EaP Green RECP Demonstration Component

Responsible Production Seminar Minsk , Belarus , 14 July 2016

DI Aida Szilagyi

Sustainability Expert

Chair of NCSPC Romania

Objectives of the session

- Presentation of chemicals use and the associated concerns at the global and business level
- Introduce the UNEP's Responsible Production approach
- Presentation of the 5-step model and the tools available in the Responsible Production Toolkit
- Case study on the implementation of Responsible Production in Romania

Chemicals, a global concern

- Between 2000 and 2009, the chemicals production increased by 54%, while the sales have doubled
- Large amounts of chemical waste continue to be generated such as waste contaminated with pesticides, heavy metals, other disposing industrial chemicals, creating pollution of air, water and soil
- 40% of chemicals supplied by companies are going unused and directly become hazardous waste
- Many industrial accidents are caused by inadequate management of chemicals *(Global Chemicals Outlook, UNEP, 2013)*
- Approximately 2.3 million fatalities per year due to work related accidents and diseases → approximately 400,000 deaths annually caused by exposure to chemicals *(ILO)*

International agreements and regulations on chemicals

GHS (United Nations Globally Harmonised System of Classification and Labelling of Chemicals)

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides

Stockholm Convention on Persistent Organic Pollutants

Montreal Protocol on Substances that Deplete the Ozone Layer

Minamata Convention on Mercury

Regional legislations on chemicals

EU REACH (Regulation on the Registration, Evaluation, Authorisation and Restriction of Chemicals)

EU CLP (Classification, labelling and Packaging) based on GHS

Seveso Directives on major accidents prevention

EU Industrial Emissions Directive sets out the main principles for the permitting and control of installations

US Toxic Substances Control Act (TSCA)

Business concerns related to chemicals use

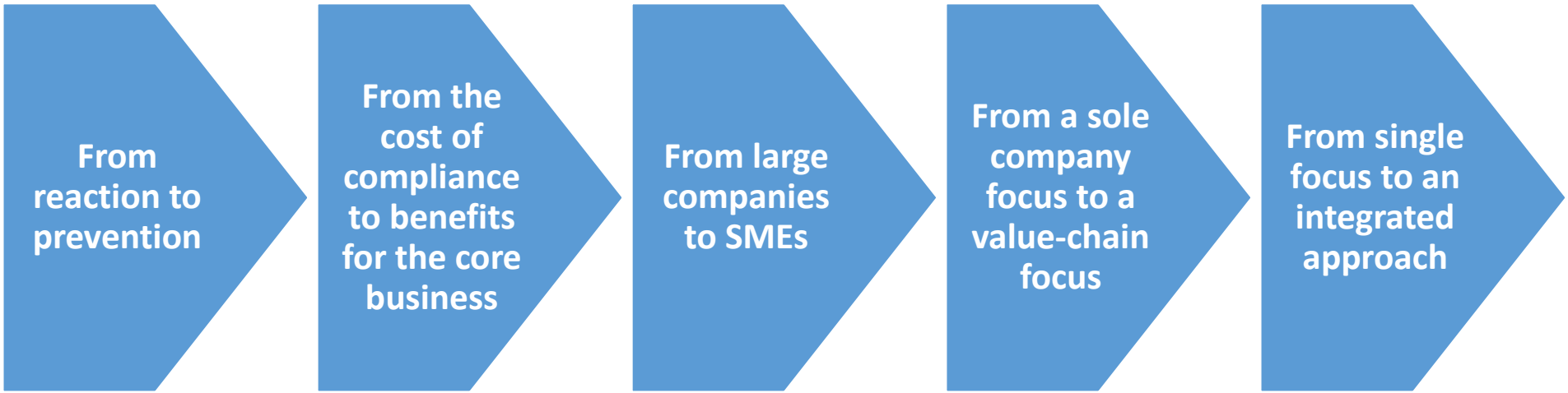
- Cost to business
  - Chemicals are expensive, and so is disposal of chemical waste
  - Proper use of right chemicals can boost efficiency and productivity
- Risk to business
  - Business risks of chemical accidents
  - Liability for chemical waste
  - Additional legal compliance required
- Impacts on human health and environment
  - Exposure to toxic chemicals causes risks for employees and communities
  - Chemicals released into the air, water or soil act as pollutants and have adverse effects on climate, potable water or land use

Challenges on the use of chemicals

- Limited awareness
  - Chemicals and their risks, in particular cumulative risks
  - Impacts of behaviour and process conditions on hazards, and severity and frequency incident scenarios
- Lack of knowledge and resources
  - Specific knowledge on chemicals and risk management
  - Safe substitutes and technologies
- Lack of infrastructure
  - Environmentally sound management, recycling and disposal of chemical wastes

UNEP's Responsible Production approach

A systematic and continuous improvement approach - practical guidance and tools - for assisting SMEs in **identifying** and **understanding the hazards and risks** related to **chemicals, company products** as well as **operations on-site** and **along the value-chain**



