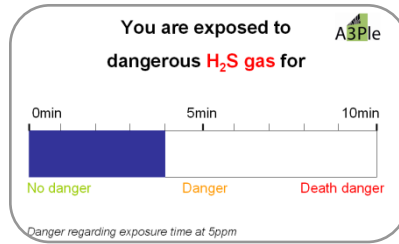


### Three demonstrators under development:

#### Demo 1: safety label

gas detection at home or  
in industrial environment



**Demo 3: packaging label**  
**Demo 2: safety poster**  
to have more information go and  
visit public website:

[www.A3Ple.eu](http://www.A3Ple.eu)



### How we are making demo 1 ?

#### 1-Circuit design

Make electrical design with known  
printed components:

**Sensor** = detector ;  
**battery** = energy supplier;  
**display** = visual information  
**resistor** and **transistor** = signal  
treatment

#### 2- Layout of functional inks

#### 3'-Industrial printing

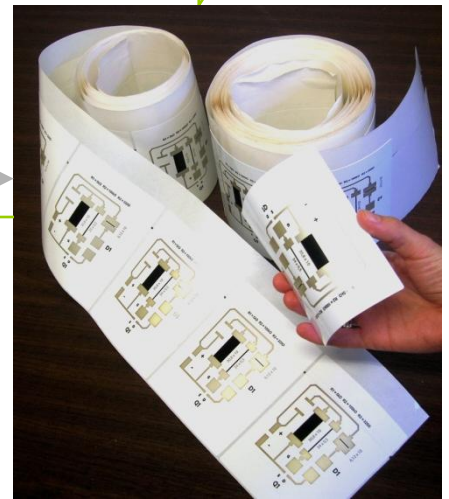
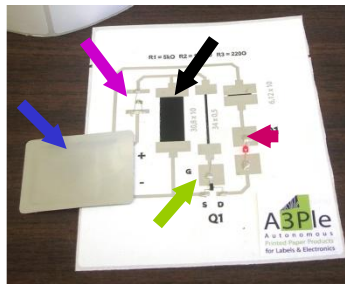
Lines, interconnections  
and resistors

#### 3-Lab scale printing

Manage printing  
process and  
functional issues

#### 4-Circuit proves of concept

Components at lab scale development  
are replaced by chips with equivalent  
electrical behaviour to make hybrid  
circuit. It validates first printing steps and  
integration.



### Work still under progress:

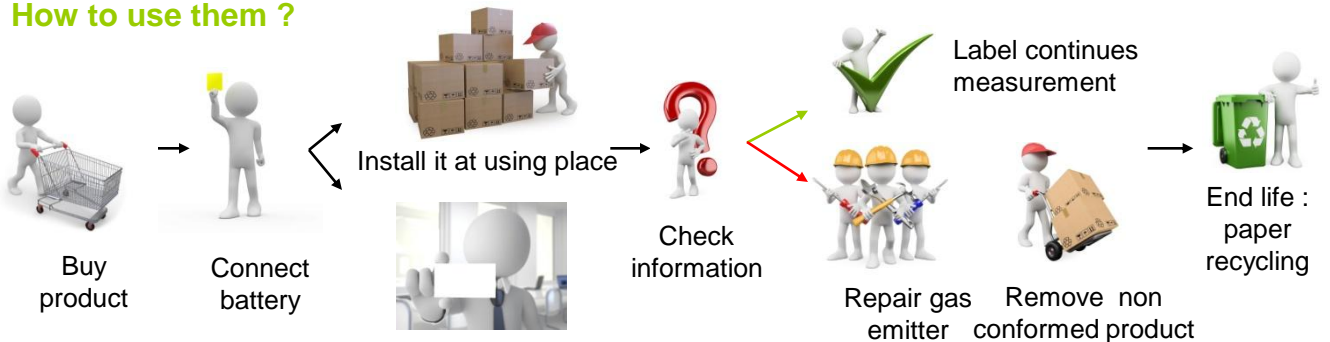
Optimise printing steps of components regarding industrial constraint.

Replace progressively each conventional electronic component (chip) by printed one: at lab and industrial scale.

Perform final and optimal circuit design and attached layout.

Transpose the knowledge and the procedure to demo 2 and 3...

### How to use them ?



A3Ple is SME focused collaborative project funded by the European Community's 7th Framework Programme under grant agreement n° 262782 (APPLE).



