



SIEMENS

www.siemens.com/right-dose

Right Dose

Innovation Leadership in Dose Management

Can There Be One Single Opinion Carved in Stone?

Radiation Dose – A Multi-faceted Topic

The general discourse on radiation, absorbed radiation dose, and what implications there are for humans is highly controversial. Video promotions on YouTube¹ advertise radiation as being something that occurs naturally and as a safe and normal part of everyday life. On the other hand, a substantial amount of time has passed since the Fukushima Daiichi nuclear disaster and decontamination efforts are still ongoing in the area. A healthy debate on the future of nuclear power has not yet occurred in Japan and there is still quite a split on the question of the safety of nuclear power in the political class – worldwide.²

In the field of medicine, radiation has two sides as well. It has unquestioned medical advantages: Radiation can reveal hidden indications of disease, from broken bones and lung lesions to heart defects and tumors. And it can be used to treat certain cancers. But it also has a potentially serious medical downside: the ability to damage DNA and, if used irresponsibly, to eventually cause cancer.³

Right Dose

In light of these manifold arguments and as an innovation leader in medical imaging technologies, Siemens has claimed an opinion on this matter, it is called: **Right Dose**. It is our top priority to protect patients and staff from unnecessary radiation – while always pursuing premium image quality in diagnostics and thus optimal patient outcomes. We intend not only to lead in dose reduction technology, but also in approaches of how to best manage dose for patients, for caregivers, and for healthcare businesses.

At Siemens we believe that as low doses in all modalities become more and more achievable, it becomes more and more obvious that there isn't one dose level that fits everyone. Every clinical question and every single patient demands an individual and specific dose level.

Siemens is convinced that what really matters is the Right Dose. Meaning a reasonable balance between applied medical radiation and image quality.

Value orientation

Imaging

¹ <http://www.youtube.com/watch?v=GRPxxcDPFoA>

² <http://www.nytimes.com/2013/10/15/opinion/fukushima-politics.html?src=xps>

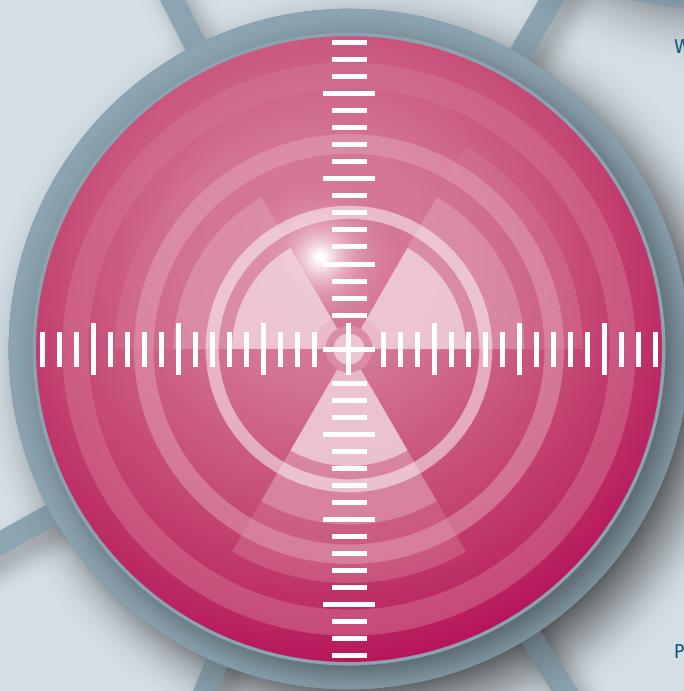
³ <http://well.blogs.nytimes.com/2012/08/20/medical-radiation-soars-with-risks-often-overlooked/>



The value of medical radiation
in a general context



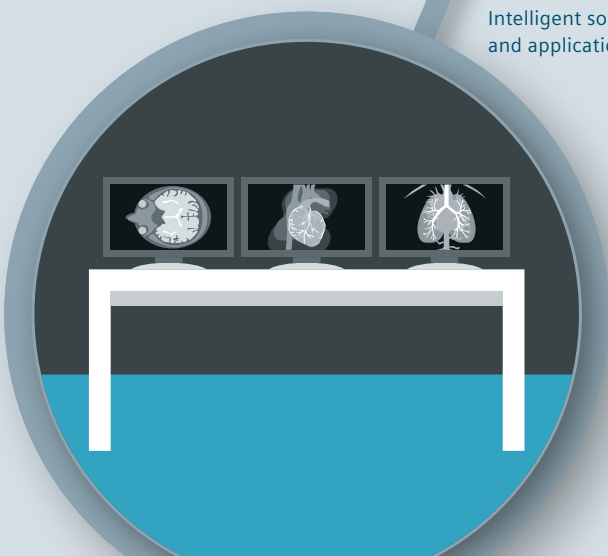
Why Siemens?



