Centro Para Prevenção da Poluição (C3P)
(Center for Pollution Prevention)

C3P and NASA Technical Workshop 2005

Greening of the Portuguese Printing Industry:

Architecture for Sustainable Industrial Innovation

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❑ Background

⇨VOC's Primary Isssue

⇨C3P Performed Initial P2 Assessments of 30+ Facilities Across a Variety of Industrial Sectors.

- Electronics Manufacturers, Textiles, Printing, Aeronautics, Automotive Manufacturers, UST/AST Production Facility, Microprocessor Facility, Ink and Coatings Manufacturers, Foundries, etc.

⇨Conducted Industry-Specific Assessments After Initial Visits.

- Electronics Manufacturing
- Printing

⇨Much Work Being Done Already Within Electronics Manufacturing

⇨Printing Became Focal Area Due to Interest Among Facilities, Industry Associations and Publishers.

❑ Printing Facilities Visited

- ⇨Amcor Flexibles
  - ▪Flexographic Printing
- ⇨Lisgrafica
  - ▪Lithographic Printing (Web and Sheet Fed)
- ⇨Gráfica Vila Verdense, Artes Gráficas, Lda. (Vila Verde)
  - ▪Lithographic (Sheet Fed)
- ⇨HESKA PORTUGUESA – Indústrias Tipográficas, S.A. (Sintra)
  - ▪Lithographic (Web and Sheet Fed)
- ⇨Martins e Irmão, Lda. (Porto)
  - ▪Lithographic (Sheet Fed), Letterpress
- ⇨MULTITEMA, SGPS, S.A. (Porto)
  - ▪Lithographic(Sheet Fed), Plateless
- ⇨OFFSETLIS – Indústria Gráfica, Lda. (Leiria)
  - ▪Lithographic (Sheet Fed), Plateless

❑ Initial Assessment Observations

⇨ Needs Exist in Many Categories within Industry in Portugal and the US

- Material Selection
- Process Optimization
- Reduction, Recycling, Reusing
- Waste Management
- Health and Safety
- Best Management Practices / Work Methods
- Culture / Mindset

⇨ Many Good Things are Happening

- Computer to Plate
- Direct to Print (Plateless)
- Testing of New Materials (Limited Successes)
- Culture of Environmental Responsibility

Is it Enough?

Overall Goal:

Build an "Architecture for Sustainable Industrial Innovation"

❑ Innovate the Industry:

- ⇨ Reduce Overall Environmental Impact of Industry in Portugal, EU, US, Etc.;
- ⇨ Increase Occupational Health and Safety
- ⇨ Reduce, Reuse and Recycle hazardous materials;
- ⇨ Reduce Hazardous Wastes generated/released to the environment;
- ⇨ Sustainability as the GOAL;
- ⇨ Increase Capability, Competitiveness and Value of Workforce;
- ⇨ Increase Quality, Productivity, Profit.

❑ Project Drivers

- ⇨ European Environmental Regulations
- ⇨ Portuguese Regulations / US Regulations
- ⇨ Occupational Safety and Health Needs
- ⇨ Environmental Sustainability
- ⇨ Social Responsibility

❑ Who (US and Portuguese)

- ⇨ Universities, Technical Institutions and other Academic Bodies
- ⇨ Business / Industry
- ⇨ Government

❑ Partners Identified

⇨ C3P, European Printing and Publishing Industry Associations (e.g., Apigraf, Aind, FAEP, FIPP, etc), individual members of the Portuguese printing industry, Portuguese Universities, EPA, NASA, and Printing Industries of America/Graphic Arts Technical Foundation, Rochester Institute of Technology and other US Universities.

