Sustainable Competence
in Advancing Healthcare

COCIR SRI
7th ANNUAL FORUM

Thursday 22 March, from 14.00 to 16.00

HAZARDOUS SUBSTANCES ARE SOMETIMES NEEDED FOR CLINICAL PERFORMANCE

- Hazardous substances are used when no suitable alternatives substances are available
- Hazardous Substances are only used if justified by risk/benefit analysis and if they pose no risk for environment
- Risk assessment is a formal standardized process already undertaken by the Medical Device Industry in order to obtain worldwide market approvals

We must balance the benefits and risks of using hazardous substances in medical devices against health care effectiveness, safety and environment

Complex products with long supply chains

Typical MRI unit weighs about 10 tons

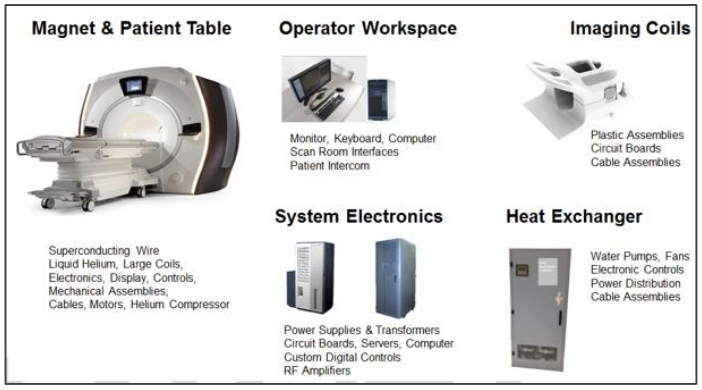
- 3,600 assemblies
- 27,000 sub-assemblies
- 120,000 component parts
- More than 1,000,000 "articles"

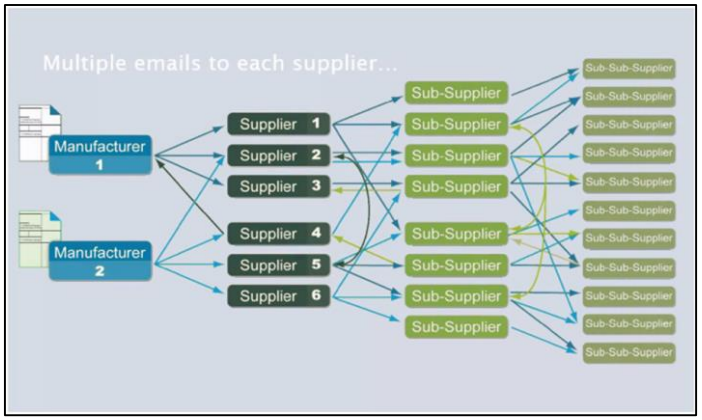
Typical supply chain has 5 to 7 levels

- About 11,000 suppliers across the world
- 10 different languages

High value devices, low unit sales numbers

- Limited purchasing leverage even on 1st level suppliers





MEDICAL DEVICES ARE SAFE

- MDD set requirements for chemical safety of medical devices, where an exposure may occur. Materials are tested for biocompatibility:
  - ISO 10993-1:2009 Biological evaluation of medical devices Part 1: Evaluation and testing in the risk management process
  - ISO 10993-2:2006 Biological evaluation of medical devices Part 2: Animal welfare requirements
  - ISO 10993-3:2014 Biological evaluation of medical devices Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity
  - ISO 10993-4:2002/Amd 1:2006 Biological evaluation of medical devices Part 4: Selection of tests for interactions with blood
  - ISO 10993-5:2009 Biological evaluation of medical devices Part 5: Tests for in vitro cytotoxicity
  - ISO 10993-6:2007 Biological evaluation of medical devices Part 6: Tests for local effects after implantation
  - ISO 10993-7:2008 Biological evaluation of medical devices Part 7: Ethylene oxide sterilization residuals
  - ISO 10993-8:2001 Biological evaluation of medical devices Part 8: Selection of reference materials (withdrawn)
  - ISO 10993-9:1999 Biological evaluation of medical devices Part 9: Framework for identification and quantification of potential degradation products
  - ISO 10993-10:2010 Biological evaluation of medical devices Part 10: Tests for irritation and skin sensitization
  - ISO 10993-11:2006 Biological evaluation of medical devices Part 11: Tests for systemic toxicity
  - ISO 10993-12:2012 Biological evaluation of medical devices Part 12: Sample preparation and reference materials (available in English only)
  - ISO 10993-13:1998 Biological evaluation of medical devices Part 13: Identification and quantification of degradation products from polymeric medical devices
  - ISO 10993-14:2001 Biological evaluation of medical devices Part 14: Identification and quantification of degradation products from ceramics
  - ISO 10993-15:2000 Biological evaluation of medical devices Part 15: Identification and quantification of degradation products from metals and alloys
  - ISO 10993-16:1997 Biological evaluation of medical devices Part 16: Toxicokinetic study design for degradation products and leachables
  - ISO 10993-17:2002 Biological evaluation of medical devices Part 17: Establishment of allowable limits for leachable substances
  - ISO 10993-18:2005 Biological evaluation of medical devices Part 18: Chemical characterization of materials
  - ISO/TS 10993-19:2006 Biological evaluation of medical devices Part 19: Physico-chemical, morphological and topographical characterization of materials
  - ISO/TS 10993-20:2006 Biological evaluation of medical devices Part 20: Principles and methods for immunotoxicology testing of medical devices
  - ISO/TR 15499:2012 Biological evaluation of medical devices—Guidance on the conduct of biological evaluation within a risk management process
- New MDR requires manufactures to provide justification for the use of hazardous chemicals where exposure may occur

