding the non-conformity or the conformity. But, if the company already supplied a nonconforming product/unsafe product, that fact per se irreversibly proves the failure of the outcomes of classical logic evaluation. In this case, there is no interest to see what is true or false, but what is necessary to do or to avoid doing. This fact requests to apply a fundamental different logic that predominantly considers the human related written aspects or practices (expectations, obligations, interdictions etc.), which allow beyond any doubt the assessment of the capability or the lack of capability of the organization to continue supplying compliant products. Such behavioral assessments - as the basis of the management system, requires an assessment of what is known as organizational culture. Thus, the simple existence of non-conforming or insecure product reception creates, for reasons of effectiveness, the need to change the logic of assessment by replacing the classic second-party audit with the audit of the organizational culture of food safety or food quality and safety. The assessment of the food safety culture has as starting point the equation “Food safety = Behavior”, and the system to be evaluated taking into consideration criteria integrated within both food science and behavioral science is a “food safety management system based on behavior” [F. Yiannas, Food Safety Culture / fig 1.1]. The evaluation criteria switch from management system documentation and food safety plans and programs to the way employees think about food safety and how they actually apply it, as well as from the management reviews presented at a typical evaluation to the way the implication in food safety is reinterpreted by key business indicators, that could cause an unacceptable tolerance to the risk of producing unsafe products for consumption.

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# **Aspects on the Approach to the Water Safety Plan in an Integrated Management System Quality-Food Safety According to ISO 9001:2015 and ISO 22000:2018**

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## **Abstract**

The successful keeping of a performing water management in an integrated manner by quality –water safety systemic approach allow the investigation of management system and leads to the objectives and targets fulfillment. The motivation to raise a management integrated system, with SMART features and objectives by reporting to standard requirements, has as support internal forces (manager vision) or external forces (requirements related to regulation). A quality – water safety management system to include issues regarding: satisfaction of clients' requirements, staff training, deal with claims, improvement of relationships with interested parts, the control risks regarding the safety of drinking water should be a strategic decision of each operator from the field of water supply services. The paperwork shows the concept of integration, equivalence between the management systems and the valuation issues in the management integrated system, as well as the opportunities to improve the operators of water supply services which adopt this systemic approach. Keywords: quality, water safety plan, hazard analysis and critical control points.

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# **EMAS - Standard of Environmental Performance. From ISO 14001 to EMAS**

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## **Abstract**

Fiind cel mai important instrument de gestionare a mediului, cerințele Regulamentului EMAS depășesc cerințele Standardului ISO 14001. Cerințele EMAS acoperă deja multe dintre cerințele care sunt noi în conformitate cu standardul ISO 14001: 2015. Organizațiile înregistrate EMAS trebuie, prin urmare, să implementeze doar câteva adaptări. Organizațiile vor trebui să ia în considerare aceste cerințe noi atât în analiza de mediu, cât și în faza de implementare a sistemului de management de mediu.

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# **Waste Management. The Environmental Impact of a Waste Deposit from the Life Perspective**

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## **Abstract**

An summary of all activities that are waste-generating. Today, there are more and more talks about recovery, recycling and the most faithful recovery of nature. The main commitments of the Ministry of Environment in the area of waste prevention and management include the implementation of the concept of "Life Cycle Analysis". Life-cycle assessment of products or services is an environmental management technique that identifies the material, energy and waste streams of a product throughout its life cycle and its impact on the environment. Thus, this paper aims to bring to the forefront a life cycle assessment approach in the management of an ecological waste disposal. Why should I make such an assessment? Because its objectives are: risk assessment, environmental performance assessment, environmental auditing and environmental impact assessment, as well as identifying possible changes that can be made at each phase of the life cycle and which can lead to environmental benefits and savings costs.

**Keywords:** waste management, ecological disposal, environmental management, life cycle, environment

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# Concrete Durability Under Different Aggressive Environments with Optimized Accelerated Test Plan

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## Abstract

La fabrication du béton dans le domaine de la construction respecte des spécifications prescriptives. En Europe, c'est la norme EN 206 qui est la référence pour la production du béton. Cependant, avec l'innovation, l'exigence d'une durabilité supérieure à 100 ans pour les nouvelles structures et les contraintes liées au respect de l'environnement, il devient de plus en plus difficile d'utiliser les seules spécifications prescriptives pour justifier la fabrication du béton. En effet, les normes existantes, limitent la durabilité du béton et sa composition. Pour compléter les spécifications prescriptives, une approche alternative basée sur la performance est proposée. Cette approche se concentre sur l'évaluation des indicateurs de durabilité au moyen de tests de performance. Un nouveau béton est ainsi qualifié si sa durabilité est au moins égale à celle du béton qui respecte les spécifications prescriptives de la norme. Les tests de performance représentent un coût économique pour l'industrie du béton qui cherche une solution pour le réduire et en même temps garantir la robustesse du processus de qualification de la nouvelle formule de béton. Une solution consiste à réduire la durée des tests et à contrôler le nombre d'échantillons pour les tests de durabilité. Ainsi, avec un plan d'essais accélérés optimisé, il est possible de caractériser la durabilité du béton en utilisant les processus de dégradation. Le plan d'essais optimisé donne le temps optimal et le nombre minimum d'essais permettant de prédire de la durabilité du béton.

**Keywords:** durability, performantial approach, reference concrete, concrete to be qualified, optimization, degradation process, accelerated tests, test plan

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# Test, Testability and Reliability Aspects of Integrated Circuits

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## Abstract

The role of testing is to detect whether something went wrong and the role of diagnosis is to determine exactly what went wrong. Testability is a design criterion and should be included in design reviews. Quiescent power supply current (IDDQ) testing of a CMOS integrated circuit is a technique for production quality and reliability improvement, design validation, and failure analysis. It has been used for many years by a few companies and has now receiving wider acceptance as an industry tool.

**Keywords:** ASIC, IDDQ, NNR, SEC, TCV, operational test, test methods, reliability

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# Enhancing the Quality of a Web Application Through Responsive Design

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## Abstract

An attractive design engages even the most fastidious users and alleviates most concerns over the investment acumen of any marketing strategy involving future web application development. Integrating responsive design ensures that the content properly displays on a large variety of terminals, including desktop computers, mobile phones and tablets. This article addresses managers, quality assurance engineers and junior developers with an interest towards qualitative web development. It highlights essential information for upcoming development and testing phases, focuses on quality and usability and virtually guarantees a successful product. Containing time-saving tips, it outlines the transformation process required to reach the stage of seamless, modern Responsive Web Design (RWD) and concentrates on the quality assurance perspective through deeper understanding of the development and testing requirements.

**Keywords:** Responsive design, Quality Improvement Process, Cross-platform Testing, Adaptive design

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# Multicriterial Analysis of the Assets of a Critical System in the Management Process of Information Security

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## Abstract

The selection of an optimal solution for the identification of the critical assets is a rather complex process, as all the valuable assets of an organization have to be identified, classified and quantified under a common approach, within the risk management process. The paper proposes a quantitative method for the identification of critical assets/ services within information security assessment and analysis process which is based on multi-criteria analysis. The aim of this paper is to present a most objective method for the assessment, ranking and quantification of critical assets/services through the analysis of predefined criteria using TOPSIS method. We think that by using this method we can make best decisions in ranking critical assets/services.