Powerful hardware



Intelligent software
and applications



The Value of Medical Radiation in a General Context

To be able to provide sound arguments regarding the value of medical radiation, the integration into a broader context may make sense. As a leading provider of innovative dose reduction and dose management solutions and applications, we have set our goal on demonstrating the value of our offering to specifically you, our customer. Why should you invest in these technologies? How can you have a helpful conversation with your patients to reduce their anxiety surrounding this topic? How can you do good regarding your institution's reputation by investing in these technologies? How can you even increase patient satisfaction by actively discussing this?

As a first step, the integration of medical radiation into a broader context may help put the ongoing clinical discussion into perspective. As opinion leaders in the field of radiology continue to state, justification is a viable means to win public confidence and reassure patients over the benefits of medical imaging.⁴ Medical radiation is only one component of the radioactive world we live in – always have lived in. Consequently, a range of different sources – both natural and man-made – contribute to our exposure to ionizing radiation in daily life.⁵

Natural radiation

Naturally occurring radiation is found in the food we eat, the water we drink, and the construction materials used in our buildings, while terrestrial radiation also comes from soils enriched in naturally occurring uranium and natural forms of energy. In addition to terrestrial radiation, we are also exposed to radiation from space or “cosmic radiation” which increases with altitude.

Man-made radiation

Today, man-made sources of radiation account globally for the smaller amount of our total exposure. Sources include natural gas, nuclear and coal power plants, phosphate fertilizers, and, last but not least, medical diagnostics. The use of radiation in medicine has led to major improvements in the diagnosis and treatment of human diseases. While the development of modern health technology makes new applications safer, the appropriate use of this technology should always stand at the forefront of the discussion.⁶

For further information on medical radiation focused on patients please visit:

<http://www.medicalradiation.com/facts-about-radiation/>



Natural radiation

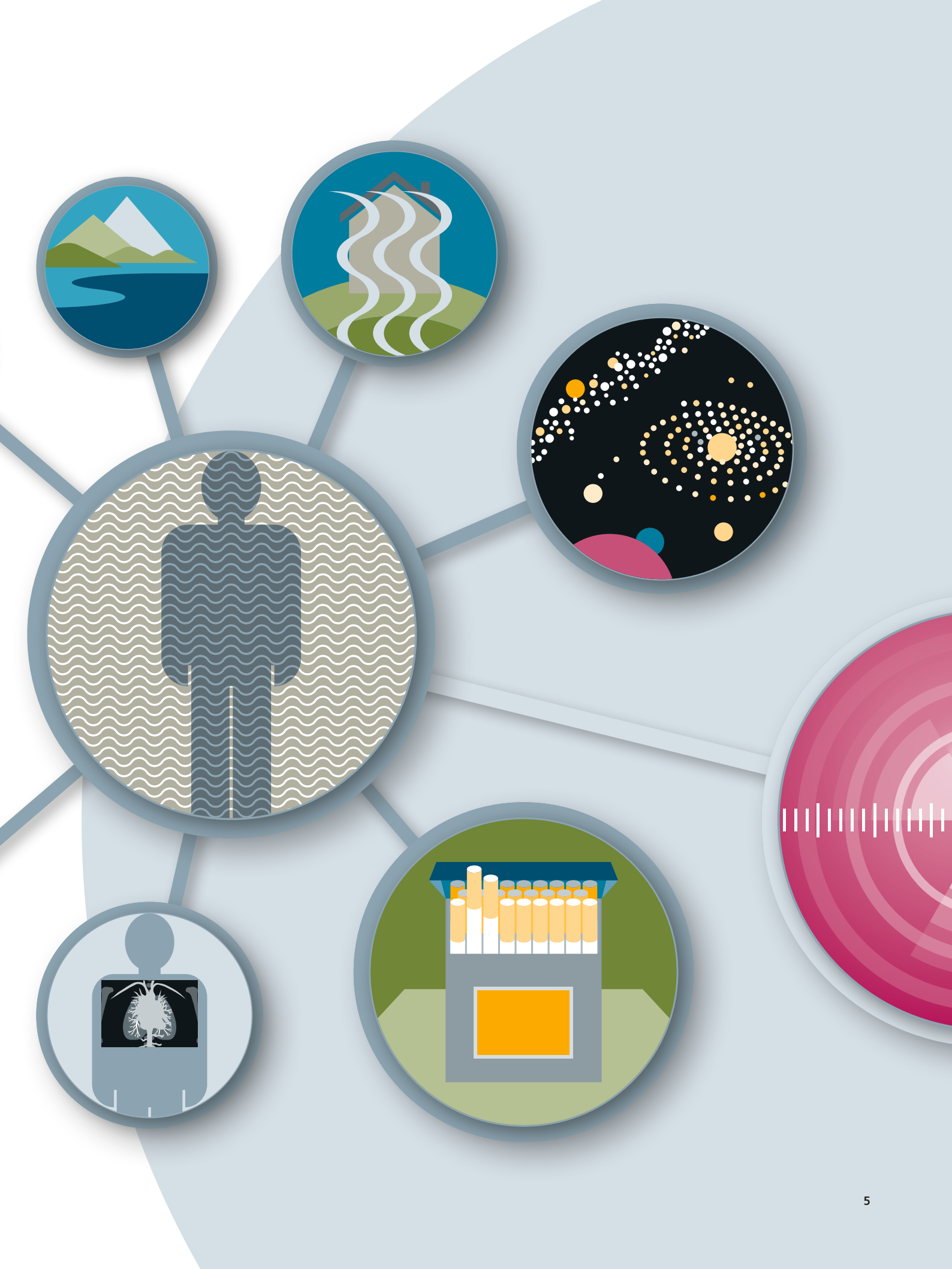
Man-made radiation



⁴ http://www.auntminnieeurope.com/index.aspx?sec=rca&sub=ecr_2013&pag=dis&ItemID=607891

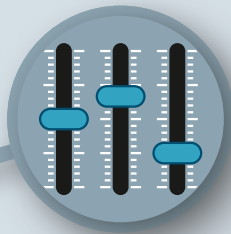
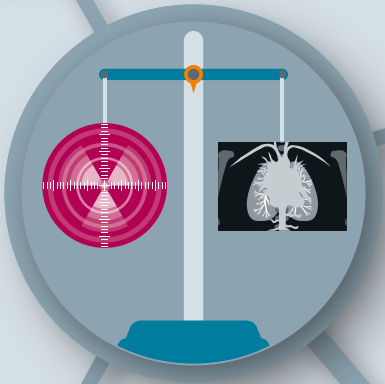
⁵ <http://www.ans.org/pi/resources/dosechart/msv.php>

⁶ http://www.who.int/ionizing_radiation/about/med_exposure/en/index.html

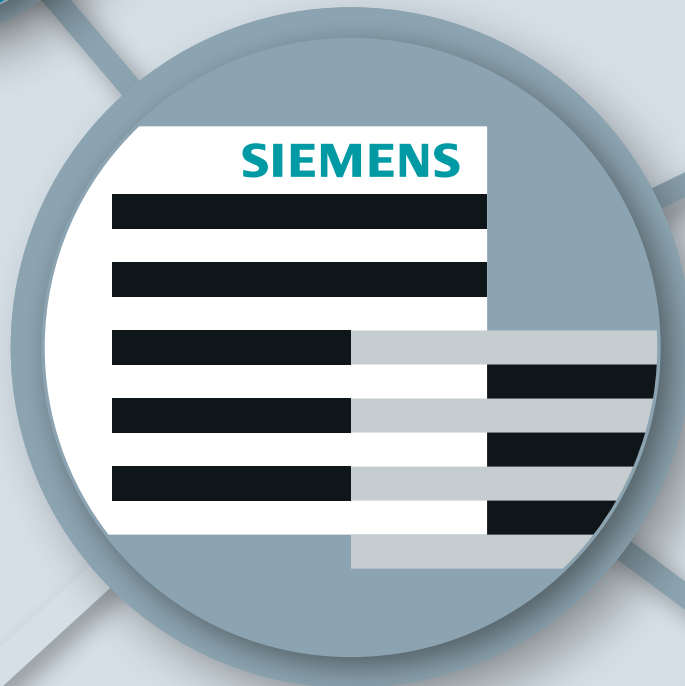




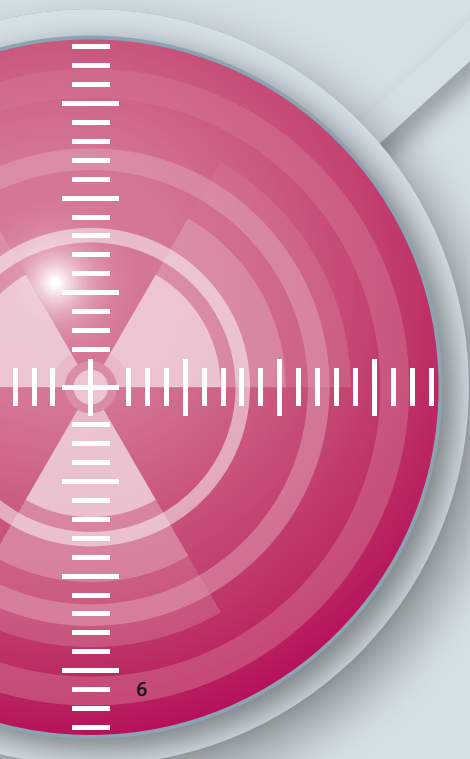
Reasonable balance between
image quality and applied dose



Valid quantification of dose values



Value orientation
for tangible patient outcomes



Why Siemens?



Following the Right Dose approach means demonstrating innovation leadership in dose management.