Responsible Production
Aims and Rationale

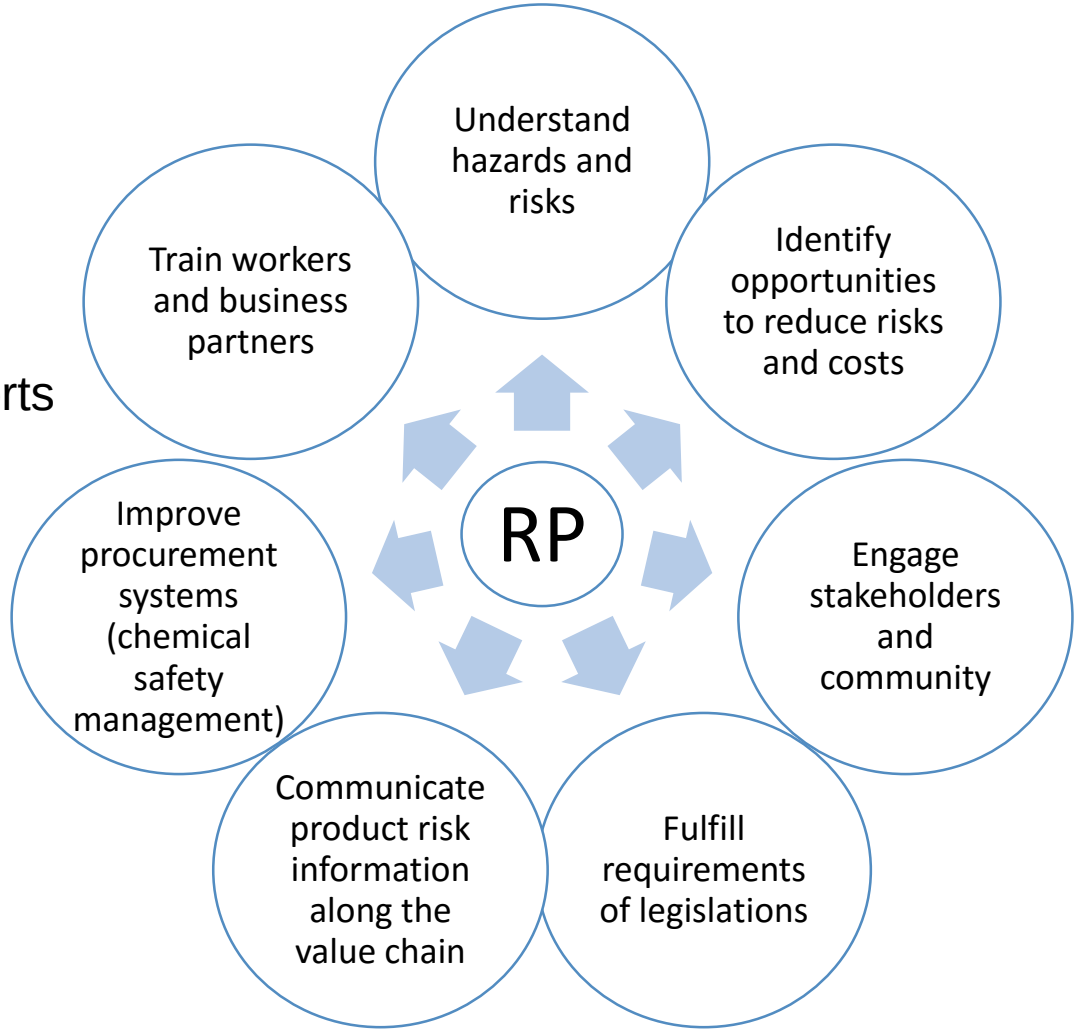
- Need to **foster chemical risk control, safe work practices** and **chemical safety information** along the **industry value chain**, (involving not only the producers but also their suppliers, transporters, end customers, and other relevant business partners)
- An integrated approach to **chemicals safety** and **chemical product stewardship** can not be implemented without the identification and engagement of the **relevant stakeholder**s along the value chain

Chemical product stewardship "…the practice of making health, safety and environmental protection an integral part of the life cycle of chemical products."

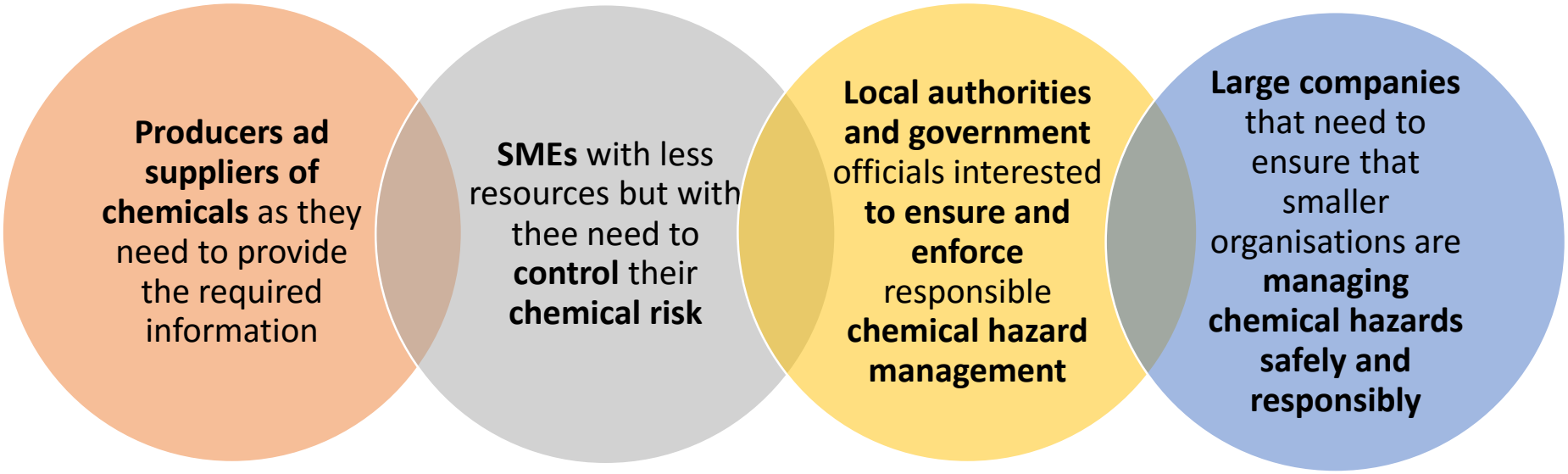
(ICCA Product Stewardship Guidelines, 2007)

Elements of Responsible Production

Responsible Production supports companies to:



Who is interested in Responsible Production?



EXPERTS

Responsible Production
A focus on SMEs

- SMEs are the backbone of the industrial sectors where hazardous chemicals are manufactured, transported, repackaged and used
- SMEs needs for a systematic and effective approach to improve chemical safety measures
- SMEs can benefit from an integrated guidance on safer production and safer chemicals handling

Benefits of Responsible Production for SMEs

Direct and indirect savings

- Cut direct cost with chemicals
- Cut indirect cost of chemical waste and regulatory compliance
- Avoid accident, incident and clean up cost

Business security

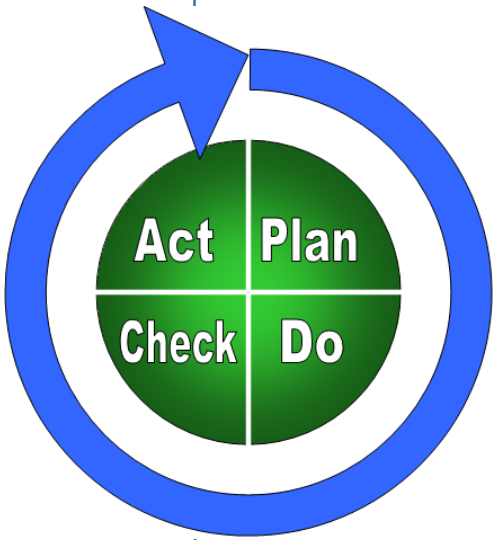
- Compliance with regulation
- Reduce dependence on substances of concern
- Risk prevention and risk control
- Maintain license to operate and license to market

