

# Emerging Risk Identification Support for early detection of upcoming occupational risks

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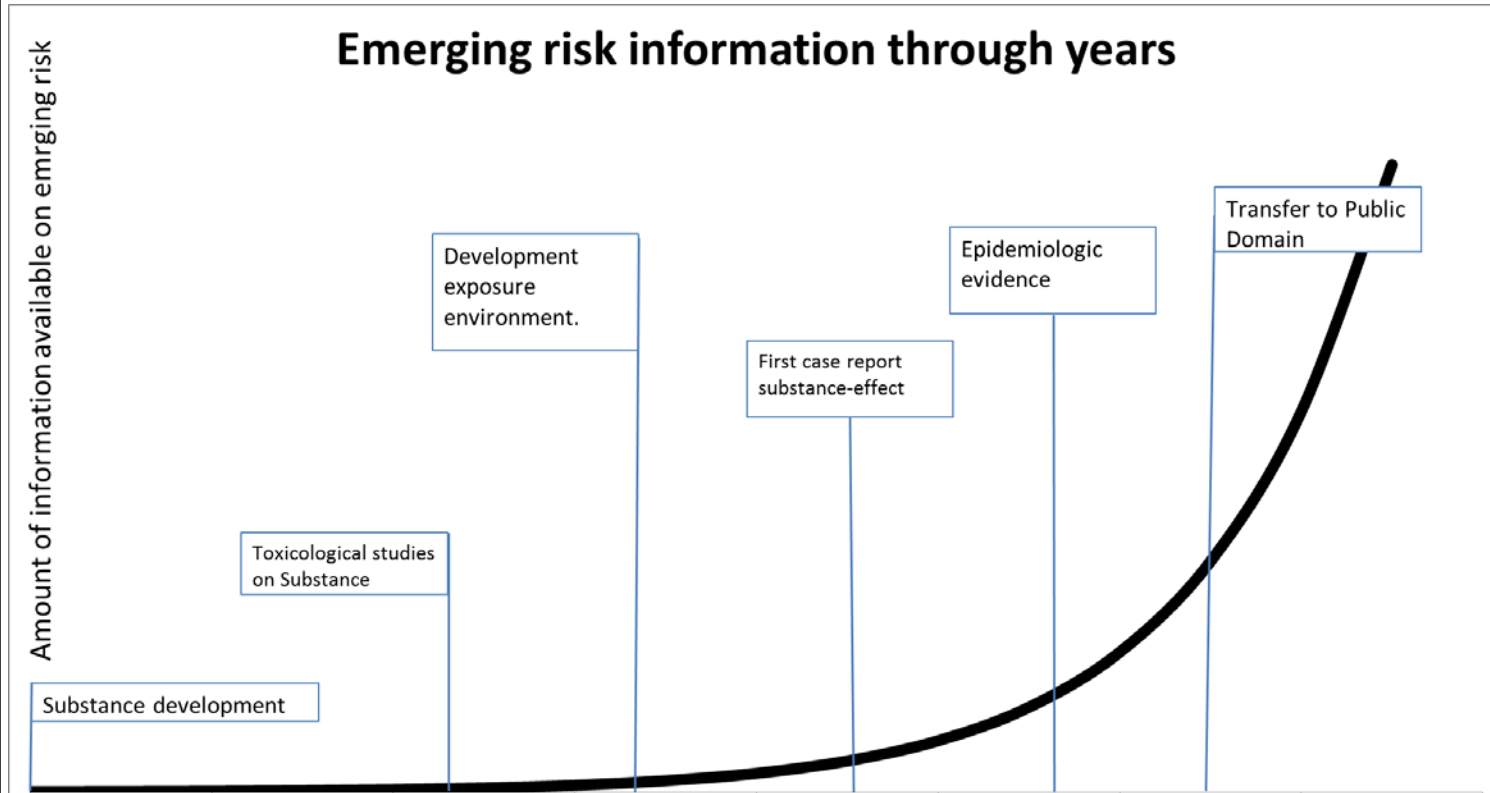
TNO – Dept. Risk Analysis of Products in Development (RAPID)



## Overview

- › Information expansion in emerging risk
- › Goals of early detection systems
- › Relationships between Key concepts
- › Text mining principles
- › Benchmark analysis
- › Discussion





- › Rapid expansion and specialisation of (scientific) knowledge
- › After growing scientific evidence, transfer to public domain is possible