For us at Siemens **Right Dose** means offering a set of products, solutions, and technologies that enable you to identify and realize a **reasonable balance** between image quality and applied dose. Our solutions take into account that you and your colleagues are often challenged with having to fulfill constantly changing rules and regulations on this topic. We understand you need your dose emitting diagnostic technologies to be adaptable and manageable to justify their value for both the patient and your institution. This implies an exact targeting of emitted radiation at all times – precisely what we are aiming for.

In addition, it means supporting you with technologies for a **valid quantification** of results and dose values. In order to help physicians make sound and thus valuable decisions, imaging technologies must provide accurate and reproducible quantification. This also ensures the best protection from unnecessary radiation dose for both patients and your staff. If this is not the case, users and patients alike face the issue of variability of results. An exemplary imaging technology that provides this kind of quantification is the Biograph mCT Flow – the world's first system to offer improved axial noise sensitivity. This system offers innovative solutions that allow the lowest dose to be administered, while still scanning patients faster than ever before.⁷

The third pillar of our **Right Dose** approach should demonstrate our effort to offer you a sound **value orientation** for tangible patient outcomes.

Radiologists and diagnostic care providers in general are faced with the dual mandates to improve patient safety and increase productivity, while ensuring the highest quality and cost-efficient patient care. Within the realm of the **Right Dose** approach, it is Siemens' goal to sensibly address your clinical, operational, and financial needs. We want to transform our offering into sound clinical, operational, and financial values for you.



⁷ <http://www.healthcare.siemens.com/molecular-imaging/pet-ct/biograph-mct-flow>

Powerful Hardware

Modern medicine is inconceivable without the innovative imaging technologies that help provide early and detailed diagnoses and confirm or refute the presence of suspected disease. Used increasingly in prevention and therapy, advanced imaging systems can also help cut healthcare costs. This development would not be possible without a fleet of imaging systems, or “hardware” that is specifically designed to deliver maximum image quality with minimum dose. Siemens has a long, successful history of engineering imaging systems that help you manage and lower radiation to meet your specific needs and those of patients. These engineering efforts are continuously guided by the industry-wide ALARA principle pertaining to radiation dose levels in imaging scans: As Low As Reasonably Achievable.

Angiography – Artis Q.zen

The **Artis Q.zen** product line for interventional imaging is a visionary breakthrough in X-ray detection with unique sensitivity enabling ultra-low dose imaging. It takes performance in X-ray generation and precision to the next level.

Computed tomography – SOMATOM Force

The **SOMATOM® Force** allows for a dose reduction of up to 50% less than today’s leading CT systems. CARE Dose4D, CARE kV, and the Advanced Modeled

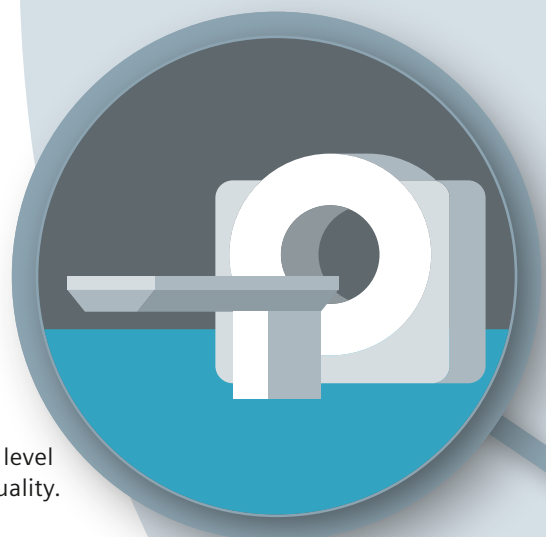
Iterative Reconstruction **ADMIRE⁸** make up a comprehensive dose reduction and dose management portfolio, enabling the perfect dose level to deliver the best possible image quality.

Mammography – Mammomat Inspiration PRIME Edition

The **Mammomat Inspiration PRIME Edition⁹** with the Siemens unique **PRIME Technology⁹**, offer up to 30% less dose¹⁰ and uncompromised image quality in women’s health diagnostics. The latest technological innovation, the faster direct-to-digital aSe detector (the substantial element of clinically advanced digital mammography technology), and dose saving algorithms individually calculate the exposure.

Molecular imaging – Biograph mCT Flow

The PET-CT imaging scanner **Biograph mCT Flow** offers innovative solutions that allow the lowest dose to be administered, while still scanning patients faster than ever before. Now clinicians can have it all – scans with half the dose and double the speed. And by reducing dose and increasing speed, patient safety and utilization are improved while costs are dramatically reduced.

