



How to assess REACH-related obsolescence risk in early design?

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1. Introduction: REACH obsolescence risks for space programmes

REACH obsolescence risks for space programmes

What is REACH? A European Union Regulation

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the

Registration

Evaluation

Authorisation and Restriction of

Chemicals

The strictest law to date regulating chemical substances. Global impact.

Applies directly in entire EU/EEA (incl. French Guiana, excl. CH)



Managed by ECHA - key decisions with European Commission - Enforced by national authorities

Main purpose: ensure a high level of protection of human health and the environment

In force since 1.6.2007

Reverses the burden of proof for safe use from authorities to industry

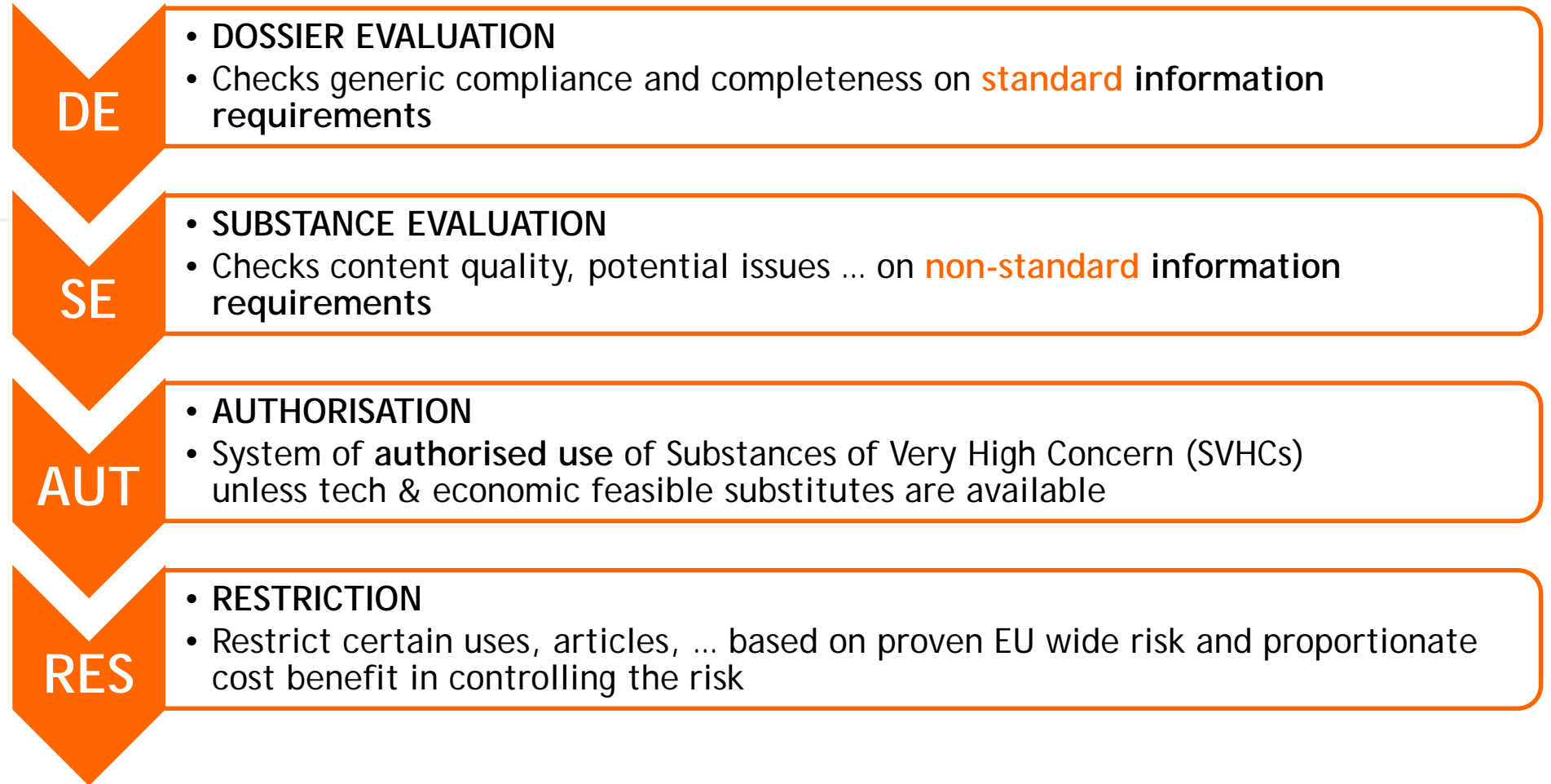
REACH obsolescence risks for space programmes