### Objectives:

**Visual information for A3Ple's demonstrator is given by the display.**

- White display turn into blue colored letters or signal in order.
- Display informs customers about environmental change via paper printed electrical circuit

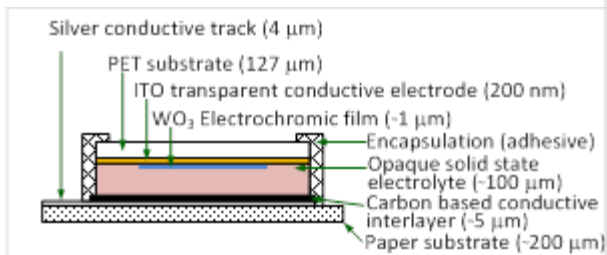
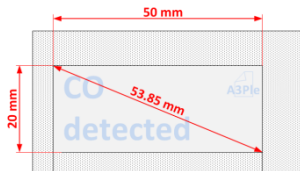
**Video access:** [www.A3Ple.eu](http://www.A3Ple.eu)

Or flash the QR code



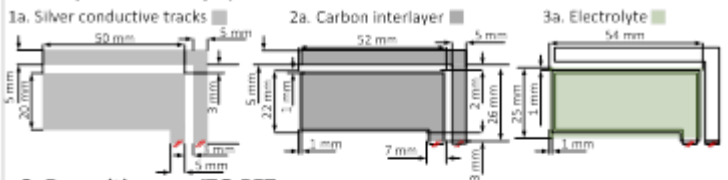
### How is electrochromic display made ?

#### 1-Structure and Layout



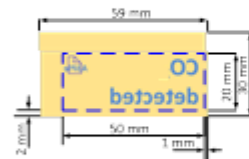
#### 2- printing step and assembling

##### 1. Depositions on paper



##### 2. Depositions on ITO PET

1b. Electrochromic film on ITO PET foil



##### 3. Encapsulation

1c. Flipping and placing the ITO PET substrate and electrolyte curing *in-situ* (UV)



2c. Frame made of adhesive



### Final sample:

Electrical characteristic



### How to use them ?

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### Objectives:

#### Make a thin rechargeable battery compatible with flexible electronic

- Thin battery that could be integrated into printed electronic on flexible substrate as paper
- Rechargeable battery will allow to ....
- Use R2R machine of printed industry
- Be rechargeable on Roll

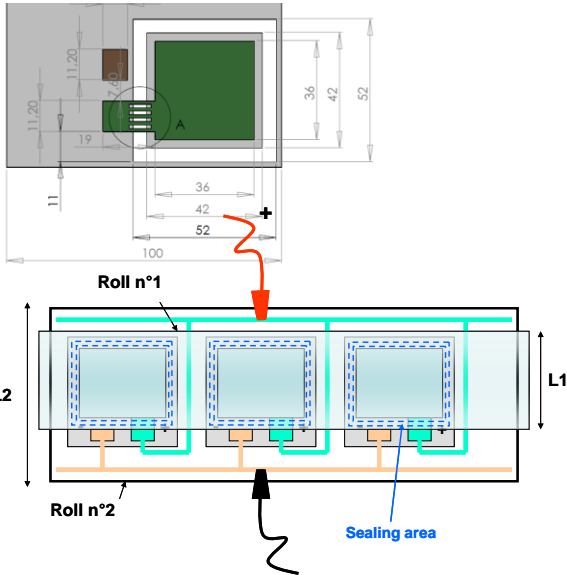
Video access: [www.A3Ple.eu](http://www.A3Ple.eu)

Or flash the QR code

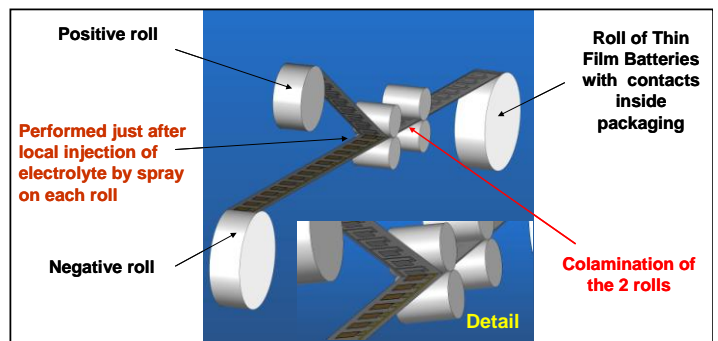


### How is battery made ?

#### 1-Structure and Layout

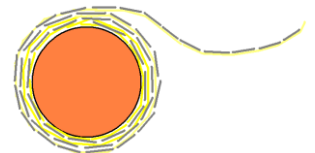


#### 2- printing step and assembling



### Final sample:

Electrical characteristic



### Hybridization on A3Ple demonstrator?

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### Objectives:

Take account of raw materials  
+ production stages and give environmental impacts

- ⇒ Climate change,
- ⇒ No renewable energy consumption,
- ⇒ Eutrophisation , etc...



