



HEALTH
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MEDICAL IMAGING EQUIPMENT
AGE PROFILE & DENSITY

COCIR EXECUTIVE SUMMARY EDITION 2014

SUSTAINABLE COMPETENCE IN ADVANCING HEALTHCARE

European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry

COCIR



FOREWORD ALARMING KEY FINDING ON AGEING EQUIPMENT



Since 1996, COCIR has closely monitored the ageing of medical imaging equipment and distributed the findings through various publications (one in 2003, one in 2009).

This publication is providing an executive summary of the findings based on data collected at the end of 2013.

A more in-depth publication will include additional elements further substantiating the findings already highlighted in this publication.

If the current trend is not reversed, European healthcare systems will be unable to meet the challenges of the next decade, including the ageing of its population and workforce, the increase of chronic diseases, patient security and quality expectations and healthcare system sustainability in the widest sense.

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COCIR Secretary General

19 May 2014



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1. INTRODUCTION

AUSTERITY MEASURES CAUSE DECLINE IN UPTAKE OF INNOVATION

COCIR's latest figures on the type, number and age of diagnostic imaging equipment (the installed base) in Europe, highlight a worrying consequence of the broad austerity measures European countries have been exacting on their healthcare delivery systems.

These figures demonstrate that in many countries the installed base is the oldest it has ever been and this comes at a time when healthcare systems need to adjust to increased demands, and when the European Commission is promoting investment in health and innovation as an essential element to lead Europe's economic recovery.

COCIR believes that short-term financial accounting must not be allowed to jeopardise the sustainability of Europe's healthcare systems. Countries are urged to invest in healthcare, to encourage the uptake of innovative technology and solutions that can help transform the delivery of care. COCIR sees an important role for the EU in this matter.

COCIR INSTALLED-BASE FIGURES REVEAL:

1. Dramatic inequality in access to healthcare across Europe
2. Oldest recorded Installed-base in many countries
3. Growth in use of technologies more than 10 years old
4. Overall slowing in uptake of Technologies that enable better access & quality
5. Some countries still not addressing lack of MR and PET

2. WHY AGE OF MEDICAL IMAGING EQUIPMENT MATTERS

Innovation in the field of Medical technology continues to bring solutions and services to the market that provide new tools for healthcare professionals to expand the breadth and capabilities of healthcare systems; increasing the possible efficiency gains to be achieved by examining patients faster, enabling improved image collection and quality, increasing patient comfort, supporting decision making, all of which allow for improved patient throughput.

Image guided planning and treatment support the development of less invasive and more efficient treatments, creating a rapid rise in day surgery essential to manage the ageing population, while driving patient-centric care pathways that can improve the efficiency and productivity of healthcare. At the same time, efficient treatment monitoring systems accelerate treatment decisions and reduce the cost associated with drugs which might be providing little or no therapeutic benefit to certain patient groups.

Every year advances in engineering provide incremental gains, and an occasional major breakthrough like low-dose CT capable of revolutionising image capture and quality with a much reduced radiation dose to the patient. These gains deliver better accuracy, specificity and patient benefits that extend the utility of medical imaging equipment. Clearly, the age profile of electro-medical equipment within a healthcare system can be considered a significant factor in attaining these benefits.

Unsurprisingly, as technology ages it becomes less suited to, and often incapable of, performing at the levels demanded by the increasing pressures afforded by the cumulative growth in patient throughput, and the requirements of progressive medical

guidelines. Indeed the growth in healthcare demand and progression of clinical expectation fuels investment in medical technology R&D focussed on providing clinicians with unprecedented visual and functional information on their patients, and faster more intelligent diagnostic imaging systems that support decision making, reduce complexity, and increase productivity.

Since advances in technology are often incremental, the industry offers upgrades that can help extend the life of equipment over a defined period of time, however as technologies become obsolete a variety of technical incompatibilities e.g., in equipment control, and the redesign of components, renders continued updating of equipment uneconomical, if not impossible.

Older equipment also involves a higher risk of failures or breakdowns. This may endanger the health and safety of patients and medical staff, and could also lead to considerable delays for essential medical interventions while the equipment is out of service. Although this situation can partially be avoided through timely and regular maintenance, the operating cost of such equipment tends to be higher than that of up-to-date electro-medical equipment, leading to higher net costs for the provision of similar medical services using older equipment.

3. COCIR'S GOLDEN RULES

A sound mix in the age profile of installed equipment is essential for healthcare systems driving for efficiencies and productivity gains. Since the late nineties, COCIR has been collating statistics and proactively supporting countries monitor their installed base. In 2003 COCIR drafted a pragmatic and prudent set of '*Golden Rules*'¹ to further support the evaluation of medical equipment installed-base and to aid procurement decisions. The rules resulted from a detailed analysis of the incremental benefits afforded by the new development arising from industry's and customers' R&D over time. The formulation of these rules aims to balance the benefits of advancing innovation against the pragmatic need to derive maximum value from capital investment.