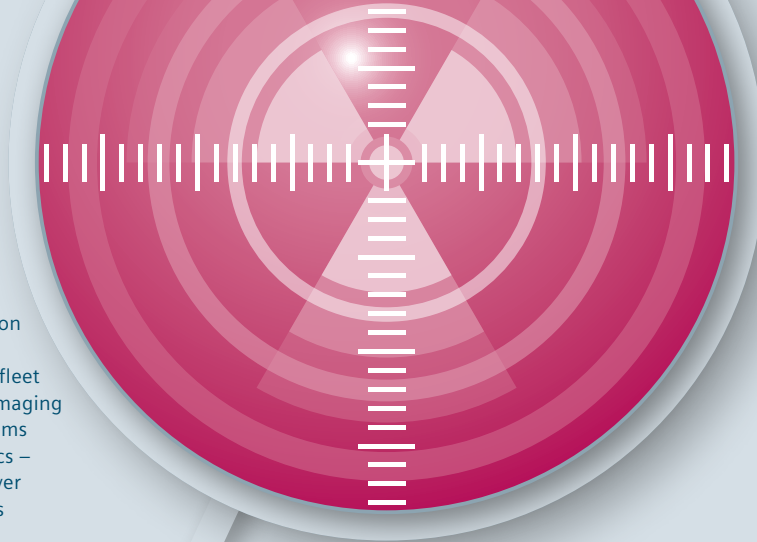


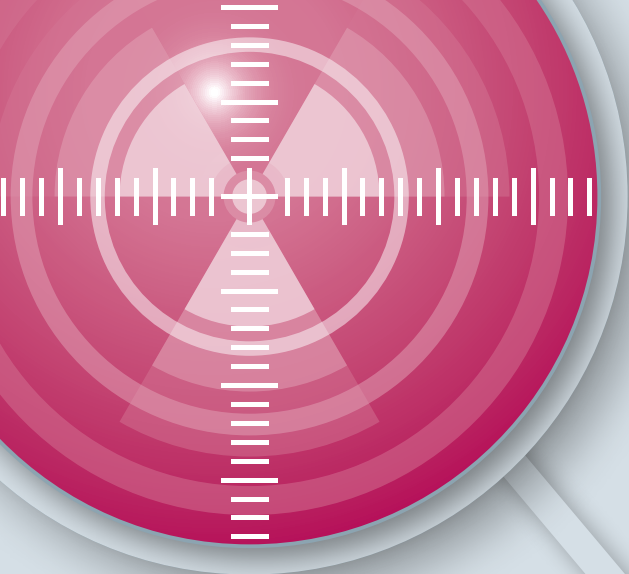
⁸ As demonstrated in model observer studies using the MITA IQ LCD phantom, the use of ADMIRE may reduce CT patient dose by up to 60% while maintaining image quality compared to conventionally reconstructed full dose data. Individual results depend on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task. Data on file.

⁹ The products/features shown in this brochure are not commercially available in all countries. Due to regulatory reasons their future availability cannot be guaranteed. Please contact your local Siemens organization for further information.

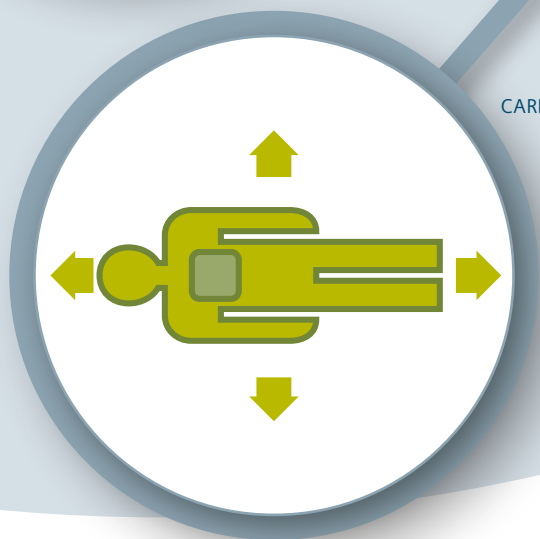
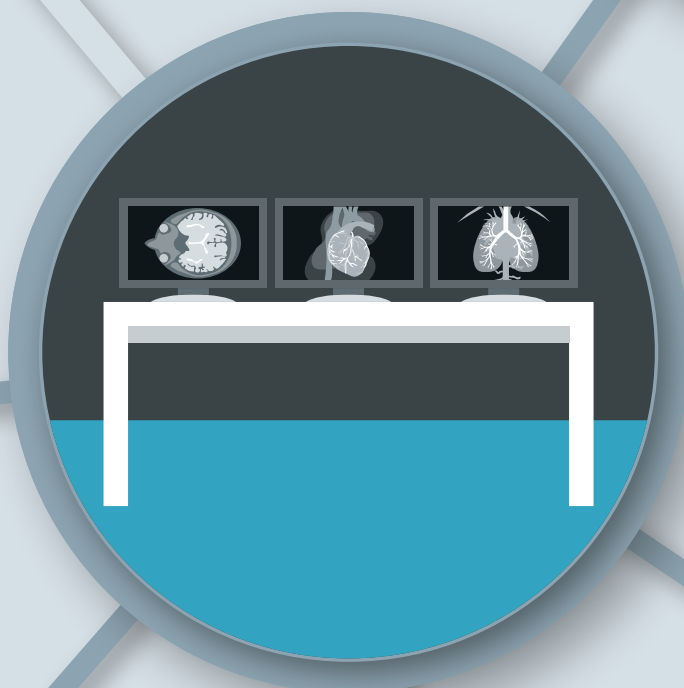
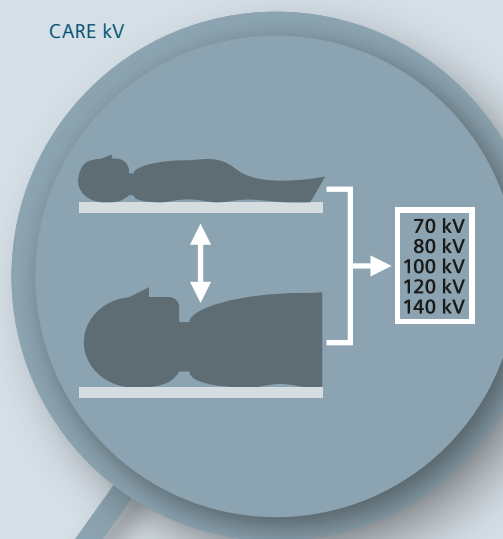
¹⁰ Compared to grid-based acquisition with Mammomat Inspiration, depending on breast thickness.