**Keywords:** options/option, criteria, normalization, weight, selection of critical asset

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# Modelling and Analysis of the Survivability of Telecommunication Networks

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## Abstract

Network survivability is the potential of a network to continuously offer the required services under undesired events. We can observe the survivability models for a telecommunication network subject to disaster propagation. The primary objective is to develop a stochastic modeling framework and associated computational techniques to assess the survivability of the system.

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# Analysis on Telecommunication Network Survivability Based on Stochastic Petri Net

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## Abstract

Survivability of network system is the concept of survivability as the ability of a system to perform its mission within a set timeframe in the presence of attacks, failures or accidents. We have defined survival systems, their properties and the main elements of survival. The technique of analyzing the survival of a computer system is useful in defining the requirements, system specifications and system architecture.

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# Bivariate Weibull Distributions Applied to Maintenance Modeling

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## Abstract

The main idea of the paper is to determine a bivariate Weibull distribution for maintenance data, with Weibull marginal repartitions, generated from a bivariate standard normal repartition, each component (mileage and costs) having a normal distribution. The marginal univariate Weibull distributions were obtained from the values of standard cumulative distribution functions of the normal variables, with a correlation coefficient  $\rho$ . The values of the cumulative distribution function, derived from normal, follow an uniform continuous distribution on  $[0; 1]$ . The paper proposes procedures of calculus for bivariate Weibull distributions to enhance the modeling of the maintainability vs. the normal distribution. The calculus of the multivariate Weibull cumulative distribution function (CDF) is based on standard bivariate normal distribution, with a change of variables, which maintains and transfers the features of the former. The CDF of a univariate Weibull distribution was obtained using  $\text{erffunction}$ , which can convert to a new variable, uniform distributed. Each univariate normal distribution with two parameters is transformed in a Weibull one with scale and shape parameters are estimated the four parameters of the joint Weibull distribution. The estimate of the correlation coefficient,  $\rho$ , of the initial normal marginal distributions, was considered as a measure of the dependence to determine the bivariate probability density function (PDF). The maximum likelihood method was applied to the bivariate Weibull probability density function to obtain an estimate of dependence parameter,  $\rho$ , necessary for the calculus of joint Weibull CDF.

**Keywords:** bivariate Weibull distribution, maintenance-costs

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# Network Security Monitoring with Embedded Platforms

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## Abstract

Wireless networks are used worldwide as the means of connecting computers and mobile devices to the internet with ease and without any wires. Over the years technology advancements made wireless routers accessible for consumer use in public places as well as in households. From a security perspective, wireless networks pose an increased risk, not only for unauthorized access to the network, but more important for manipulating the information flow of other users on the network. Man-in-the-middle attacks enable attackers to impersonate legitimate services and intercept communications from the users in an attempt to steal sensitive information. This paper aims to propose a solution based on embedded devices to detect attackers that manipulate the network with the scope of stealing sensitive information. The proposed solution is based on low cost and energy efficient computers that can be connected to regular network equipment to detect and alert on malicious activity.

**Keywords:** Security, Embedded devices, ARP Spoofing, Man-in-the-middle, Packet Analysis, Intrusion Detection

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# Cinci decenii de învățământ tehnic superior în calitate și siguranță în funcționare în România

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## Five decades of high-level technical education in quality and dependability in Romania

### *Abstract*

*This paper analyses the evolution of Romanian postgraduate technical education in the field of quality and reliability during the last five decades, especially for the domain of electronics and telecommunications. It is mentioned that the first graduate and postgraduate courses in the field were introduced at the faculty of Electronics and telecommunication of the Polytechnic Institute of Bucharest, under the coordination of the new chair of Electronic Technology and Reliability.*

*The main stages that marked the evolution of the high-level technical education in the field of quality and reliability in electronics and telecommunication, - mainly through the achievements of the Department of Electronic Technology and Reliability of the Polytechnical University of Bucharest - are analysed, namely: the postgraduate academic program "Quality, reliability and maintainability of complex systems" (1972-2008), the European educational project TEMPUS S-JEP 11300 "EUROQUALROM" (1996-1999), and the Master's programs "Quality and Reliability Engineering" - ICF (1996-2006) and "Quality and Dependability Engineering in Electronics and Telecommunications" - ICSFET (since 2006).*

*After almost five decades of achievements in higher technical education and scientific research in the field of quality and reliability in electronics and telecommunications, it is concluded that there is today a real "Romanian school" in the field, whose achievements are known and appreciated at national level, as well as internationally.*

**Keywords:** *Quality, Reliability, Electronic Technology and Reliability, Technical education, High-level education, Postgraduate, TEMPUS \**

*Calitatea și fiabilitatea sunt domenii relative noi, comparativ cu domeniile tehnice tradiționale: actul de naștere al calității datează de la mijlocul anilor '20 ai secolului trecut (când **Shewhart** a elaborat primele diagrame de control pe flux a calității), iar cel al fiabilității din anii '50 ai secolului trecut, când au fost elaborate primele normative militare americane, datorate specialiștilor din celebrul grup de reglementare în domeniul fiabilității **AGREE**<sup>(1)</sup>.*

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Tot din anii '50 dateaza si *primele programe de instruire in domeniu*, cursurile in domeniul calitatii pentru manageri tinute in Japonia de catre cei doi "guru" ai calitatii - **J.M.Juran** si **E. Deming** – fiind faimoase in acest sens.

Pe plan mondial, primele programe educative in domeniul fiabilitatii apar de abia la inceputul anilor '60 ai secolului trecut. Programul de *Master in domeniul ingineriei fiabilitatii*, demarat in 1962 la US Air Force Institute of Technology din Dayton, Ohio, S.U.A.- destinat personalului militar si din administratia americana - este considerat drept primul program educativ in domeniu pe plan mondial.

Dupa 1965 sunt dezvoltate mai multe programe educative in domeniul fiabilitatii la diverse universitati americane, intre care Air Force Institute of Technology Dayton, Ohio, US Naval Post-Graduate School Monterey, California, University of Phoenix, Arizona, Princetown University, New Jersey si Columbus University, New York. *Cel puțin un curs în statistică și probabilități și unul în domeniul fiabilității trebuie inclus în curricula tuturor universităților tehnice*", menționa profesorul american **D. Kececioglu** într-un articol publicat în prestigioasa revistă *IEEE Transactions on Reliability* în 1984.

### **Invățământul tehnic superior în domeniul calității și fiabilității în electronică și telecomunicații în România – câteva repere istorice**

In conformitate cu tendinta manifestata pe plan mondial, cercetarile in domeniul calitatii si fiabilitatii in domeniul electric ( si cu precadere cel al electronicii) au devansat cu 10...15 ani pe cele din celelalte domenii.