❑ Integrated Design Teams

(Partners / Members / Experts From Major Categories)

- **Academic Bodies**
- **Industrial Associations**
- **Sectors**
  - -Flexographic
  - -Lithographic / Offset
  - -Screen Printing
  - -Gravure
  - -Letterpress
- **Process**
  - -Pre-Press
  - -Press
  - -Post Press
- **Materials**
  - -Pre-Press Chemicals
  - -Inks, Substrates, Solvents
  - -Waste Streams (Water, Air, Solids)

Goal: Design & Carry Out Blueprints for Project Success

❑ Inputs to Teams

Sector Specific Needs, Problems, Responsibilities, Legislations & Goals

LIMITING FACTORS ALWAYS EXIST:

- ⇨ Human
  - (Function of Drive and Biology)
- ⇨ Environmental
  - (Carrying Capacity, Legal Allowable Impact, Etc.)
- ⇨ Market Limiting Factors
  - (Quality, Cost, Trade Etc.)
- ⇨ Technology
  - (Equipment, Materials, Complexity)

SUSTAINABILITY = BALANCE

❑ Outputs After Following Blueprints

Environmental Benefits

- ❑ Reduce Waste and Hazardous Waste
  - ⇨ Health & Safety of People
  - ⇨ Social Environmental Responsibility
  - ⇨ Reduce Environmental Footprint
  - ⇨ Close the Loop (Sustainability)
  - ⇨ Increase Profitability (Waste is Waste is Waste)

- ❑ Reduce Hazardous Materials (Inputs)
  - ⇨ Same as Reduction of Waste and…
  - ⇨ Reduces In-Process Risk
  - ⇨ Leads to Increased Competitiveness Through Efficiency
  - ⇨ Reduces Hazardous Waste and Associated Cost of Disposal

❑ Outputs (Continued)

Non – Environmental Benefits

- ❑ Education / Training
  - ⇨ Increase value and marketability of personnel
  - ⇨ Tool for making change in environmental mindset (Sustainability)
  - ⇨ Increase capabilities of Universities and other Academic Bodies

- ❑ Business / Industry
  - ⇨ Increased Efficiency
  - ⇨ Increased Productivity
  - ⇨ Better Work and Business Practices
  - ⇨ Increased Profitability and Competitiveness
  - ⇨ Healthy Workforce

- ❑ Research / Testing
  - ⇨ Increase Research Capabilities / Competencies

Sustainability's Triple Bottom Line

To Manage and Measure Success Based On:

Profit – Economic ● People – Social ● Planet – Environmental

"*(Waste = Loss): The first rule of business is to survive and the guiding principle of business economics is not the maximisation of profit, it is the avoidance of loss*."
- Peter Drucker

"*The ultimate test of a moral society is the kind of world that it leaves to its children*."
- **Dietrich Bonhoeffer**

"*Sustainable development is...development that meets the needs of the present without compromising the ability of further generations to meet their own needs*."
- World Commission on Environment and Development, *Our Common Future*, 1987