REACH processes at a glance

REACH
Registration is
the Start

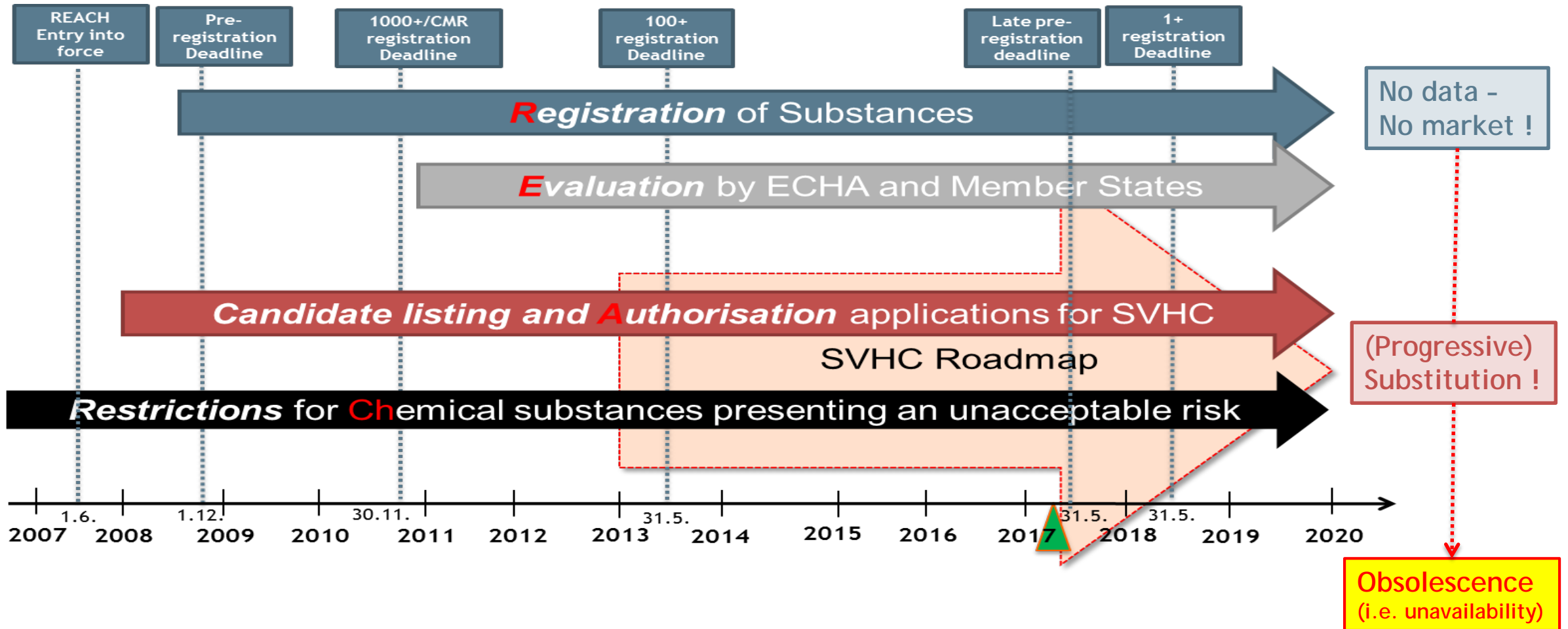


Applies to all
substances
manufactured or
imported to EU/EEA
≥ 1t/y (unless
exemptions apply)



REACH obsolescence risks for space programmes

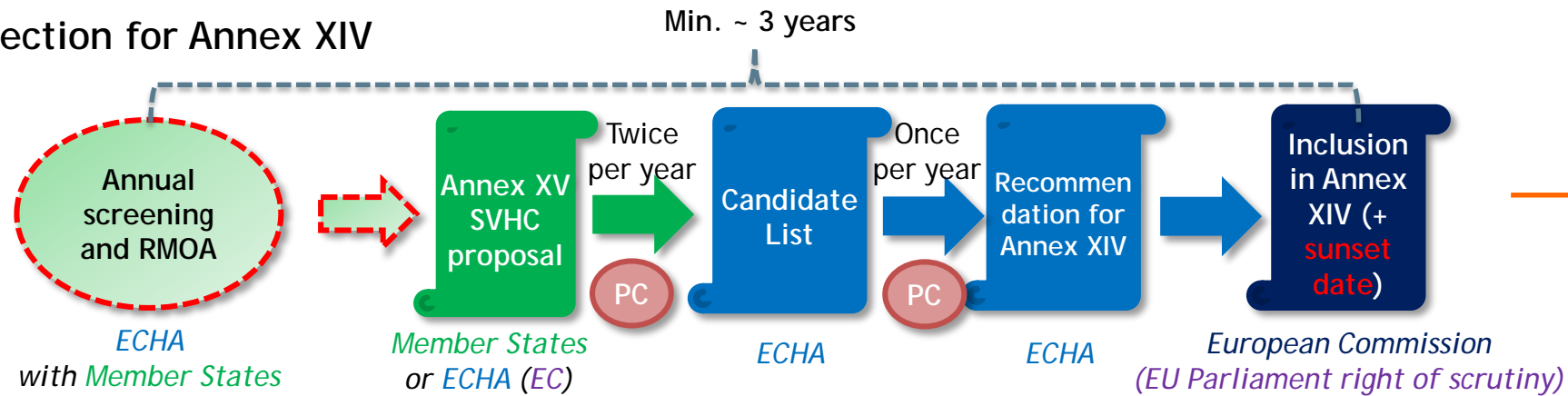
REACH processes causing obsolescence



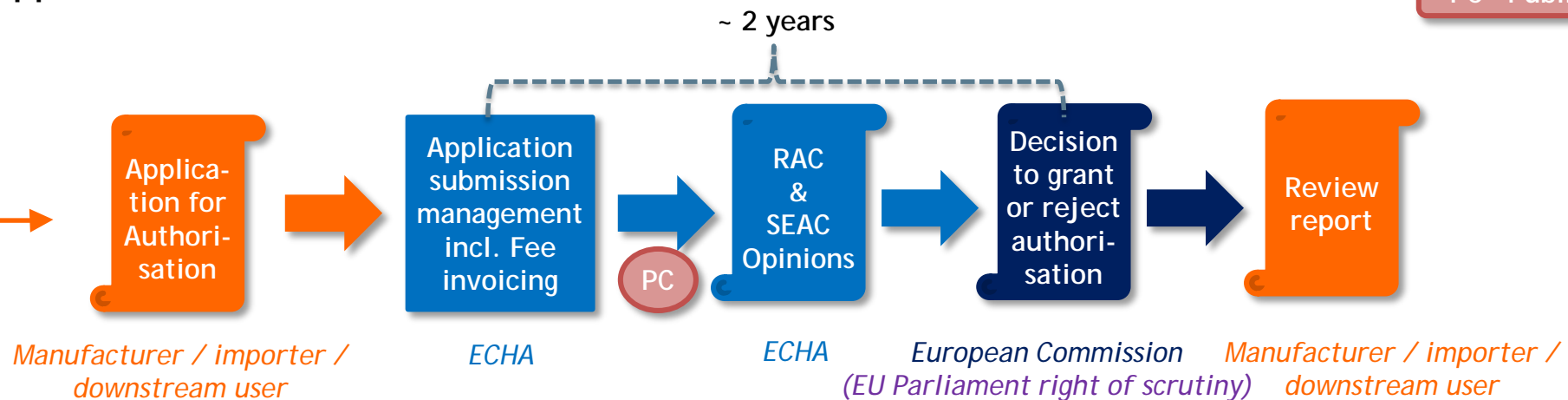
REACH obsolescence risks for space programmes