<sup>(1)</sup>AGREE- Advisory Group on Reliability of Electronic Equipment



Fig.1 - Profesorul Vasile Catuneanu alaturi de cativa dintre colaboratorii din catedra TEF, intre care Angelica Dogaru, Ovidiu si Marieta Dragomirescu, Paul Svasta si Ioan Rusu (1972)

In Romania, pionierii domeniului fiabilitatii sunt profesorii **Vasile M. Cătuneanu** (pentru domeniul electronic si de telecomunicatii) si **Vasile Nitu** (pentru domeniul energetic).

In continuare, in aceasta lucrare, ne vom referi doar la domeniul electronicii si al telecomunicatiilor. Profesorul **Catuneanu** a publicat - la mijlocul anilor '60 - primele articole in domeniul fiabilitatii [1], bazate, in principal, pe literatura tehnica rusa; tot el a introdus la sfarsitul anilor '60 si primele capitole de fiabilitate in cursul de "**Materiale**" predat studentilor facultatii de profil din cadrul Institutului Politehnic Bucuresti (IPB, devenit dupa 1990 UPB).

In 1971, profesorul **V. M. Cătuneanu** – din pozitia de decan al facultatii de Electronica si telecomunicatii (ETc) din IPB - are excelenta idee, si totodata parghiile necesare infiintarii catedrei de **Tehnologie Electronica si Fiabilitate (TEF)**, incepand cu 1 octombrie 1971. In acest scop, a selectionat pe cei mai buni absolventi ai promotiei 1971 ai facultatii de electronica, tineri cu deschidere totala spre studiu si cercetare, vorbitori ai mai multor limbi de circulatie international, dupa cum mentioneaza **D. Stoichitoiu** si **V. Voda** in excelenta lor "**Istorie a calitatii**" [11].

Dintre cei care au fost chemati in 1971 sa "desteleneasca" educatia si cercetarea in domeniul calitatii si al fiabilitatii in noua catedra, mentionam pe **Ioan C. Bacivarov** (seful de promotie al sectiei de "**Telecomunicatii**" a facultatii), precum si pe **Angelica Dogaru** (viitoare **Bacivarov**) si **Adrian Mihalache** - unii dintre cei mai buni absolventi ai sectiei de "**Electronica aplicata**".<sup>(2)</sup>

<sup>(2)</sup>La infiintare, in 1971, catedra de Tehnologie Electronica si Fiabilitate din IPB avea trei colective principale: Calitate si fiabilitate, Materiale si Tehnologie electronica; in cadrul acestei lucrari vor fi avute in vedere doar activitatea si realizarile primului colectiv



Fig.2 - Profesorii Ioan Bacivarov, Angelica Bacivarov si Adrian Mihalache participand la o conferinta internationala de specialitate in anul 2002

Acestia au inceput o munca de pionierat, bazata in primul rand pe studierea lucrarilor fundamentale din literatura tehnica de specialitate anglo-saxona, ce existau in acea perioada in cele mai “bogate” biblioteci tehnice din tara: **INID** si **IFA**.

In afara de cei mentionati anterior, in colectivul de *Calitate-fiabilitate* al catedrei au mai fost inclusi si **Marieta Georgescu** (viitoare Dragomirescu) - absolventa a facultatii ETc din 1966 , si spre sfarsitul anilor '70, **Florin Popentiu**.

Profesorul **Catuneanu** si colaboratorii sai au meritul de a fi inteles ca pregatirea viitorilor ingineri electronisti nu poate fi completa, decat daca in programa analitica a facultatii este avut in vedere intregul ciclu de viata al sistemelor, iar conceptele de baza ale ingineriei calitatii si sigurantei in functionare (fiabilitate, mentenabilitate, securitate) precum si notiunile privind proiectarea pentru calitate, fiabilitate, testabilitate si proiectarea tehnologica trebuie invatate inca de pe bancile facultatii.

Pentru aceasta idee au militat in intreaga lor activitate, in ciuda multor constrangeri si opinii contrare, unele venite chiar din partea unor colegi sau chiar factori de decizie din facultate.

Primele capitole de curs in domeniul calitatii si fiabilitatii fusesera deja introduse in programa analitica a facultatii de electronica la inceputul anilor '70 (in cadrul cursului de *Materiale*). Tinerele cadre didactice ale catedrei TEF pregatesc noi cursuri, corespunzatoare specializarii fiecaruia: *Fiabilitatea sistemelor de telecomunicatii*, *Fiabilitatea aparaturii electronice* s.a.), care sunt succesiv introduse la sectiile de specialitate.

De mentionat ca - spre deosebire de domeniile tehnice “traditionale” (cum sunt matematica, fizica, electrotehnica s.a.), pentru care exista deja un background serios si numeroase lucrari fundamentale

deja publicate, domeniul *calitatii si fiabilitatii* era un domeniu nou, care a fost efectiv “destelenit” de catre membrii colectivului de profil din catedra TEF: de la elaborarea programelor didactice, pana la scrierea unor carti si manuale de specialitate.

In perioada dificila a anilor 1975 – 1990, se contureaza deja germenii unei *scoli romanesti de fiabilitate*, in care membrii colectivului de fiabilitate ai catedrei TEF au avut un rol important: sunt publicate lucrari fundamentale in domeniu [2]...[7] si sunt realizate contracte de cercetare stiintifica prin care sunt solutionate probleme reale de fiabilitate ale industriei si cercetarii de profil, cum ar fi cresterea fiabilitatii televizoarelor si calculatoarelor electronice, analiza si cresterea fiabilitatii echipamentelor electronice din transportul naval si industria chimica, realizarea de echipamente pentru testarea componentelor electronice si a sistemelor de calcul etc.)<sup>(3)</sup>

Printre **noile domenii didactice si de cercetare stiintifica** pe care le-au dezvoltat si impus in Romania cadrele didactice amintite anterior mentionam: *fiabilitatea sistemelor de telecomunicatii, analiza fiabilitatii si securitatii sistemelor de mare raspundere functionala, managementul sigurantei in functionare, fiabilitate umana (Ioan Bacivarov), fiabilitatea si securitatea sistemelor de calcul -atat la nivel hardware, cat si software, sisteme/calculatoare tolerante la defectari, testare automata si diagnoza tehnica (Angelica Bacivarov), teoria incertitudinii (Adrian Mihalache), optimizari in fiabilitate (Florin Popentiu).*

Noua catedra TEF isi consolideaza prezenta si rolul de leader al domeniului in peisajul stiintific romanesc al acelei perioade si prin organizarea mai multor manifestari stiintifice, dintre care cea mai importanta este, desigur, *Simpozionul national “Tehnologie electronica si fiabilitate”*. Prima editie a simpozionului a fost organizata la IP Bucuresti in noiembrie 1977 (presedinte - V.M. Catuneanu, coordonare stiintifica – Ioan C. Bacivarov), in deschiderea sa vorbind mai multe personalitati stiintifice si administrative ale momentului; o vasta selectie din cele peste 120 de lucrari prezentate in cadrul simpozionului a fost inclusa intr-un amplu volum publicat de catre Editura Didactica si Pedagogica. Simpozionul “Tehnologie electronica si fiabilitate” mai este organizat in inca 10 editii, in diferite centre universitare, pana in anul 1990, cand isi inceteaza existent; locul sau fiind luat de alte conferinte in domeniu, intre care desigur cea mai importanta va fi *Conferinta internationala de calitate si fiabilitate – CCF*.

