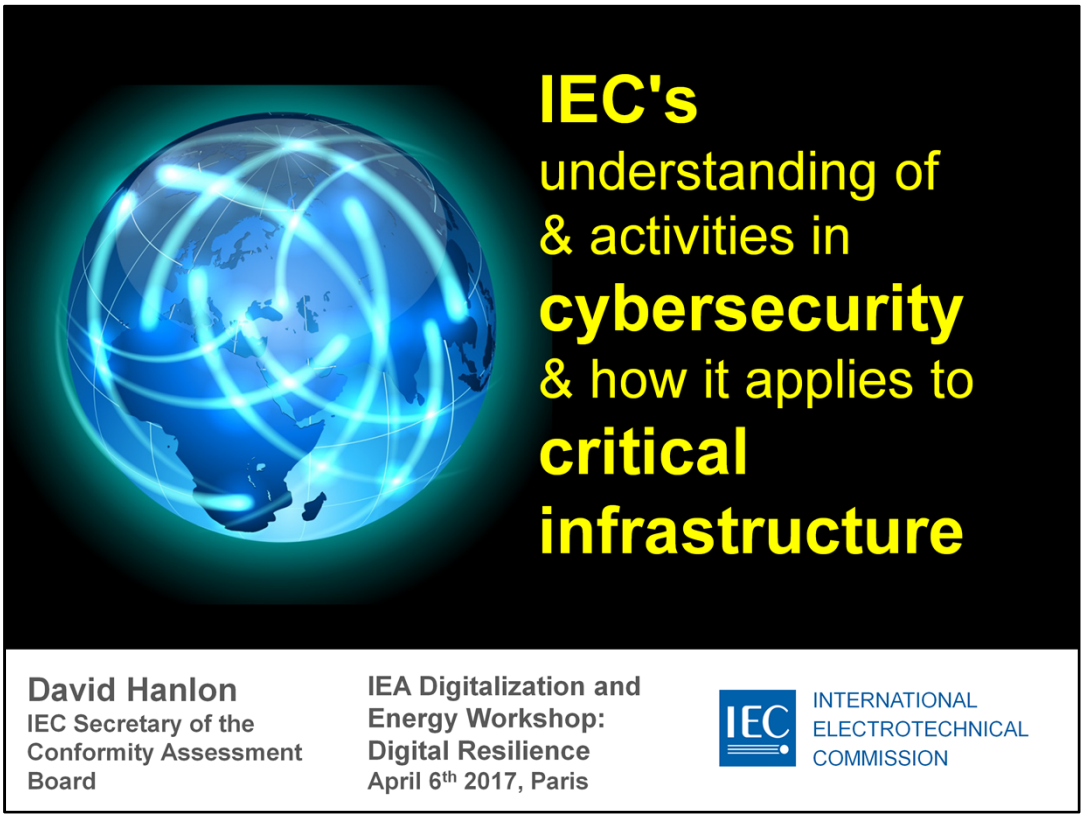
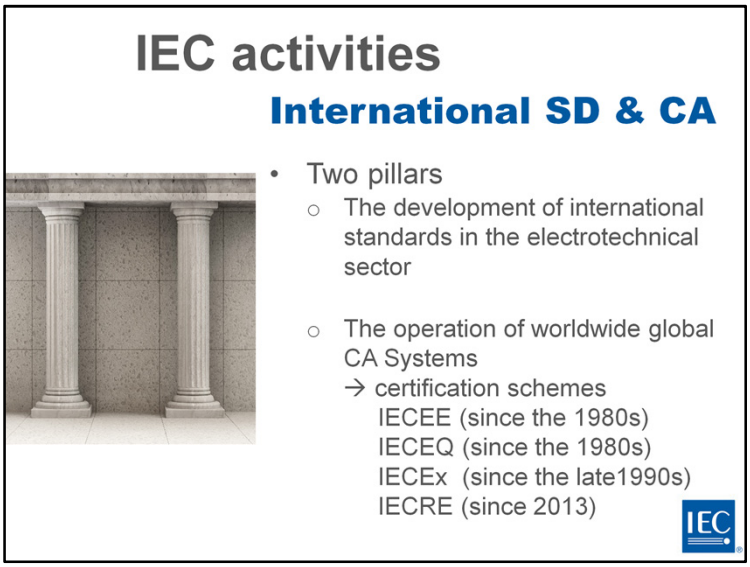


Good morning / afternoon.
My name is David Hanlon.
I am the Secretary of the IEC Conformity Assessment Board.