Challenges for the space sector: The REACH authorisation process

Step 1: Selection for Annex XIV

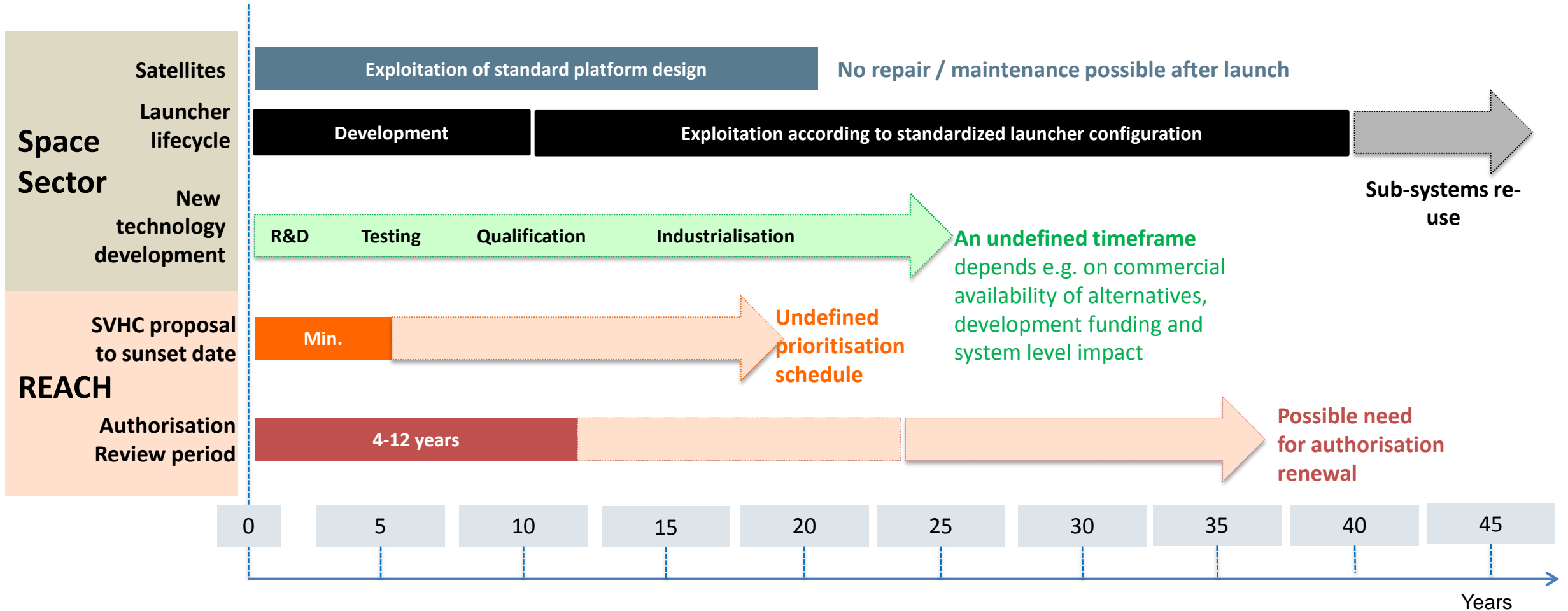


Step 2: Applications for Authorisation



REACH obsolescence risks for space programmes

Challenges for the space sector: Strong mismatch of timelines



REACH obsolescence risks for space programmes

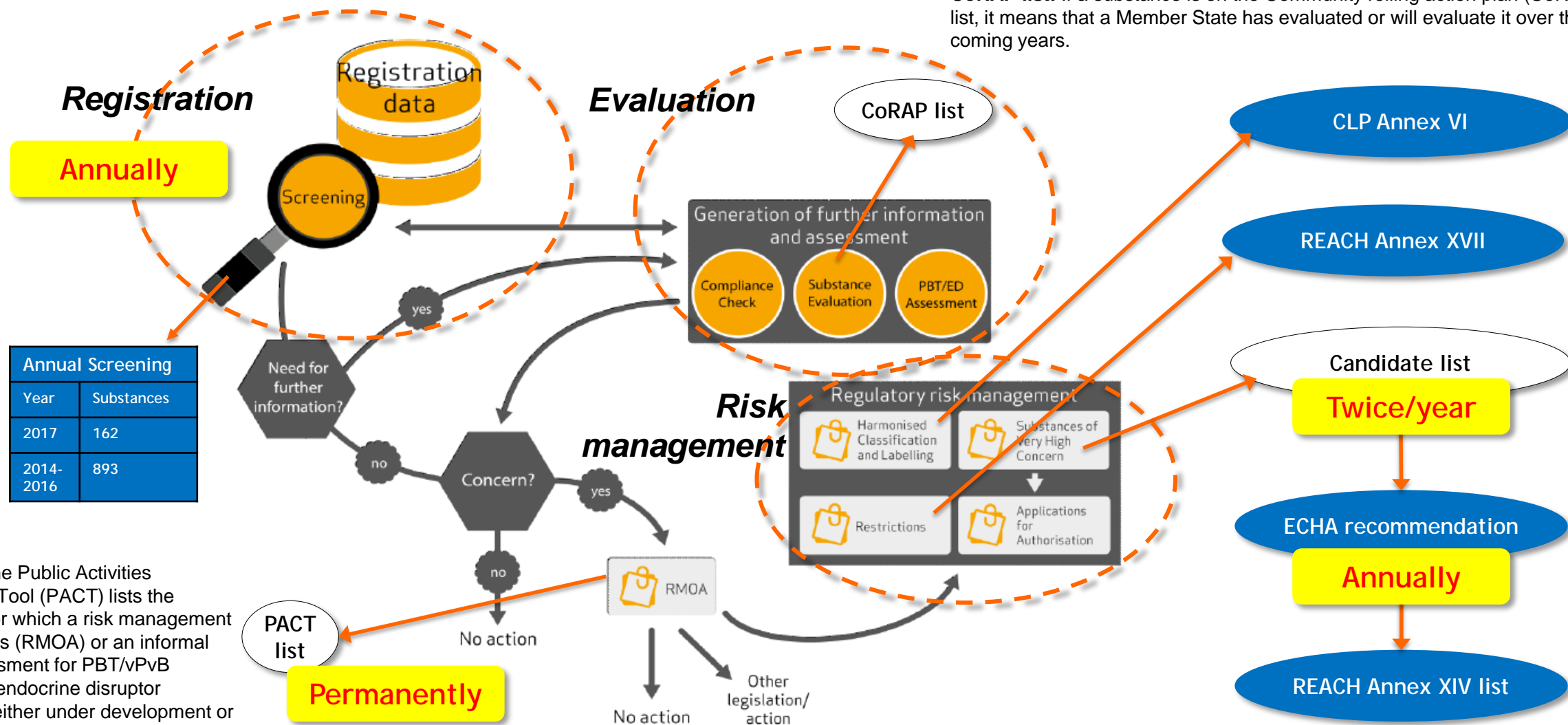
Challenges for the space sector: The EC's SVHC Roadmap to 2020

- The European Commission agreed in 2013 to have **all relevant currently known substances of very high concern (SVHCs)** included in the candidate list by 2020.
 - SVHC identification work is to continue **also beyond 2020**.
- The "**SVHC Roadmap**" defines a methodology for working towards achieving this goal.
- The **Risk Management Options (RMO)** approach identifies the **best regulatory option to manage the risk from these substances of concern**, either in REACH (*authorisation, restriction*) or outside of REACH (*with another legislation, e.g. EU workplace legislation, CLP, RoHS, etc.*).
- The SVHC Roadmap lists certain **groups of substances** to be covered:
 - 1. Carcinogens, mutagens, reprotoxicants (Categories 1A/1B)
 - 2. Sensitisers
 - 3. Persistent, bioaccumulative and toxic (PBTs) or very persistent, very bioaccumulative (vPvBs)
 - 4. Endocrine disruptors (EDs), *and*
 - 5. Petroleum/coal stream substances that are CMRs or PBTs

REACH obsolescence risks for space programmes

Challenges for the space sector: REACH "machinery" - A moving target

CoRAP list: If a substance is on the Community rolling action plan (CoRAP) list, it means that a Member State has evaluated or will evaluate it over the coming years.



PACT list: The Public Activities Coordination Tool (PACT) lists the substances for which a risk management option analysis (RMOA) or an informal hazard assessment for PBT/vPvB properties or endocrine disruptor properties is either under development or has been completed since the implementation of the SVHC Roadmap.

