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European Space Agency

Impact of regulatory constraints in the procurement of EEE parts: RoHS, REACH

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- 1. RoHS Update**
- 2. RoHS and the Space Sector**
- 3. RoHS Supply Chain Impact**
- 4. REACH Introduction**
- 5. REACH and the Space Sector**
- 6. Main impact of REACH for the Space Sector**
- 7. Conclusions**

- In January 2003, the European Union issued two pieces of legislation which focused on commercial and consumer electronics:
 - Waste Electrical and Electronic Equipment (**WEEE**) legislation aims to increase recycling and recovery of end-of-life electronics.

Producers (manufacturers, sellers, distributors) will be responsible for financing the collection, treatment, recovery, and disposal of WEEE from private households deposited at collection facilities by 13 August 2005.
 - Restriction of Hazardous Substances (**RoHS**) legislation prohibits the use of lead and other harmful substances (i.e., mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), polybrominated diphenyl ethers (PBDEs) in new electrical and electronic equipment put on the market after 1 July 2006.
- A new European Union RoHS Directive 2011/65/EU (known as RoHS2) was adopted by the European Council on 27 May 2011 as a recast of the original RoHS. It requires Member States to transpose the provisions into their respective national laws by 2nd January 2013.

■ RoHS2 vs. RoHS1

1. Scope

- a gradual extension of the requirements to all electrical and electronic equipment (EEE), cables and spare parts with a view to full compliance
- a clarification of important definitions (Article 3);
- provision for a review of the scope no later than July 2014

2. Restriction of new substances

- a methodology for the assessment of new hazardous substances in EEE with a view to restriction mainly based on waste-related criteria;
- a review of the list of restricted substances carried out by the Commission by July 2014, and periodically thereafter;
- an opportunity for Member States to propose new substance restrictions;

3. Exemptions:

- clearer and more transparent rules for granting, renewing or deleting exemptions;
- obligation of manufacturers to apply for exemptions and to carry out the necessary assessment

4. Coherence with other EU-Legislation:

- New Legislative Framework (CE marking and Declaration of Conformity); and
- Regulation (EC) No 1907/2006 on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

- **China RoHS:**

- Pollution Control and Management Measures for Electronic and Information Products, Order 39
- Entered into force in 01/03/2007

- **Japan RoHS:**

- JIS C 0950
- Entered into force in 01/03/2007

- **Korea RoHS:**

- The Act for Resource Recycling of Electrical/Electronic Products and Automobile
- Entered into force in 01/01/2008

- **US (California) RoHS:**

- SB20/SB50
- Entered into force in 01/01/2007

RoHS is not just an European affair

- In **RoHS 1** not specifically mentioned in the directive but was covered in the Commission FAQs document:
 - The opinion of the Commission is that excluded from the scope of the RoHS Directive is the equipment which part of another type of equipment that does not fall within the scope of this Directive. Therefore, equipment that is specifically designed to be installed in airplanes, boats and other **means of transport** (including satellites) is considered to fall outside the scope of the RoHS Directive.
- In **RoHS 2** Space is specifically mentioned in the directive (article 2):
 - The directive does not apply to:
 - a) Military equipment;
 - b) Equipment designed to be sent into space;**
 - c) Equipment which is specifically designed, and is to be installed, as part of another type of equipment that is excluded or does not fall within the scope of this Directive;
 - d) Large-scale stationary industrial tools;
 - e) Large-scale fixed installation;
 - f) Means of transport for persons or goods;
 - g) non-road mobile machinery;
 - h) Active implantable medical devices;
 - i) Photovoltaic panels

Therefore, today, European Space Industry does not have a legal obligation to comply with RoHS2, and this without any time conditions.