My presentation today is titled
IEC's understanding of and activities in cybersecurity and how it applies to critical infrastructure

Although that is rather a long title, I'll try to keep my presentation short and interesting.



Many of you may know the IEC as an international standards development organization.

And this is certainly true.

But IEC stands on two pillars, not only the development of international standards,
but it also operates 4 worldwide global conformity assessment systems.

The IECEE, for certification of consumer and industrial products,
IECQ, for business to business supply chain certification
IECEx, for certification of products, people and services in the explosive atmospheres sector, also known as HAZLOC areas,
and our newest CA System, the IECRE, for renewable energies in the wind, marine and PV solar sectors.

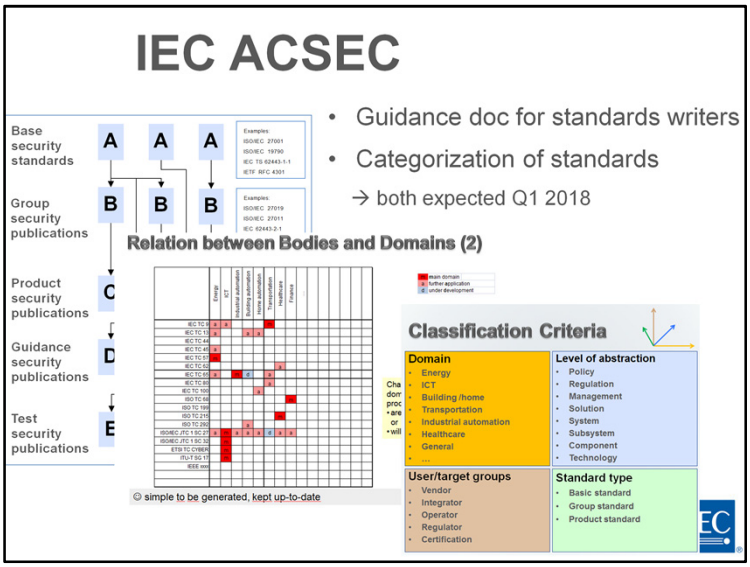
Almost a million certificates have been issued through the IEC CA Systems, with more than 90’000 certificates currently being issued each year.

For the IEC cyber security became an important issue about 3 or 4 years ago.

On the standards development side an advisory committee on security, or ACSEC, was established to investigate the current situation of cybersecurity in international standards.

The initial investigation revealed a list of more than 650 standards containing cybersecurity elements,

developed by more than 50 standards development organizations including IEC, ISO, ITU, IEEE, CEN, CENELEC, ANSI, BSI, NIST, DIN, DKE, ETSI and about 40 more.



ACSEC was then given two tasks:

- Firstly it was to create a guidance document for IEC standards writers called IEC Guide 120 – Security aspects – Guidelines for their inclusion in publications

- And secondly it was to create a landscape view of all of the IEC standards mapped to a number of categories given in the guidance document.
  The categories include the application domain, the user target group, the type of content, and so on.

Currently a draft of the guide has been written and has been through a first round of commenting.

It has yet to go through a number of editing and commenting rounds, and is expected to be completed in Q1 2018.

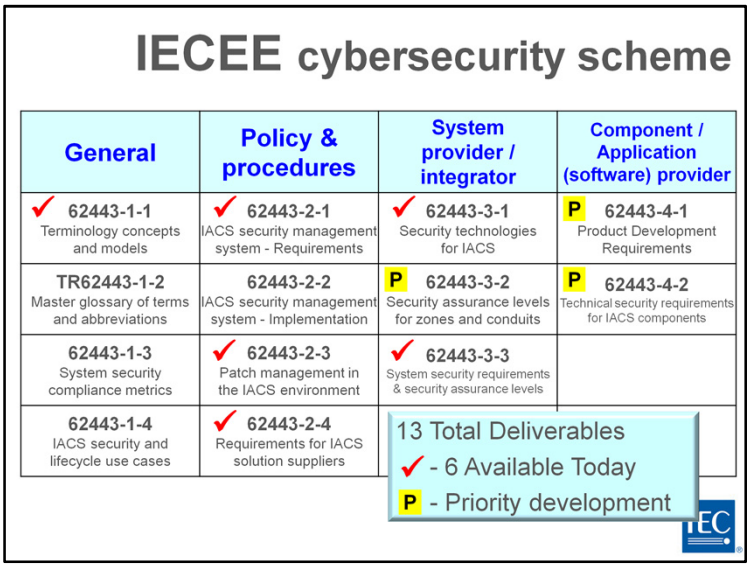
The mapping exercise is started, and is also hoped to be completed by Q1 2018.