### One product:

Evaluate the pollution sources

Decrease the pollution

### Product/process comparison:

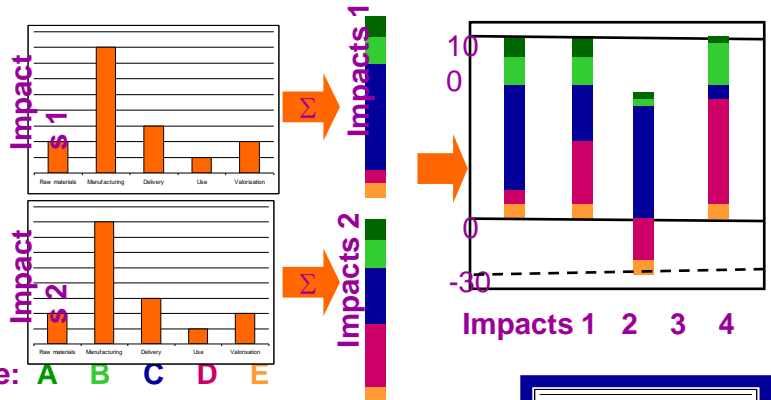
Avoid the pollution transfers

### One product

⇒ Source evaluation

(chosen by evaluator)

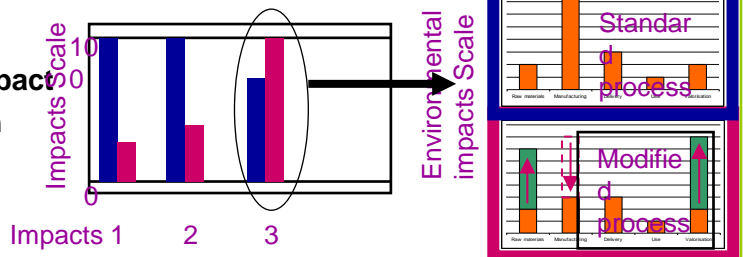
⇒ Effect evaluation on each impact



Source: A B C D E

### Comparison between two products:

- Same product before and after process optimization to decrease environmental impact
- Two product with the same unite function (ex: To write a distance of 90 km)



### How to use LCA for printing electronic?

#### How to define the Unit function ?

How to introduce electronic paper properties? As weight, flexibility, recyclability, “how to use” properties, etc... Do we want to evaluate electrical circuit of product? How to know the use of a product that do not exist yet?

#### To compare with what product ?

Could we found Conventional electronic sensors? Do they have more functions? Are only transportable? Are used by only one person? Could we only evaluate equivalent electronic circuit made with conventional electronic on FR4 or PET?

### Strategy chosen for A3Ple project ?

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### Objectives:

#### Show how to integrate printing electronic into graphic mill.

-Machin for graphic printing has lot's of advantages and could be with small modification used for R2R and high speed electronic printing.

**Video access:** [www.A3Ple.eu](http://www.A3Ple.eu)

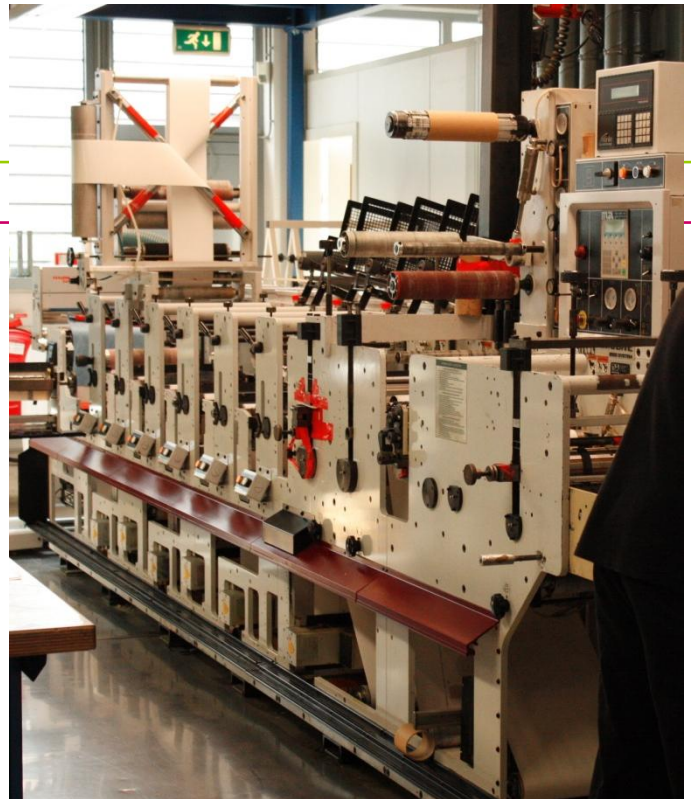
Or flash the QR code



### Parralel between graphic and electric printing?

### The machine and its avantages:

- pritner has the know-how of "printing step
- R2R
- High speed form 60-200 m/min
- Machine investment is minimized (modification in order to build new machine
- Transformation into label or finished product



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