Source: ECHA

REACH obsolescence risks for space programmes

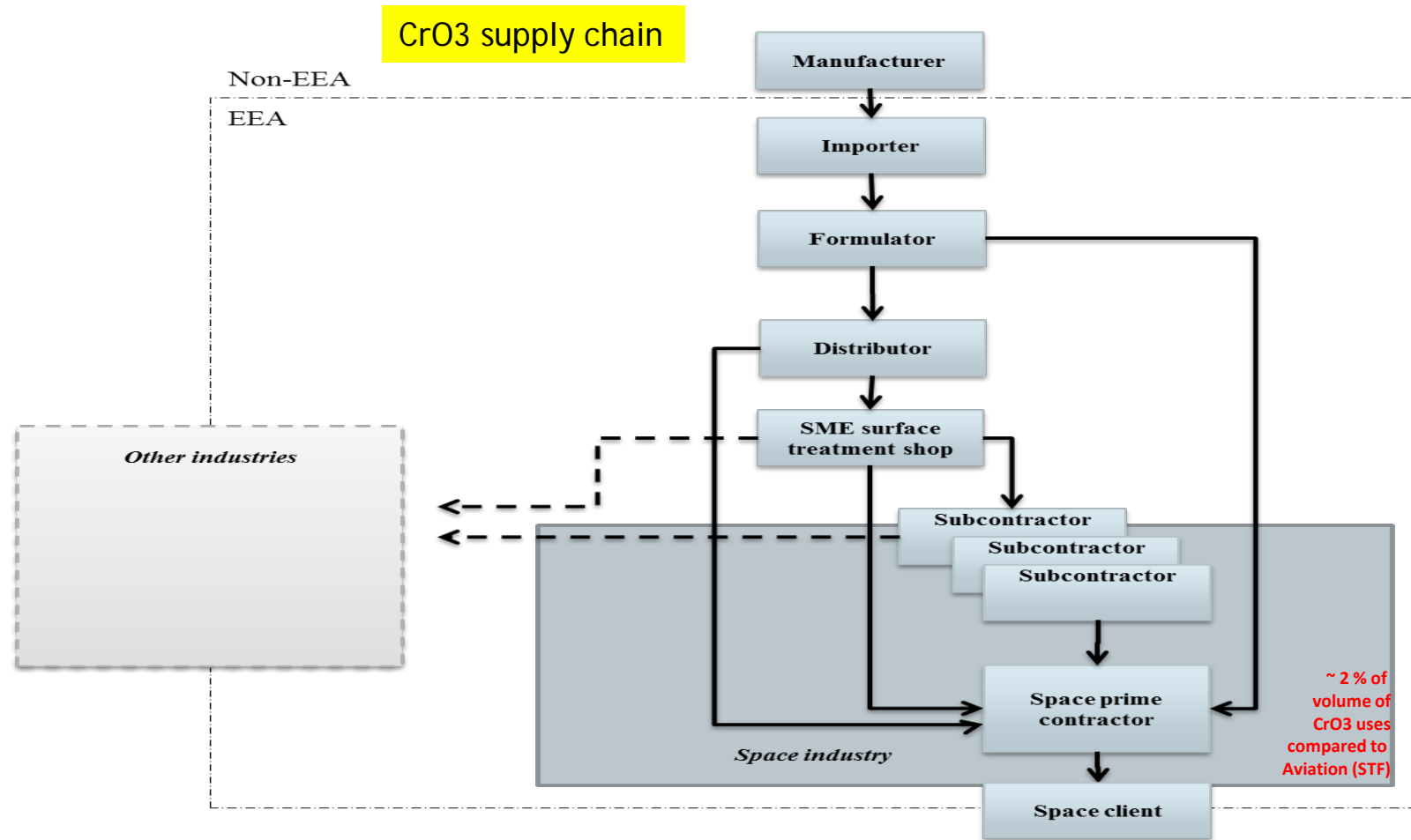
Challenges for the space sector: Complex supply chains

Complex supply chains leading to the manufacture of space hardware, e.g. A5 consists of > 150 000 parts, ~ 1 500 subcos in tier 1, typically 3-5 tiers with 70% suppliers within and 30% outside EU

Main implications:

- a **lack of visibility** as regards upstream materials and processes used and at risk of REACH-related obsolescence
- Space industry **dependence on upstream supplier actions** to avoid supply chain disruptions (continued supply, REACH registration and authorisation applications)
- Chemical suppliers alternatives typically driven by **requirements from non-space sector**
- **SMEs** involved in supply chains find it difficult to comply and may not be able to pay the REACH costs.

Supply chain communication is therefore of prime importance to avoid supply chain disruptions and mitigate REACH obsolescence risks.



REACH obsolescence risks for space programmes

Risk assessment: A major objective of the ESCC MPTB*

Reason	Membership	Main REACH-related tasks
<p>European wide coordination To optimise the utilization of the direct and indirect resources available in Europe and to enable all partners to co-operate and influence the formulation of a European Strategy and work plan in the area of Materials and Processes for space applications. The overall goal is cost reduction of space programs by consolidation of efforts, coordinated planning, and risk reduction. The MPTB shall formulate recommendations and strategic work plans in the field of Materials and Processes used in European space programs</p>	<p><u>Space industry (Eurosace through its Members)</u> Airbus Defence and Space ArianeGroup AVIO MT-Aerospace OHB RUAG TESAT Thales Alenia Space(TAS)</p> <p><u>Space agencies</u> ASI, CNES, DLR, ESA</p> <p><u>Suppliers</u> MAP Coatings</p> <p><u>REACH consultancy</u> REACHLaw</p>	<ul style="list-style-type: none"> • Legislation: Intelligence of legislative processes (e.g. REACH, RoHS) and coordination of actions. • Obsolescence risk management: Identify in advance critical materials and processes - establish the long-term obsolescence risk matrix for materials and processes for satellite and launcher applications via a joint materials database linking REACH exposed substances and commonly used materials in the space sector. Propose action plans to mitigate obsolescence risk of materials and processes. Reduce programmatic risks and costs by early replacement. • Data exchange: Share materials test data and avoid test duplication. • R&D activities: Coordination of R&D activities, monitoring of alerts, analysis of in-orbit anomalies, etc. • Communication & information exchange: Coordination of information via symposia, WGs, training. Development of synergies with other industrial sectors. • Splinter activities: Chromate Space Task Force (STF), Hydrazine Task Force (HTF), European Space Materials Database (ESMDB) steering board.