# Early detection of upcoming occupational risks

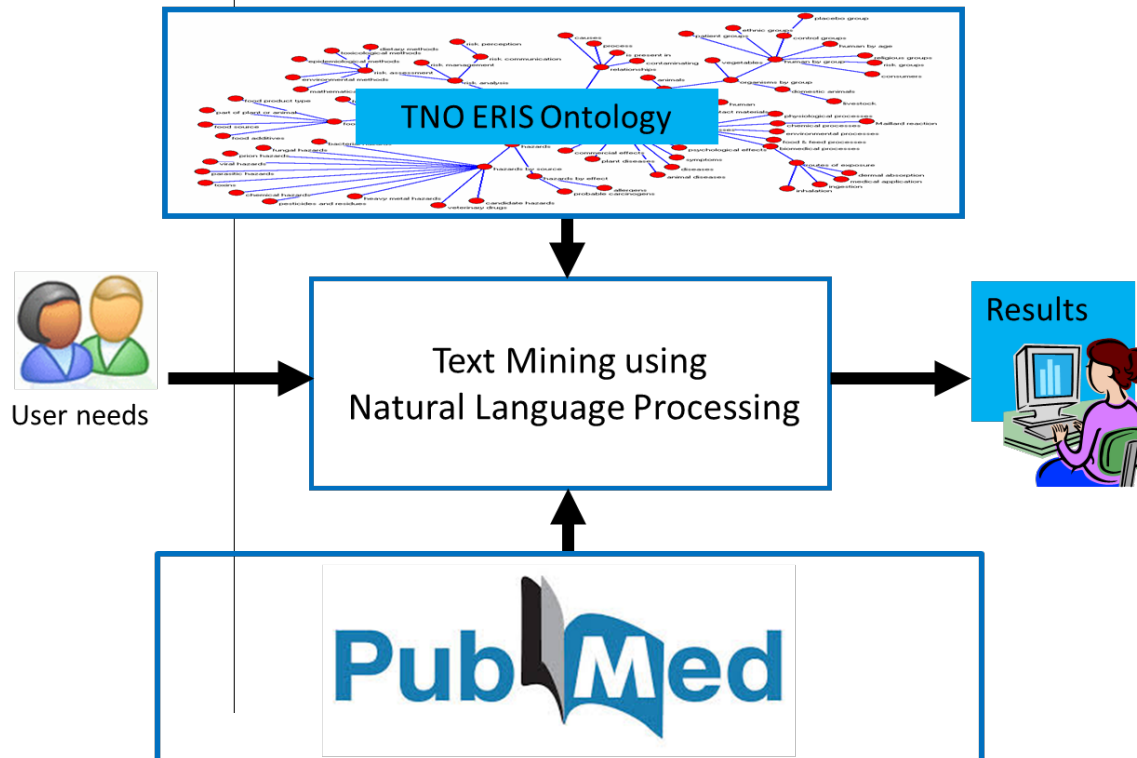
- › ERIS Goals:
  - › Identify potential risk in existing information structures
  - › Combine multidisciplinary information
  - › Detect early signals prior to effect
  - › Shift from reactive intervention to pro-active design
    - › Potential input for Safe by Design
  
- › ERIS-OSH is a running system under development

# Key Concepts

- › Relationship between Key Concepts
  - › Health Effect
    - › E.g. ICPC coding system
  - › Exposure Assessment
    - › E.g. Exposure assessment methodology descriptions
  - › Substance
    - › E.g. MESH categories with tree structures
  - › Product
    - › Application of the substance
  - › Occupational Safety and Health
    - › E.g. worker, occupational setting
- › Optional concepts
  - › Study, Population, Novelty, or a KC

# Text mining

## TNO Emerging Risk Identification Support



- › Extensive Ontology available for main concepts
- › Expanded and specified to user needs
- › Search based on linguistic rules
- › Specific textual structures for occupational R.A.
- › Output is concept relationships

Am J Respir Crit Care Med. 2007 Sep 1;176(5):498-504. Epub 2007 May 31.

## Bronchiolitis obliterans syndrome in chemical workers producing diacetyl for food flavorings.

van Rooy FG, Rooyackers JM, Prokop M, Houba R, Smit LA, Heederik DJ.

Text mining

Effect	Substance	Product	Arbo context	Id
Bronchiolitis obliterans syndrome	diacetyl	food flavorings	chemical workers	<a href="#">17541015</a>
...		...	...	...
...	...		...	...