Social responsibility

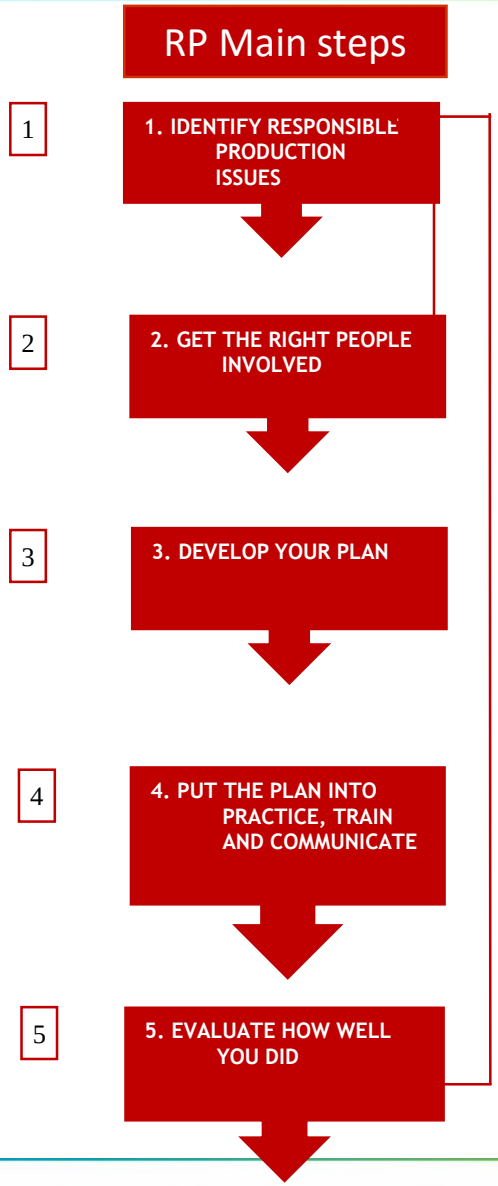
- Positive impact on Occupational Health and Safety
- Enhance risk awareness and emergency preparedness
- Meet customers and clients requirements
- Improved relations with stakeholders and community

The 5-step model of the Responsible Production Framework

1. IDENTIFY RESPONSIBLE PRODUCTION ISSUES
2. GET THE RIGHT PEOPLE INVOLVED
3. DEVELOP YOUR PLAN
4. PUT THE PLAN INTO PRACTICE, TRAIN AND COMMUNICATE
5. EVALUATE HOW WELL YOU DID



The RP Toolkit

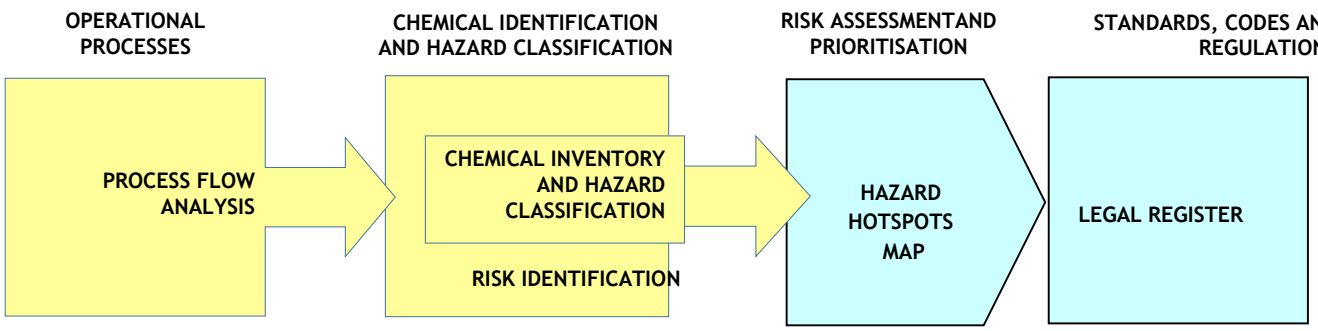


Step 1: Identify Responsible Production Issues

1
2
3
4
5

1. IDENTIFY RESPONSIBLE PRODUCTION ISSUES

	Basic Tools	Advanced Tools
UNDERSTAND THE PROCESS FLOW	Tool 1.1 Prepare process flow chart	Tool 1.6 Hazard Classification (Control Banding)
IDENTIFY CHEMICALS, QUANTITIES AND HAZARD INVOLVED	Tool 1.2 Chemical inventory and Hazard Classification	
RISK ASSESMENT AND PRIORITIZATION	Tool 1.3 Identify Risks Tool 1.4 Hazard Hotspots Map	
IDENTIFY LEGAL, CODE, STANDARDS AND OTHER REGULATORY REQUIREMENTS	Tool 1.5 Legal register	



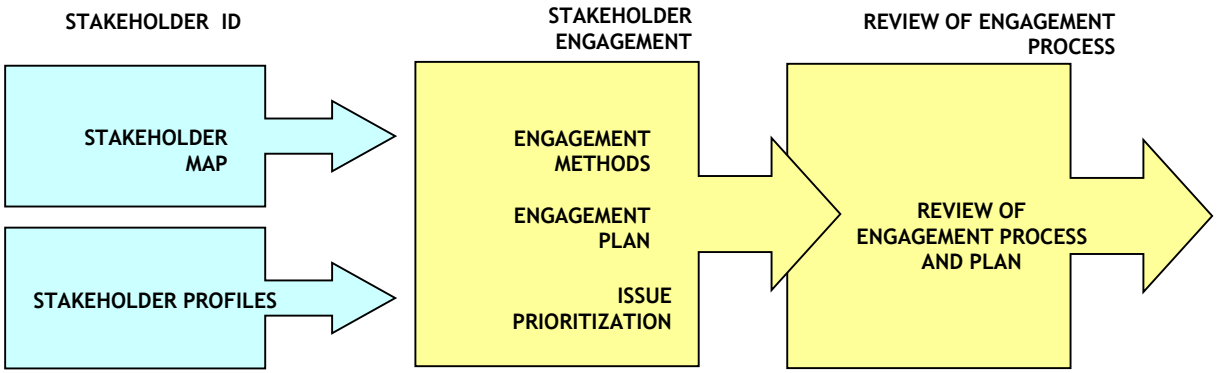
Step 2: Get the Right People Involved

1
2
3
4
5

2. GET THE RIGHT PEOPLE INVOLVED

- IDENTIFY YOUR STAKEHOLDERS
- UNDERSTAND YOUR STAKEHOLDERS AND HOW THEY ENGAGE
- ENGAGE YOUR STAKEHOLDERS
- PRIORITSE STAKEHOLDER ISSUES
- REVIEW THE ENGAGEMENT PROCESS