In perioada anilor '80, profesorul Catuneanu si alti membri ai colectivului de specialitate din catedra TEF sunt implicati in organizarea si coordonarea unor sectiuni de calitate - fiabilitate din cadrul diverselor conferinte si simpozioane nationale (sesiuni ale Academiei Romane, conferintele nationale de electronica si telecomunicatii, simpozioanele SACEP s.a.).

Cu toate restrictiile din acea perioada, membri ai colectivului de fiabilitate din catedra TEF incep sa fie tot mai vizibili si pe plan international, publicand articole in reviste stiintice internationale de prestigiu, cum sunt *IEEE Transactions on Reliability, Reliability Engineering & System Safety, Microelectronics and Reliability* s.a., sau triminand lucrari la conferinte internationale de fiabilitate cunoscute, organizate in Anglia, Franta sau Ungaria.

<sup>(3)</sup> O lista selectiva a principalelor contracte de cercetare stiintifica, nationale si internationale in domeniul calitatii si fiabilitatii in cadrul departamentului TEF, precum si a lucrarilor elaborate de catre acestia este data pe site-ul laboratorului EUROQUALROM, [www.euroqual.pub.ro/](http://www.euroqual.pub.ro/)

Ca editori ai putinelor reviste stiintice romanesti care mai apareau pana in 1989, prof. **V. Catuneanu** (*Automatica si Electronica, Telecomunicatii*) si dr. **Ioan Bacivarov** (*Calitate, fiabilitate, metrologie*) au contribuit la popularizarea celor mai importante rezultate ale cercetarii stiintifice autohtone in domeniu.

Dupa 1990, profesorul *Ioan Bacivarov* s-a implicat in infiintarea si coordonarea editoriala a unor reviste internationale de specialitate (intre care *Asigurarea Calitatii – Quality Assurance*, incepand cu 1995 si *International Journal of Information Security and Cybercrime – IJISC*, incepand cu 2012). In calitate de Editor/membru al Editorial Board al unor prestigioase reviste international in domeniu intre care *Quality Engineering* (S.U.A) si *Reliability Engineering & System Safety* (Elsevier, Marea Britanie) a contribuit la o mai buna vizibilitate internationala a cercetarilor romanesti in domeniul calitatii si sigurantei in functionare.

### **Programul academic postuniversitar "*Calitatea, fiabilitatea și mentenabilitatea sistemelor complexe*"**

Un moment important pentru dezvoltarea invatamantului de profil l-a reprezentat lansarea in 1972 - sub coordonarea profesorului **Catuneanu**, si cu contributia substantiala a tinerilor sai colaboratori - a *programului didactic postuniversitar* in domeniu, prima promotie obtinand diplomele de absolvire in anul 1973.

Acest program postuniversitar, s-a desfășurat neîntrerupt pe parcursul a 36 de ani (1992 – 2008), fiind absolvit de circa 1400 de cursanți, specialiști cu studii superioare, în principal din domeniul tehnic (peste 95% dintre absolvenți), dar și din domeniul economic; el reprezintă, fara indoiala, unul dintre programele de învățământ tehnic postuniversitar de success cu cea mai îndelungată existență în România.

În perioada 1976-1980, coordonatorul cursurilor a fost prof. univ. dr. **Vasile Corlățeanu**, iar din anul 1981 cursurile au fost coordonate de către dr. ing. **Ioan C. Bacivarov**.

Dacă inițial acest program postuniversitar avea în vedere în special domeniul *fiabilității* (fiind, de altfel, denumite inițial "*Cursurile postuniversitare de fiabilitate*") și, parțial, pe cel al *mentenabilității*, după 1982 sfera acestora s-a extins, succesiv, spre toate laturile *siguranței în funcționare* (fiabilitate, mentenabilitate, securitate), iar după 1990 în cadrul său a început să fie abordată *întreaga problematică a calității*, privită în sinergia laturilor sale.

Mulți dintre specialiștii români de prestigiu în domeniul calității și siguranței în funcționare în România au funcționat, de-a lungul anilor, ca profesori în cadrul programului academic postuniversitar "*Calitatea, fiabilitatea și mentenabilitatea sistemelor complexe*".

Ne face o deosebită plăcere să amintim pentru prima perioadă a cursurilor numele profesorilor universitari **Vasile Cătuneanu, Vasile Corlățeanu, Vasile Nitu, Cezar Ionescu, Tudor Baron**, precum și cele ale profesorilor asociați **Dan Stoichițoiu, Eugeniu Diatcu, Ulrich Wiener, Dumitru Niculescu** ș.a.

Dintre specialiștii care - pentru o perioadă mai lungă sau mai scurtă - au predat cursuri în cadrul programului postuniversitar în domeniul calității și siguranței în funcționare, organizat sub egida catedrei Tehnologie electronică și fiabilitate, amintim, între alții, pe: prof. univ. dr. **Angelica Bacivarov** (testare și diagnoză tehnică, toleranță la defectări), dr. ing. **Marius Bâzu** (fiabilitatea componentelor), prof. univ. dr. **Marieta Dragomirescu** (fiabilitatea aparaturii electronice), prof. univ. dr. **Adrian**

**Mihalache** (teoria reînnoirii, fundamentele matematice ale calității și fiabilității), prof. univ. dr. **Gheorghe Oprișan**, conf. univ. dr. **Rodica Tomescu** (fundamentele matematice ale calității și fiabilității), dr. ing. **Dan Stoichițoiu** (asigurarea și certificarea calității), prof. univ. dr. **Sorin Ionescu**, dr. ing. **Traian Teodoru** (managementul calității), prof. univ. dr. **Ioan Bacivarov** (bazele calitatii si fiabilitatii, abordari moderne în fiabilitate și mentenabilitate, asigurarea și certificarea calității și siguranței în funcționare).

Din enumerarea acestor nume, se remarcă faptul că majoritatea specialistilor romani importanti ai domeniului din ultimele 5 decenii au contribuit la instruirea cursantilor din industrie si cercetare si ceea ce este poate mai important, la sensibilizarea acestora asupra importantei calitatii si sigurantei in functionare.

O influență deosebit de pozitivă asupra acestui program academic postuniversitar, ca și asupra programelor de master care i-au urmat, l-au exercitat proiectul educațional european TEMPUS S\_JEP-11300 "EUROQUALROM" și ulterior programul educațional european ERASMUS/SOCRATES. Astfel, curriculum-ul / syllabus-urile au fost restructurate pentru a fi în concordanță cu cele ale unor universități de prestigiu ale Uniunii Europene (și în special cu cele ale *European Programme in Quality of Complex Integrated Systems - EPIQCS*).

