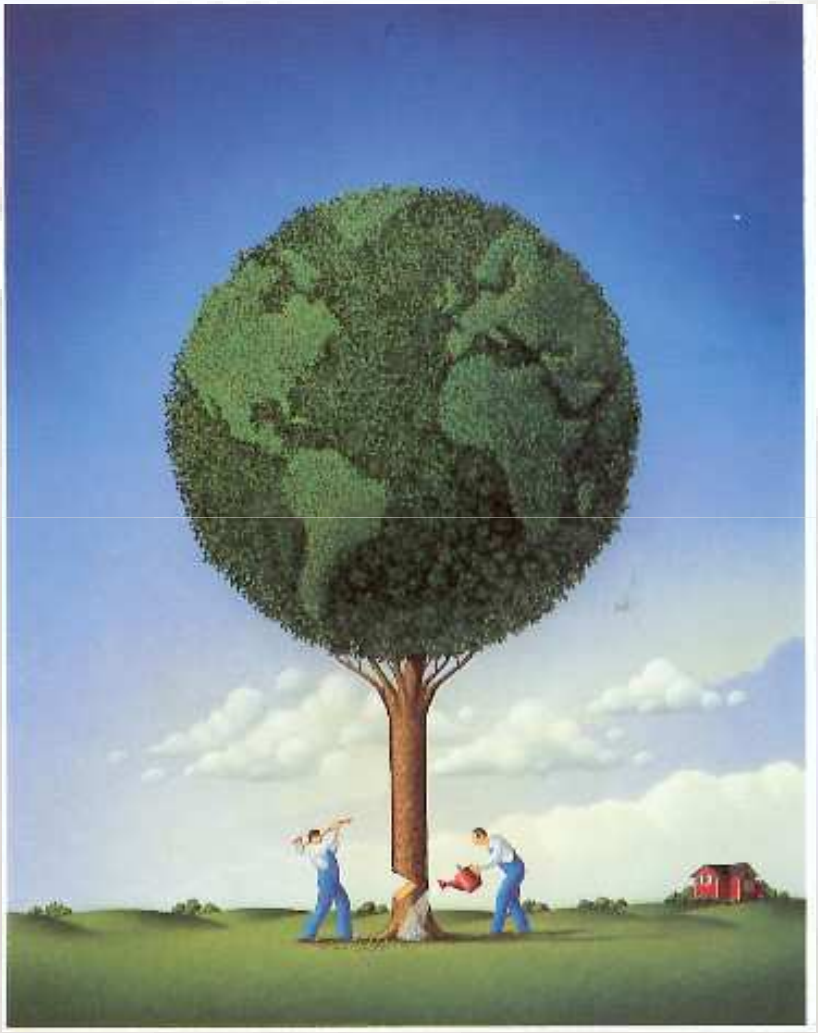
Workshop F - INNOVAZIONE - ECO-DESIGN - IMPRESE