In 2009 an additional *publication*² exacerbated and confirmed the Golden Rules listed hereafter which now are based on data gathered until 2013:

THE GOLDEN RULES

1. AT LEAST 60% OF THE INSTALLED EQUIPMENT BASE SHOULD BE YOUNGER THAN 5 YEARS

Medical technology life-cycle averages suggest equipment that is up to 5 years old adequately reflects the current state of technology and offers opportunities for economically reasonable upgrade measures

2. NOT MORE THAN 30% SHOULD BE BETWEEN 6 - 10 YEARS OLD

Medical technology which is between 6 - 10 years old is still fit for use, but already requires replacement strategies to be developed in order for systems to benefit from efficiency gains afforded by current technologies

3. NOT MORE THAN 10% OF THE AGE PROFILE SHOULD BE OLDER THAN 10 YEARS

Medical technology older than 10 years is outdated, difficult to maintain and repair, and may be considered obsolete and inadequate for conducting some procedures when compared with current medical guidelines and best practices; replacement is essential

1. http://www.cocir.org/site/index.php?id=63&tx_ttnews%5btt_news%5d=571&cHash=78f2b6bd4000176fa392a26f11ffb3fe

2. http://www.cocir.org/site/index.php?id=63&tx_ttnews%5btt_news%5d=331&cHash=7a195225f9ec6c81c59c91b67c932003

4. WHAT OUR EQUIPMENT AGE ANALYSIS TELLS US

Comparing our latest 2013 data with that of 2008 it is clear that the installed base across Europe is aging. The percentage of the installed base units aged 6 years or older, highlighted in red below (Table 1), has increased for each of the key modalities examined, and within this category those units older than 10 years have also increased with the exception of Angiography. All modalities show a decrease in the percentage of total units aged between 1-5 years, showing that the rate of purchase of new or replacement equipment has fallen throughout Europe during the period of economic pressure.

Encouragingly, there are also examples of countries, like Poland, France and Denmark where some healthcare providers have sought to engage in capital financing programmes that can protect against technical obsolescence, resulting in an installed base that is not as aged as elsewhere. Managed Equipment Services (MES) is a financing innovation proving to be a powerful solution to overcome current healthcare and hospital challenges and drive EU objectives. It is a contractual partnership between a care provider (Hospital) and an equipment supplier, providing access to medical technology (equipment and services) against a certain annual fee.

The provider of the equipment takes responsibility for the availability, quality, maintenance and upgrading over the lifetime of the technology. The equipment is not only maintained, but is regularly updated with the latest technology to guarantee a state-of-the-art performance. Thus, the facility is assured to benefit from the future improvements and innovations.

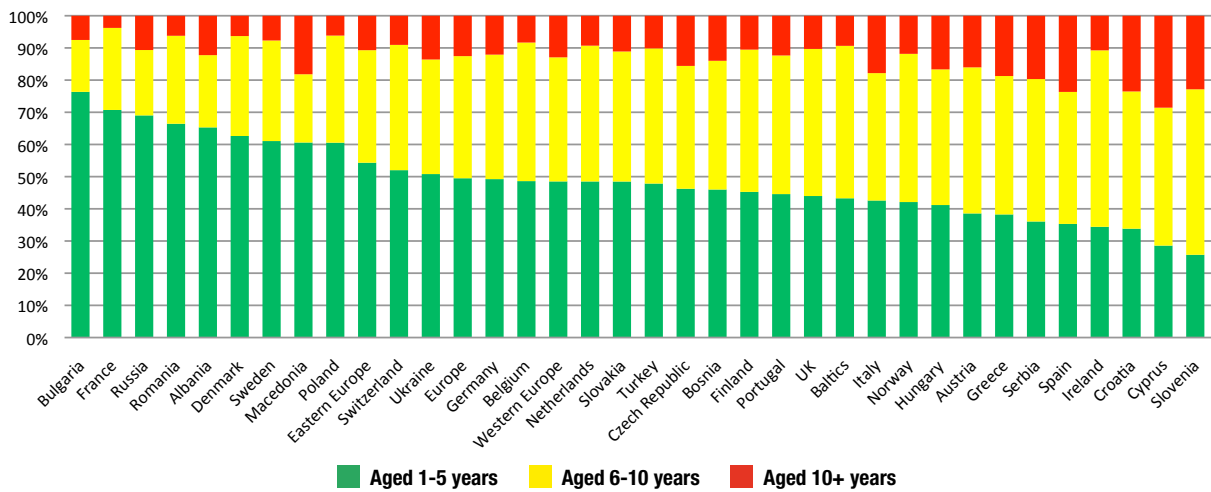
COCIR believes there are considerably more benefits to be gained from designing smarter flexible financial options with the necessary flexibility for both doctors and patients to fully benefit from the implementation of these technological solutions, a topic that was the theme of a COCIR report on financial sustainability which can be found on the COCIR website³.