On the Conformity Assessment side, two separate initiatives have been launched.

- Firstly, at an operation level, the IECEE is working to establish a cybersecurity certification scheme for the industrial automation sector.

It needs to be mentioned that all of the IEC CA services exist because the various market sectors requested those services.
IEC only starts a new service if it is asked to do so.
The Industrial Automation sector asked the IECEE to create this scheme for it.
And IECEE is working with the Industrial Automation sector to fulfill their needs.

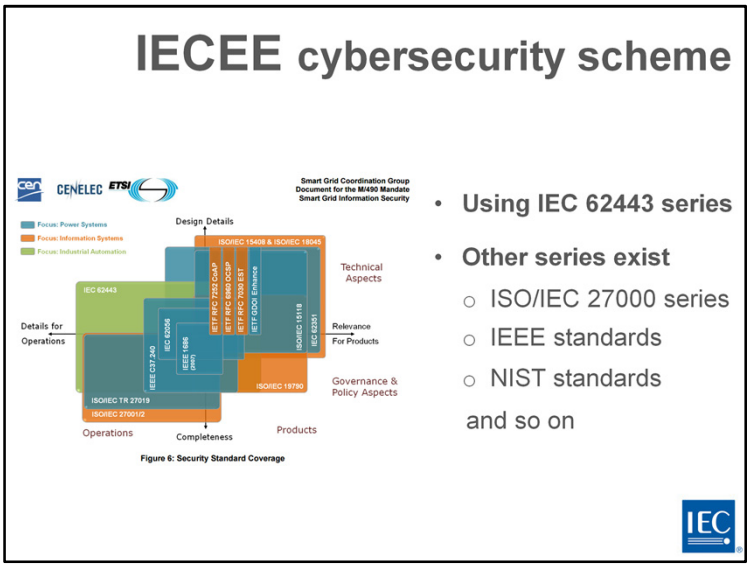
- Then the second initiative, at a helicopter level, a working group was established to try to understand the needs of cybersecurity on a global level across sectors.
  This is CAB WG 17.



To put in place a global cybersecurity certification system for the Industry Automation sector, the IECEE is working with the IEC 62443 series of standards.

This is a series of standards that covers security requirements for providers of integration and maintenance services for Industrial Automation and Control Systems (IACS).

The entire series is expected to contain 13 standards, of which 6 are available today, while three others are being developed in priority.



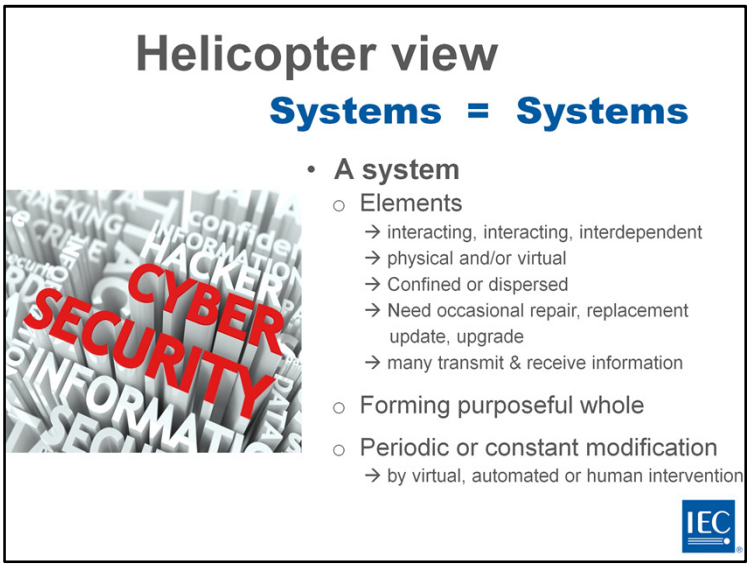
The IECEE is using the IEC 62443 series for its global cybersecurity conformity assessment system.