Ecodesign, integrare economia ed ecologia nel ciclo di vita dei prodotti

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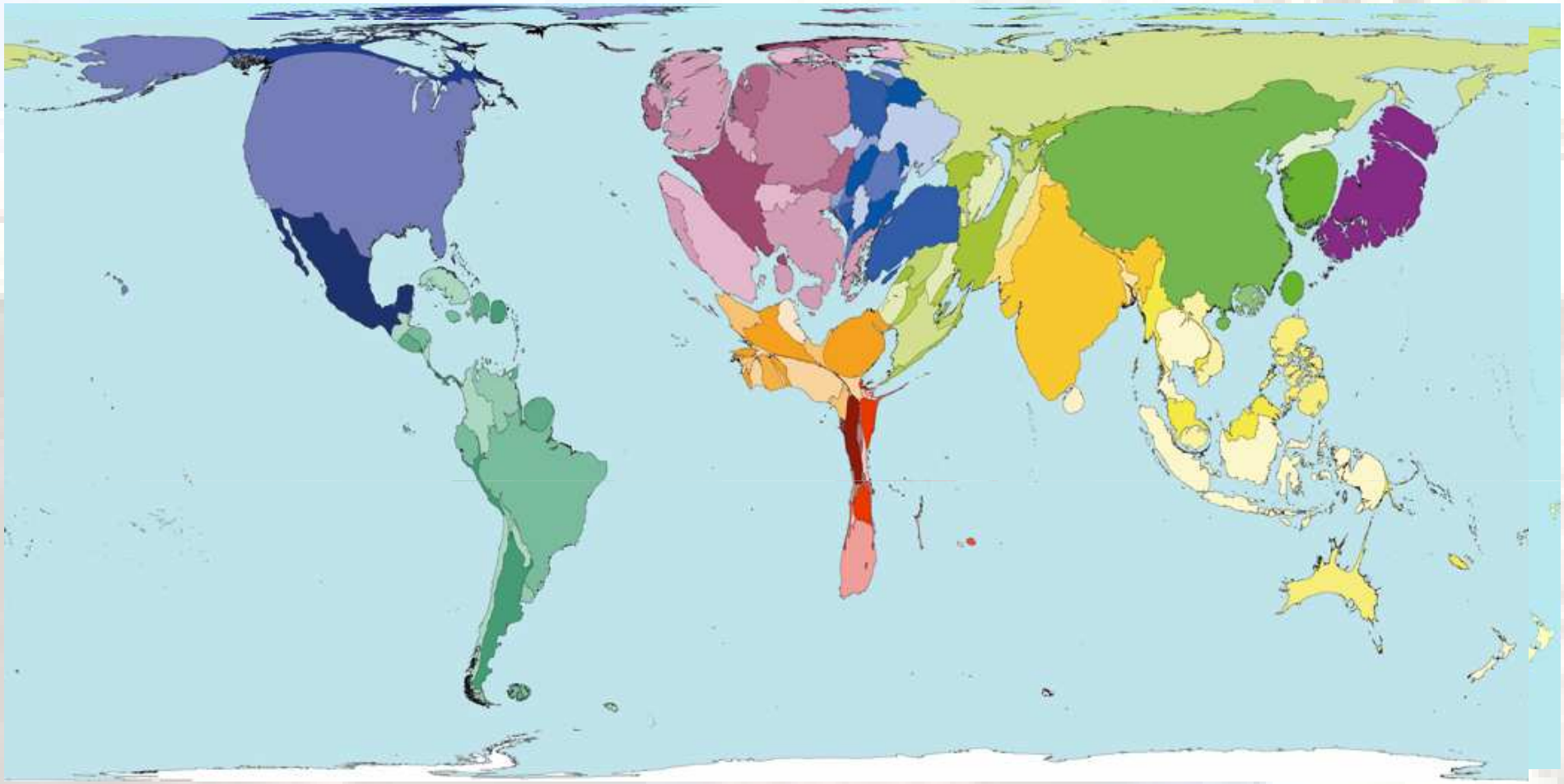