TABLE 1 Age Profile on selected modalities for the years 2008, 2011 and 2013

		INSTALLED BASE			AGE VS 'GOLDEN RULES'		
		2008	2011	2013	Mkt% by age 2008	Mkt% by age 2013	Golden rules
Angio (CV)	IB 1-5 years - units	2650	3811	3084	48.6%	42.8%	60%
Angio (CV)	IB 6-10 years - units	1571	2163	2579	28.8%	35.8%	30%
Angio (CV)	IB >10years - units	1237	1780	1534	22.6%	21.4%	10%
Angio (CV) Total		5458	7754	7197			
CT	IB 1-5 years - units	6189	6569	5898	60.2%	49.5%	60%
CT	IB 6-10 years - units	3155	3627	4528	30.7%	38.0%	30%
CT	IB >10years - units	933	1061	1477	9.1%	12.5%	10%
CT Total		10277	11257	11903			
MR	IB 1-5 years - units	3568	4287	4002	55.2%	46.8%	60%
MR	IB 6-10 years - units	2082	2546	2898	32.2%	33.9%	30%
MR	IB >10years - units	808	1178	1653	15.6%	19.3%	10%
MR Total		6458	8011	8553			
PET	IB 1-5 years - units	430	532	448	73.1%	51.8%	60%
PET	IB 6-10 years - units	118	294	325	20.1%	37.6%	30%
PET	IB >10years - units	40	110	91	6.8%	10.6%	10%
PET Total		588	936	864			

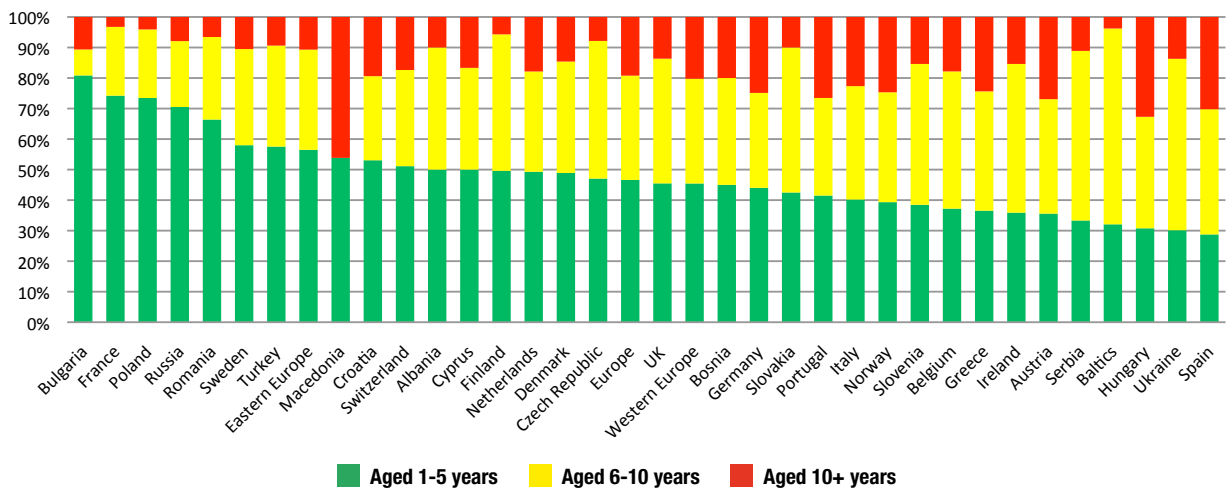
3. http://www.cocir.org/site/index.php?id=63&tx_ttnews%5btt_news%5d=587&chash=74fec1abfbf1aa3e3df7c693c0280176