*Materials and Processes Technology Board of the European Space Components Coordination

REACH obsolescence risks for space programmes

Risk assessment: "Black lists"* and their meaning are central

List name	Purpose	Update of list (current practice)	Legal obligations of industry	Possible actions by the user of the M&P	Next regulatory step
REACH Authorisation List (Annex XIV)	Proper control of risks from SVHCs and progressive substitution	No fixed schedule	Authorisation or exemption or phase out from sunset date	Replacement Authorisation compliance actions	Granting of authorisation, periodical review
ECHA Annex XIV Recommendation	Short list of substances from the candidate list to be prioritized for Annex XIV inclusion	Once per year (at least every second year)	None	Replacement Preparation for authorisation Participate in ECHA public consultation	European Commission decision on Annex XIV inclusion
REACH Candidate List	Identification of Substances of Very High Concern (SVHC)	Every 6 months, normally in June and Dec/Jan	Primarily: Article 33 communication by EU article suppliers	Clarify supplier position; R&D for replacement; authorisation strategy	Prioritization by ECHA for Annex XIV
Public Activities Coordination Tool (PACT) list	Give advance notice of substances under authorities' scrutiny	Several times per year	None	Provide relevant input to authority, monitor outcome	e.g. proposal for Candidate List or Restriction or harmonised classification
SIN List	Long list of substance which according to NGO ChemSec should be placed on the Candidate List	No fixed schedule	None	Possible indicator for long-term obsolescence risk assessment	N/A - Being an NGO list, the SIN List is not part of any regulatory procedure

*Note: This is only an unofficial term referring to REACH-related lists of substances of concern. The table only includes key lists which are directly relevant for the REACH authorisation process. Other lists relevant for REACH risk managements (e.g. CoRAP, Restriction List) are not discussed.

REACH obsolescence risks for space programmes

MPTB joint materials REACH database - REACH cross-check

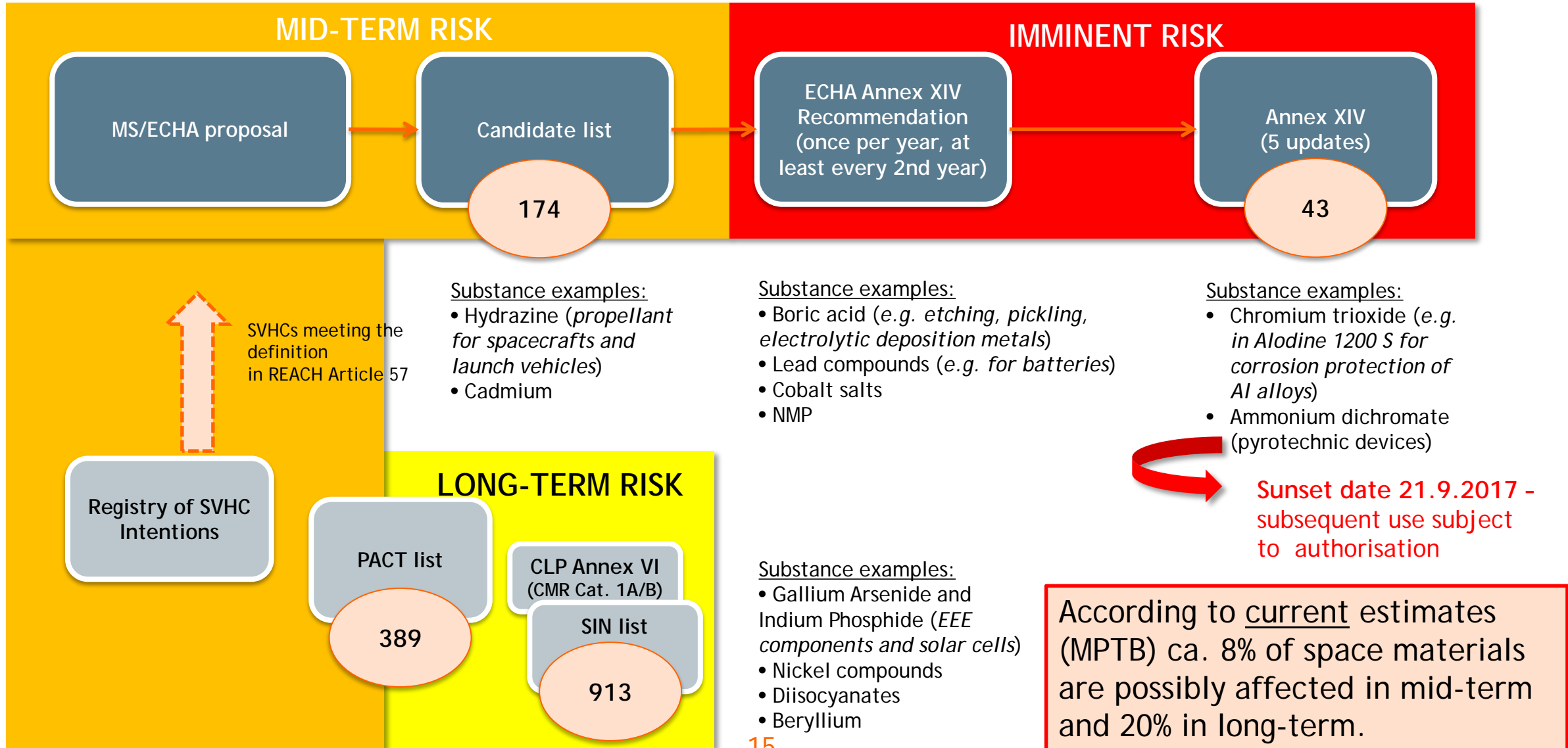
Compound	A	B	C	D	E	F	G	H	I	J	K	L	...	X
Composition material 1										●	●			
Composition material 2	●	●				●								
Composition material 3					●				●					●
Composition material 4														
Composition material x							●			●	●			●
<i>e.g. Alodine 1200S (20.10.2011)</i>		n.a.	CrO ₃											
<i>e.g. Alodine 1200S (17.4.2013)</i>		CrO ₃	n.a.											
	Annex XIV	Annex XIV	Annex XIV recom.	Annex XIV recom.	Candidate list	Candidate list	Registry of Int.	Registry of Int.	SIN list	SIN list	REACH/CLP	REACH/CLP		National regulat.
Obsolescence risk	Imminent		Probably mid-term				Possibly long-term							

→ assumes that materials composition / substances used in processes are known. **No / only limited information in early design phases.** Current project "REACH into LCA" aims to help reduce / close this information gap.

Source:
T. Rohr
(ESA)

REACH obsolescence risks for space programmes


Risk assessment: Determining the risk level based on REACH status



REACH obsolescence risks for space programmes

Conclusions

- REACH processes, especially authorisation and registration of chemical substances, are causing **obsolescence risks** for space materials and processes **of unprecedented magnitude**.
- The anticipation of these obsolescence risks is very challenging because of the **limited visibility and predictability** because of the complexity of (1) supply chains (including up-stream processes) and (2) REACH regulatory processes (which substances will be affected, when and how?)
- Extensive work to identify and address REACH obsolescence risks for space materials and processes has been ongoing in the frame of the **ESCC MPTB**. However, in early design phases there is a **lack of information about the materials and processes and their possible REACH exposure over the projected lifetime of the programme** in order to assess the risk.
- The anticipation of REACH obsolescence risks **in early design phases** of space programmes is critical to best avoid supply chain disruptions and resource-intensive requalification later in the programme as well as anticipate corrective actions to manage obsolescence.