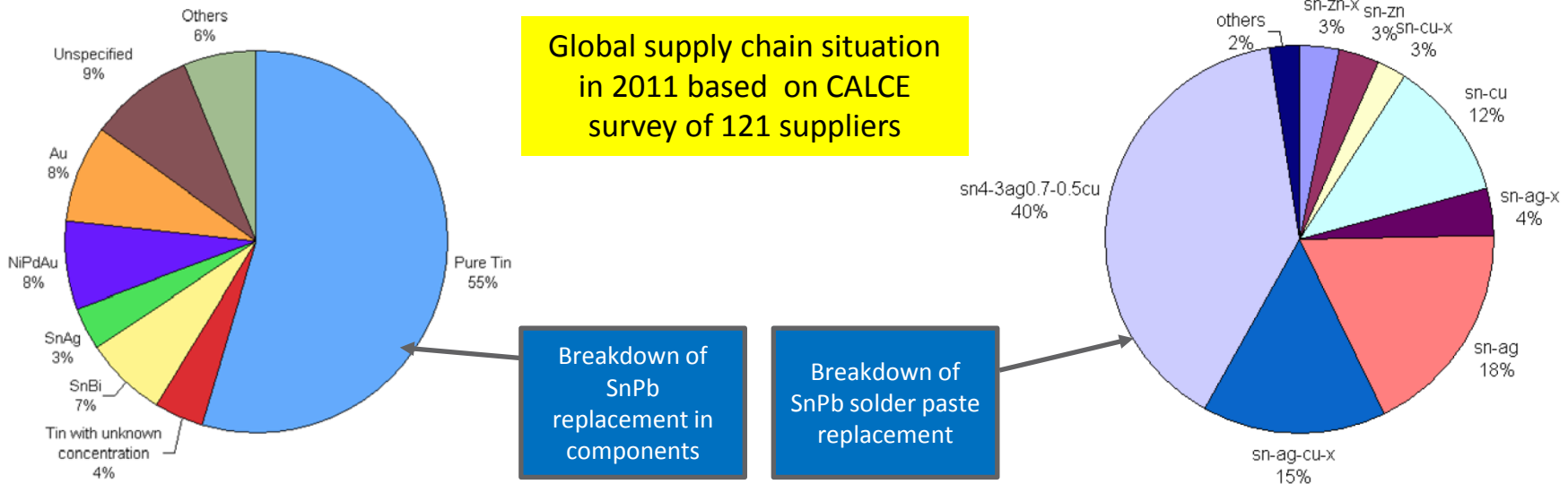
RoHS Supply Chain Assessment

Solder paste:

- There seems to be, in the short term, a low risk of interruption for the supply of Pb based solder pastes to the Space Industry. But nobody knows what will happen in the medium/long term. Switching to a Pb-free solder paste will be **very costly** and **very disruptive** for the Space Industry

Components:

- All our suppliers have switched to Pb-free packages for most of their customers.
- Many suppliers of Space Industry keep an SnPb option (**but for how long?**)



Can the Space Industry turn safely to Pb-free world and abandon current manufacturing processes based on Pb?:

- Some actors say **no**, there are serious, unsolved, risks:
 - Tin whiskers
 - Pad cratering
 - Creep corrosion
 - Drop fragility
- Some actors say **yes**, with proper mitigation and re-use of other sectors results

Customers:

- Most end customers forbid the presence of pure tin in the flight hardware and many require a specific certificate for better insurance coverage.
- For some commercial projects where cost is a major driver, pure tin may be tolerated (with appropriate mitigation) to allow utilization of some commercial parts.

- For programs where pure tin is forbidden we may face the situation where we have to use pure-tinned components due to one of the following:
 - The components are only available with pure tin, or.
 - The components are available in SnPb, were ordered with SnPb but were delivered with pure tin and there is no time for a re-order.

Pure tin forbidden → eliminate all the pure tin and replace it with an acceptable coating, this is Reprocessing

- For programs where pure tin is allowed:

Pure tin allowed → analyze tin whisker risk for the project that allows tin and, if necessary, take measures to lower the risk, this is Mitigation

- **As all suppliers switch to Pb-free coatings, the risk of wrong delivery becomes very important:**
 - **Appropriate incoming inspection is crucial to detect wrong deliveries.**
 - **Common approaches across the supply chain are needed to reduce costs and build up trust.**
- **A new document ESCC 25500 BASIC SPEC (pure tin detection), prepared by PSWG at the initiative of Eurospace has recently been approved and will be released shortly.**