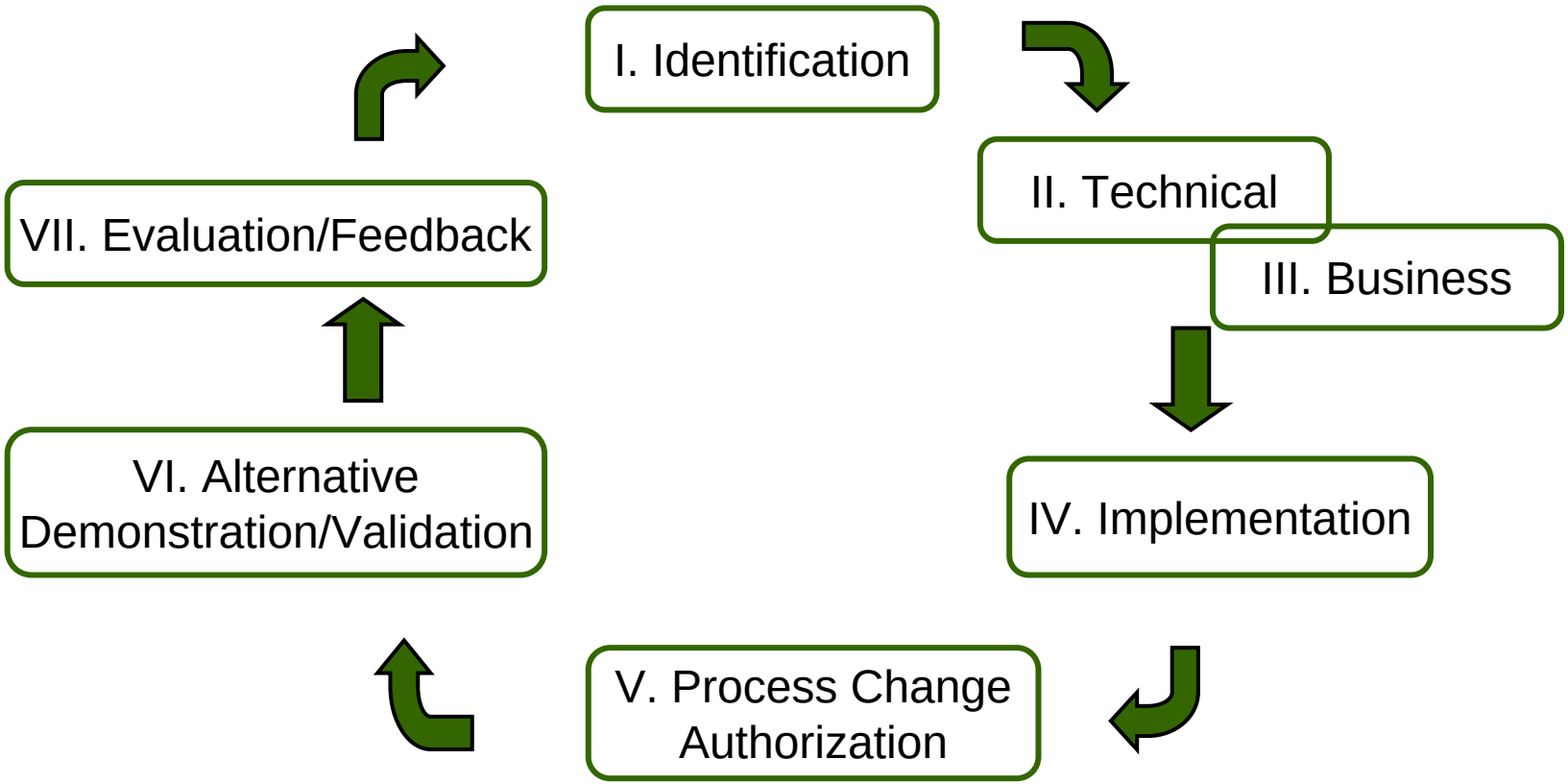
"*If all mankind were to disappear, the world would regenerate back to the rich state of equilibrium that existed ten thousand years ago. If insects were to vanish, the environment would collapse into chaos*."
- Edward O. Wilson

"Mãos à obra que ainda é tempo!"