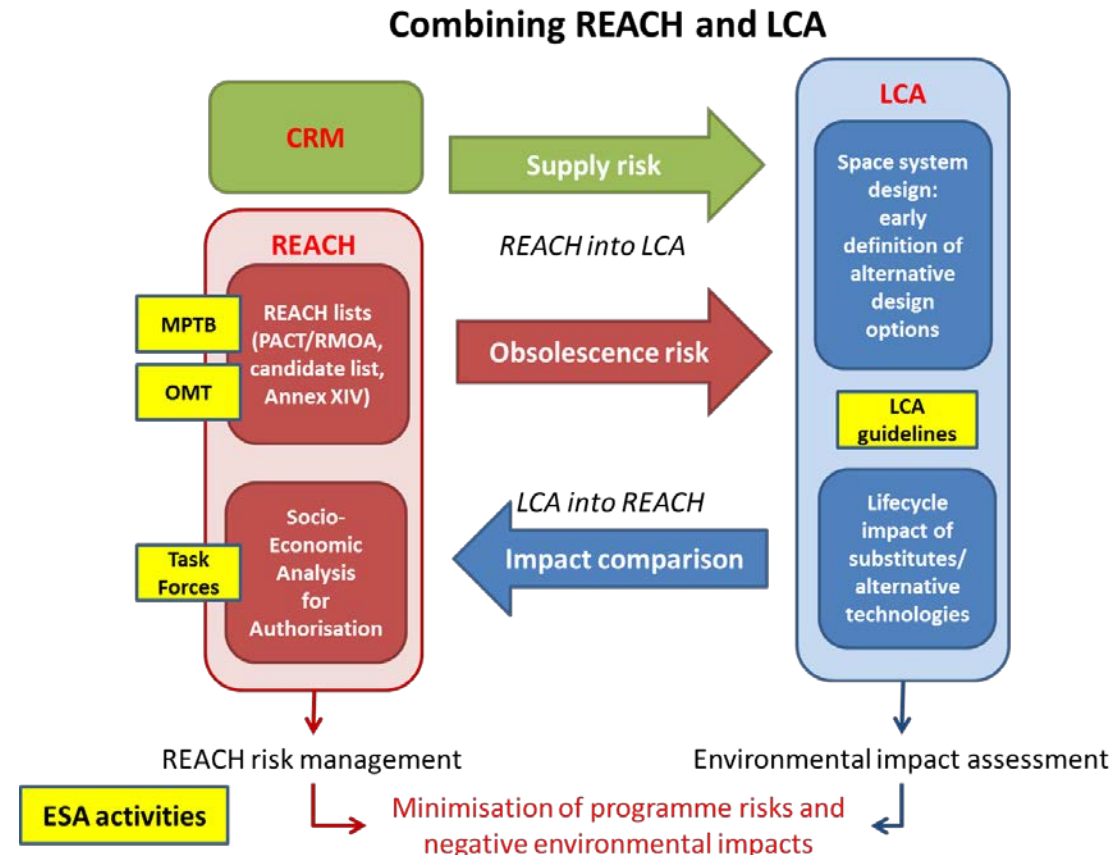


The current activity of **"REACH into LCA"** aims to define and validate a methodology to identify, flag and classify the REACH obsolescence risks within the **eco-design framework** used at **pre-design stage**.

2. “REACH into LCA” project

Main objectives of this project

1. To develop and validate an adaptation of the LCA methodology to identify, flag and classify the obsolescence risks due to REACH (and CRM use) through the complete life-cycle of space products: **“REACH into LCA”**
2. To establish how LCA can support REACH risk management efforts (e.g. REACH authorization) and demonstrate through one specific case study: **“LCA into REACH”**



REACH into LCA

Objective of the indicator, and literature review results

- The risk assessment aims to:
 1. Identify hotspots in the space missions
 2. Anticipate corrective actions for the studied mission
 3. Raise awareness of obsolescence risks at pre-design stages
- Warnings based on a qualitative approach, e.g. a colour code / a range of values / a flag could be appropriate, as opposed to a single quantitative risk indicator, since the comparison of several design options is not the objective of the assessment.
- The indicator aims to capture possible obsolescence risks related to REACH and not risks related to toxicity through the REACH framework
- Literature review results:
 - ✓ When used in conjunction with LCA, REACH is used as a toxicity assessment tool but the industrial obsolescence risk are not documented
 - ✓ Interviews w/ industry will allow to confirm / gather complementary information