De altfel, având în vedere nivelul acestor cursuri postuniversitare, si - ulterior - a masterului in domeniu, Universitatea "Politehnica" din București a fost acceptată ca membru asociat în cadrul Programului European EPIQCS, finalizat prin Master-ul European în domeniul Calității Sistemelor Integrate Complexe.

### **Proiectul TEMPUS – EUROQUALROM – ancorarea invatamantului postuniversitar de specialitate la coordonate europene**

Cel mai vast și important proiect dezvoltat în cadrul catedrei de Tehnologie Electronica și Fiabilitate în anii '90 a fost desigur proiectul european **TEMPUS S-JEP 11300 "EUROQUALROM"** (coordinator international: prof.dr.ing. **Ioan Bacivarov**, contractor: prof.dr.ing. **Marin Dragulinescu**), program ale carui rezultate au fost apreciat pozitiv și de către organismele în domeniul educatiei ale Comisiei Europene.



Fig.3 - Coordonatorul proiectului educational European TEMPUS, profesorul Ioan Bacivarov, deschizand unul dintre workshop-urile TEMPUS-EUROQUALROM alaturi de profesorii Ioan Constantin, Marin Dragulinescu, Vasile Catuneanu, Bernard Dumon si Tudor Baron (1998)

Proiectul educational „**EUROQUALROM**” a fost dezvoltat in cadrul programului european **TEMPUS - PHARE** in perioada 1996-1999 si la acesta au participat parteneri cu realizari de marca in domeniul calitatii si sigurantei in functionare, in principal din mediul universitar; interfata cu sfera industriei si a serviciilor a fost asigurata prin intermediul a doua dintre principalele organizatii non-guvernamentale romanesti in domeniul asigurarii si managementului calitatii de la acea vreme, respectiv *Societatea Romana pentru Asigurarea Calitatii (SRAC)* si *Fundatia Romana pentru Promovarea Calitatii (FRPC)*

Daca ne referim la universitatile autohtone, trebuie mentionata participarea principalelor universitati romanesti din domeniul **tehnic** (*Universitatea „Politehnica” Bucuresti - facultatea de Electronica si Telecomunicatii si facultatea de Energetica* - ambele facultati avand realizari notabile in sfera ingineriei si asigurarii calitatii si fiabilitatii) si din cel **economic** (*Academia de Studii economice Bucuresti*, de asemenea cu contributii importante in domeniul controlului si managementului calitatii), precum si a altor doua universitati tehnice active in acest domeniu, respectiv universitatile din *Oradea* si *Pitesti*.

Dintre universitatile de prestigiu din Uniunea Europeana participante la proiectul **TEMPUS S\_JEP 11300 “EUROQUALROM”** merita amintite *Institutul National Politehnic din Grenoble* (Franta), coordonatorul Programului Educational European in domeniul calitatii sistemelor integrate complexe - EPIQCS, *Universitatea din Pireu* (Grecia), coordonatorul Programului Educational European in domeniul Managementului Total al Calitatii - EMPTQM, *Institutul pentru Managementul Strategic al Calitatii* din cadrul *Universitatii Erasmus din Rotterdam* (Olanda), *Institutul Politehnic din Torino* (Italia) precum si a universitatilor din Angers si Paris - ENSAM (Franta), Barcelona (Spania), Lisabona (Portugalia), Paisley (Marea Britanie).

Obiectivul principal al proiectului **TEMPUS “EUROQUALROM”** l-a constituit *restructurarea planurilor de invatamant* din facultatile cu profil tehnic (in special electric - electronic si energetic) si economic, in scopul includerii in programele educationale a *problematicii calitatii*, si in particular a *asigurarii, certificarii si managementului calitatii*, in conformitate cu cerintele organizatiilor

economice si cu dezideratele Romaniei de participare la structurile euro-atlantice, ceea ce a implicat si o aliniere la standardele europene in acest domeniu vital.

De asemenea, s-a urmarit *restructurarea cursurilor* in domeniul calitatii si sigurantei in functionare, in conformitate cu cele predate in universitati de elita din tarile Uniunii Europene (UE), ca si *modernizarea metodelor de predare* utilizate in acest domeniu (in principal, prin utilizarea intensiva a *instruirii asistate de calculator si a sistemelor multimedia*).

S-a avut in vedere, de asemenea, problema *asigurarii si managementului procesului educational din invatamantul superior*, inclusiv elaborarea de modele si metrice adecvate *monitorizarii si evaluarii* acestuia.

Acest proiect a fost unul dintre acelea prin care s-au pus bazele sistemului autohton de asigurare si certificare a calitatii invatamantului superior ethnic si economic.

Intr-o prima etapa a proiectului, s-a avut in vedere elaborarea, in cooperare cu partenerii din UE, a unei **strategii de abordare a calitatii** (in special asigurarea calitatii - QA si managementul calitatii - QM) in invatamantul superior - tehnic si economic - din Romania in conformitate cu sistemul utilizat universitatile de profil din Uniunea Europeana.

In scopul realizarii obiectivelor proiectului TEMPUS "EUROQUALROM" au fost formate mai multe *grupe de lucru* avand obiective legate de elaborarea unor strategii optime pentru introducerea problematicei calitatii in invatamantul superior. Intre grupele de lucru cele mai active mentionam pe cele avand ca obiect de studiu: implementarea calitatii in invatamantul superior tehnic, respectiv economic; asigurarea calitatii; ingineria calitatii; managementul calitatii; interfata industrie-invatamant; probleme specifice universitatilor mici si mijlocii, probleme specifice ale asigurarii calitatii in invatamantul superior etc). Concluziile rezultate in urma reuniunilor de lucru au fost prezentate in cadrul mai multor dezbateri/mese rotunde si reuniuni organizate sub egida proiectului TEMPUS S\_JEP-11300-96 "EUROQUALROM", intre care mentionam workshop-urile „*Strategia abordarii calitatii in invatamantul superior tehnic si economic romanesc*” (Bucuresti, 30 noiembrie 1997) si „*Strategii pentru universitatile din Romania si Uniunea Europeana privind invatamantul superior in domeniul calitatii*” (ENSAM Paris, 3-4 Aprilie 1998) „*Programe universitare si post-universitare romanesti si europene in calitate si fiabilitate*” (Oradea, 17-18 mai 1999).

De mentionat ca in atentia Comitetului Director al Proiectului TEMPUS "EUROQUALROM" a stat in permanenta o cat mai buna *diseminare a rezultatelor obtinute*, atat la nivel national, cat si la nivel international, fapt realizat atat prin cele 6 carti si peste 60 de articole si comunicari stiintifice publicate ca urmare a acestui proiect.

Din punct de vedere educational s-a realizat restructurarea -in conformitate cu exigentele europene actuale – a cursurilor universitare si postuniversitare din universitatile partenere. In particular - ca urmare a acestui proiect – in facultatea de Electronica si telecomunicatii din UPB au fost modernizate programul academic postuniversitar in domeniu si a inceput sa functioneze, incepand cu 1996, primul program de studii aprofundate (master) "Ingineria calitatii si fiabilitatii".