SITUATION AROUND HAZARDOUS CHEMICALS

- **Increase in environmental legislations (globally doubling since 2010) and initiatives** such as material compliance, energy consumption, battery, waste managemet, packaging, green public procurement, etc.
- As a consequence there is a **deep impact on product design** and entrepreneurial flexibility

PRIVATE INITIATIVES

HEALTHCARE WITHOUT HARM

- Broad-based international coalition of hundreds of organizations and thousands of hospitals and health partners in more than 50 countries.
- Implement ecologically sound and healthy alternatives to health care practices that pollute the environment and contribute to disease
- Projects: safer chemicals, medical devices database, PVC free blood bags, pharmaceuticals in the environment , endocrine disrupting chemicals released by medical devices

KAISER PERMANENTE

- Kaiser Permanente is one of the nation's largest not-for-profit health plans, serving 11.8 million members, with headquarters in Oakland, California.
- Active in advancing an economy where chemicals used in commerce are not harmful to humans or the environment.

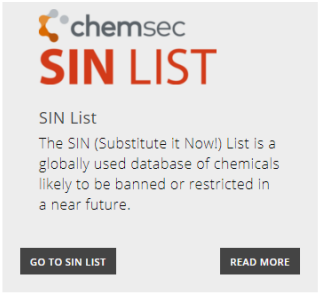
PRACTICE GREENHEALTH

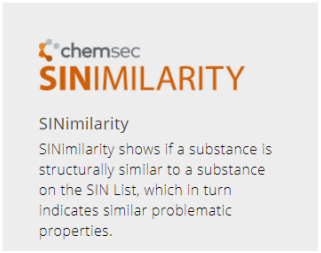
- Practice Greenhealth provides support to health care facilities by:
  - Determining best practices to meet environmental compliance regulations for chemicals.
  - Developing programs (in collaboration with its membership) to transition away from the use of certain high-risk chemicals.
- Environmentally preferable purchasing (EPP): EPP can reduce waste, reduce the toxicity of products in the facility, reduce occupational and patient health risks, and increase your image in your community.

INDUSTRY INITIATIVES

- The ChemSec Business Group is a collaboration among companies working together to inspire concrete progress on toxic use reduction. It gathers market-leading companies, across a diversity of sectors, for the development of effective corporate practice in the substitution of hazardous substances. It also raises public awareness of companies' efforts to be d
- Adidas Group, Apple, Boots, Coop, Dell, EurEau, H&M, Ikea, Kingfisher, Lego, Shaw, Skanska, Sony Mobile and the Swedish Construction Federationrivers on this issue.
- ChemSec's SIN List: it is a globally used database of chemicals likely to be banned or restricted in a near future. The chemicals on the SIN List have been identified by ChemSec as Substances of Very High Concern (SVHC) based on the criteria established by the EU chemicals regulation REACH.
- However, chemicals are listed based on hazard and not risk

chemsec
INTERNATIONAL CHEMICAL SECRETARIAT





EU/INTERNATIONAL

LEGISLATION

1. **ROHS Directive**
   - ✓ 10 Substances already included
   - ✓ 7 new substances to be evaluated for inclusion
2. **REACH Regulation**
   - ✓ List of substances subject to authorization
   - ✓ List of restricted substances
   - ✓ List of candidate substances
   - ✓ Substances in the registry of intentions
3. **POP Regulation**
4. **Medical Devices Regulation**
   - ✓ Around 1200 CMRs and ED substances
5. **Batteries Directive**
6. **Packaging Directive**
7. **International legislation (US, ASIA)**
   - ✓ California Proposition 65 (around 980 substances)
   - ✓ Korea, Vietnam, China, Taiwan, United Arab Emirates, etc REACH/RoHS like legislation

INDUSTRY

Industry restricted substances (regulated and not yet regulated)

SAICM

Strategic Approach
to International Chemicals Management

SAICM overall objective is the achievement of the sound management of chemicals throughout their life cycle so that by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health.

Emerging Policy Issues

- Lead in paint
- Chemicals in products
- Hazardous substance within the life cycle of electrical and electronic products
- Nanotechnology and manufactured nanomaterials
- Endocrine-disrupting chemicals
- Environmentally persistent pharmaceutical pollutants
- Perfluorinated chemicals and the transition to safer alternatives
- Highly hazardous pesticides

EU AGENDA

1. **Strategy for a non-toxic environment**
   - ✓ Substitution, including grouping of chemicals and measures to support substitution
   - ✓ Chemicals in products (articles) and non-toxic material cycles
   - ✓ Very persistent chemicals
   - ✓ Policy means, innovation and competitiveness
   - ✓ Programme on the development on new, non-/less toxic substances

   http://ec.europa.eu/environment/chemicals/non-toxic/pdf/NTE%20main%20report%20final.pdf

2. **Communication on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation**
   - ✓ Insufficient information about substances of concern in products and waste
   - ✓ Presence of substances of concern in recycled materials and in articles made thereof
   - ✓ Uncertainties about how materials can cease to be waste