The Siemens **Right Dose** portfolio consists of an outcome-oriented combination of scanners, or “hardware,” and software. Our hardware fleet covers a complete range of imaging modalities, from hybrid systems to women’s health diagnostics – all designed to help you deliver definitive and timely answers to clinical questions.



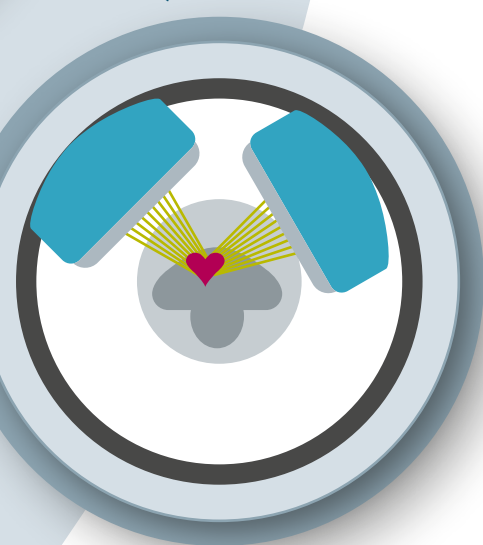


The software portion of our **Right Dose** portfolio is designed to help you get the most information possible from a medical image while managing and reducing dose for all stakeholders to a sensible minimum. These are only a few special highlights.



Intelligent Software and Applications

IQ-SPECT



syngo Workflow SLR¹²



Siemens complements its range-covering fleet of imaging scanners with state-of-the-art imaging features and software applications that help you address the needs of patients, your staff, and your healthcare institution. The features and software applications combined within the Siemens **Right Dose** approach help you ease patients' concerns about exposing themselves to too much radiation. They are also uniquely designed to help your clinical team get the most information possible from patient images, while keeping exposure to high X-ray and radiopharmaceutical radiation to a sensible minimum. These features may also transfer into a competitive advantage for your institution, as you can increase patient satisfaction by advising patients that their procedures will be performed using the lowest possible dose.

Angiography – CARE+CLEAR

CARE+CLEAR depicts a portfolio of software tools designed to enhance image quality and save dose. They are all based on the belief that every patient and every clinical case is different. Only the user should decide on the image quality needed, and then determine the lowest possible dose. CAREfilter, CAREposition, and CAREguard are outstanding examples of software-based applications that benefit dose saving and dose monitoring in the angiography suite.

Computed tomography – CARE Right

For computed tomography, providing sound and sustainable results means applying the right dose to your patients for sound diagnostic imaging.

Consequently, Siemens is committed to the right dose in CT with the holistic dedicated computed tomography approach CARE Right. The Right Dose Technology, like CARE Dose4D, CARE kV or ADMIRE¹¹, enables clinical staff with appropriate means to effectively reduce patient radiation.

Molecular imaging – IQ-SPECT

One of the key trends in nuclear medicine has been the ever-increasing demand for faster myocardial perfusion imaging. Historically, image quality has been limited by the number of detected photons. Siemens IQ-SPECT is the only technology today that performs ultra-fast cardiac imaging with a general purpose camera. With IQ-SPECT, physicians can perform a myocardial perfusion imaging study in approximately four minutes using the standard dose, eight minutes using half the standard dose, or 16 minutes using one-quarter of the standard dose.

Reading and reporting – syngo Workflow SLR¹²

Siemens radiology information system, syngo Workflow SLR¹², has partnered with Bayer Healthcare LLC to leverage Radimetrics¹³ and provide a comprehensive dose tracking system. When used with Siemens' powerful Radiology Information System (RIS) application, syngo Workflow SLR¹², the Radiation Dose Management Solution automatically captures the radiation dose information in the diagnostic report without any additional clicks or dictation. This helps to save time, enhance data accuracy, and reduce any additional overhead.