Fonte: www.worldmapper.org

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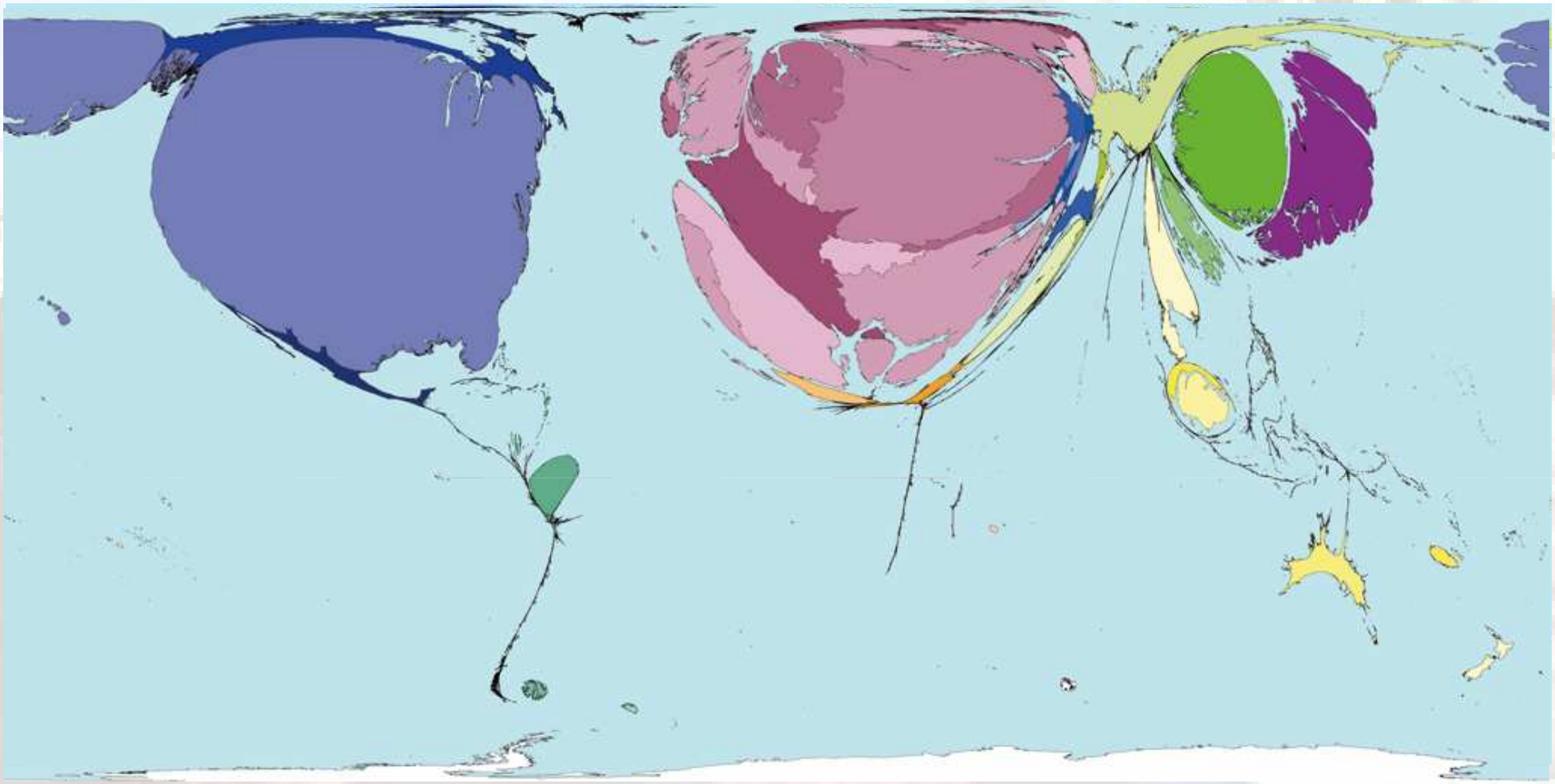

Fonte: www.worldmapper.org

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Source: **New Scientist**, 26 May 2007. David Cohen, “Earth's natural wealth: an audit”

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WEEE can be a a cost efficient source for raw materials

Primary raw materials		1 t		Secondary raw materials
2 t	→	Fe	←	2 t
200 t	→	Cu	←	13 t
200.000 t	→	Au	←	70.000 t

Factor soil to be moved: x 10

Source: ECG

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Industrial ecology is the shifting of industrial process from linear (open loop) systems, in which resource and capital investments move through the system to become waste, to a closed loop system where wastes become inputs for new processes.