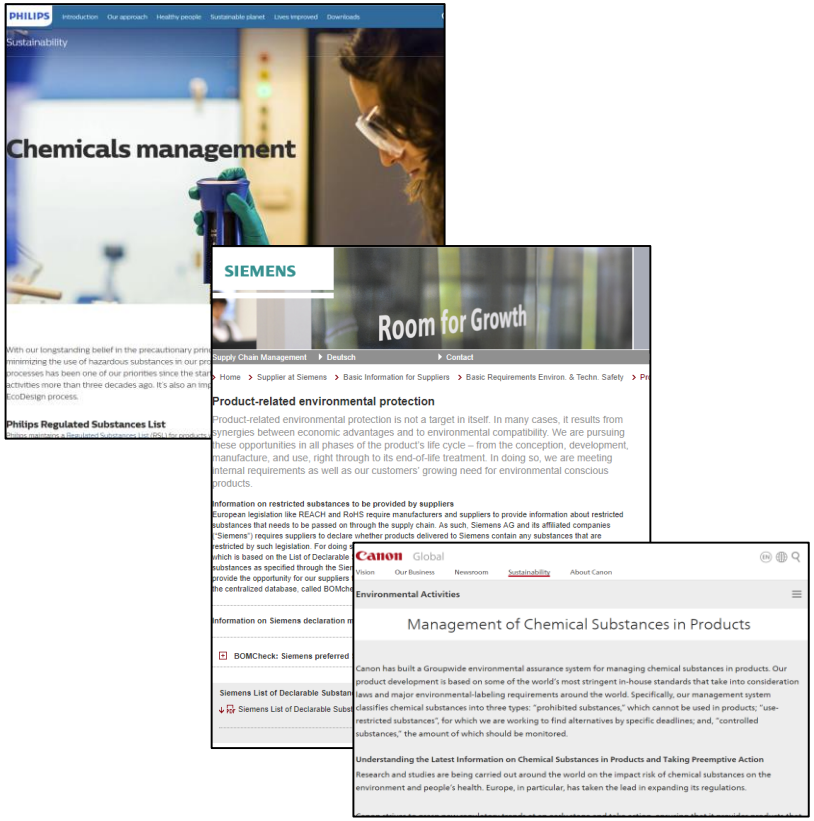
   https://ec.europa.eu/docsroom/documents/27321

3. **General Report on the operations of REACH and review of certain elements**
   - ✓ Action 4 – Tracking substances of concern in the supply chain

INDUSTRY INITIATIVES UP TO NOW

COMPANIES' INDIVIDUAL INITIATIVES

- COCIR Members have developed policies and management systems over the years to monitor and reduce the use of hazardous chemicals.
- Lists of regulated chemicals going beyond legislation are very common and determined on the base of market trends.

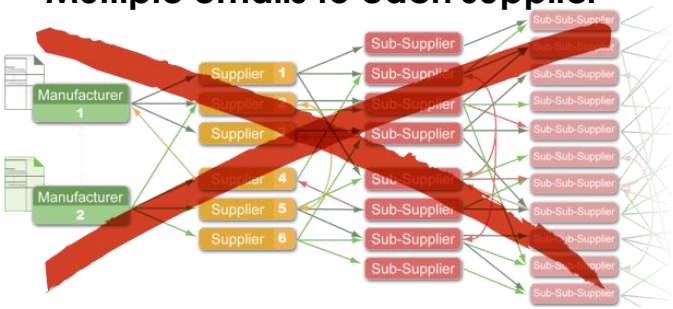


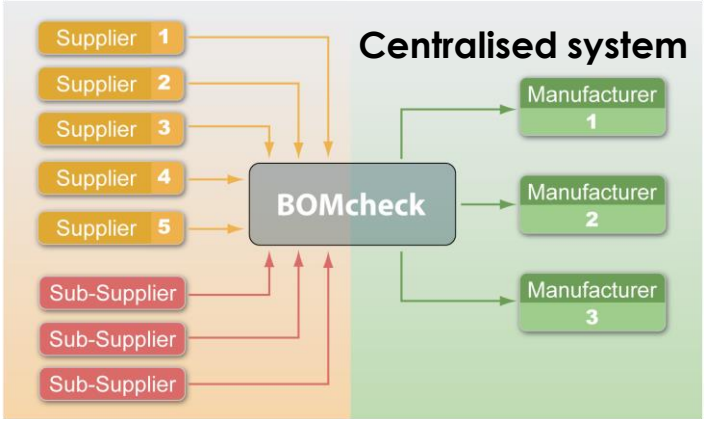
COMPANIES' JOINT INITIATIVE

BOMCHECK: CENTRALISED WEB DATABASE

Suppliers can manage their data securely in the database and download and email their declarations to any customers not already on BOMcheck in industry standard IPC 1752A XML, PDF or Excel formats.

Multiple emails to each supplier





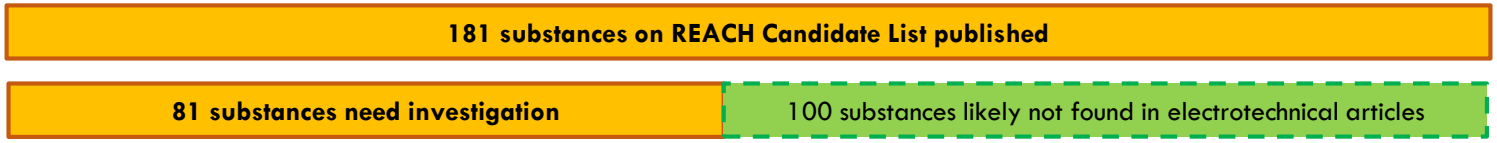
"BOMcheck has the simplest input interface we have seen and provides extensive help and data checking to reduce errors and highlight potential issues while you are working on your part declarations."