But the IEC 62443 series is not, of course, the only series of standards that covers a full range of cybersecurity issues.

The ISO/IEC 27000 series also cover cybersecurity, but they are more focused on information technology infrastructures.
Then there are IEEE standards and NIST standards, and so on.

It's also true that there is much overlap between all of these standards series.

And this is perhaps the most important understanding to come out of the other IEC conformity assessment initiative.

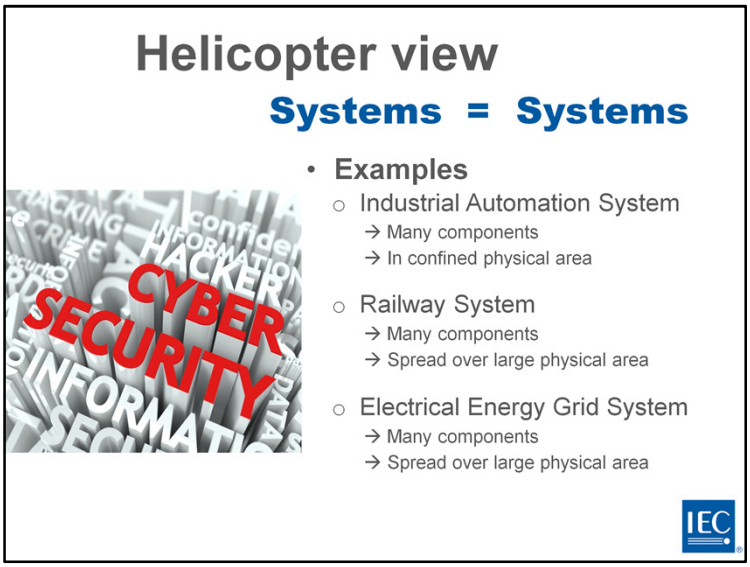


The second conformity assessment initiative for cybersecurity was a helicopter view of cybersecurity needs across application and market sectors.

What this group found, across applications and sectors, was that the needs are very similar.

It also realized that the root cause of this was simply because all technical systems are very similar.

If we consider a system to be a group of interacting, interrelated, or interdependent elements forming a purposeful whole, and that those elements can be physical and/or virtual, and that they can be confined to a limited physical location, or spread out over a large physical distribution, and that they need periodically to be repaired, replaced, updated or upgraded, and that many of those elements transmit and receive information between themselves and are, or could be, in some way connected to the internet, and that the whole system itself is periodically or constantly undergoing modification and development through interventions that could be virtual, automated or human, then, the needs for cybersecurity protection of systems become pretty generic.



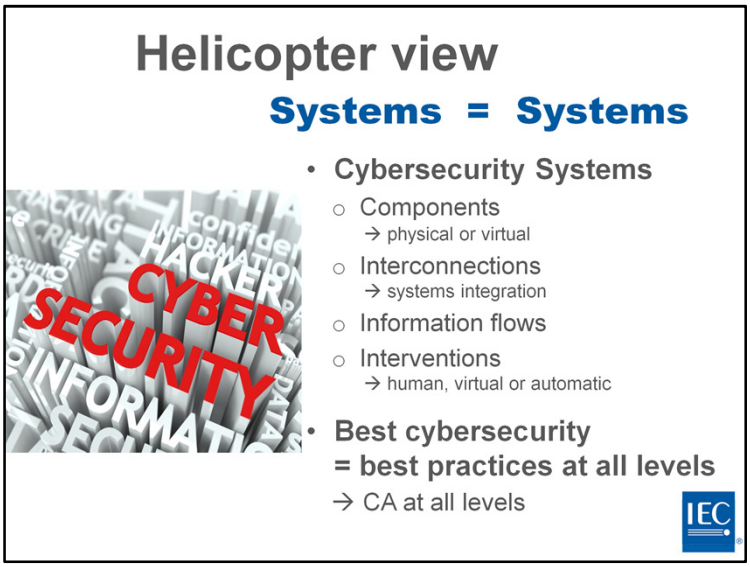
As examples,
An industrial automation system is many components connected together generally in one physical location that is relatively limited in size.

A railway system is many components connected together but spread over a large physical area.

