Safe-by-Design issues in developing for a circular & sustainable economy

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Abstract

Safe-by-design (SbD) has been suggested as a novel approach inspired by inherent safety principles developed for nanotechnology, to improve safety of products and processes. Inherent Safety focuses on changing the process at an early stage to eliminate hazards, rather than developing add-on features to control them (Khan & Amyotte, 2003). In a similar manner, SbD emphasizes risk prevention rather than risk management. It encourages an early identification of risks all across the product lifecycle and a search for alternative design solutions that prevent the identified risks to the extent possible. It places a higher responsibility on researchers and a higher demand on stakeholder interaction at different levels (technology, policy and society). This provides issues on risk perceptions and acceptability of risks which are particularly emerging and troublesome in innovation for circularity for a sustainable and circular economy. Sustainability may impede on safety as safe solution are not always sustainable, and reusing waste(water) introduces a source of uncertainty which is hard to control. Responsibility in SbD is therefore complex and influenced by established multi-actor value chains. In order to implement SbD more generally, we need a shift in approach from regulatory-compliant to responsibility, but how can we define and agree on responsible designs and applications in a multi-actor and context dependent environment? Methods from responsible research innovation and inclusive design could elucidate value exploration and provide guidance for context specific sustainable innovation for a circular economy. The presentation will discuss these issues related to examples and case-studies in biotechnology, chemistry and water management.

Key words: Safe-by-Design, circular economy, responsibility, value exploration, case studies

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