GE Healthcare

REGULATORY COMPLIANCE DECLARATION TOOL

REDUCES SUPPLIER TIME AND EFFORT BY 66%

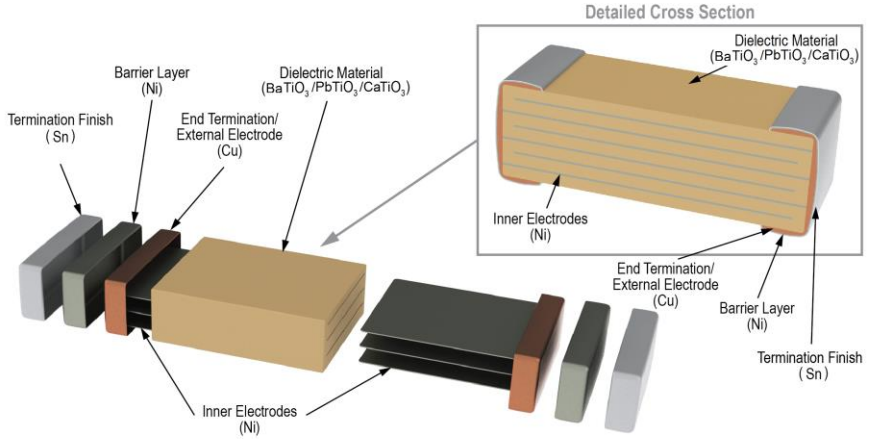
- BOMcheck Substance List Working Group / IEC 62474 investigates new REACH SVHCs
  - ✓ Extensive outreach through trade associations and supply chains
  - ✓ Develops detailed knowledge of all known uses of the substance
- Suppliers rely on up-to-date concise chemicals guidance in RCD tool to investigate materials and parts which are at risk
  - ✓ BOMcheck is updated within 3 weeks of new REACH Candidate List
  - ✓ BOMcheck screening for substances not found in electrotechnical articles is published at https://www.bomcheck.net/reach



SUPPLIER FMD

LIST ALL MATERIALS AND SUBSTANCES IN THE PART

- FMDs for supplier parts are not normally transmitted through 5 – 7 layers in the supply chain to the OEM
- 76% of declarations in BOMcheck are Regulatory Compliance Declarations



Materials		Substances			
Name	**Mass percent of material in the part**	**Substance Name**	**Substance CAS number**	**Mass percent of substance in the material**	**Exemption**
Dielectric Material	62%	Barium titanium oxide ($BaTiO_3$)	12047-27-7	70%	
		Lead titanium oxide ($PbTiO_3$)	12060-00-3	20%	RoHS exemption Annex III 7(c)-IV
		Calcium titanium oxide ($CaTiO_3$)	12049-50-2	10%	
Inner Electrode	17%	Nickel (Ni)	7440-02-0	100%	
End Termination / External Electrode	8%	Copper (Cu)	7440-50-8	100%	
Barrier Layer	6%	Nickel (Ni)	7440-02-0	100%	
Termination Finish	7%	Tin (Sn)	7440-31-5	100%	

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THE NEW STEP FOR THE SRI

THE NEW SRI

- COCIR Members evaluated in 2017 the possibility to introduce the management of substances in the COCIR SRI
- The objectives of this new step:
  - ✓ Gain a better knowledge of substances used in medical devices that are not yet regulated
  - ✓ Study the different applications to understand if the use is justified, if there are risks for health or environment, if safer alternatives are available, etc
- The Benefits:
  - ✓ Reducing the use of hazardous substances where appropriate, to improve environmental and circular economy performances of medical devices
  - ✓ Meeting the concerns of users/regulators on safety of medical devices
  - ✓ Collecting useful information that can be shared with regulators for the decision making process on new regulated substances

PLANNED SCOPE OF COCIR SRI NEXT PHASE

- The new MDR addresses CMR and ED substances used in devices where an exposure might occur
- The ROHS Directive addresses substances that may have an impact on waste management and may negatively impact health of workers or environment during the waste phase
- The REACH Regulation restricts substances where risks are identified that cannot be managed/minimized

The COCIR SRI will target not yet regulated CMRs and EDs (and others listed on the REACH SVHC list) in uses that are not addressed by current regulations.

IDENTIFICATION OF CMRs
USED IN MEDICAL DEVICES

- ✓ Compose a list of substances that are **carcinogens, reproductive toxins and mutagens** of category 1A and 1B and **endocrine disruptors** with EU harmonised classifications that are in scope of Article 10.4.
- ✓ There are various lists published but the definitive one that should be used is the ECHA Classification and Labelling Inventory (C&L I)

Classification	Number listed
Carcinogen 1A	1,059 substances, of which 336 are harmonised classifications
Carcinogen 1B	1,707 substances, of which 692 are harmonised classifications
Mutagen 1A	232 substances, of which none are harmonised classifications
Mutagen 1B	900 substances, of which 429 are harmonised classifications
Reproductive Toxin 1A	692 substances, of which 27 are harmonised classifications
Reproductive Toxin 1B	1,572 substances, of which 232 are harmonised classifications