TABLE 2 Country overview age profile for COMPUTER TOMOGRAPHY in 2013



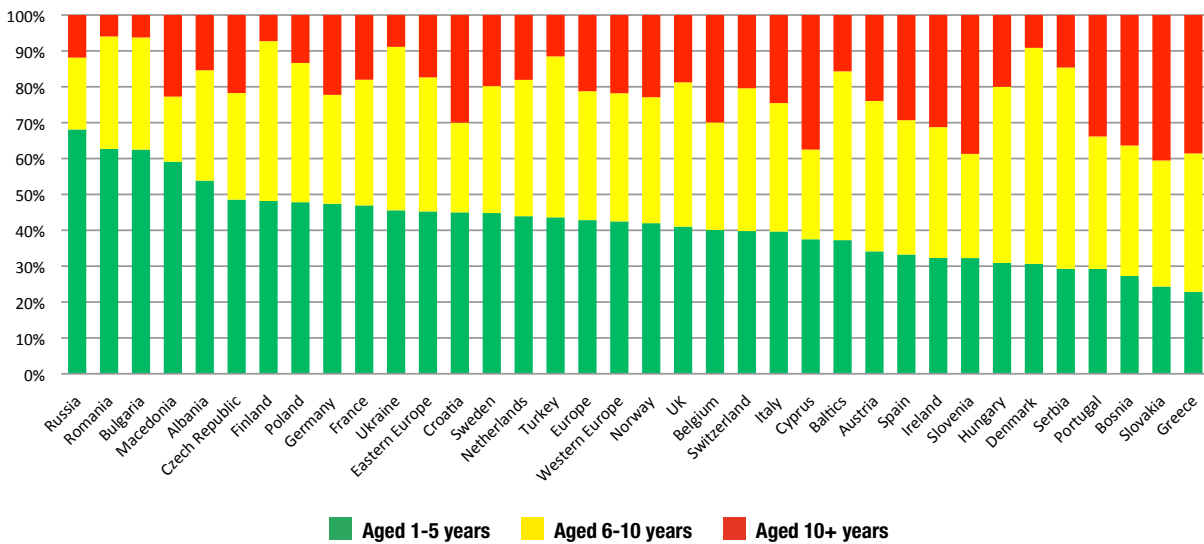
- In Western Europe the known CT installed base has significantly aged; the percentage of over 6 year old systems has risen from 40% in 2008 to 51.5% in 2013.
- Several countries, including Spain, Italy, Ireland, Greece, and Austria, are showing significant and negative deviations from the Golden Rules criteria.
- Aging CT equipment has specific issues relating to patient exposure to radiation – these are addressed in Section 6.

TABLE 3 Country overview age profile for MAGNETIC RESONANCE IMAGING in 2013



- In Western Europe the situation has deteriorated significantly. In all 54.5% of all installed MRI systems exceed 6 years of age versus 47.8% in 2008.
- On average 1 in 5 MRI systems is currently more than 10 years of age. Notably the Spanish Greek and Portuguese age profiles show rapid and extensive ageing, in Spain this translates to 1 system every 3, and in Portugal and Greece 1 every 4 is over 10 years old. At this age, MRI equipment is simply not as powerful in diagnostic capability or function compared to new machines and the older equipment will be slower to operate. Additionally current technology has allowed for wider bores and much quieter operating.

TABLE 4 Country overview age profile for X-RAY ANGIOGRAPHY in 2013



- Many countries have shown deterioration in age profile compared to the previous years; none of the countries in Western Europe meet the Golden Rule.
- Installed equipment over the age of 6 years is substantially over 60% in many countries; in Greece 77.1%, in Portugal 70.7%, in Denmark 69.3, and in Spain 66.7%.

5. IT'S NOT JUST ABOUT EQUIPMENT AGE - INSTALLED BASE DENSITY PER CAPITA IS HIGHLIGHTING FUNDAMENTAL ACCESS INEQUALITIES

Ensuring that citizens have equal access to safe, quality treatment lies at the very heart of the European Union health policy and our healthcare systems. The early and accurate diagnosis of diseases such as cancer is regarded as essential in delivering better outcomes for patients. Hence, it is vital that patients have timely and affordable access to appropriate diagnostic tests and screening technologies. Innovations in both diagnostic engineering and software are increasingly available to help address healthcare challenges - not just advancing efficiencies, productivity and clinical decision making but also enabling greater access to healthcare. However, funding of capital investment can be challenging, and too often technology is perceived as a cost driver in healthcare. But if we are to move to a more effective, efficient and equitable delivery system, an acknowledgment of the importance of appropriate new technology as part of the solution, requires further political support.

Our analysis shows the consequences of slowing the flow of investment in healthcare is a stagnation of the dramatic inequality of access to healthcare within the EU. The density per capita of CT, MR, Angio and PET equipment for many Western countries has remained flat or is showing a decline⁴. Despite this, the disparity between Western and Eastern European country averages remains.

Comparing figures for Western Europe there are some notable exceptions, countries like Germany and the Nordics have continued to grow their CT and MR installed base, but overall the per capita data for CT and MR suggest a plateau effect since 2011, with no significant investment in PET⁵ by any countries apart from Denmark, Switzerland, Belgium and the Netherlands, since 2008. Investment seen in the installed base is more mixed for Eastern Europe depending on the technology and the degree to which countries qualified for European funding for healthcare. CT has a similar picture for many Eastern countries.

Investments in CT and MR by countries like Poland, Bulgaria, Romania and Hungary are pushing the Eastern European per capita average in the right direction; this progress has also to be seen in relation to the targeted healthcare funding within the 2007-13 structural funds program of the European Commission. The positive data illustrate to all healthcare structural funding recipients the progress which can be achieved when countries focus on spending part of their allocation on improving healthcare infrastructure.

However, policymakers should be cautiously optimistic that targeted healthcare funding can reduce inequalities, while also recognise that much more is required. For both CT and MR the disparity between the Western and Eastern European averages remain stark. While the evidence suggests EU funding mechanisms targeted at healthcare can help to reduce current disparities, it also points to a need for continued EU financial programs to further redress the current inequality in access to healthcare.