Curricula programelor educationale postuniversitar si de master coordonate de catedra TEF au fost perfectionate in mod continuu, astfel incat sa fie in concordanta cu normativele si reglementarile existente pe plan national si international in domeniile calitatii si sigurantei in functionare. S-a pus un accent deosebit pe problematica asigurarii, certificarii si managementului calitatii, fiabilitatii si securitatii fiind introduse mai multe cursuri cu aceasta tematica. Au inceput sa fie studiate - in acest context - normativele din seriile ISO 9000, ISO 14000, ISO 27000, CEI 300, sistemele integrate de management al calitatii, mediului si securitatii, instrumentele moderne ale managementul calitatii totale, metoda six sigma s.a.

De mentionat ca in anii '90 - inclusiv prin intermediul unor programe europene de tip TEMPUS - sunt introduse cursuri (universitare si postuniversitare) de calitate si fiabilitate la majoritatea facultatilor din UPB si in majoritatea universitatilor tehnice importante din Romania; aceasta a contribuit desigur, la o pregatire mai completa a studentilor in raport cu cerintele sistemelor tehnice reale, precum si cu cele ale companiilor producatoare.

## Programele de Master in domeniul calității și siguranței în funcționare

Incepand cu anul 1996 - pe baza experientei acumulate prin programul postuniversitar in domeniu si a programului TEMPUS-EUROQUALROM - a fost implemetat în facultatea ETTI programul de master (studii aprofundate) **“Ingineria Calității și Fiabilității”- ICF**, primul master in domeniu din Romania (cu durata de 1 an). Acest master care a functionat cu succes timp de un deceniu si a fost coordonat de catre profesorul *Ioan Bacivarov*.

Incepand cu anul 2006, avandu-se in vedere noile cerinte ale invatamantului superior, legate de implementarea “ciclului Bologna”, a inceput sa functioneze in facultatea ETTI masterul **“Ingineria Calității și Siguranței în Funcționare în Electronică și Telecomunicații ”** – ICSFET, coordonat succesiv de catre profesorii *Angelica Bacivarov* si *Ioan Bacivarov* ; acesta s-a bazat pe experiența și pe îmbunătățirile aduse – timp de un deceniu – masterului ICF. Avandu-se in vedere , concurenta ridicata de la admitere, precum si evaluarile favorabile privind satisfactia masteranzilor si angajatorilor, masterul ICSFET poate fi considerat drept unul dintre masterele de succes dezvoltate în cadrul facultății ETTI din UPB. Masteranzii au apreciat faptul ca acest master le asigura cunostiintele de specialitate in domenii putin sau deloc abordate in cadrul studiilor de licenta, dar absolut necesare pentru pregatirea exhaustiva a viitorilor ingineri. Este important de mentionat faptul ca majoritatea absolvenților acestui master au fost angajați - în special in compartimentele Calitate-Fiabilitate si/sau Testare-Diagoza - din întreprinderi și companii românești sau multinaționale, pregătirea lor fiind favorabil apreciată de către angajatori.



Fig.4. - Promotia 2016 a Masterului ICSFET, ETTI-UPB

Dintre cadrele didactice din departamentul de Tehnologie electronic si fiabilitate din cadrul ETTI-UPB care si-au adus contributia la succesul acestor programe de master mentionam pe profesorii **Ioan C. Bacivarov**, **Angelica Bacivarov**, **Adrian Mihalache**, **Norocel Codreanu**, **Orest Oltu**, **Iulian Năstac**, **Lucian Milea** s.a.

De menționat faptul că unele dintre cursurile de specialitate privind asigurarea și certificarea calității și fiabilității, managementul calității, securitatea sistemelor informatice, standardizare si legislatie în domeniu, controlul calității proceselor tehnologice ș.a. au fost ținute de catre cunoscuți specialiști în domeniu din *Societatea Română pentru Asigurarea Calității – SRAC* (dr. ing. **Dan Stoichițoiu**, dr. ing. **Cristinel Roncea**, dr. **Gabriel Ionescu**, s.a.), *Institutul pentru Microtehnologii-IMT* (dr.ing. **Marius Bazu**), *Academia de Poliție “Al. I. Cuza” București* (conf. dr. ing. **Ioan Cosmin Mihai**), *Asociația Română pentru Asigurarea Securității Informației – ARASEC* (dr.ing. **Costel Ciuchi** si dr.mat. **Luminita Copaci**). Aceasta a permis ancorarea cursurilor predate la problemele reale ale economiei si societatii europene, in general, si romanesti, in special si a favorizat integrarea rapida a absolventilor in companiile de profil.



Fig.5 - Juriul comisiei din cadrul ETTI-UPB pentru sustinerea examenului de disertatie din cadrul Masterului ICSFET, prezidat de prof. Ioan Bacivarov (iunie 2016)

De mentionat ca gratie programelor educationale europene de mobilitate *ERASMUS/SOCRATES* un numar de circa 40 de masteranzi ICSFET au putut efectua stagii educationale de cate 3 luni la universitati din Uniunea Europeana (cu precadere la *ISTIA – Universitatea din Angers*, Franta, cu care laboratorul *EUROQUALROM – ETTI – UPB* are excelente relatii de colaborare educationala si stiintifica), unde si- au elaborate si lucrarile de disertatie. In acelasi timp, 18 studenti francezi de la Universitatea din Angers si-au efectuat stagiile *ERASMUS* in cadrul laboratorului *EUROQUALROM* in ultimul deceniu.

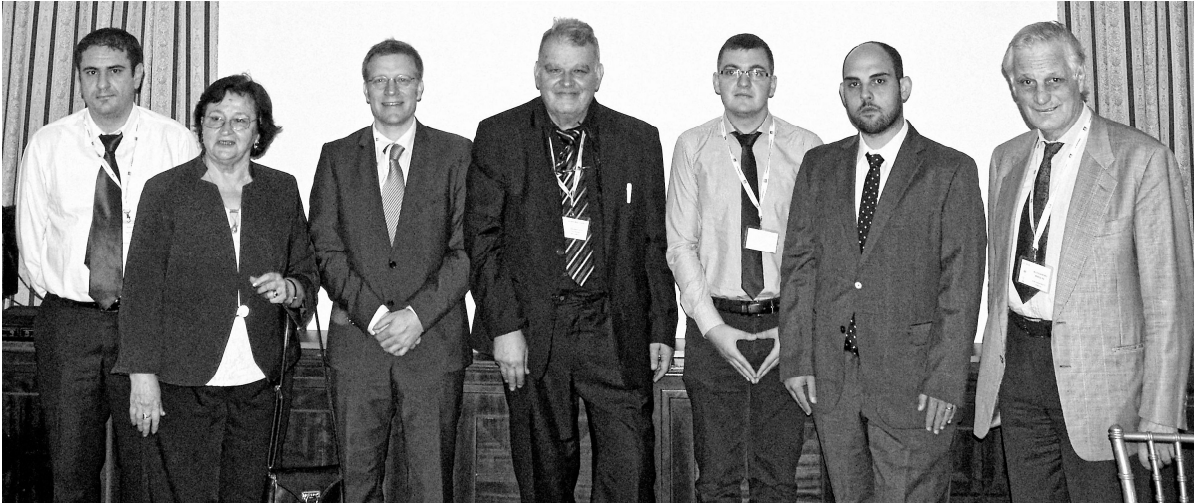
## Doctoratul in domeniul fiabilitatii

Primii profesori care au primit dupa 1971 dreptul sa conduca doctorate in fiabilitate in I.P.B. in domeniul electronicii si respectiv al automaticii au fost profesorii **Vasile Catuneanu** (*Electronica*), si ulterior, **Dumitru F. Lazaroiu** (*Automatica*).