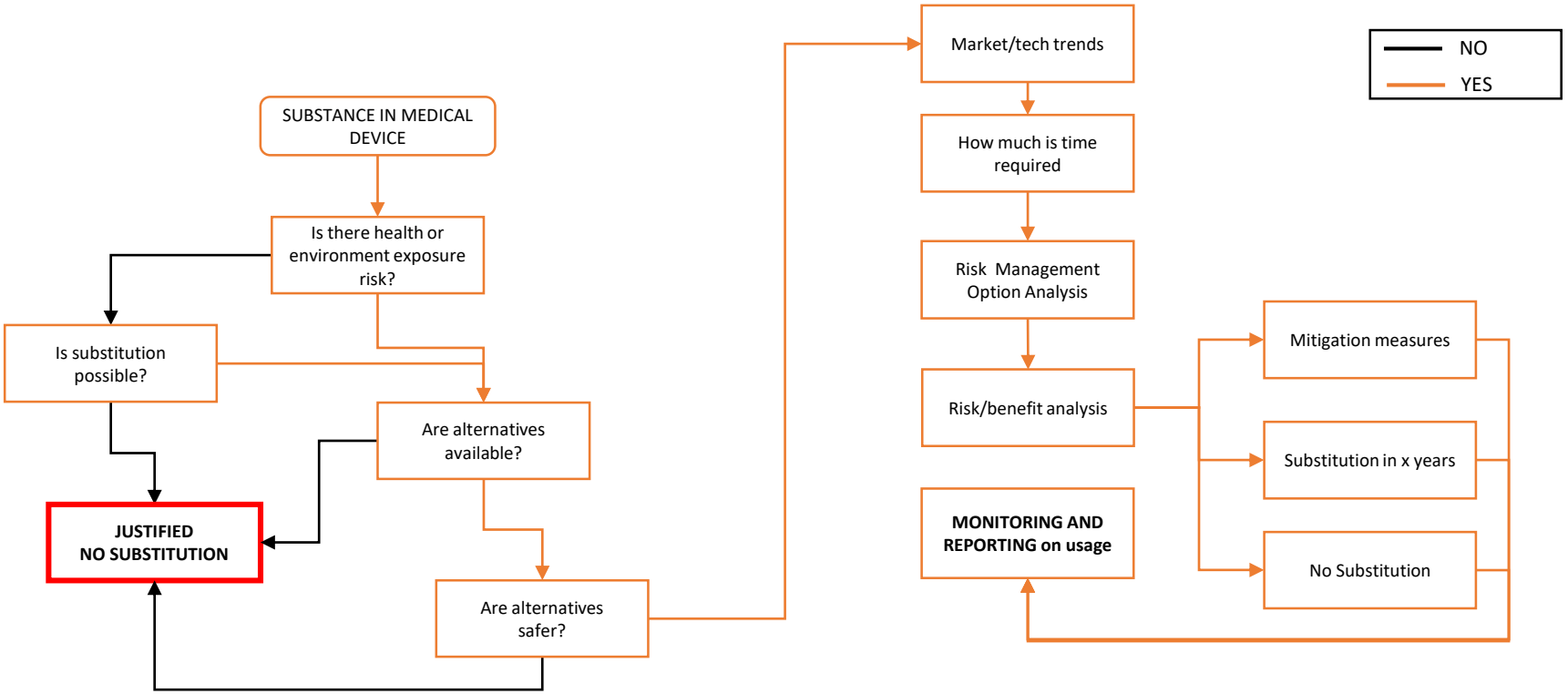
- ✓ Reduce the list from 1200 substances to 100, identifying only those used in **medical devices**

COCIR is going to contract RINA to perform the analysis
to come to a list of CMR
that may be used in medical devices

CRITERIA TO SELECT A SUBSTANCE

- Not yet restricted
- In focus of NGOs and stakeholders
- In declarable lists of regulated substances
- Used in medical devices in significant amount
- Likelihood of exposure

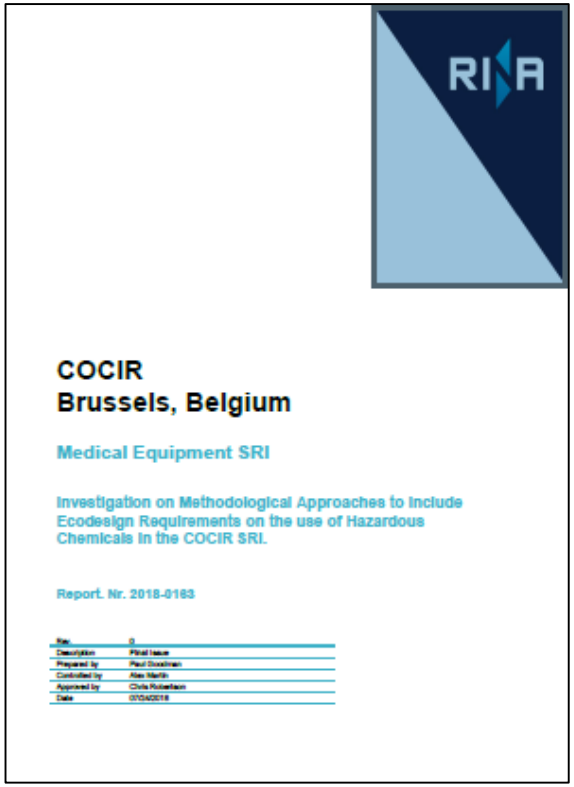
SUBSTANCE ASSESSMENT



COCIR STUDY

COCIR contracted RINA to perform an assessment on the methodological steps to assess a substance:

- ✓ Exposure risks
- ✓ Assessment of alternatives
- ✓ Global Trends
- ✓ Time needed for substitution
- ✓ Impact on innovation
- ✓ Risk/benefit analysis


COCIR
Brussels, Belgium

Medical Equipment SRI

Investigation on Methodological Approaches to include Ecodesign Requirements on the use of Hazardous Chemicals in the COCIR SRI.