REACH into LCA

General procedure

Global procedure

```
graph TD; A[Global procedure] --- B[1 - Mapping between APSs & LCI of materials and processes]; A --- C[2 - Addition of REACH-targeted substances in the LCI database]; A --- D[3 - Implementation of the 'characterization' method of the risk];
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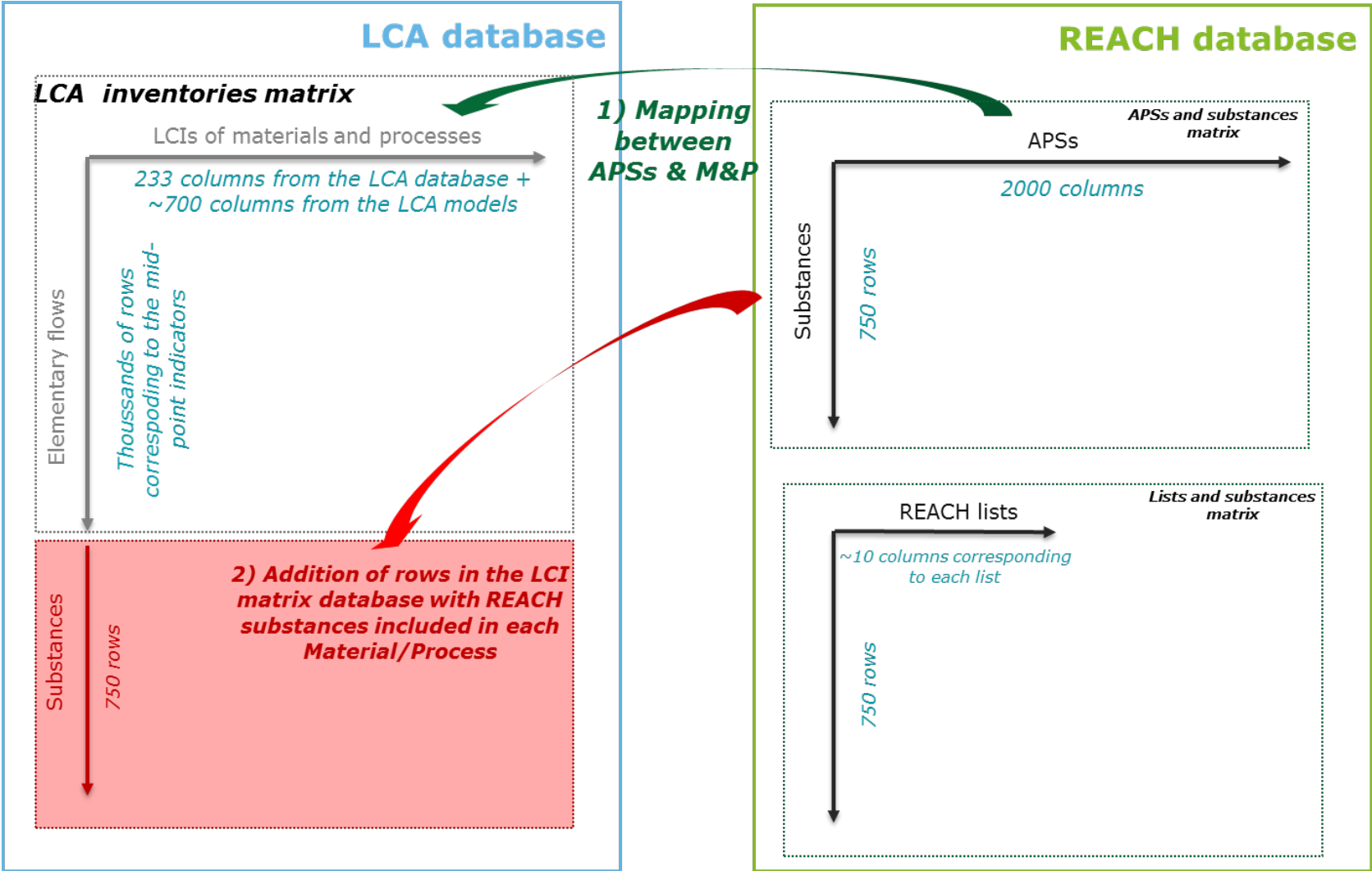
1 – Mapping between
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the LCI database

3 – Implementation of
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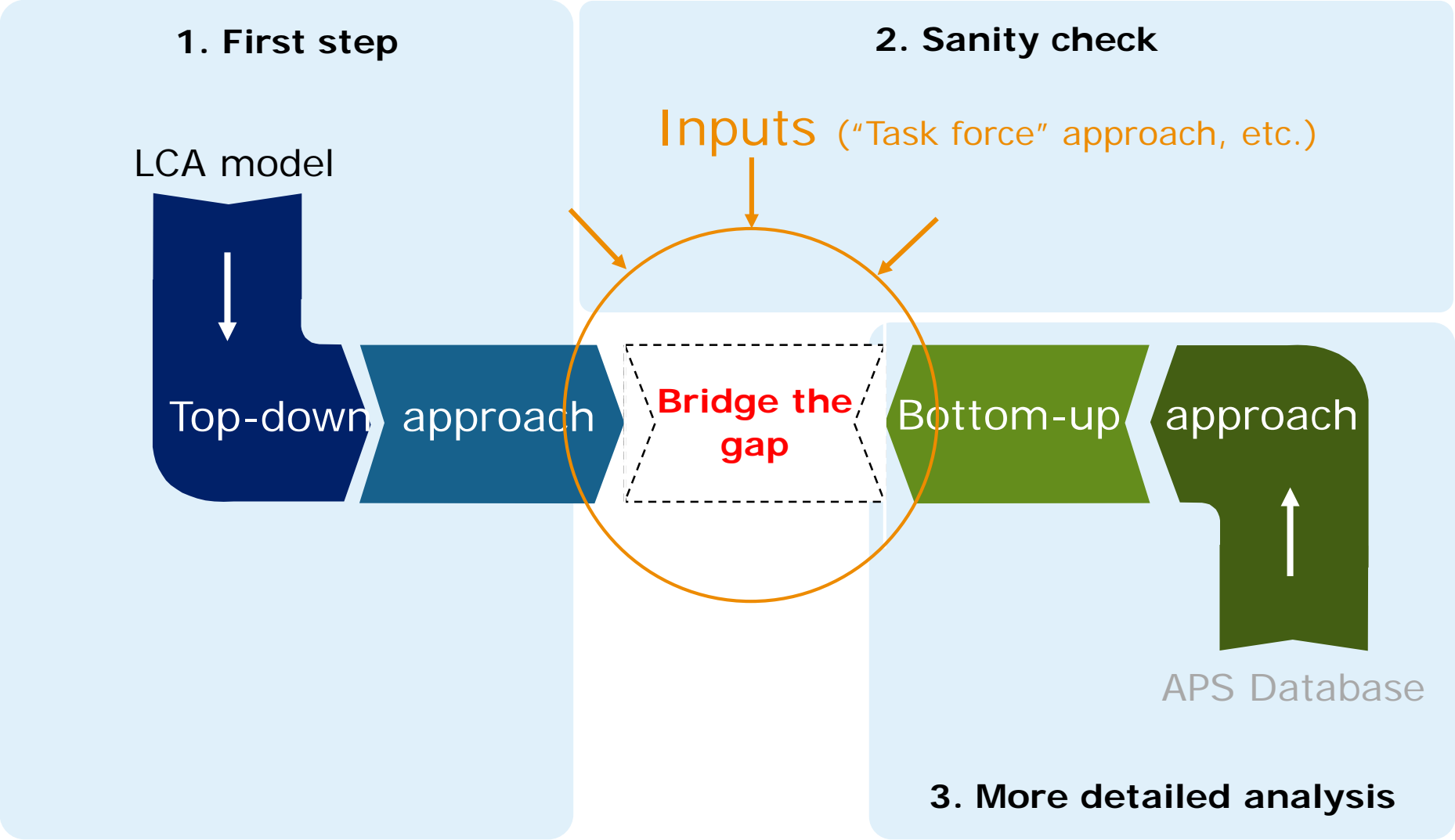
REACH into LCA

Steps 1 & 2



REACH into LCA

Three complementary approaches for the "mapping" step



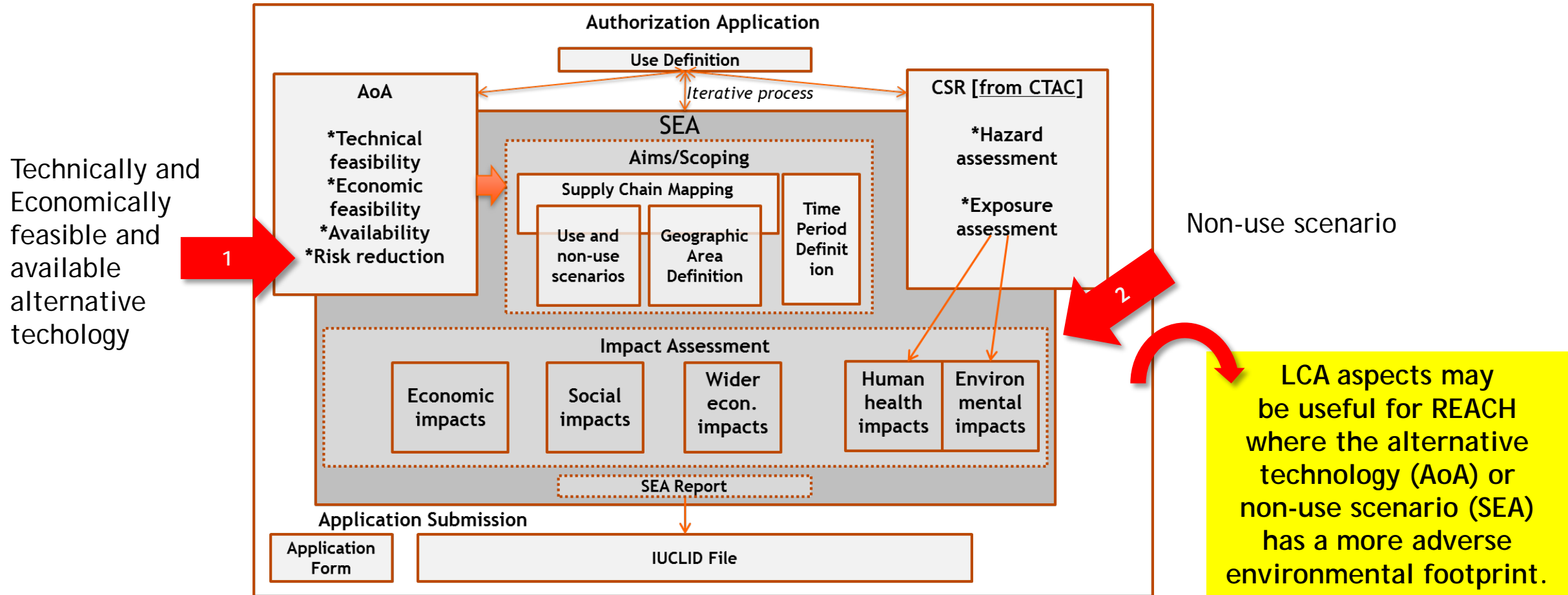
REACH into LCA

Risk assessment

- Main challenge: Information known at pre design stage is partial (e.g. on the technologies which will be used). The risk assessment done at this level should thus address generic pools of materials/components, considering the associated uncertainties.
- Evaluation of the risk should consider:
 - The blacklists:
 - SIN List
 - Substances under screening and RMOA, RoI
 - SVHCs, substances in the candidate list
 - Prioritised substances from Candidate List to inclusion in Authorisation List
 - Annexes XVII and XIV
 - The existence of a substitute and its TRL level?

LCA into REACH (Task 4)

Possible entry points for LCA aspects in an authorisation dossier



LCA into REACH (Task 4)

Findings to date

Based on REACHLaw's analysis of available literature, REACH guidance and discussions with the European Chemicals Agency (ECHA) authorisation team

- Some reference to LCA aspects in the **ECHA guidance** on the preparation of an application for authorisation (AfA) and on the preparation of socio-economic analysis
- **None** of the 100+ AfAs submitted and processed by ECHA's scientific committees to date have made explicit use of the LCA methodology.
- 4 applications have used "light" LCA assessment (all for 1,2-Dichloroethane (EDC))
 - One application presented a calculation for increase in green house gas emissions
 - None elaborated on the LCA methodology used
- ECHA currently *not* developing guidance on how to use LCA assessment as part of AfA
- LCA adds another level of complexity to the application



LCA will have limited beneficial impact on Authorisation opinion/decision

LCA into REACH (Task 4)

Next steps

- Develop an illustrative **case study** e.g. hydrazine, to show how LCA aspects may be used to support an authorisation application
 - Input: Work done by ESA on the LCA for alternative space propellants
 - Simulate an LCA-based argument for an authorisation dossier, assuming that an alternative propellant is technically and economically feasible and available.
- Documentation of study results