END

Extra Slides

❑ Project Methodology



❑ Project Methodology

1. Identification

- Stakeholders
- Pollution Prevention Needs

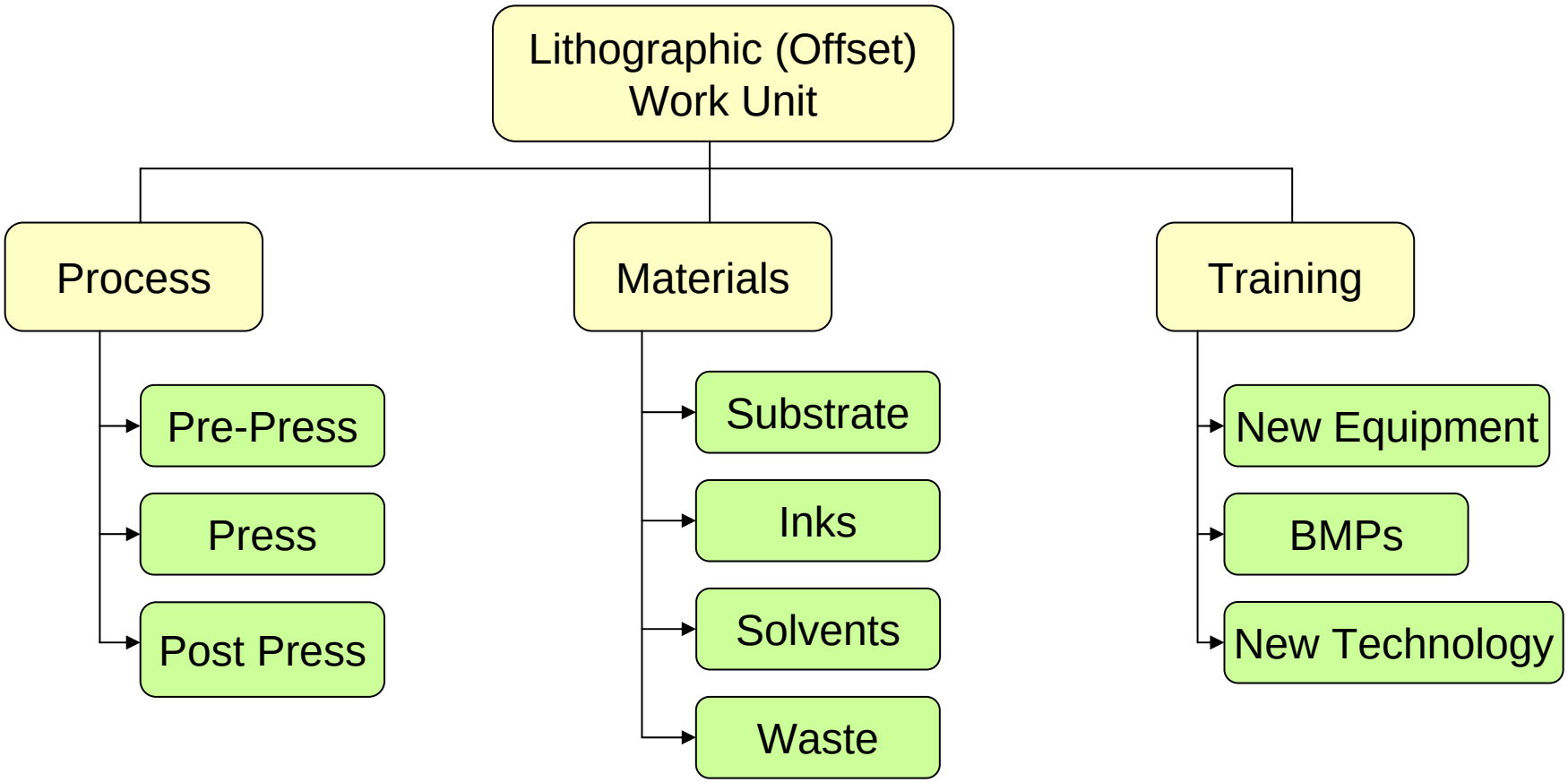
Potential Projects

1.1 Assessments to Printing Industries

⇨ Identify system and institutional processes within the various printing industries that use hazardous materials and generate hazardous waste or pollution

Identify the most viable pollution prevention opportunities and project areas

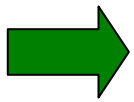
Example Sector Work Unit:



2. Technical

- Identification of Potential Alternative Processes, Materials and Alternatives for Demonstration / Validation

  - Printers
  - Ink and Paper Manufacturers
  - Scientific Journals
  - International Partners



Potential Alternative Report (PAR)

- Historical Test Results

Use information on potential alternatives collected by other Organizations (EPA DfE, etc.) if they are applicable to eliminate Duplication of Effort

2. Technical

- Identification of Technical Requirements

Work Unit identifies and defines Critical Testing, Requirements, Methodologies, Acceptance Criteria to Qualify the Potential Alternatives

Joint Test Protocol (JTP)

3. Business

- Develop business strategy that identifies funding for testing and implementation;
- Perform a Cost/Benefit Analysis (CBA) to:
  - support funding requirements;
  - determine cost implications;
  - determine environmental quality benefits;
  - determine magnitude of change.

4. Alternative Demonstration / Validation

- Perform required tests in accordance with the approved JTP
- Analyze the data and determine acceptability

Joint Test Report (JTR)

5. Process Change Authorization

Technical performance of potential alternatives is demonstrated and determine to be acceptable

Implementation of the Alternative Materials / Processes / Technologies

6. Implementation

Implementation of the Technology or Material into as wide a spectrum of Sectors or Facilities as possible

Implementation Plan

7. Evaluation / Feedback

- Technical conclusions of the project