Report. Nr. 2018-0183

RISK OF EXPOSURE

- Exposure levels from hazardous substances ideally need to be measured for an accurate estimation of risk. It is necessary to consider exposure to:
  - Workers
  - Humans via the environment
  - Humans as patients/equipment users
  - The environment

- Minimum amount that cause harm
  - Useful published data exists for the most commonly used hazardous substances, but may not exist for less common substances.
  - Methods have, however, been developed to estimate hazard classification and minimum amounts that cause harm, which are known as QSAR (quantitative structure-activity relationships) modelling. A QSAR toolbox is available from the European Chemical Agency and is intended for industry and governments to use6

IDENTIFICATION and EVALUATION OF ALTERNATIVES

Possible sources of information for identifying substitutes include:

- Supplier declarations
- Patents
- REACH documentation
- Websites, articles, advertising and technical datasheets from manufacturers of substitutes and material suppliers
- Scientific literature

Alternatives will be evaluated against the following criteria:

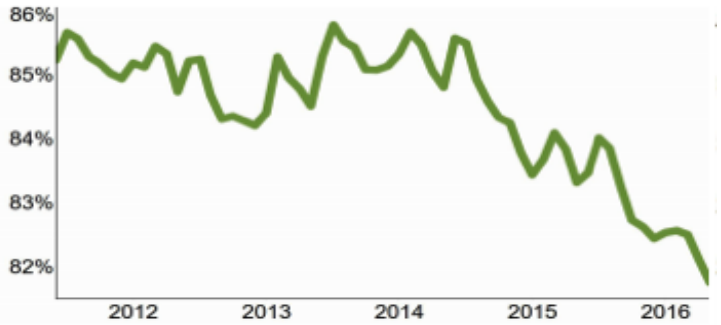
- Substitution is scientifically or technically impractical
- Reliability is not assured
- Overall health, safety and environmental impact of alternatives are more negative than the overall impact of the substance
- Socio-economic assessment
- Impact on innovation
- Availability

In 2015 DG ENVI worked on a methodology for evaluating alternatives in RoHS.
The methodology was not finalized but provides a solid base

Since 2011 COCIR studies almost 40 exemption requests and performed an assessment of alternatives for each one.

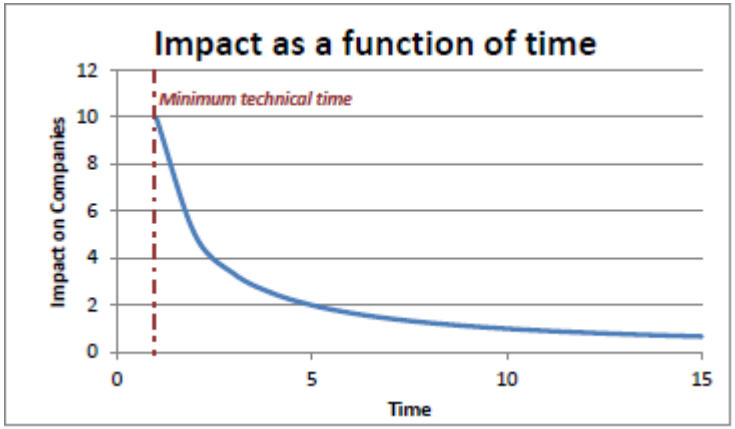
TECHNOLOGY TRENDS

- All industry sectors are affected by trends in the use of hazardous substances and their replacement:
  - Pressure of EU or International legislation
  - Regulatory requirements in other sectors such as IT and electronics
  - NGO initiatives
  - Green Purchasing Initiatives
- If the analysis of current trends shows that the use of the substance is already declining, there may be no need to take action
- This analysis may be paired with the analysis of the time required for substitution.



TIME NEEDED FOR SUBSTITUTION

- In 2015 COCIR developed a methodology to assess objectively the time required to substitute chemicals in medical devices.
- Determining the time required for substitution is important to assess the impact of regulatory measures, the effects of market trends, the required resources and the impact on innovation.
- Each step in the substitution process is accounted for.
- Experts assign a time required for each step for each specific application of the hazardous chemical.
- The sum of all the steps and loops gives the final result.



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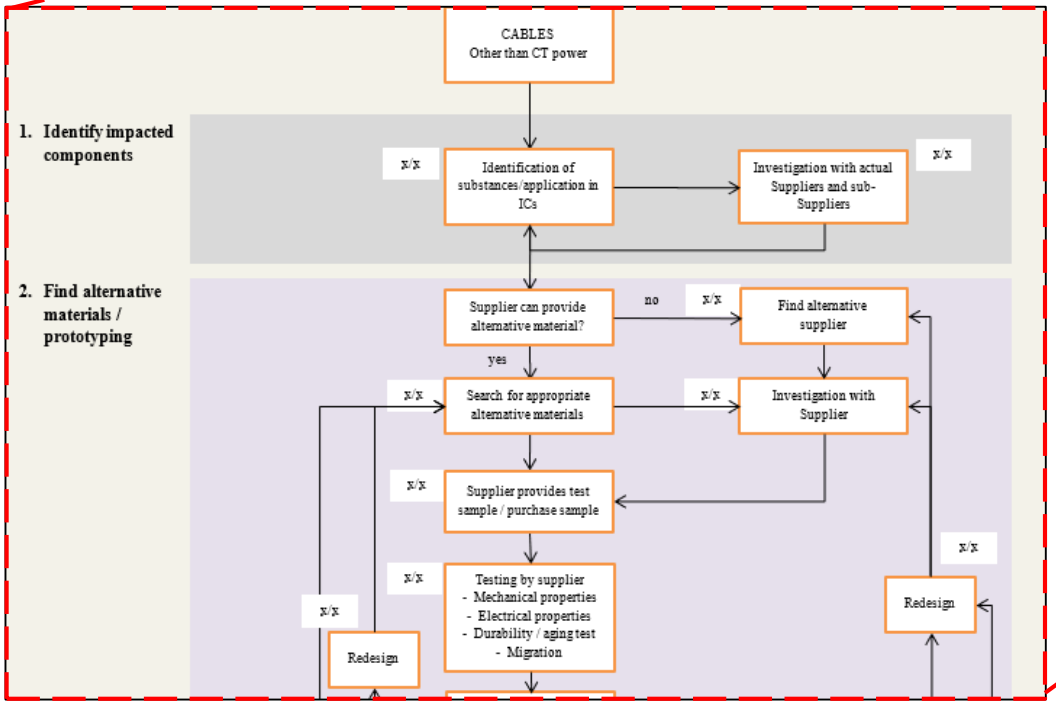