- Regulation (EC) No 1907/2006 concerning the **Registration, Evaluation, Authorisation and Restriction of Chemicals** (REACH)
- One single and coherent system for **new and existing chemicals**
- Applies directly in EU (incl. French Guiana), Norway, Iceland and Liechtenstein, but not in Switzerland
- **Shift of responsibilities** for safe use of chemicals from public authorities to industry
- Managed by **European Chemical Agency** (ECHA), Helsinki; enforced by national authorities in the Member States
- Creates major **market access restrictions** for industry
 - Main impact is on manufacturers, importers and downstream users of substances (incl. in mixtures)
 - Producers, importers and suppliers of articles have limited obligations (but hard to fulfil) relating to "Substances of Very High Concern" (SVHC)
- Focus on priorities
 - **High volumes** (as a proxy for potential risk)
 - Greatest concern (**substances with highest risk**)

REACH in brief

REACH processes

R



- Pre-registration
- Data sharing
- Registration

+ industry obligations triggered by Candidate List inclusion

Industry gathers information and ensures responsible and well-informed management of the risks

E



- Evaluation
 - Dossier evaluation
 - Substance evaluation

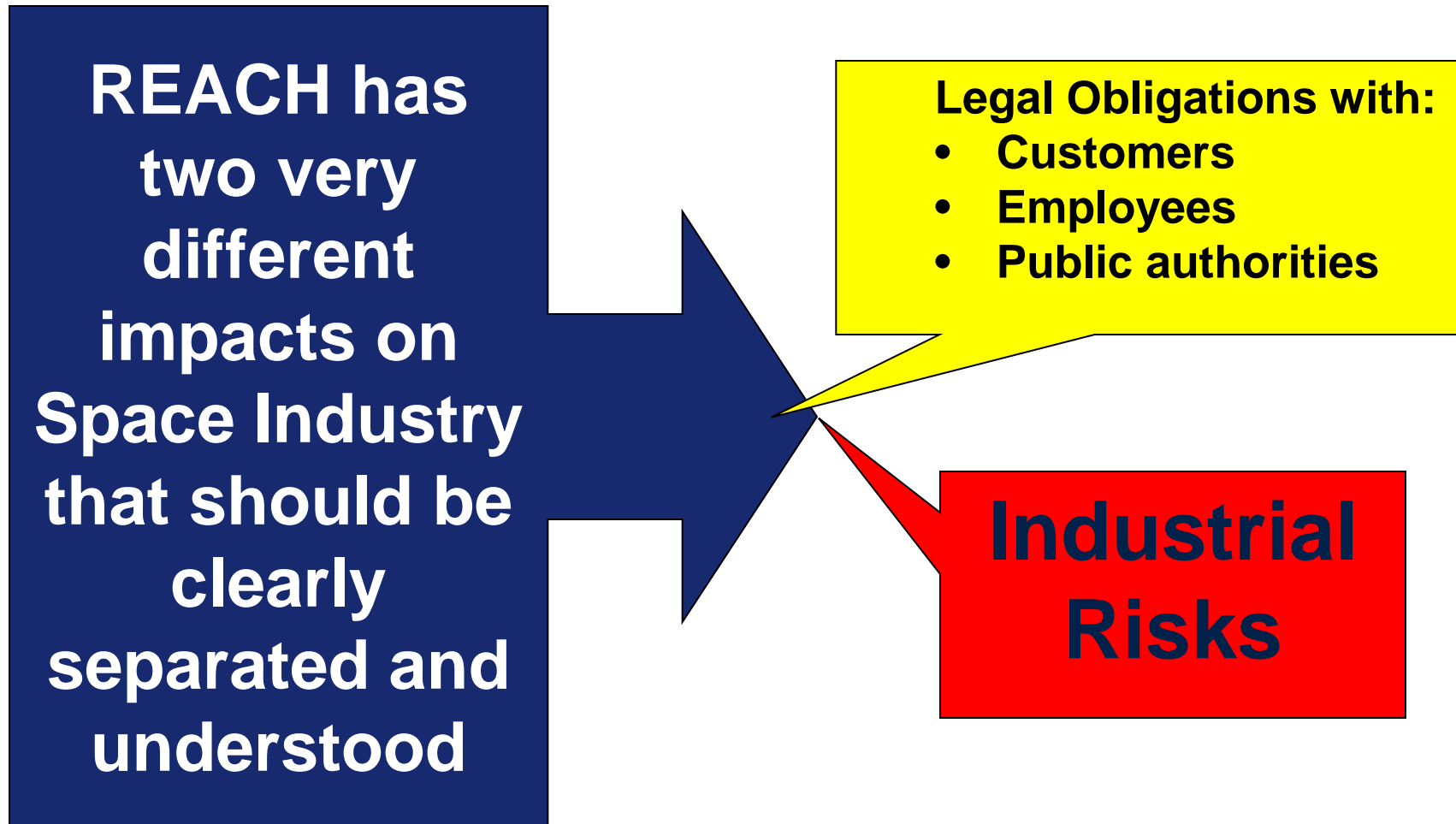
ECHA and MS-CAs control and request for further info