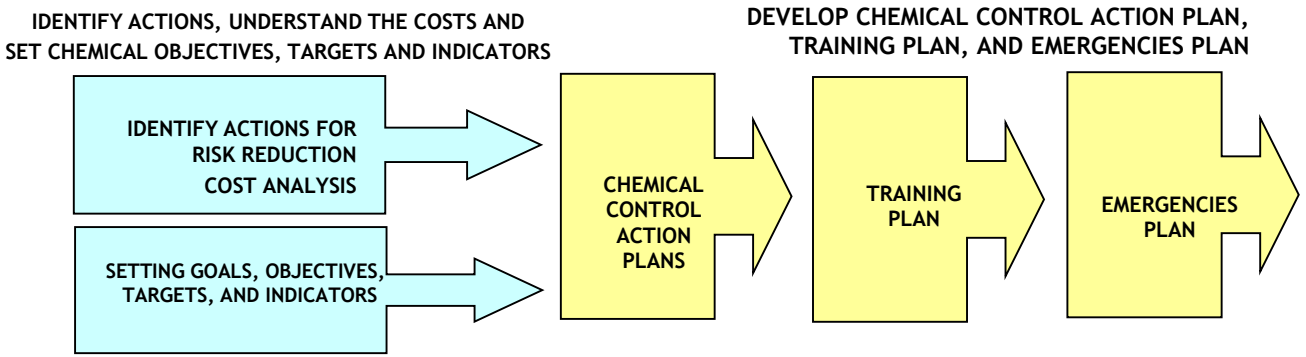
Basic Tools	Advanced Tools
Tool 2.1 Map Stakeholders	
Tool 2.2 Profile Stakeholders	
Tool 2.3 Select the engagement method	
Tool 2.4 Plan the engagement	
	Tool 2.5 Prioritise issues
	Tool 2.6 Review Engagement Process



Step 3: Develop your Plan

1
2
3
4
5

3. DEVELOP YOUR PLAN	Basic Tools	Advanced Tools
IDENTIFY OPPORTUNITIES FOR RISK AND COST REDUCTIONS	Tool 3.1 Identify Actions for Risk Reduction	Tools 3.7 to 3.11 Prevent and Reduce Risk (per activity)
BUILD AND COMMUNICATE THE BUSSINESS CASE	Tool 3.2 Risk Reduction Cost Analysis	Tool 3.12 Business Case
SET CHEMICAL OBJECTIVES, TARGETS AND INDICATORS	Tool 3.3 Set goals, objectives, targets and indicators	
PREPARE CHEMICAL CONTROL ACTION PLANS	Tool 3.4 Chemical Control Action Plan	
DEVELOP TRAINING NEEDS ASSESSMENT AND PLAN	Tool 3.5 Training plan	
DEVELOP EMERGENCIES PLAN	Tool 3.6 Emergencies plan	



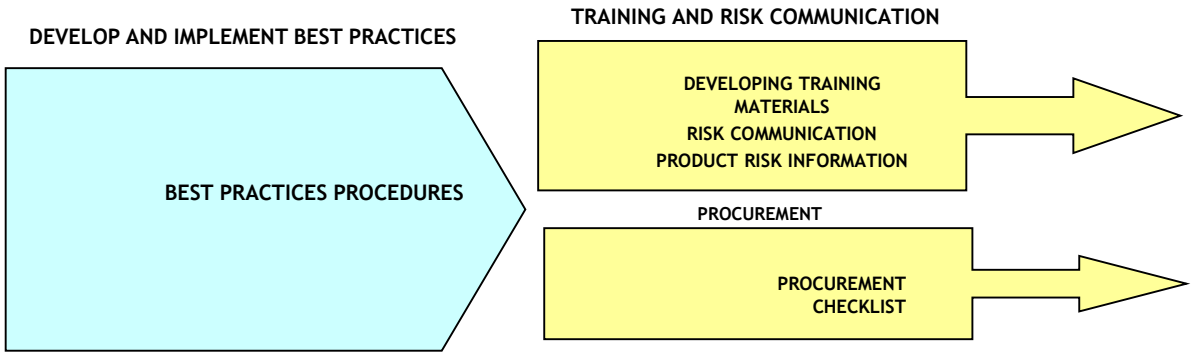
Step 4: Put Plan into Practice, Train and Communicate

1
2
3
4
5

4. PUT PLAN INTO PRACTICE, TRAIN AND COMMUNICATE

- DEVELOP AND IMPLEMENT BEST PRACTICE PROCEDURES
- TRAIN YOUR WORKERS AND BUSINESS PARTNERS
- FOSTER RISK COMMUNICATION
- IMPROVE YOUR PROCUREMENT PRACTICES

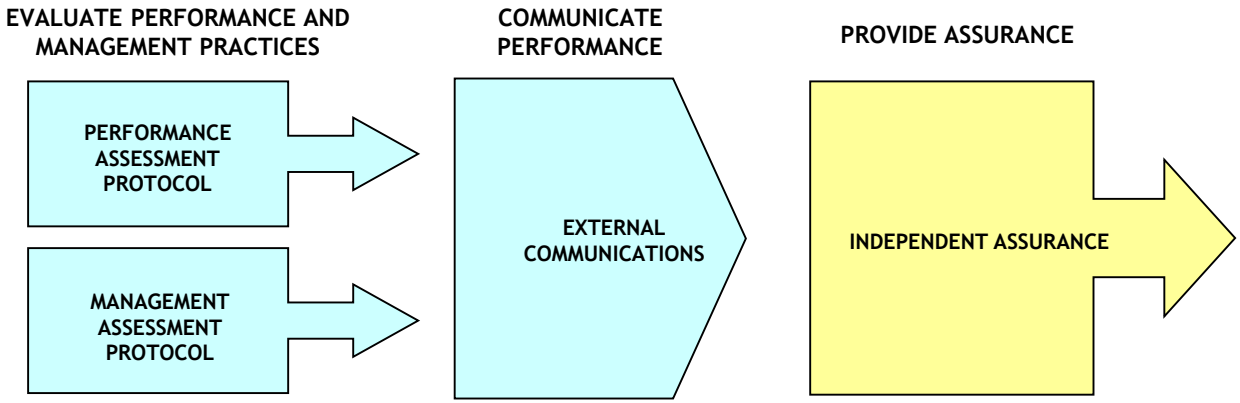
Basic Tools	Advanced Tools
Tool 4.1 Best Practices Procedures	
Tool 4.2 Develop Training Materials	
Tool 4.3 Risk Communication	
Tool 4.4 Product Risk Information	Tool 4.5 Procurement Checklists



Step 5: Evaluate How Well you Did

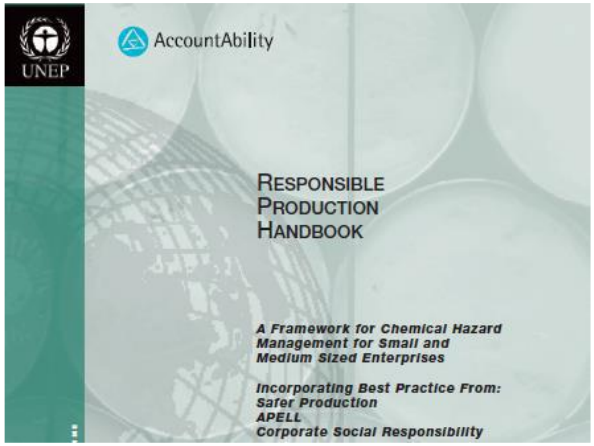
1
2
3
4
5

5. EVALUATE HOW WELL YOU DID	Basic Tools	Advanced Tools
EVALUATE PERFORMANCE AND MANAGEMENT PRACTICES	Tool 5.1 Performance Assessment	
COMMUNICATE PERFORMANCE	Tool 5.2 Management Assessment	
PROVIDE ASSURANCE	Tool 5.3 External Communications	Tool 5.4 Independent Assurance