Sub conducerea acestora si-au finalizat doctoratele tinere cadre didactice din mediul universitar: **Ioan Bacivarov** (1978), **Adrian Mihalache** (1979), **Angelica Bacivarov** (1980), **Ioan Hohan** s.a., dar si tineri cercetatori in domeniu, intre care **Dan Stoichițoiu**, **Eugenie Staicut** si **Ioan Tutoveanu**.

Dupa schimbarile politice din decembrie 1989, se remarca si un reviriment in invatamantul superior: dupa un deceniu de stagnare, avansarile in invatamantul superior sunt deblocate si cadre didactice

performante primesc dreptul de a conduce doctorate in domeniul fiabilitatii incepand cu 1991: **Ioan Bacivarov** in telecomunicatii (sub egida ICTc), **Angelica Bacivarov** si **Adrian Mihalache** in electronica (sub egida ICPE, respectiv ICE). Sub conducerea acestora isi finalizeaza tezele de doctorat cercetatori importanti in domeniu intre care *Marius Bazu, Traian Teodoru, Marcu Buse* s.a.



*Fig.6 – Doctoranzii in domeniul sigurantei in functionare coordonati de prof. I. Bacivarov au prezentat lucrari in cadrul conferintelor internationale CCF*

Dupa anul 2000, in contextual restructurarii invatamantului superior tehnic in conformitate cu “ciclul Bologna” are loc si o restructurare a doctoratelor si - din pacate - *fiabilitatea* dispare ca specialitate de doctorat. Totusi, profesorul **Ioan Bacivarov**, a fost acreditat ca, incepand cu anul 2000, sa conduca doctorate in domeniul “*inginerie electronica si telecomunicatii*”, iar sub conducerea sa sunt finalizate - mai multe teze de doctorat valoroase in domeniul fiabilitatii si securitatii IT, cum sunt cele elaborate de catre *Alin Mihalache, Razvan Lupan, Florina Babus* (teze de doctorat coordonate in co-tutela impreuna cu profesori de la departamentul Calitate-fiabilitate al Universitatii din Angers, Franta), *Ioan Cosmin Mihai, Costel Ciuchi, Luminita Copaci* s.a.



Fig.7 - Profesorii B.Dumon si A.Kobi (ISTIA- U. Angers, Franta) si I.C. Bacivarov (U.P. Bucuresti) alaturi de doi dintre doctoranzii pe care i-au coordonat in co-tutela, R.Lupan si A.Mihalache (Angers, 2004)

### **Consideratii finale**

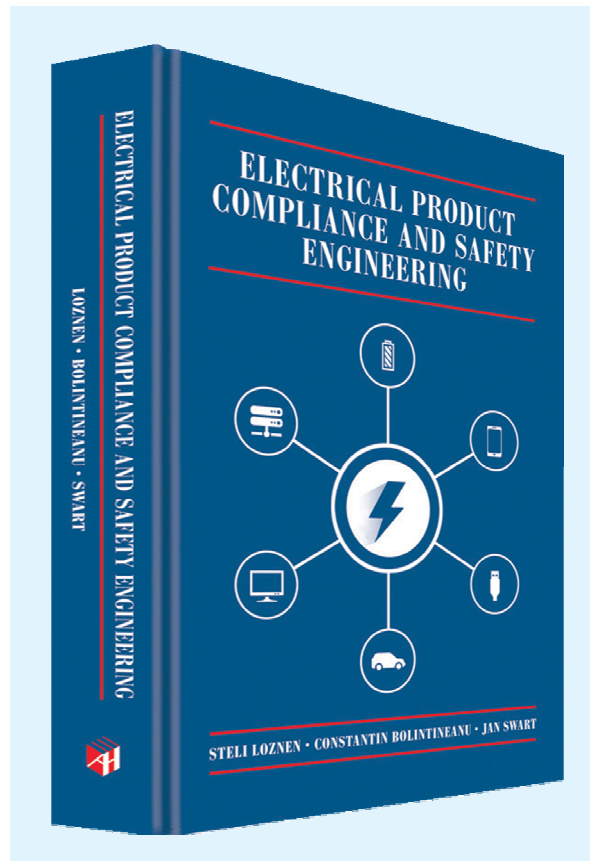
La acest moment de bilant putem afirma că dincolo de cunoștințele tehnice, economice sau manageriale pe care le-au transmis cursanților, cursurile postuniversitare si programele de masterat în domeniul calității și siguranței în funcționare organizate sub egida colectivului de specialitate din catedra/ departamentul TEF au meritul de a fi *sensibilizat* un mare număr de cursanți din domeniile tehnic și economic sau din sfera serviciilor, asupra importanței instrumentelor și abordărilor moderne, precum și a legislației din acest domeniu interdisciplinar de mare actualitate.

Dupa aproape cinci decenii de invatamant tehnic superior si cercetare stiintifica in domeniul calitatii si fiabilitatii in electronica si telecomunicatii se poate vorbi astazi de o adevarata “scoala romaneasca” in domeniu, ale carei realizari sunt cunoscute si apreciate atat la nivel national, cat si international: au confirmat-o, in cadrul unor importante conferinte internationale in domeniu (intre care *ESREL*, *QUALITA*, *CCF*) importanti specialisti internationali in domeniu, intre care profesorii: *A. Birolini*, *A. Barreau*, *Ton van der Wiele*, *E. Zio*, *Michele Cano*, *A. Goncalves*, *A.Kobi* s.a. Cele peste 40 de carti si 700 de articole si comunicari stiintifice publicate in tara si strainatate de catre membrii colectivului de calitate si fiabilitate din departamentul **TEF**, ca si cele peste 50 de contracte de cercetare stiintifica

nationale si international coordonate de catre acestia sunt un argument in aceasta directie. In plus, numeroasele reviste tehnice pe care le-au creat / coordonat, conferintele nationale / internationale de specialitate pe care le-au initiat si condus, sunt un argument in aceasta directive.

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## BOOK LAUNCHING

**Steli Loznen, Constantin Bolintineanu, Jan Swart**

***Electrical Product Compliance and Safety Engineering***

Artech House, 2017, ISBN 978-1-63081-011-5, 400 pages, \$149.