A



- Authorisation
- Restriction
- [Classification & labelling]

COM, with support of ECHA and MS-CAs, applies community wide risk management systems



Industrial Risks

- The Legal Compliance is a clear annoyance that will increase the cost of doing business but is not, by itself, a major threat (very low probability that your CEO will end up in prison!!)
- On the other hand REACH, because of its stated aim to eliminate substances from Europe, will have a major direct and indirect impact in the Space business:
 - Substances that we use will disappear from the market with or without warning
 - Substances that we use will be affected by hefty price increases because volume application will be forbidden

REACH and Space Industry

All Substances used in Europe

The Elimination of Substances

Registered Substances (4300)

Obsolescence Risk Starts

Substances of Very High Concern
SVHC (~1500)

Obsolescence Risk Increases

Candidate List Substances (138, 19/12/2012)

Annex XIV Substances (38, 17/01/2013)

Substances to be notified to **Customers** if > 0.1%
and attach relevant Safe Use Instructions

Article 33 Declaration

Start Substance Replacement Process

ECHA Notification

Increased Obsolescence Risk

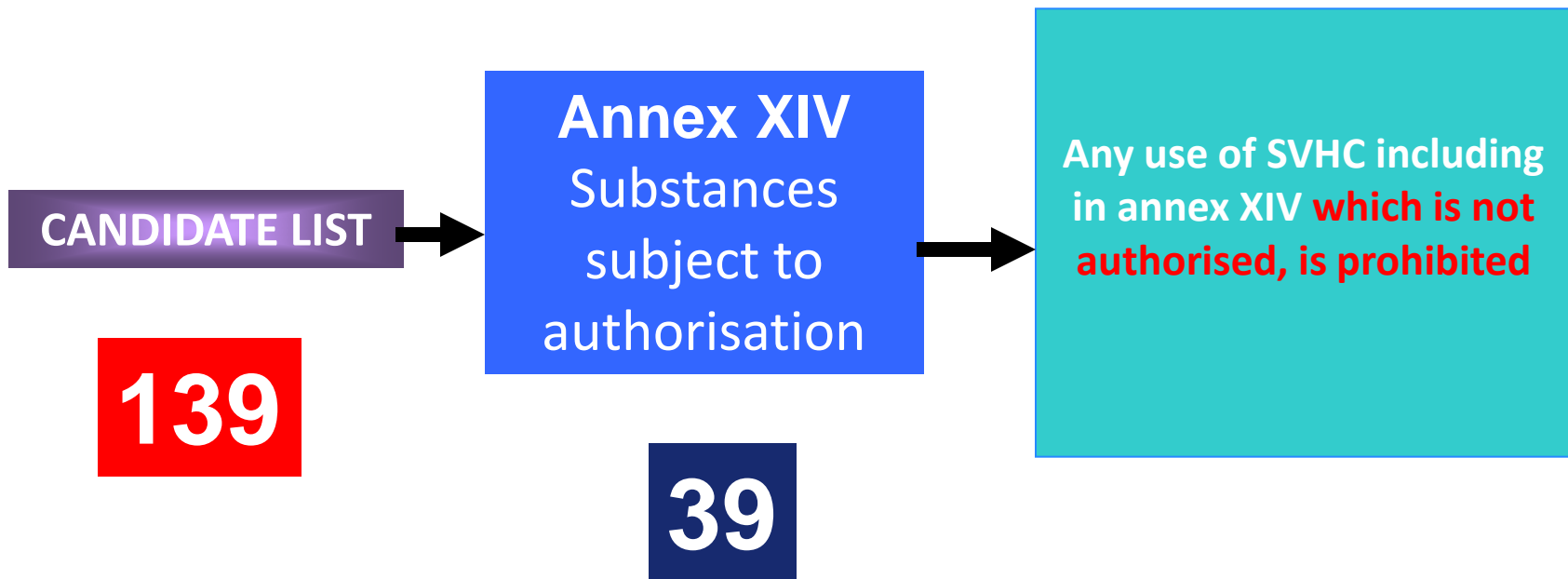
Substance use prohibited after **Sunset**
date unless **Authorisation** for specific
use granted