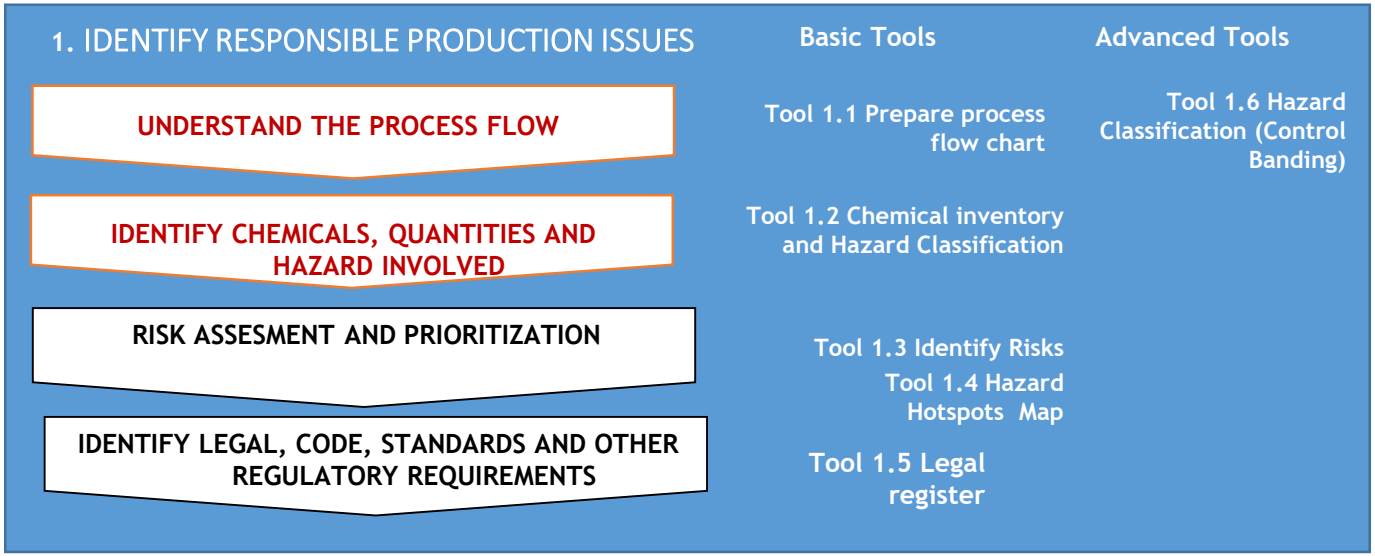
Responsible Production materials and tools

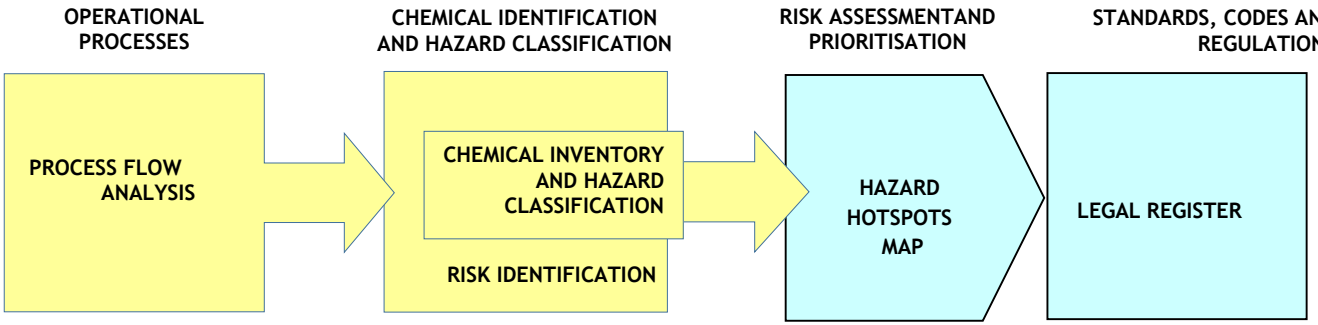
- Framework Booklet
  - Overall background, technical approach and business case for implementation
  - Indicators , case studies and lessons learned
- Toolkit
  - Core technical materials for operationalizing the framework
  - Includes basic and advanced tools
- Training Package
  - Adaptable base for capacity building
  - 18 thematic training sessions to aid SMEs in implementation
  - Includes guidance for trainers and adaptable presentations
- Learners and Trainers Companion
  - Software based package to support capacity building
- Web portal: www.unep.org/responsibleproduction



Section 1: Identify Responsible Production Issues

1
2
3
4
5





Step 1 Understand the process flow

Tool 1.1 Prepare the process flow diagram

- Define the boundaries of the process

  Where does the process start? (supplier, purchasing)

  - trace where your raw materials come from
  - what they are
  - how they get to your business

  Where does the process ends? (customer, sales, waste company)
- Decide the level of detail
- List all processes and activities
- Describe sequence of activities
- Review of flowchart with relevant stakeholders (eg., workers and supervisors, suppliers, customers,...)

1.2 Identify chemicals, quantities and hazards involved in the process

Main questions:

- Use of Chemicals

  What types and quantities of chemicals are in use?

  Where are chemicals used and for what purpose?