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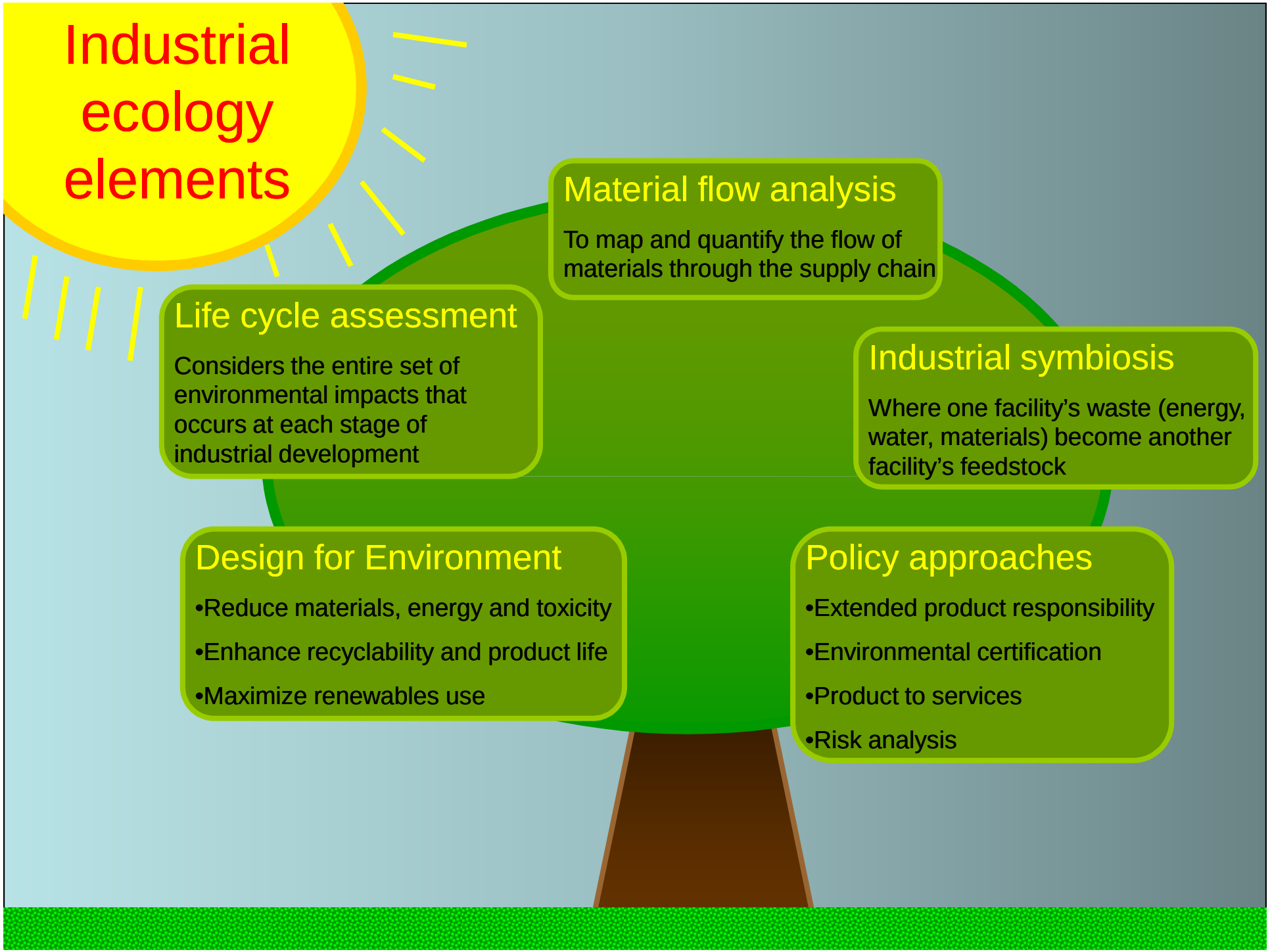
Industrial ecology elements
Material flow analysis
To map and quantify the flow of materials through the supply chain
Life cycle assessment
Considers the entire set of environmental impacts that occurs at each stage of industrial development
Industrial symbiosis
Where one facility's waste (energy, water, materials) become another facility's feedstock
Design for Environment
•Reduce materials, energy and toxicity
•Enhance recyclability and product life
•Maximize renewables use
Policy approaches
•Extended product responsibility
•Environmental certification
•Product to services
•Risk analysis

Government perspective

Environmental assessment of system choices:

Optimization of waste management systems

-Recycling of materials?

-Paper (should it be burned?)