 - Technical Note (D3): “Support to the REACH authorisation process by the use of overall life-cycle LCA information” - Draft in development
 - Final Presentation (D4): “REACH into LCA: Final presentation”
 - Two Illustrations (D5)
 - Executive Summary Report (ESR): “REACH into LCA: Executive summary”
 - Final Report (FR): “REACH into LCA: Final report”

3. Conclusions and next steps

REACH obsolescence risks for space programs

Conclusions

- REACH authorisation is the main obsolescence cause
 - The obsolescence risk is typically increasing with project progress, system complexity and listing progress
- The risk assessment has to start as early as possible in the project, and has to continue throughout its lifetime
 - The view that the LCA framework provides on the space value chain can help flag the obsolescence risk at early design phase
- REACH is not only a compliance issue, but also one to be addressed in the context of deciding on alternative design options and R&D

Thank you for your attention!
Any questions?

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List of REACH Acronyms (1/2)

Abbreviation	Explanation
AfA	Application for Authorisation
CLH	Harmonized Classification & Labelling
CLP	Classification, Labelling and Packaging (Reg. (EC) 1272/2008)
CMR	Carcinogenic, Mutagenic, toxic to Reproduction
CoRAP	Community Rolling Action Plan (for REACH Substance Evaluation)
DU	Downstream User (of substances on their own/in mixtures)
EC	European Commission
ECHA	European Chemicals Agency
EEA	European Economic Area (EU MS + Norway, Iceland, Liechtenstein)
HTF	Hydrazine Space Task Force for REACH
MPTB	Materials & Processes Technology Board (previously M&P WG)
MS	Member State
MSCA	Member State Competent Authority
OEL	Occupational Exposure Limit
PACT	Public Activities Coordination Tool

List of REACH Acronyms (2/2)

Abbreviation	Explanation
PBT	Persistent, Bioaccumulative and Toxic
RAC	Risk Assessment Committee (ECHA)
RMO(A)	Risk Management Option (Analysis)
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (Reg. (EC) 1907/2006)
Rol	Registry of intentions
SDS	Safety Data Sheet
SEA	Socio-Economic Analysis
SEAC	Socio-Economic Analysis Committee (ECHA)
SIN	Substitute It Now list of the NGO ChemSec
SME	Small and Medium-sized Enterprises
STF	Chromates Space Task Force for REACH
SVHC	Substances of Very High Concern (as defined in REACH Article 57)
vPvB	very Persistent and very Bioaccumulative

REACH obsolescence risks for space programmes

Challenges for the space sector: Obsolescence due to non-registration

- It is expected that “a lot” of substances will fall off the market by 2018 due to the lack of:
 - Knowhow
 - Resources
 - Solid business case (*no point in registering a substance for a lot of money if revenues are not supporting the costs*)
 - Carelessness
- This is especially true for **low volume, small market share chemicals** (*typically specialty chemicals*)