4. Shown in full Age Profile & Density COCIR Report to be published in July 2014

5. *Ibid*

TABLE 5 CT Density (installed base units per Million inhabitants)

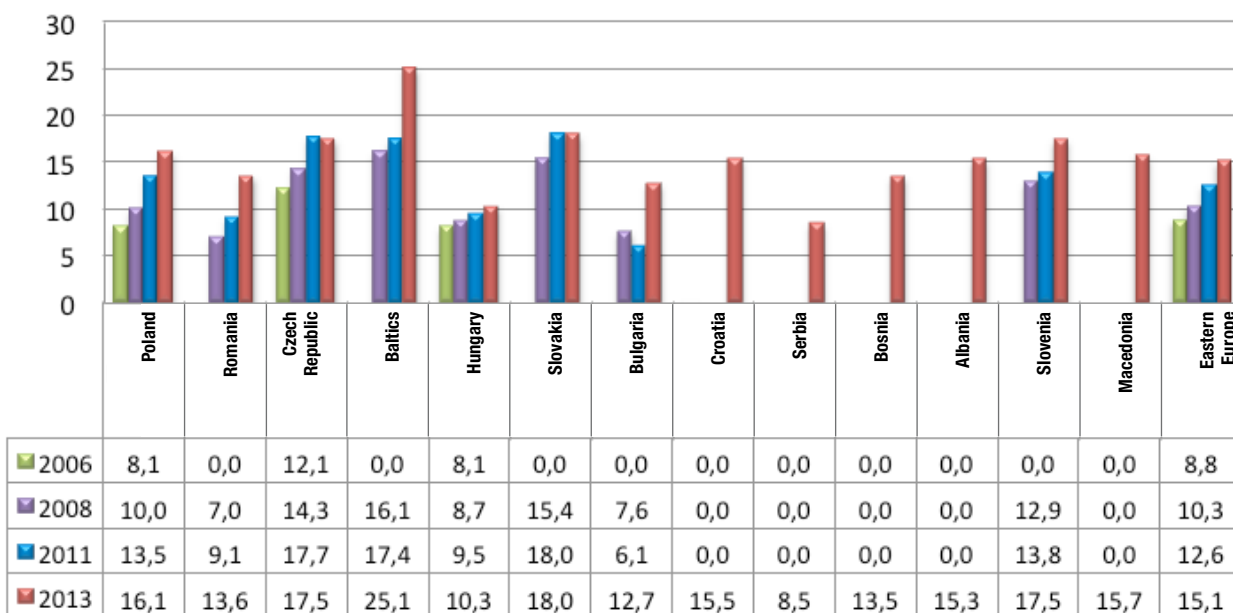
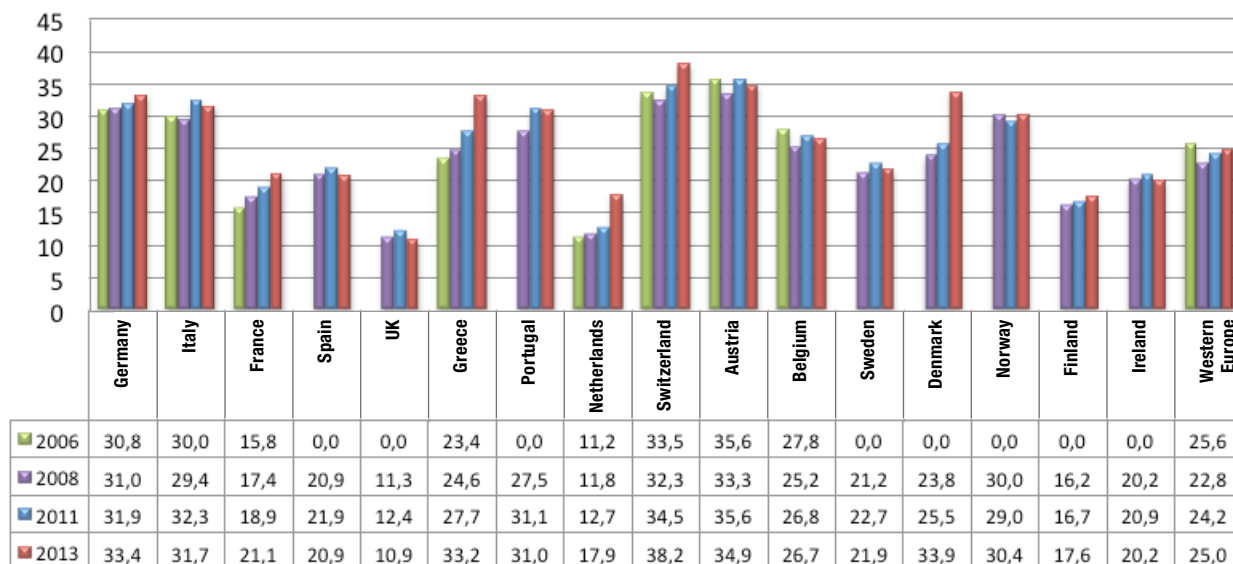
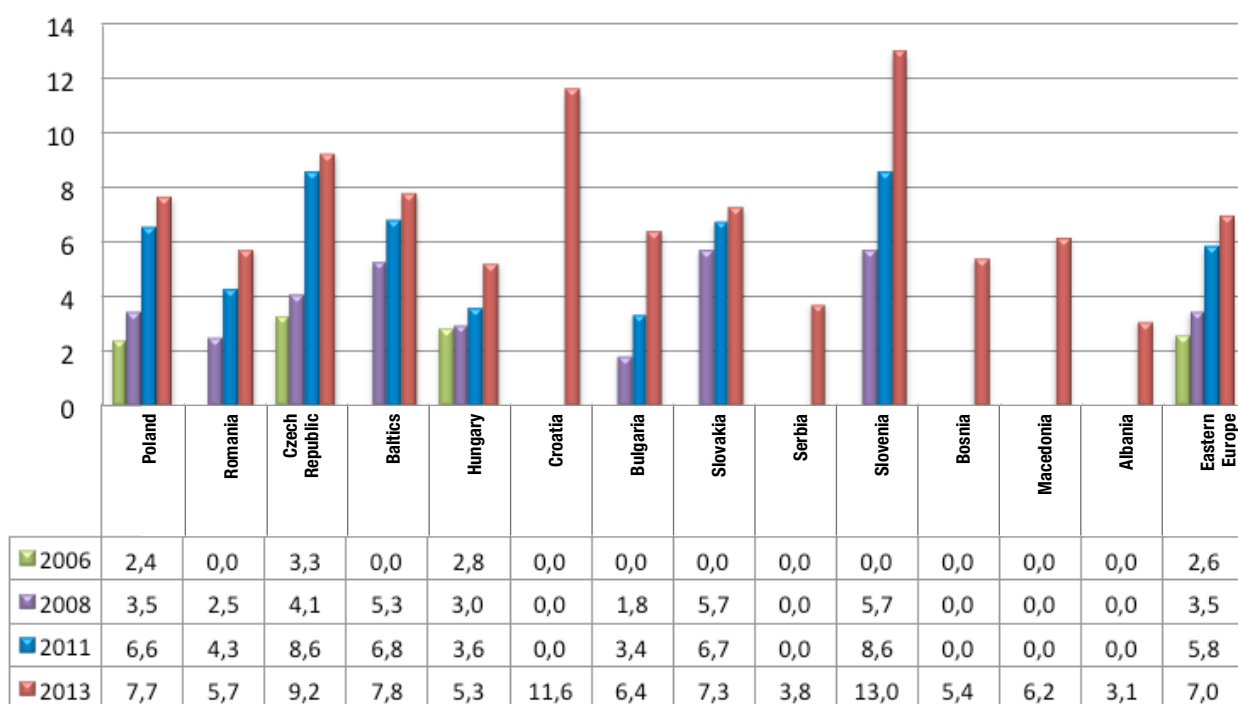
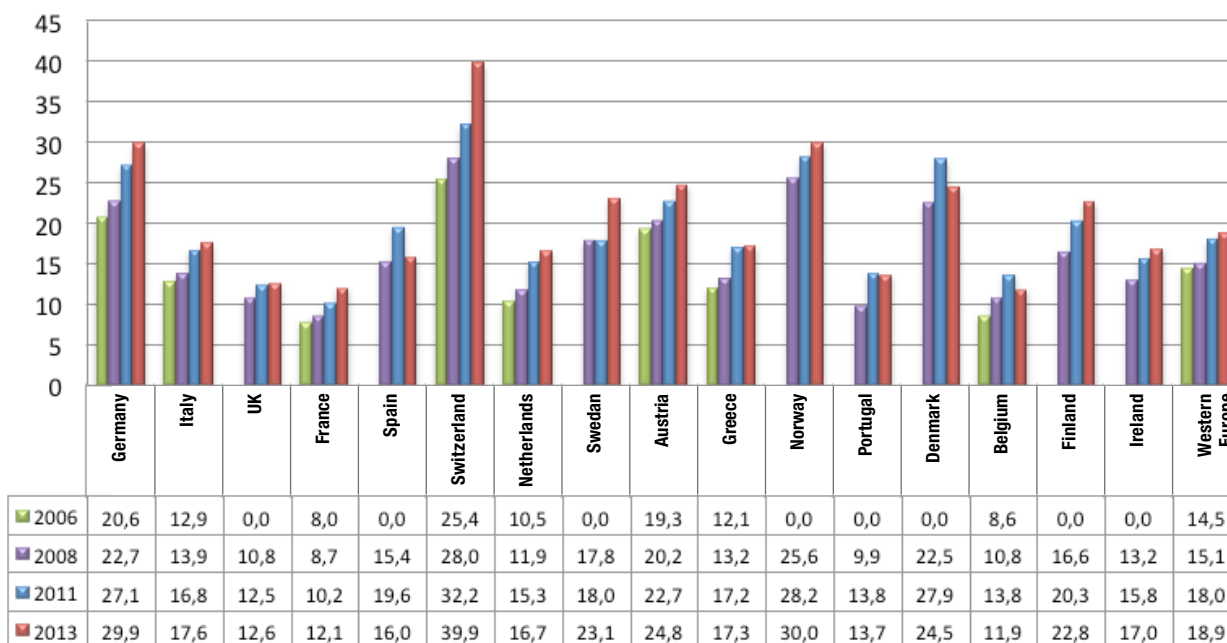