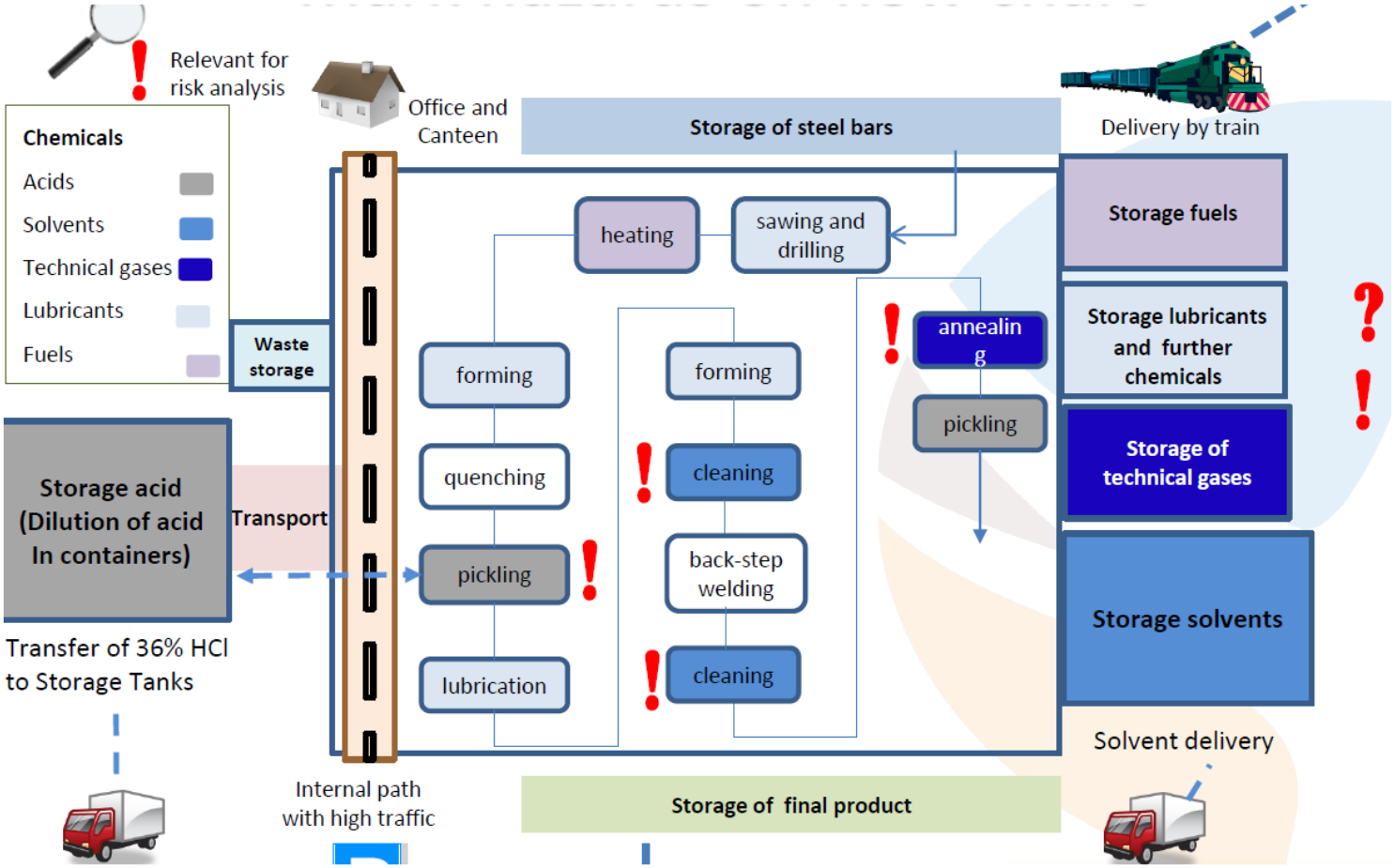
- Identification of hazards associated with chemical products
- Identification of hazards associated with activities such as potential for a fire or an explosion –

.. information is explained in Material Safety Data Sheets (MSDS);

- Mark hazards on flow-chart

Example: Mark hazards on the flow chart

Tool 1.2 Chemical inventory and hazard classification



Sonya Bauer, 2015
Hazard Management

Step 1:Review existing information on chemicals stored and used at site

Input data	Output data	Point of use
• Data from suppliers • Internet based data • Safety data sheets • Accounting documents • Internal storage records	• Hazardous waste transport sheets • Internal records • Records from disposal companies (weight sheets and invoices) • Monthly and annual production data • Air, water and land chemical analysis	• Internal records • Online recording of chemical use • Online recording of chemicals outputs (pollutants in the air, water and soil)

Chemicals / waste inventory

Tool 1.2 Chemical inventory and hazard classification

What kind of data is need?

Overview chemical input

- Types of chemicals and composition
- Classification
- Place of use / storage
- Maximum stored quantities
- Date of supply
- Expiration date
- MSDS availability

CHEMICALS INVENTORY

Overview chemical output

- Types of chemical waste
- Source / storage
- Monthly /yearly quantities
- Disposal and cost
- Maximum stored quantiles

CHEMICAL WASTE INVENTORY

Example: Chemicals inventory

No.	SDS[1].	Product name	Use	Hazardous ingredient(s)	Classification according to GHS	Container volume	Maximum of quantity stored	Storage area
1	✓	Hydrochloric acid T.S. 30	Cleaning agent	Hydrogen chloride	C	200 l barrel	800 l	GL1
2	✓	Cleaning agent A	Tank cleaning	Sodium hydroxide	C	200 l barrel	1,000 l	GL1
3	✓	Cleaning agent B	Cleaning agent	Sodium hydroxide Potassium hydroxide	C	200 l barrel	400 l	GL1
4	✓	Peracetic acid product Divosan forte	Disinfectant	Peracetic acid Hydrogen peroxide Acetic acid	O, C	25 l canister	100 l	GL1
5	✓	Disinfectant A	Disinfectant	Bromacetic acid Phosphoric acid	C	200 l barrel	400 l	GL1
6	✓	Disinfectant B	Disinfectant	Sodium hypochlorite	C	200 l barrel	400 l	GL1
7	✓	Caustic soda 50%	Cleaning agent	Sodium hydroxide	C	1 m^3 container	3,000 l	GL1
8	✓	Gleitoklar	Chain lubricant	Isopropanol	Xi	25 l canister	75 l	GL1

Source : UNIDO CP Toolkit

Example of implementation of Responsible Production in Romania

Printing company

- Activities
- Site description
- Process flow
- Chemicals use
- Chemicals inventory
- Identification of hazards
- Hazards spot map

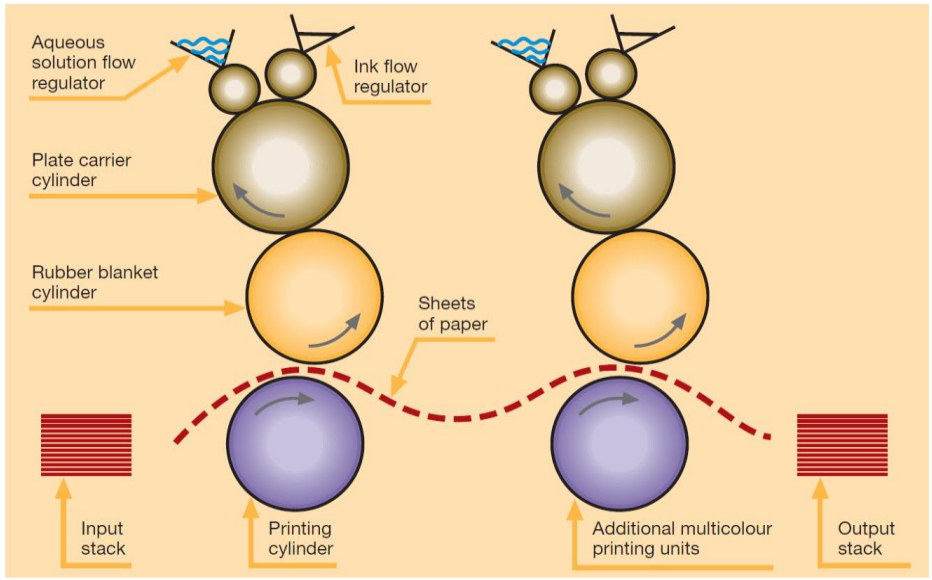
Chemical Control Action Plan

Measures to:

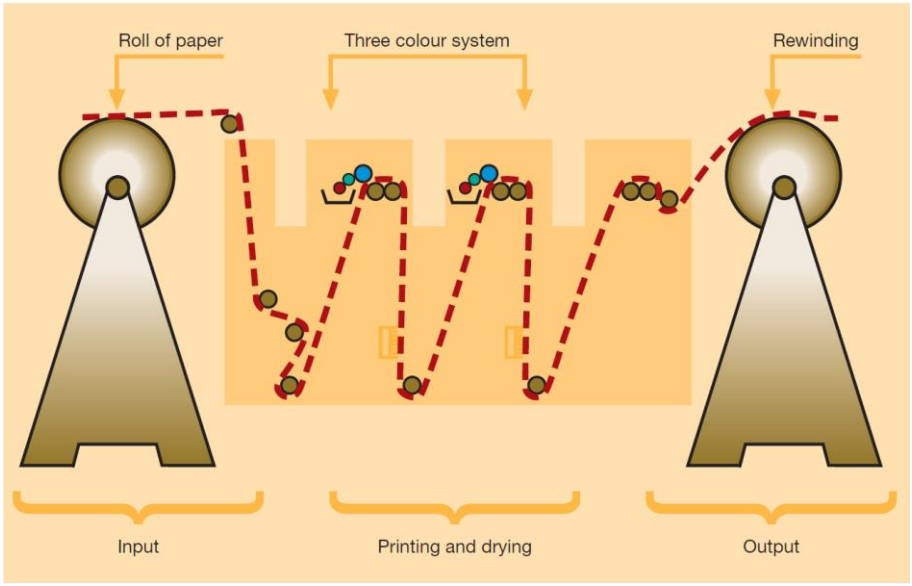
- Understand the hazard and control chemical risks
- Reduce the use of chemicals and the generation of hazardous waste

Printing process

Offset system



Flexographic system



Source: Pollution prevention on the printing and allied industries, RAC, 2003

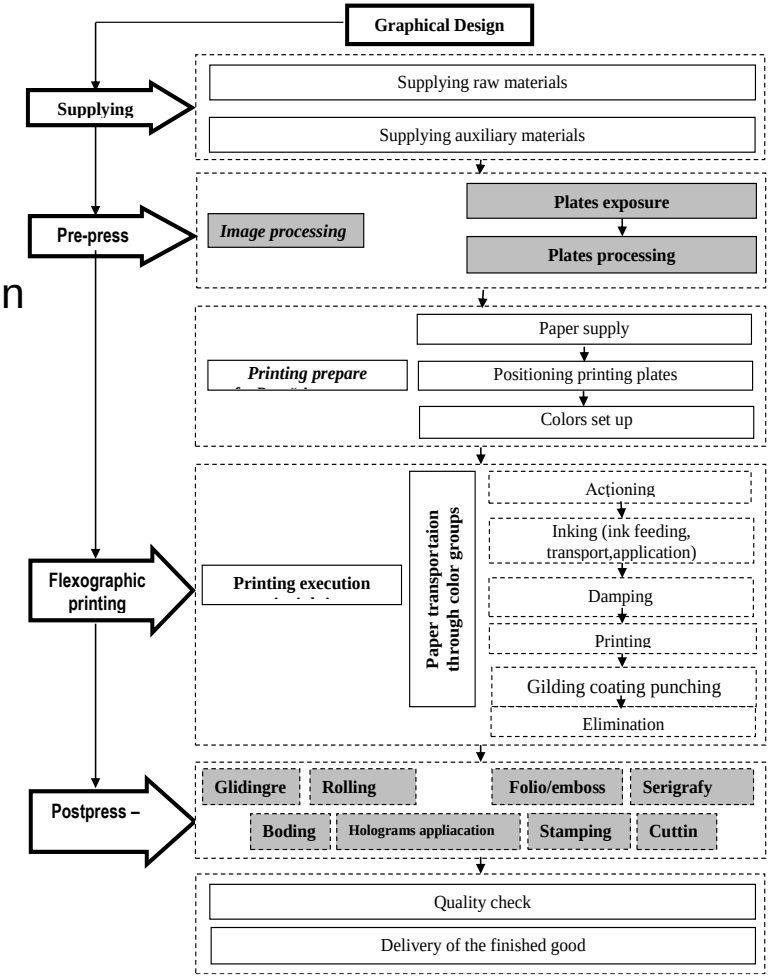
Main steps in the process

- Raw and aux. materials supply
- Transport to company
- Of-loading and storage
- Graphical design
- Production process
- Quality control
- Packaging
- Transport of final product
- Waste storage and disposal

Pre-press
- Image processing
- Color preparation
- Printing preparation

Printing process
- Printing execution

Post press
- Gilding
- Rolling
- Embossing
- Serigraphy
- Bonding
- Stamping
- Cutting