High Obsolescence Risk

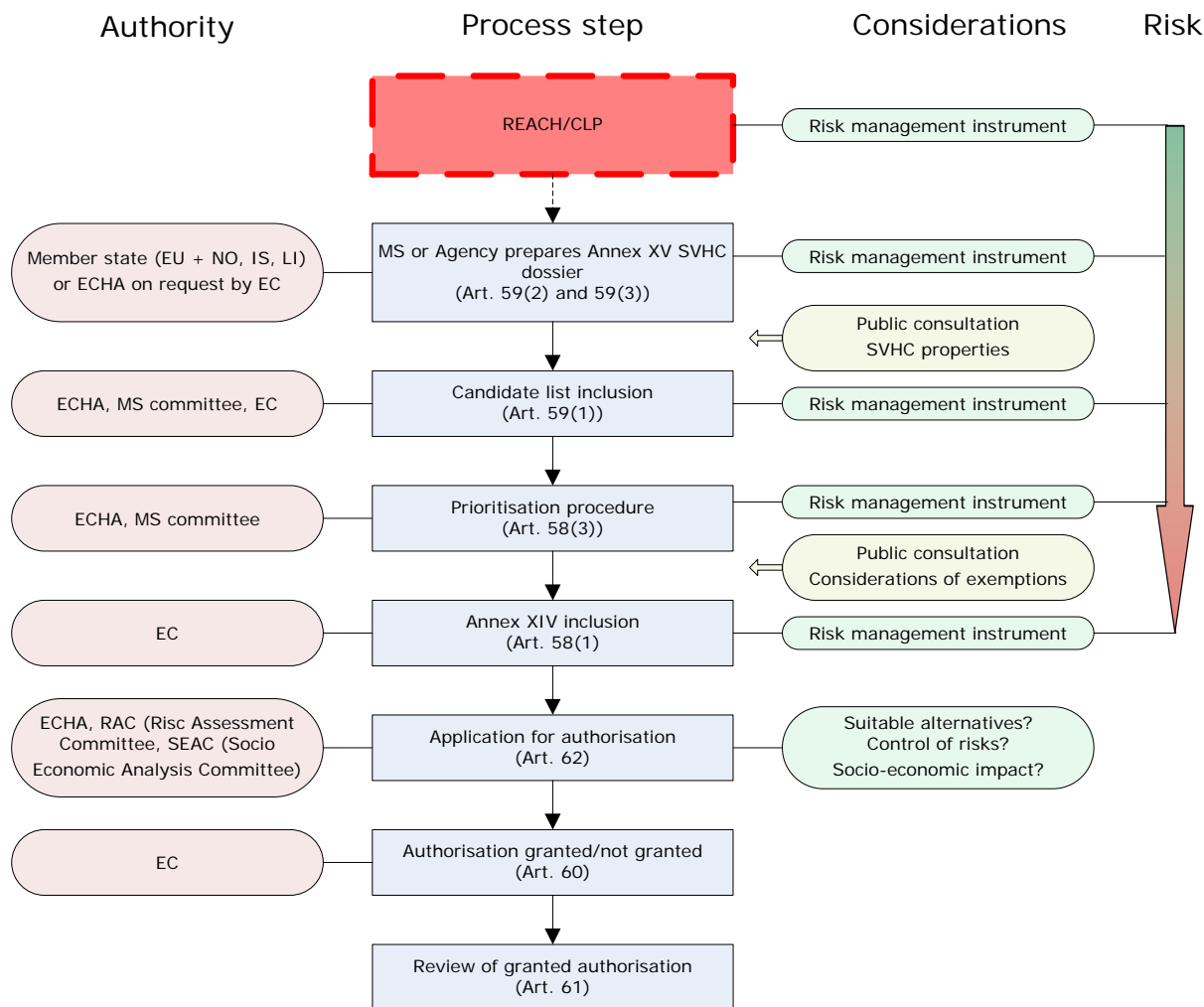
The Impact of Being on The Candidate List