## ERIS-OSH Output example

Product Pt	Substance Pt	Effect	Demographics	Year	Ranking	Snippet
	Styrene	Cancers		2012		4 There is moderate evidence of a causal association with cancer, but data are not su specific cancers at risk or relevant exposure levels. We recommend reconsideration limit value of 25 ppm, biological monitoring of <b>styrene</b> exposed workers, and epidemi exposure levels and long-term health effects among employees of the Danish reinfo
Flavoring	Diacetyl			2013		3 This facility has used acetaldehyde, acetoin, benzaldehyde, butyric acid, <b>diacetyl</b> and for many years. Ten years of spirometry testing and job descriptions data on 112 wo authors and by NIOSH. Using NIOSH's exposure assessment criteria, we compared findings (as determined by spirometry testing) in production workers to an internal cc no potential for exposure to <b>flavoring</b> chemic
Flavoring	Diacetyl	Lung Disease		2012		3 We present a case series of three BFMP consumers with biopsy-confirmed BO. We consumer exposures, estimate case exposures, and compare them to <b>diacetyl</b> -cont manufacturing workers with lung disease. These consumer cases' exposure levels ; caused disease in workers.
	Styrene	Biological	industry	2012		3 We conclude about the exposure levels that there is strong evidence that <b>styrene</b> ca respiratory tract above 25 ppm, genotoxic effects above 10 ppm, and persistent nerv instance reduced psychological performance, colour discrimination and hearing leve exposure above 10 ppm. There is moderate evidence of a causal association with c; to allow us to pinpoint specific cancers at r
	Styrene	Cancer	industry	2012		3 There is moderate evidence of a causal association with cancer, but data are not su specific cancers at risk or relevant exposure levels. We recommend reconsideration limit value of 25 ppm, biological monitoring of <b>styrene</b> exposed workers, and epidemi exposure levels and long-term health effects among employees of the Danish reinfo
	Styrene	Genotoxic		2012		3 We conclude about the exposure levels that there is strong evidence that <b>styrene</b> ca respiratory tract above 25 ppm, genotoxic effects above 10 ppm, and persistent nerv instance reduced psychological performance, colour discrimination and hearing leve exposure above 10 ppm. There is moderate evidence of a causal association with c; to allow us to pinpoint specific cancers at r
	Styrene	Health Effects		2012		3 We recommend reconsideration of the current Danish threshold limit value of 25 ppr <b>styrene</b> exposed workers, and epidemiological analyses of <b>styrene</b> exposure levels ; among employees of the Danish reinforced plastics industry.
	Disinfectants			2011		3 The pharmacist should play a role as a specialist for antimicrobial agents, antiseptic and responsibilities of the pharmacist for infection control are leading the antimicrobi appropriate and rational use of antimicrobial agents, advising the health system on th appropriate antiseptics, <b>disinfectants</b> and sterilants, developing guidelines for risk as



## Benchmark analysis

Substance	Effect	ERIS-OSH match Benchmark
Ammonia	Occupational asthma	Substance match, effect comparable
Beryllium	Chronic Beryllium Disease (lung disease)	Both perfect match
Cobalt	Hard metal lung disease, occupational asthma	Both perfect match
Crystalline silica	Silicosis	Both perfect match
Diacetyl-containing flavourings	Bronchiolitis obliterans	Both perfect match
Fibreglass with styrene resins	Bronchiolitis obliterans	Substance comparable, health effect comparable
Formaldehyde	Respiratory tract irritation	Substance match, effect comparable
Indium tin oxide	Pulmonary fibrosis	Substance comparable, health effect comparable
Methylene bisphenyl diisocyanate	Occupational asthma	Both perfect match
Triglycidyl isocyanurate	Occupational asthma, extrinsic allergic alveolitis (EAA)	Both perfect match

## Discussion

- › Text mining of readily available information
  - › Not limited to scientific literature
- › Search possible without specific keywords (pre-identification)
- › ERIS-OSH delivers information with linked concepts across fields of knowledge
- › Output flexible ranked information
- › Expert guidance needed in building search and interpretation
- › Potential input for shift from intervention to safe by design
- › Data mining can be used for harvesting purposes as well

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# Emerging Risk Identification Support for early detection of upcoming occupational risks

- › Optional sheets