An electrical energy system could be a centralized generation plant consisting of many components connected together and connected to a transmission and distribution system that are themselves made up of many components, and the whole is spread out over a wide area.

And of course I could give you many other examples of systems.

Although physical security requirements my vary significantly between these system,
the cybersecurity requirements will be very similar.

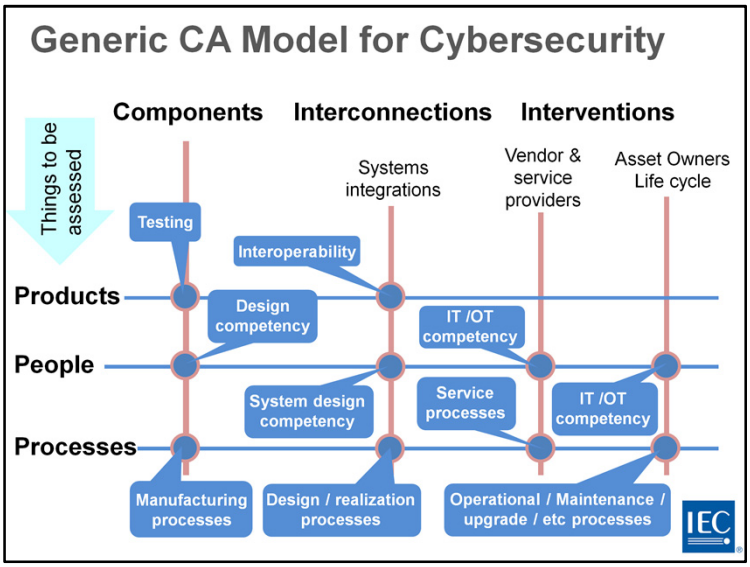


Generically speaking, the systems that concern us for the issue of cybersecurity are made up of
components (which can be physical or virtual),
interconnections (the systems integration),
information flows, and
interventions (which can be human, virtual or automatic).

To ensure best cybersecurity coverage for the system as a whole, best practices need to be applied for each of these elements.

The way to ensure the application of best practices is through the assessment of the conformity to those best practices.

For this reason the group developed a generic conformity assessment model for systems.



All technical systems consist of components, interconnections (also known as systems integration), and interventions (which can be human, virtual or automatic).

Interventions can be such things as building the system, or operating the system, maintaining the system, or providing services for the system, and so on.

Conformity assessment simply means assessing the conformity of something, to some agreed requirements.
The something, which is referred to as the object of conformity, can be components or products, or can be people, or can be processes.

Conformity assessment, occurs at the intersections, of the horizontal and vertical perspectives.
And systems conformity assessment is the overall matrix of CA activities.

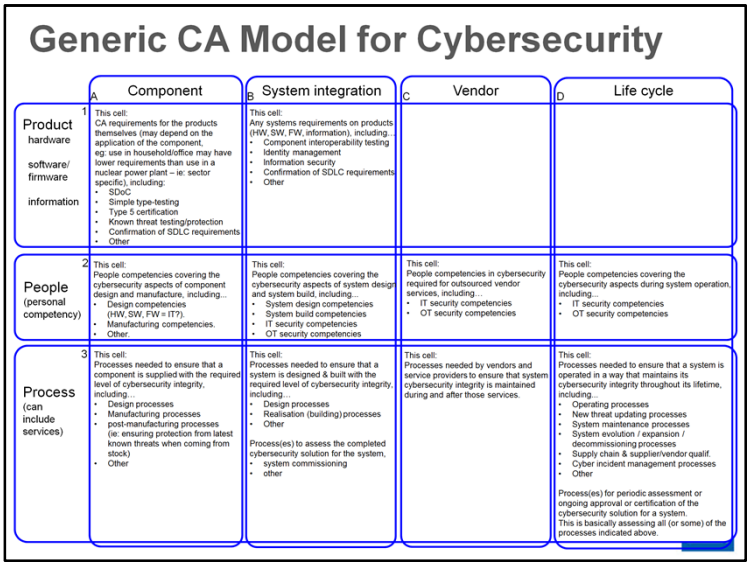
For example, in the case of components, they can be tested against a standard, but so can the manufacturing process, to ensure that the components are always built to be conformant.

And even before this, the design process for the component can be assessed and approved as can the competencies of those doing the designing.