- **Adding a substance to the Candidate List signals ECHA's clear intent to eliminate the substance from the market**
- **The clock has started ticking – but at this stage they are not telling us the timescale or end date:**
 - The substance can stay on the Candidate List indefinitely or move to Annex XIV immediately
- **Manufacturers and importers start to make decisions on whether they will continue to provide the substance**
- **The requirements of Article 33 are invoked:**
 - Informing customers if the amount of the substance in a product exceeds a threshold level
- **The requirements of Article 7 (Notification) are invoked:**
 - Under some circumstances informing ECHA of how much we use each year
- **Users must immediately start to plan what to do next!!**

The Impact of Being in Annex XIV

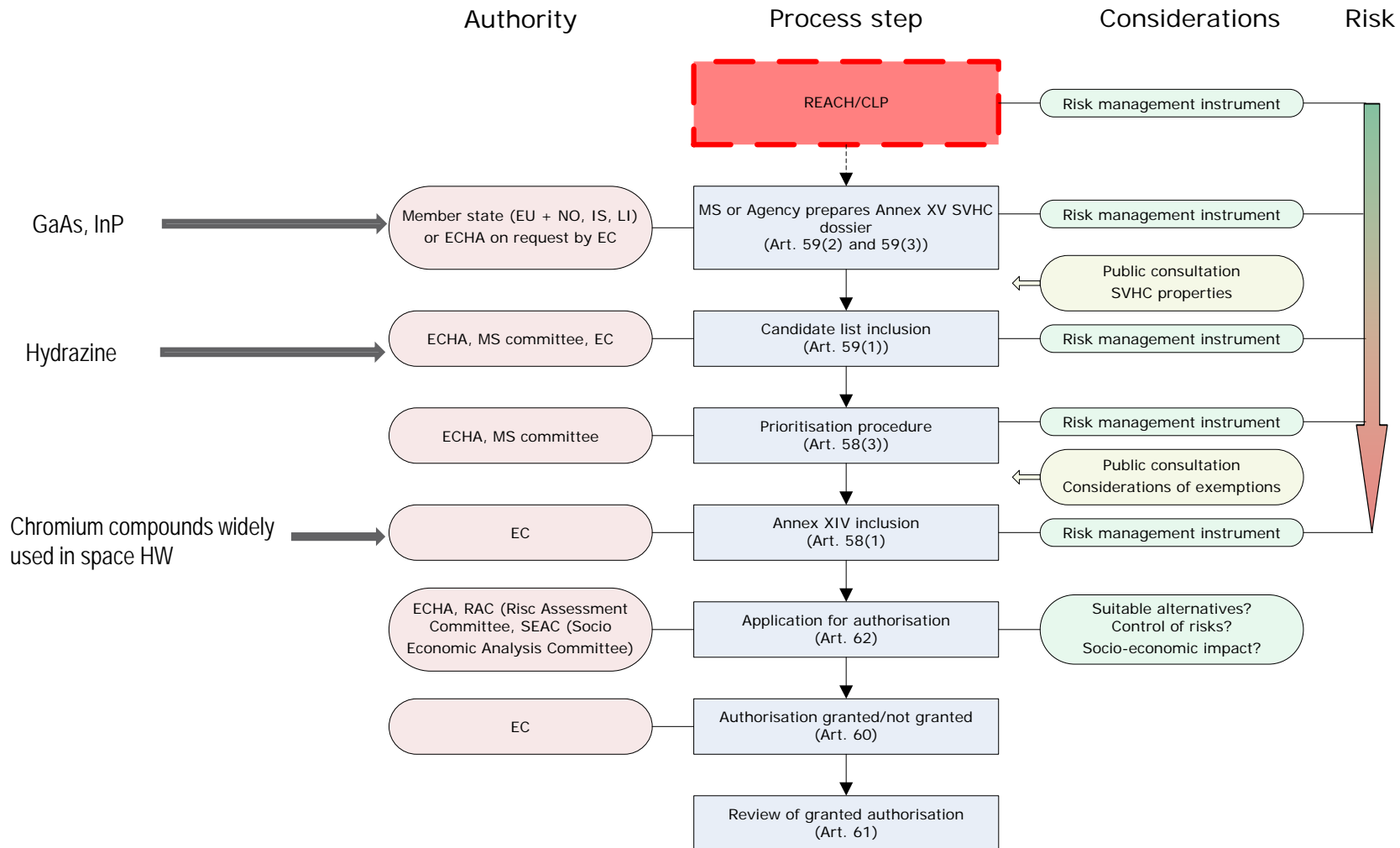


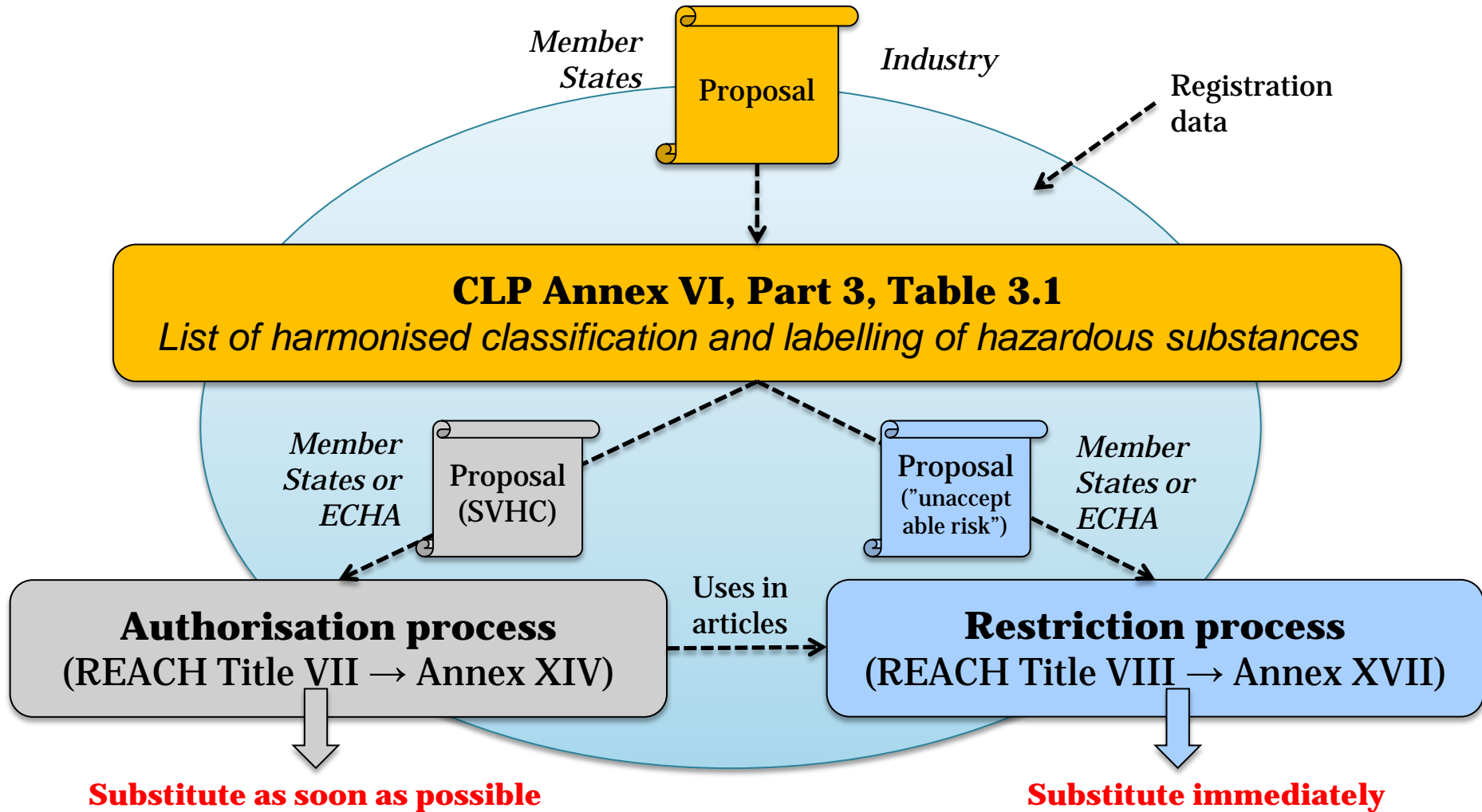
REACH 3rd process: Authorisation, Restriction, Classification and Labelling