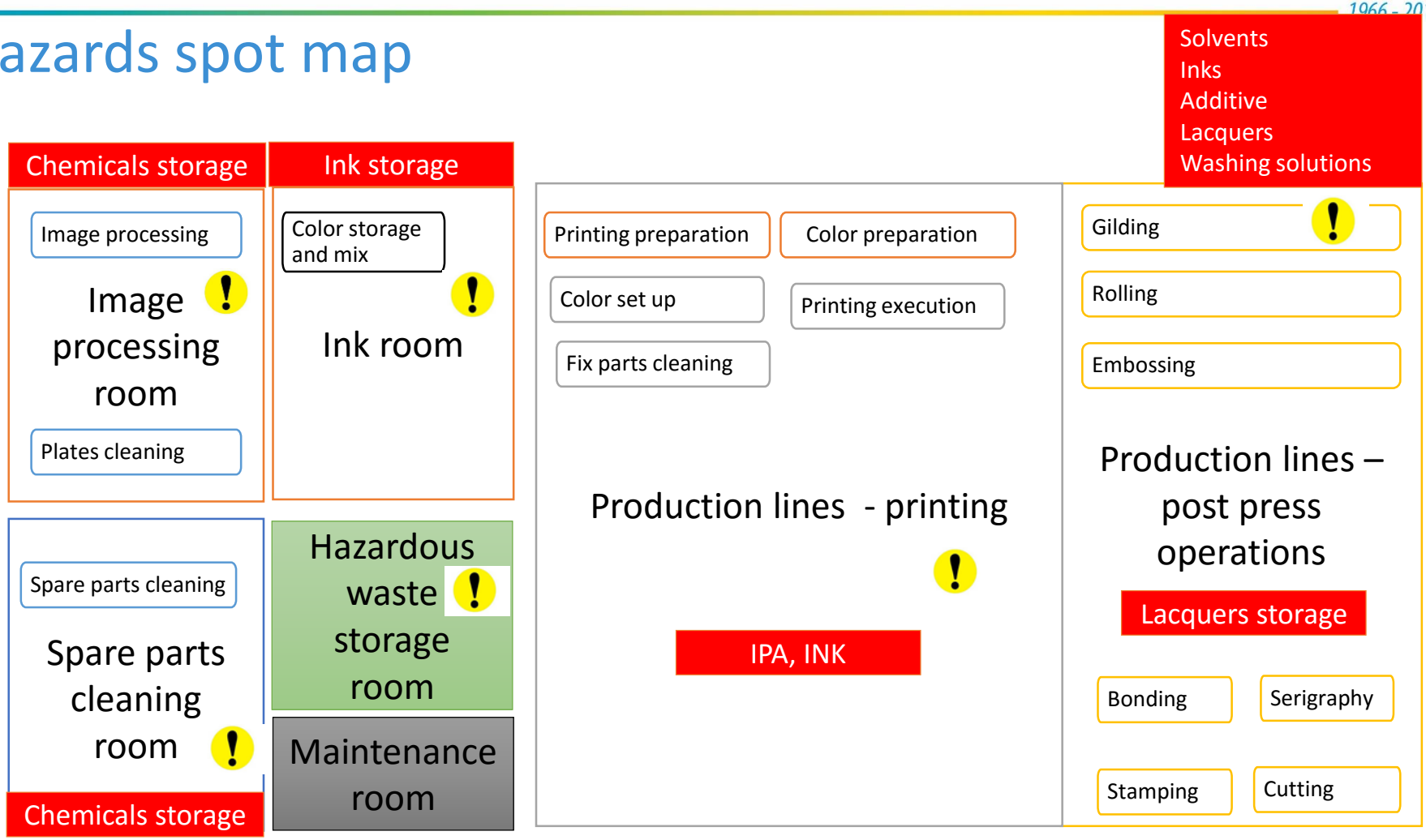


Types of chemicals involved

Processes	Chemicals	Chemical waste
Pre-press		
• Image processing • Color preparation • Printing preparation	• Developer • Fixer • Rinse water • Cleaning solutions	• Spent developer • Spent fixer • Film rinse water • Rags containing solvents; plastic containers with waste chemicals • Spent solvents and solutions • Mould cleaning liquid
Printing process		
• Printing execution • Fix parts cleaning	• Pigments, inks • Fountain solution • Cleaning solutions	• Rags containing inks and • solvents • Metal and plastic containers • Waste inks • Spent solvents • Air emissions
Post press		
• Gilding • Rolling • Embossing • Serigraphy • Bonding • Stamping • Cutting	• Adhesives • Glues • Lacquers	• Waste glue • Metal and plastic containers
Spare parts cleaning		

Process step	Chemical involved	Quantity	Classification	Hazard
Pre-press				
• Image processing	Offset plate Solvent	400	F, Xi	Flammable , Irritating
• Color preparation	Developer	1080	Xi	Irritating to eyes and skin
• Printing preparation	Flexo plate wash	400	F, Xn	Flammable ; Harmful
	Flexo plate AUTOWASH	215		
Flexographic printing				
	IPA	4200	F, Xi	Flammable , Irritating
	Ink offset	8425	Xi	Irritating
• Printing execution	Ink flexo	876	-	-
• Fix parts cleaning	Serigraphic Ink	260	Xi , N	Irritating; Dangerous for env.;
	Additive TENCACID 3030		Xi	Irritating to eyes and skin
Post press				-
• Gilding	Lacquer flexo	2643		Flammable, Irritating to eyes and skin
• Rolling	Vaseline	22	F, Xi	-
• Embossing	Adhesive	69	-	
• Serigraphy			-	
• Bonding	AUTOWASH Solution	825	Xn	Harmful
• Stamping	ACTIVAL washing solution	215	N, Xi	Dangerous for env., Irritating
• Cutting	ALPHACLEAN 3	100	C	Corrosive
Spare parts cleaning				

Hazards spot map



Hazards spot map

Solvents
Inks
Additive
Lacquers
Washing solutions

Risk of fire and health damage

Image processing

Image processing room

Plates cleaning

Risk of health damage

Color storage and mix

Ink room

Risk for environment in case of spillage

Printing preparation

Color preparation

Color set up

Printing execution

Fix parts cleaning

Production lines - printing

Risk of fire

Risk health damage

Gilding

Rolling

Embossing

Production lines – post press operations

Risk of fire and health damage

Bonding

Serigraphy

Stamping

Cutting

Spare parts cleaning

Spare parts cleaning room

Risk health damage

Hazardous waste storage room

Maintenance room

The Chemical Control Action Plan

Reduction of chemical risks

- Maintain up to date chemicals inventory
- Improve storage and handling of chemicals
- Implement systematic training of operators
- Replace VOC solvents with water based solutions for spare parts washing

Reduction of chemical input

- Improve products design and reduce number of unexpected orders
- Optimize ink supply and use
- Acquire software for efficient ink blending

Reduction of chemical waste

- Collect separately the chemical waste generated in different processes (IPA, cleaning solvent, developer and fixer solutions, etc.) and record data, compare with input data
- Improve supplying process to avoid expiration, un-necessary chemicals and contaminated packaging
- Implement automatic washing of ink tanks, rubber rollers and other spare parts of printing machines

Progress registered so far

Before

After

Progress registered so far

Before

After

Wrap Up – Take Aways

What ?

- Chemicals are part of our daily life. Their intensive use in production process end operations will increase even more due to current trends
- Chemicals are at the origin of hazardous waste and emissions and represent a major source of pollution and accidents

Why ?

- Chemicals are expensive materials and their efficient use contributes to **direct and indirect cost reduction**
- Responsible use of chemicals protect employees health and **minimize the risk of accidents**, **securing** the business and **increasing it's social responsibility**

Wrap-up – Take aways

How ?

Improving chemical **efficiency, minimizing risk, hazardous waste and emissions** requires:

To **understand**:

- Chemical use, consumption and cost
- Chemical risk
- Types of hazardous waste and emission, volumes and sources generated

To **identify:**

- Responsible production issues and actions for risk reduction
- Factors influencing chemical use, hazardous waste generation and emissions
- Relevant stakeholders

To **generate** and implement measures to **improve chemical use**, **control risk** and **minimize hazardous waste and emissions**

Thank you!

Aida Szilagyi, Chair of NCSPC
Madrid 22, Timisoara
Romania
Email: aidaszilagyi@cnpcd.ro
Website: www.cnpcd.ro
Tel/fax 0040 256 434397
Mobil: 004 0724528900