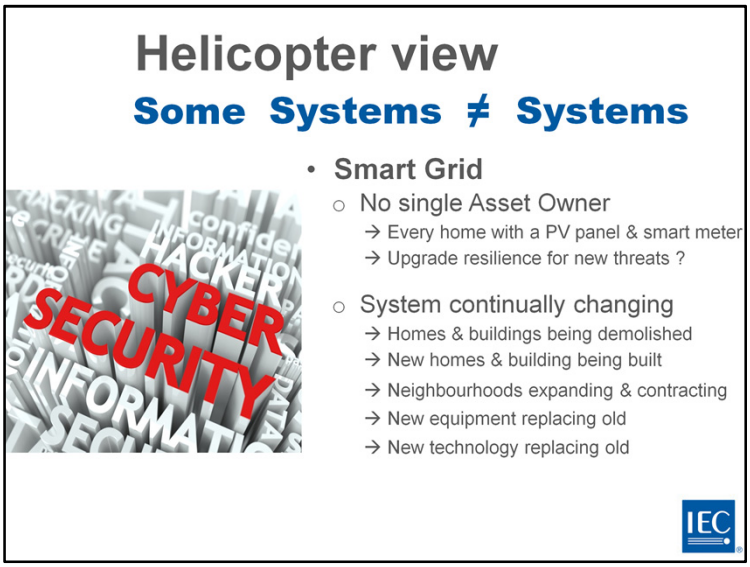
At the systems integration level, design and implementation processes need to be followed correctly by people with the appropriate competencies.

And at the Asset Owners level, correct operating procedures, maintenance procedures, enhancement procedures, and so on, by qualified persons, need to be ensured.

This is how conformity assessment of an entire system is done.



This is the same model but showing a little more detail.



A particular issue with electrical energy distribution systems, that will become more and more problematic, is that {click} there is no single asset owner.

For example the smart grid.

The smart grid will have many many owners.

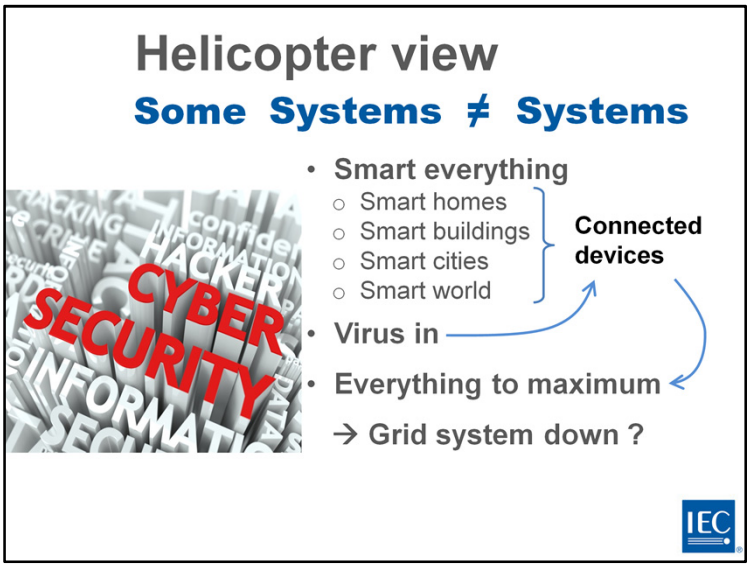
Each house with a PV panel on its roof, and a smart meter, will be one of many joint owners of the system.

How will all those smart meters be kept up to date, and resistant, to evolving cyber threats ?

Additionally, the smart grid will be a living system.

It will be continually changing as buildings get torn down, new ones are constructed and neighborhoods expand or contract.

How can the integrity of the entire system be assured ?



And as a final question to reflect on,

As our homes, building and cities all become smart, with many components, devices and equipment, including industrial and consumer products,

And all of these components and devises and equipment can all be monitored and controlled remotely,

Imagine if all of these components were to be infected by a virus and a hacker could switch everything on, or to a maximum power level, all at the same time.

Would this bring down the grid system ?

Does this mean that critical systems for electrical energy, cannot be protected unless all connected devices are cyber safe ?

Thank you

David Hanlon
IEC Secretary of the Conformity Assessment Board

IEA Digitalization and Energy Workshop: Digital Resilience
April 6th 2017, Paris

INTERNATIONAL ELECTROTECHNICAL COMMISSION