REACH and Space Industry

Main substances of interest for Space Industry affected





Courtesy of ReachLaw

Substance name (+ EC number)	Indium phosphide (244-959-5)
CLH proposal submitted (+ Member State + SVHC property)	YES (France: Carc. 1B)
Public consultation on CLH proposal	YES
Opinion of ECHA Committee for Risk Assessment	YES
ECHA proposal sent to Commission	YES
Agreement of EU REACH Committee	YES (Feb 2012)
Inclusion in REACH Annex VI	Yes, Commission Regulation (EU) No 618/2012 of 10 July 2012 (3rd ATP)
Implementation deadline for industry	1.12.2013

CLH = Harmonized Classification and Labeling

Courtesy of ReachLaw

REACH and Space Industry

Substance name (+ EC number)	Gallium arsenide (215-114-8)
CLH proposal submitted (+ Member State + SVHC property)	YES (France, June 2009: Repr. 1B; Carc. 2)
Public consultation on CLH proposal	YES
Opinion of ECHA Committee for Risk Assessment	YES for Carc. 1B (29.11.-2.12.2012); <i>draft opinion on Repr. 1B classification is still being modified and expanded, and thus the handling of the issue will continue in 2013</i> (ECHA reply to REACHLaw dd. 20.12.2012)
ECHA proposal sent to Commission	NO
Agreement of EU REACH Committee	NO (expected only after RAC opinion on reproductive toxicity)
Inclusion in REACH Annex VI	NO (only with 5th ATP, foreseen for 2013)
Implementation deadline for industry	TBC

Courtesy of ReachLaw

What are we doing?

A European-wide platform, **the M&P working group**, has been established involving, national space agencies, industry, and ESA, supported with expert advice by ReachLaw, with the objectives to:

- **Identify in advance** potential critical materials and processes for satellite platforms and launchers that may be affected by REACH.
- Perform a **risk assessment** of identified materials and processes taking into account their status in the REACH process, diversity of uses, availability of alternatives, *etc.*
- **Reduce programmatic risks and costs** by early replacement.
- Active involvement in **public consultations**
- **Joint qualification** of alternatives (European, international stakeholders),
- **Authorisation** dossiers for space-related applications
- **Exemption** dossiers from REACH regulation for space industry (if legally applicable)

Conclusions

- There begins to exist a good level of awareness for REACH across the Space Sector but many companies, big and small, still underestimate the risks and the costs.
 - The hydrazine and chromates dossiers have demonstrated the benefits of collaboration of all actors involved to achieve positive results vs. ECHA and CEE (and lower the individual costs)
-
- **There seems to be a permanent state of denial on the impact of RoHS across the Space Sector. Even though the large majority of end customers ban pure tin in their satellites, everybody seems to be assuming that, one day, they will change their stand and that we will then just re-use the solutions from other industrial sectors.**
 - **Very little is being done to facilitate a sound Pb-free transition in the Space Sector**