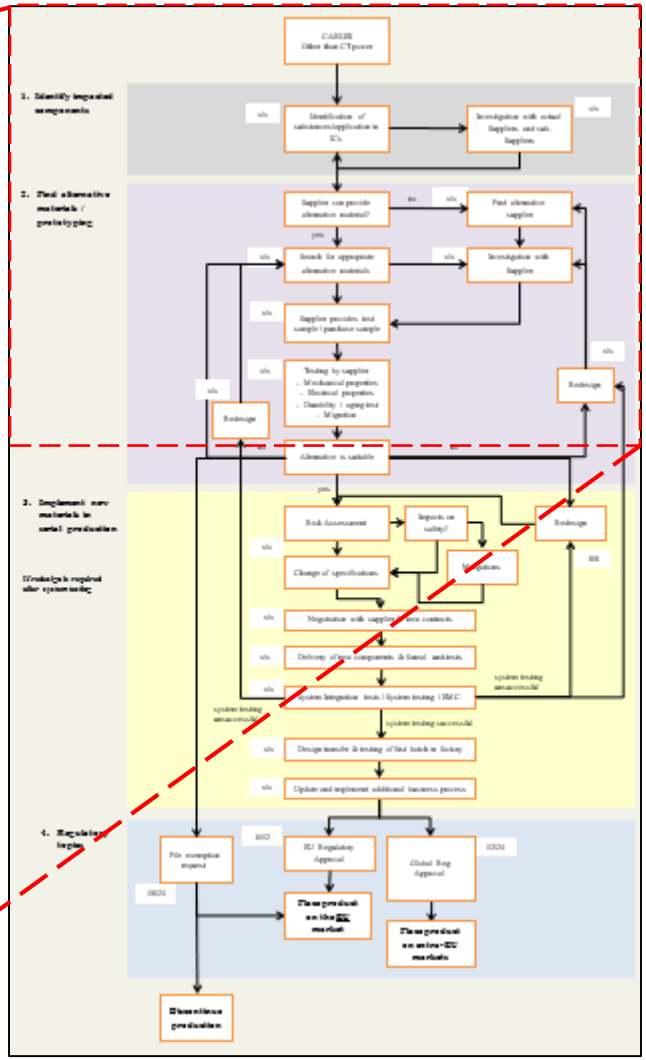

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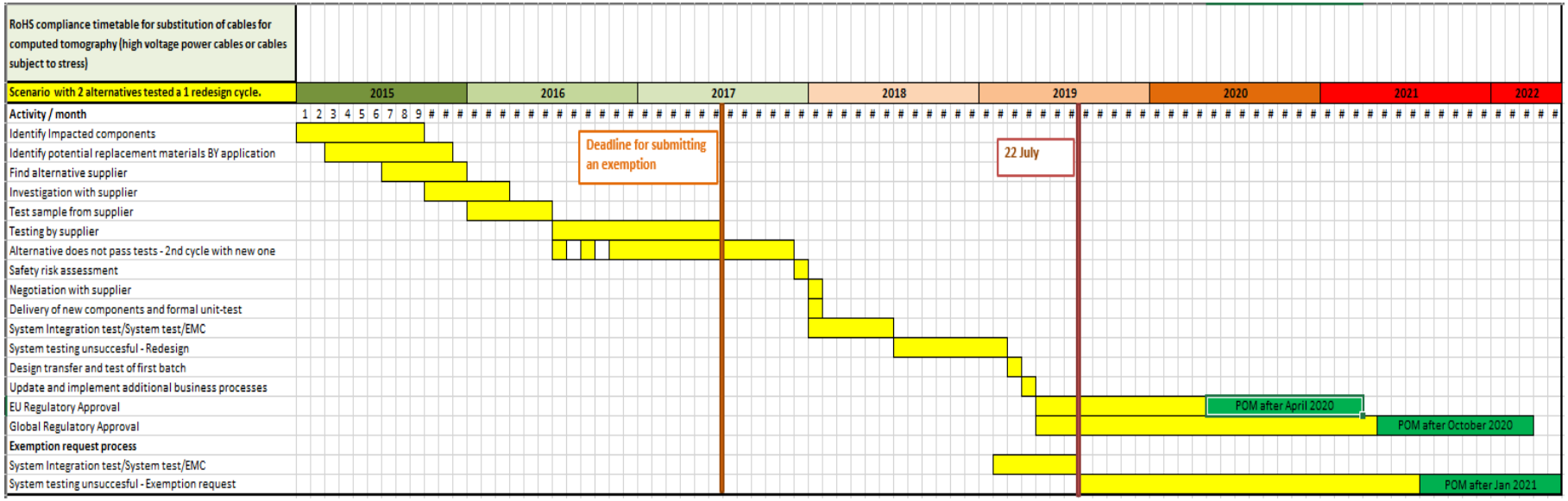


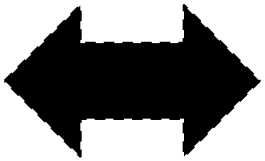
COST/BENEFIT ANALYSIS

Substitution with less harmful alternatives, while always welcome, may however not have significant benefits to human health or the environment due to:

- The relatively small quantities (e.g. lead in X-ray tube bearings use less than 50 grams of lead per year)
- The used quantities in comparison with other industry sectors (e.g. lead in batteries)
- The high value of medical devices once wasted, ensures they are collected for recycling at end of life, which is performed safely

- The cost benefit analysis aim is to compare the benefits of substitution with the cost for companies that reflects in an impact on innovation.