¹¹ As demonstrated in model observer studies using the MITA IQ LCD phantom, the use of ADMIRE may reduce CT patient dose by up to 60% while maintaining image quality compared to conventionally reconstructed full dose data. Individual results depend on the clinical task, patient size, anatomical location, and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task. Data on file.

¹² syngo Workflow SLR is available in the U.S., Australia, New Zealand, and Canada only.

¹³ Radimetrics is only available for sale through Siemens in the U.S. and Canada.

Value Orientation

Radiation as well as dose-monitoring and dose-reducing technology are at the top of the list of controversial topics in medical imaging today. The need to reduce patients' anxiety over dose is putting medical professionals under increased pressure to justify imaging procedures, and public discussions surrounding the question of dose are ongoing around the world. The need to justify further investments on an institutional side, into technology and, specifically, into dose-managing technology, is pressing for healthcare decision-makers as well.

Why should you invest in dose-managing and dose-saving technology?

At Siemens, it is our goal to provide you with a sound set of valuable arguments for investment of these sorts that focus on fulfilling clinical, operational, and financial needs. With this approach we have the dual mandates in mind to improve patient safety and increase productivity, while ensuring the highest quality and cost-efficient patient care. At Siemens, we innovate in the field of medical imaging and dose-managing technology – we innovate in Right Dose. And it is our job to make you see the value of investing in it.

The clinical value of Right Dose

By investing into Siemens **Right Dose** technology you could foster:

- Reduced potential for long-term damage in patients initiated by medical radiation
- Less patient concerns about exposing themselves to too much radiation
- Earlier detection in areas unthinkable before to help make prevention more reliable
- Better diagnostic confidence to help more precise treatment and more precise treatment decisions

The operational value of Right Dose

By investing into Siemens **Right Dose** technology you could foster:

- Awareness and transparency for patients and staff with quantifiable dose value reports
- Limited exposure for users and better staff retention for your institution
- Automated system settings and control with the aim of managing and reducing dose during scans that save time and money

The financial value of Right Dose

By investing into Siemens **Right Dose** technology you could foster:

- Patient referrals as the attractiveness of your institution increases
- Your competitive advantage when attracting top medical professionals with state-of-the-art technologies
- Cost reduction from efficiency gains through reduced dose exposure for surgeons and operating staff
- Revenue increase from higher reimbursement through high patient satisfaction scores



Clinical value

Imaging

Operational value

Financial value

To Sum it All Up

Radiation and radiation dose are delicate topics. We thank you for your interest and your contribution to a fruitful discussion.

When it comes to technology, it is our concern to provide you with solutions for valid clinical outcomes that protect both patients and staff from unnecessary radiation. When it comes to the value of dose-managing and dose-saving technology, we have made it our priority to focus on the clinical, operational, and financial value an investment could have for you and your healthcare institution.

Within this publication we hope to have shed some light on why we see ourselves as an innovation leader in providing such technologies. With the Siemens **Right Dose** approach we aim to demonstrate innovation leadership in dose management. With a reasonable balance between image quality and applied dose. With valid quantification of dose values. And with value orientation focused on tangible outcomes.

