Interview

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When common people "think" about nuclear, the feeling is on energy production or "bomb" technology. De facto, scientists use a large amount of nuclear data for different research activities. How is the preservation of this fundamental knowledge handled, being an invaluable resource for nuclear science?

Yes; 'Nuclear Data' is the fundamental underpinning need for all the applications that involve nuclear reactions or 'nuclear phenomena'. It is not only important to preserve the invaluable nuclear data, but it is also essential to continuously update and add new data to incorporate the recent research work done all through the world. And, while doing so, it is indeed necessary to validate and check the published data. Recognizing the important role of nuclear data for the nuclear community, the IAEA has been providing 'Nuclear Data Services' since more than 50 years. The Nuclear Data Section, through engagement of experts on different aspects of nuclear/atomic/molecular data development and assessment, provides a variety of databases to suit the needs of researchers from different fields of specialty. One may visit the nuclear data services page (https://www.iaea.org/resources/databases/nuclear-data-services) for more details. It may also be of interest to know that an App, "Isotope |Browser", that can provide the properties of more than 4000 isotopes, suitable for i-phones as well as android devices, has been developed and can be freely downloaded (*http://play.google.com/store/apps*).

People often misconstrue nuclear applications as risky. The IAEA is attempting to raise awareness on the health benefits of many nuclear applications. How are nuclear applications used for human health and what are the future challenges?

Nuclear and radiation technologies have several applications in health-care. The most well-known and perhaps the oldest application is in treatment of cancer. The use of radiations from radioisotopes such as Cobalt-60 (known as teletherapy) or by placing radioactive material (such as Gold-198 wires or Iridium-192 sources) in contact with cancer lesions (known as brachytherapy) has been practiced successfully to treat localized cancers for several decades. The recent trend is to move from radioactivity-based teletherapy to use of x-rays or electron beams produced in linear accelerators instead of the gamma rays from Cobalt-60. In recent years, the use of energetic heavy ions such as protons or carbon ions prepared in particle accelerators for therapy is increasing. This field is generally known as 'Radiation Therapy'.
Nuclear medicine is another branch of medicine which employs 'Radiopharmaceuticals' which are biomolecules labelled with radioisotopes. Radiopharmaceuticals, when administered, get distributed into the body through a biochemical path and are hence used to obtain information about internal organs or cancer lesions or functioning of organs, as well as for treatment of diseases such as cancer or hyperthyroidism. Radionuclides emitting radiation with high linear energy transfer are used for therapy while radiations with low linear energy transfer are used in diagnosis. The most well-known diagnostic radioisotopes in nuclear medicine are Technetium-99m and Fluorine-18, used in more than 40 million procedures all over the world.
Apart from these, high energy radiations (either gamma rays or electron beams) are also used for medical ster-

ilization and irradiation of blood/tissues to make them suitable for transfusion.
The major challenge in using radioisotopes is the stable sustained availability of radioisotopes, as they cannot be stored and need to be continuously produced in reactors or particle accelerators.

In your opinion, can education and training in the nuclear field modify the risk perception of nuclear introducing a more complete vision of these technologies?

Yes; certainly education and awareness about nuclear technologies and their beneficial uses in making our life better, safer and comfortable, would make a difference. It is important for the society to know the benefits and also understand that every technology needs to be practiced in a safe and proper way. Every technology has associated risks and need to be handled properly so that they can be harnessed to our benefit.

The exploitation of fusion energy is one of the most ambitious challenges humankind is faced with. How important is international cooperation in this field?

Yes; harnessing fusion energy is a very ambitious goal and it is indeed extremely complex to practically mimic the sun on earth, albeit on a much smaller scale! The multiple challenges associated with the 'fusion energy harnessing' make it imperative that several highly talented and experienced researchers work towards the same goal in unison. In addition, the costs involved are very huge. Hence, in order to achieve success researchers around the world need to work together and share results and experiences to move forward. In other words, 'international cooperation' is vital and absolutely essential. This is why the IAEA works towards bringing the fusion community together and facilitating co-operation among them.