80g of lead (100g of tin-lead alloy)



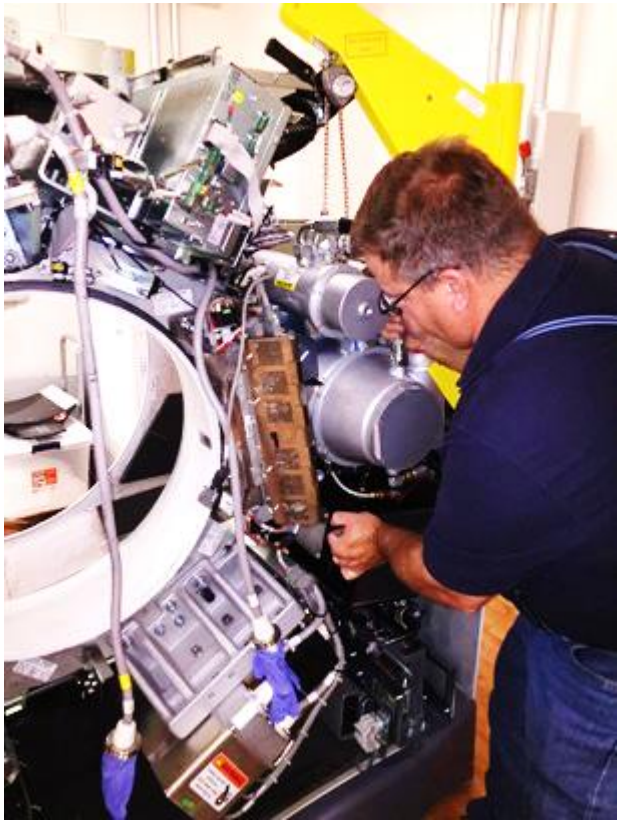
- Substituting lead in bearings of x-ray tubes can save 50g of lead per year, as much lead **as the content of a single reel of soldering wire. Cost 5€.**
- Would require costs for research programs, testing of alternatives, developing new ones, prototyping and testing, redesigning and regulatory approval.

IMPACT ON INNOVATION

- Medical device manufacturers aim to develop innovative new diagnostic equipment and treatment techniques that give better treatment outcomes for patients
- The financial cost of substitution inevitably reduces the resources that are available for investment in new designs and new treatments which will negatively impact on future health of patients worldwide, not only in the EU

IMPACT ON CIRCULAR ECONOMY

- The use of alternatives may end up in hampering the use of parts recovered from used equipment to repair, maintain, refurbish newer equipment or the installed base.
- Alternatives may require parts to be redesigned and compatibility may not be ensured i.e. For X-ray tubes
- As shown in the COCIR SRI section of circular economy the reuse of parts is a key element of circular economy



RISK/BENEFIT ANALYSIS

- Medical risk benefit analysis is not normally used to assess alternative hazardous substances.
  - «Risk» means the probability of harm, direct or indirect, to patients or environment deriving from the use of the hazardous substance in the specific application, along its life cycle.
  - «Benefit» has to be intended as the benefits for the patients deriving from the performances of the medical devices ensured by the use of the hazardous substance in the specific application
- It is not the intention of the SRI to develop such a complex methodology.
- Fortunately, the MDR requires the EC to develop a methodology for the risk/benefit assessment of CMR phthalates in invasive devices and devices used to administer fluids or medicines.

METHODOLOGY UNDER DEVELOPMENT

- The EC gave mandate to SCHEER to develop the Guidance end 2017.
- The SCHEER is requested to provide guidelines on the benefit-risk assessment of the presence of CMR phthalates.
- The guidelines shall include guidance on how, for an individual device, to:
  - Analyze and estimate potential patient or user exposure to the substance *(NOTE: not to environment)*
  - Analyze possible alternative substances, materials, designs, or medical treatments
  - To justify why possible substance and/or material substitutes, if available, or design changes, if feasible, are inappropriate in relation to maintaining the functionality, performance and the benefit-risk ratios of the product.

Once available this methodology will be analyzed by COCIR and adapted to the SRI scope and objectives

LAST STEP
FINAL RECOMMENDATION

- Following the very consolidated experience with RoHS exemptions, the COCIR SRI SC will come to a conclusion
- The use of the substance, in the specific application may be considered:
  - Justified: no action required
  - Not justified and recommended for substitution: in case safer alternatives are available and no risks are involved with substitution

JUSTIFIED: ACTIONS

- No actions are required as the use of the substance is justified. It poses no risks, there are no alternatives or the use of the substance provides significant benefits for the patients
- The information contained in the report is anyway useful for any future discussion on the substance and will be made available to stakeholders, authorities and interested parties.
- The availability of alternatives will be reviewedand reported periodically.

NOT JUSTIFIED: ACTIONS

- The use of the substance is not justified as alternatives are available and suited. The substance, in the specific application, has been recommended for substitution.
- SRI Members commit to phase out the substance in the time frame specified by the analysis (see “Time required for substitution”).

REPORTING

- The SRI will report annually about:
  - New substance addressed by the methodology
  - Uses of the substance and quantities
  - Full analysis (one substance, one dossier)
    - Exposure assessment
    - Assessment of alternatives
    - Risk/benefit evaluation
    - Etc
  - Reduction in the use in case of substitution activities

PLAN

From March 2018 to March 2019

1. Selection of a pilot substance
2. Analysis
3. Stakeholder involvement

March 2019

1. Presentation of the results on the pilot project

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