Electrical products are increasing in complexity and diversity, leading to an increase in product-related harms. Since electrical products are becoming more sophisticated, there are more complex aspects linked with the *Compliance* and *Safety*. It is unanimously accepted that the manufacturers around the world have responsibility to produce products that satisfy the safety expectations of society.

The growing field of Compliance and Safety, as a global function acts as a cross-functional discipline which has a direct impact on people's lives. The term 'safety' has many different connotations and it can be related to many different concepts such as occupational health and safety, road safety or product safety.

Majority accept that *products safety issues* are important in customer and professional areas, engineering, management and other fields. This aspect is obvious due to the fact that products compliance and safety is now a global issue, because markets are global.

Publishing the book *Electrical Product Compliance and Safety Engineering*, **Artech House**, a prestigious publisher located in London and Boston, intended to develop an attitude, an approach, and a concept for the professionals in the field.

Actually, a large amount of information related to Product Compliance and Safety can be found, but spread in many sources without a unitary presentation. *Electrical Product Compliance and Product Safety* it is the first book which put together the main information in the field, becoming a comprehensive resource designed to guide professionals in product compliance and safety in order to develop safer and profitable products.

The first goal of the book is to present the basics of *Product Compliance and Safety*, considering the key actions for implementing these issues. There is a second purpose, equally important: to promote the idea that on developing and manufacturing an electrical product need to have developed a *culture of compliance*

*and safety*, to show the importance of this discipline in our days and the necessity to support their goals, as a discipline, in achieving a given level of Safety, as a key characteristic of any electrical product.

Even more important, this book is aimed to show to industry managers the reasons for taking into account the compliance and safety issues, even from the design phase and then during the whole life cycle of any electrical product. It was proved that the only way to promote compliance and safety requirements is top-down, starting from the manager and going down to every worker.

The content of the book, divided into sixteen chapters, was chosen to provide background on why need to know Compliance and Safety Engineering for Electrical Products and how to use the information provided.

Chapter 1 examines **Why Electrical Product Compliance and Safety** need, by referring to Product Compliance and Safety in 21<sup>st</sup> century, Electrical Product Safety Legislation and Liability, Designing for Safety and Safety Cost Estimation

Chapter 2 makes an introduction to **International Regulations and Global Market Access** Regulations, addressing the Regional regulations and how they differ, CE Marking, National Recognized Testing Laboratories (NRTL), IECCE CB Scheme, Product Certification Marks and the ISO Registration Process.

Chapter 3 addresses the **Products Safety Standards** and Standardization presenting what is a standard and his structure; what means the conformity to standards; which types of Products Safety standards exist and which are their objectives, grouping in the final of the chapter the main Standards development organizations.

Chapter 4 covers the **Electrical Products Safety Philosophy** analyzing the concepts of Safety, Reliability, Product Safety, Perception of the Risk, Failure, Single Fault Safe, Redundancy, Safety Factors, concluding with the differences between Work Safety and Product Safety.

Chapter 5 introduces the **Methods for Failure Analysis**: FMEA, FTA, HAZOP, AEA and ETA.

Chapter 6 presents the **Risk Management for Product Safety**, by detailing the process: Identification of Hazards, Estimation of the Risk, Risk Evaluation and Risk Control. Dedicated sub-chapters are for Functional Safety and for Standards used for Risk Management.

Chapter 7 deals with the **Electrical Products Safety Concepts**: Means of Protection, Insulation Diagram; Safe Current and Voltages Limits; Leakage Currents, Spacing: Air Clearance and Creepage Distances, Grounding, Fire, Electrical, Mechanical Enclosures; Ratings; Type of Circuits, Normal Load and Abnormal operating conditions.

Chapter 8 is dedicated to **Selection of Components**: Semiconductors, Passive components, Temperature control devices; Motors, Fans, Thermoplastic materials, Terminal Blocks, Connectors, Internal Wiring

Chapter 9 examines the **Batteries**: secondary and primary, including the main applicable standards; a particular attention is paid to Battery Safety Design.

Chapter 10 addresses the **Power Sources** and the associated components: Power Supply Plugs, Connectors and Cord Sets, Fuses, Fuse holders, Power Entry Module, Switches, Varistor, Transformers and Power Supplies

Chapter 11 describes typical **Product Construction Requirements**: Enclosures, Circuit Separation, Grounding and Bonding, Resistance to Fire and Flame Rating, Interlocks, Moving Parts, Part subject to Pressure, Constructive aspects related to EMC. Information about Serviceability makes the object of a special sub-chapter

Chapter 12 looks at **Markings, Indicators and Accompanying Documents** describing the Internal and External marking, Safety labels, Marking of controls and instruments, Color of indicators. User's Manual and Installation Instructions, Safety instructions, cautions and warnings.

Chapter 13 addresses **Human Factors and Product Safety**, pointing in the followings: Operator and Service Personnel, Human Factors, Ergonomic Hazards.

Chapter 14 (the largest part of the book) is dedicated to **Testing for Compliance and Safety** and consists of: Kind of Product Basic Safety and EMC tests, Information typically required for Product Basic Safety and EMC testing, Work Safety in a Product Basic Safety and EMC testing laboratory, Equipment used on Product Basic Safety and EMC Testing, General testing conditions, Product Basic Safety Testing, EMC Testing and Software Testing.

Chapter 15 examines how **Manufacturing a Safe Electrical Product** by referring to: Responsibility of the Manufacturer, Supply chain, Manufacturability, Integration and Routine Tests (Production Line Testing)

Chapter 16 provides some inputs on the **Education and Training for Compliance and Product**

**Safety Professionals** analyzing the Compliance and Product Safety Engineering in Senior Design Courses; Training Resources Development and the Professional Certification.

The **Glossary of Terms** and **Acronyms** included in the Appendix helps as a quick reference to deal with the issues at hand.

The authors have structured this book in an easy to read and follow fashion, from product design considerations, to manufacturing and prototyping, conformity assessment necessities and the sustaining engineering principles. Also, they have provided a logical and meaningful contribution to the overall process of facilitating the entry of safe products into the various global markets.

A strong point which recommends this book are the authors: **Steli Loznen**, **Constantin Bolintineanu** and Dr. **Jan Swart**, three well known specialists and experts in the field, with a long experience in the domain of Compliance and Safety, Standardization, Testing, International Regulations and Failure Analysis.

***Electrical Product Compliance and Safety*** is an essential reference and text book that will prove of great importance for all professionals involved in the design, manufacturing, testing, servicing and marketing of electrical products, as well is intended also for instructors and students on electrical and electronics departments of Engineering Universities, by adding to the training syllabus an issue which was neglected until today.

Consequently, I highly recommend this book, which is among the best ones in its category.

Professor **Ioan C. BACIVAROV**, PhD  
Director of EUROQUALROM- ETTI laboratory  
University “Politehnica” of Bucharest, Romania  
Editor-in-Chief “*Asigurarea Calitatii -Quality Assurance*”  
Editor for Europe “*Quality Engineering*” (U.S.A.)

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