TABLE 6 MR Density (installed base units per Million inhabitants)



6. INNOVATION 2014: SPECIAL FOCUS ON LOW-DOSE CT

Computed Tomography has made a dramatic contribution to the accurate and earlier detection of disease and is used extensively in cardiovascular and cancer diagnosis, pelvic examinations and complex fractures. The latest CT technology combine multiple X-ray 'slices' and complex computer software to routinely construct detailed 3 dimensional images.

As well as the constant flow of incremental innovation additional leaps of technology also occur like low-dose CT. Until recently acquiring CT images required using levels of radiation several times greater than conventional X-Ray. However, the industry has worked with healthcare professionals to design and develop software and engineering solutions in breakthrough new 'low-dose' CT systems that reduce the amount of radiation exposure required that is now comparable to conventional X-Ray, without losing clinical functionality.

Additionally, CT systems are now equipped with powerful software tools and other procedures that enable hospitals and healthcare providers to monitor and track dose during diagnostic and therapy procedures. Dose management strategies directed toward optimization, rather than dose reduction, per se, recognise the need to balance the risks of exposure with the clinical benefits to the patient.

In light of the transposition of *Council Directive 2013/59/EURATOM*⁶ (the 'Basic Safety Standards Directive') which consolidates and updates previous Directives protecting workers and the public from exposure to ionising radiation, dose optimisation should receive special attention. Healthcare providers using CT (and other procedures using non-ionising radiation) will be obliged by the new Directive to do more to track and monitor the radiation dose to patients. They will also have to show that they are using technology and techniques to keep radiation dose to "as low as reasonably achievable (ALARA)" which, in the time leading up to the Directive's implementation in April 2018, should drive investment in new and replacement CT installed base with low dose CT technology throughout all of Europe. Refer also to the *CT Manufacturers' commitments*⁷ on CT Dose Optimisation.

COCIR expects healthcare providers to prioritize dose reduction and optimization when replacing aging equipment or protecting vulnerable patients. To this end COCIR welcomed the recent launch of the European Society of Radiologists' *EuroSafe Imaging Campaign*⁸ that aims to promote awareness and build collaborations around the optimized use of radiological imaging. The COCIR poster developed for this campaign can be accessed from the EuroSafe Imaging website⁹.

6. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2014:013:0001:0073:EN:PDF>

7. <http://www.cocir.org/site/index.php?id=107>

8. http://www.myesr.org/cms/website.php?id=/en/eu_affairs/esr_eurosafe_imaging_campaign.htm

9. http://www.eurosafeimaging.org/wp/wp-content/uploads/2014/02/COCIR_Eurosafe-Imaging%E2%80%93Poster%E2%80%93neu.pdf

7. AGE PROFILE 2014: CONCLUSION AND RECOMMENDATIONS

Working with clinicians the medical technology manufacturers continue to develop new medical technologies that play a critical role **in driving access to healthcare, increasing efficiency, improving productivity and progressing patient safety**, e. g., through optimisation of radiation dose. However the latest installed base data are showing that the timely adoption of new technologies by European hospitals is the slowest ever recorded.

Our analysis shows that an increasing part of the age profile of equipment in certain countries is already 10 or more years old, notably with reference to MR and X-Ray Angiography systems. The installed base within some countries is the oldest ever recorded, and in a number of cases COCIR is concerned that equipment is in danger of becoming technically obsolete with consequences on hospital efficiency and costs, plus clinical effectiveness and in some instances patient safety.

COCIR urges the European Commission to look at the adoption of new technologies beyond its regulatory remit and develop policies and actions that will increase patient safety and address the dramatic inequality in healthcare through improving access to these new technologies.

The great divide in access to medical imaging technologies which exists between Western and Eastern European countries is showing little overall improvement. There are however some countries like Poland, Romania and Bulgaria where this gap is closing, pointing perhaps to the benefits that can stem from allocating and dedicating some Structural Funding to healthcare.

COCIR calls on EU institutions and Member States to further support the **need of a comprehensive, coherent and sustained investment and deployment strategy for all medical imaging equipment modalities and related healthcare ICT equipment and services**, through an effective use of cohesion policy funding.

COCIR recommends that governments, politicians, hospital administrators and medical practitioners keep the technological progress in mind when the investment in medical imaging equipment is planned and decided upon.