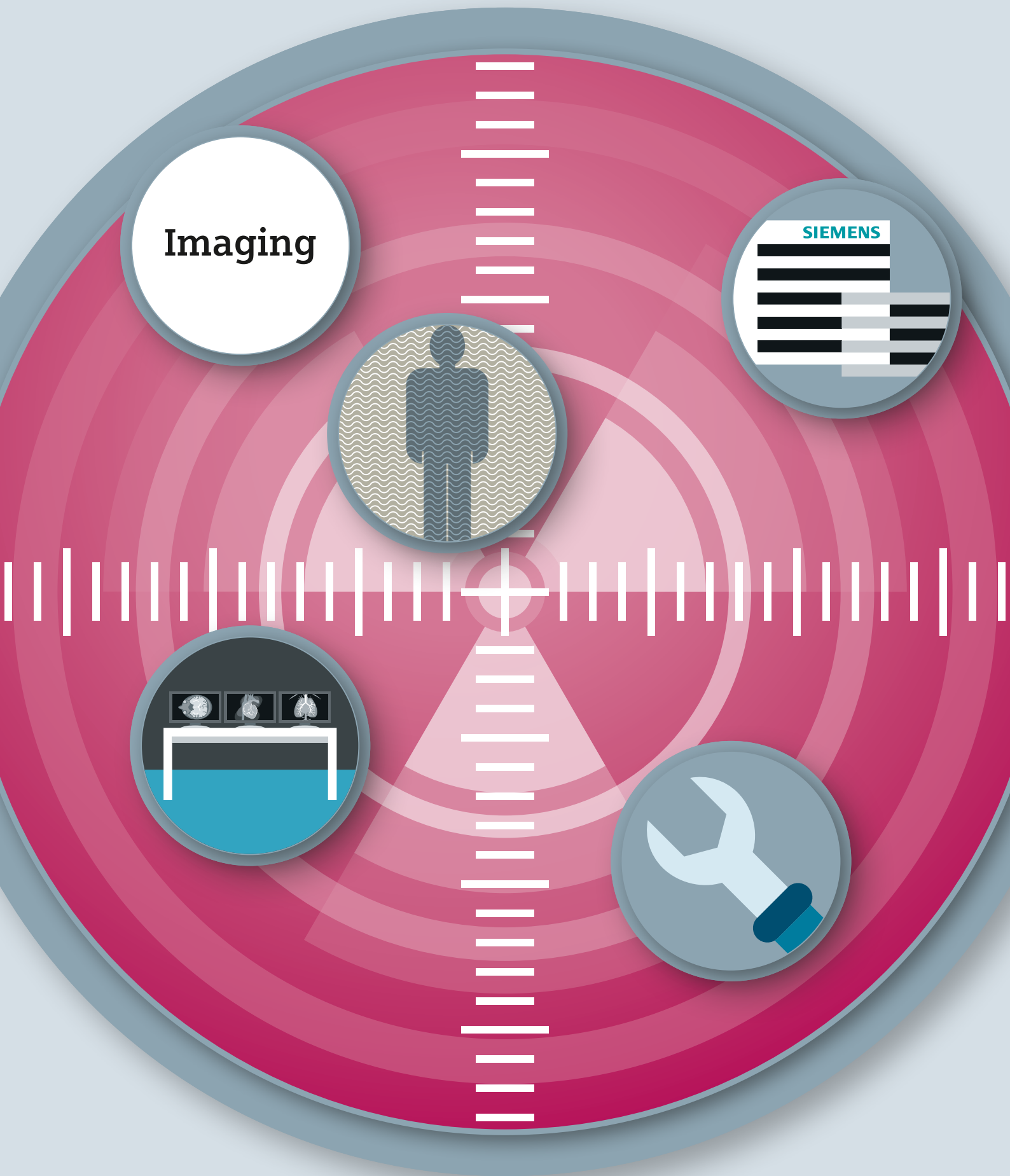
Humans are exposed to radiation on a daily basis. Medical radiation is only one of many contributing factors.

The Siemens Right Dose approach demonstrates innovation leadership in dose management. Within this approach we offer a set of products, solutions, and technologies that enable you to achieve best clinical outcomes with sensible dose values.

Our Right Dose hardware fleet covers a complete range of imaging modalities, from hybrid systems to women's health diagnostics.

The Right Dose software portfolio optimally complements our scanners and focuses on providing sound and sustainable results.

If we have convinced you to see the value in our Right Dose approach, we have reached our goal.



Imaging

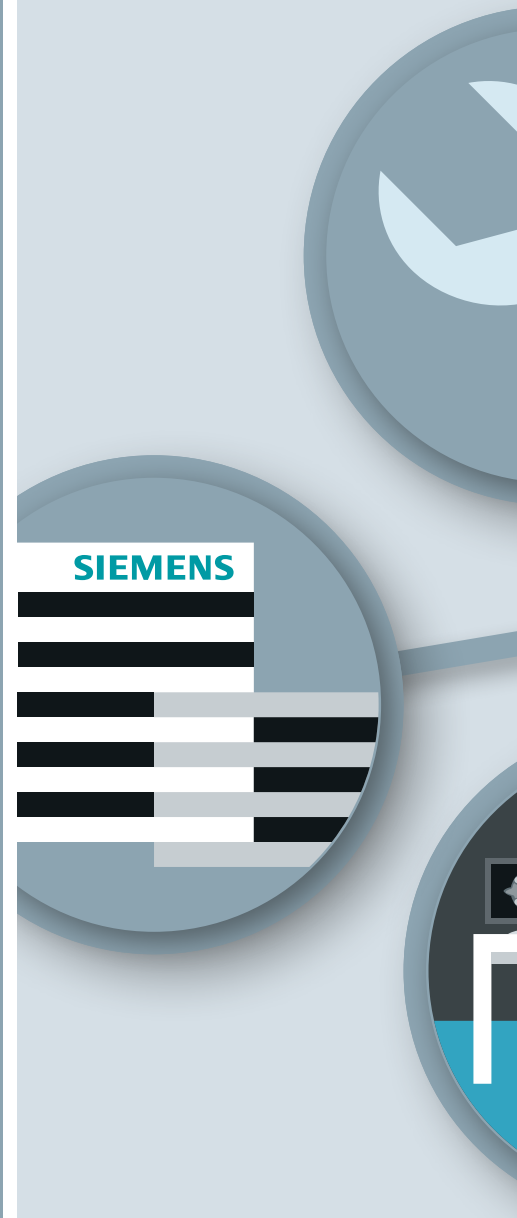
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