If the current aging profile trend of medical imaging equipment is not addressed, European healthcare systems risk continuing to struggle to meet the challenges generated by the ageing of its populations and workforces, the increase of chronic diseases, patient security, quality expectations and healthcare system sustainability in the widest sense.

ANNEX BENEFITS OF MEDICAL IMAGING

COMPUTED TOMOGRAPHY (CT)

Also commonly referred to as a CAT scan, Computed Tomography (CT) is a medical imaging method that combines multiple X-ray images taken from different angles to produce detailed cross-sectional pictures of areas inside the body. The resulting images provide more information than regular X-rays, and allow doctors to look at individual slices within the 3-D images.



CT is often used to evaluate:

- Organs in the pelvis, chest and abdomen
- Colon health (CT colongraphy)
- Presence of tumors
- Pulmonary embolism (CT angiography)
- Abdominal aortic aneurysms (CT angiography)
- Spinal injuries

MAGNETIC RESONANCE IMAGING

Magnetic Resonance Imaging (MRI) is a medical imaging technology that uses radio waves and a magnetic field to create detailed images of organs and tissues. MRI has proven to be highly effective in diagnosing a number of conditions by showing the difference between normal and diseased soft tissues of the body.



MRI is often used to evaluate:

- Blood vessels
- Breasts
- Organs in the pelvis, chest and abdomen (heart, liver, kidney, spleen)

NUCLEAR MEDICINE

Nuclear Medicine examinations are used for both diagnosis and therapeutic reasons. In Nuclear Medicine diagnosis, metabolic processes are made visible by administering radioactive pharmaceuticals to patients via skin injection, in tablet form or by inhalation. These substances accumulate in certain parts of the body where they render metabolic processes visible.



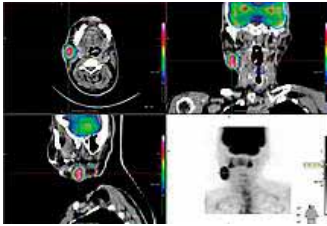
In Nuclear Medicine therapy, special radiation with short-range effects is used. The substances administered reach the diseased cells and destroy them by radioactive radiation. The best-known example of this is radioiodine therapy for thyroid patients.

A comprehensive tool was developed by *AIPES*¹⁰ to get familiar with nuclear medicine. For more information, go to www.whatisnuclearmedicine.com

10. <http://www.aipes-eeig.org/>

POSITRON EMISSION TOMOGRAPHY

Positron Emission Tomography (PET) is a type of nuclear medicine that provides physicians with information about how tissues and organs are functioning. PET, often used in combination with CT imaging, uses a scanner and a small amount of radiopharmaceuticals which is injected into a patient's vein to assist in making detailed, computerized pictures of areas inside the body.



PET is often used to evaluate:

- Neurological diseases such as Alzheimer's and Multiple Sclerosis
- Cancer
- Heart disease

RADIATION THERAPY

Radiation therapy (RT) is used to treat a wide range of cancers by delivering highly targeted radiation to cancerous cells, destroying their ability to grow and divide while leaving healthy cells intact. Generally, RT is delivered through beams emitted from a machine outside the body or through brachytherapy, which involves placing the radiation source directly inside or near the site of the cancerous cells. Cancer patients may be treated with both radiation therapy and chemotherapy to limit the need for more exploratory surgery.



ULTRASOUND

Diagnostic ultrasound, also known as medical sonography or ultrasonography, uses high frequency sound waves to create images of the inside of the body. The ultrasound machine sends sound waves into the body and is able to convert the returning sound echoes into a picture. Ultrasound technology can also produce audible sounds of blood flow, allowing medical professionals to use both sounds and visuals to assess a patient's health.



Ultrasound is often used to evaluate:

- Pregnancy
- Abnormalities in the heart and blood vessels
- Organs in the pelvis and abdomen
- Symptoms of pain, swelling and infection

X-RAY

X-ray technology is the oldest and most commonly used form of medical imaging. X-rays use ionizing radiation to produce images of a person's internal structure by sending X-ray beams through the body, which are absorbed in different amounts depending on the density of the material.



X-ray images are typically used to evaluate:

- Broken bones
- Cavities
- Swallowed objects
- Lungs
- Blood vessels
- Breast (mammography)

GENERAL INFORMATION ABOUT COCIR

COCIR is the European Trade Association representing the medical imaging, health ICT and electromedical industries.

Founded in 1959, COCIR is a non-profit association headquartered in Brussels (Belgium) with a China Desk based in Beijing since 2007. COCIR is unique as it brings together the healthcare, IT and telecommunications industries.

Our focus is to open markets for COCIR members in Europe and beyond. We provide a range of services in the areas of regulatory, technical, market intelligence, environmental, standardisation, international and legal affairs.

COCIR is also a founding member of DITTA, the Global Diagnostic Imaging, Healthcare IT and Radiation Therapy Trade Association (www.globalditta.org).

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