-Glass (recycling worth the effort?)

-Organic waste (incineration, composting, gasification?)

-…

Energy systems (e.g. Biofuels)

Packaging systems (bottle or cans for beer packaging?)

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Industry perspective

Product development

-Identification of hot spots

-Integration of environmental considerations

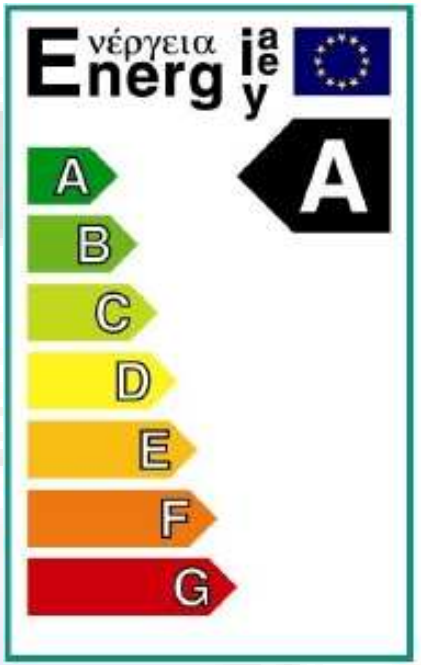
Marketing

-ecolabels

-environmental declarations, documentation

Environmental management system

-LC perspective in management



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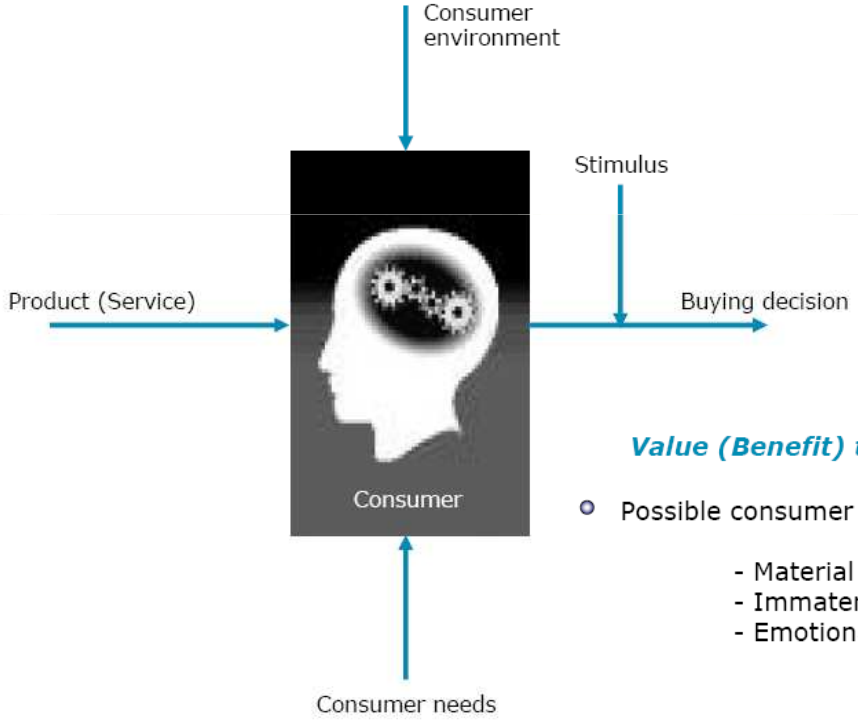
Citizen perspective

Green consumer behavior

-What is the environmental impact of the product?

-Which product has the lowest impact?

-Which solution has the lowest impact? Dishwashing by hand or by dishwasher?



***Value (Benefit) to the consumer** is the key.*

- Possible consumer benefits from ecoproducts:

  - Material benefit : lower Price, lower cost of ownership
  - Immaterial: convenience, fun
  - Emotional: feel good, quality of life, less fear.

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BACKGROUND

> Companies face new challenges and have to cope with new challenges, risks, uncertainties, and changes concerning:
  - > globalized market conditions,
  - > Social and legal framework,
  - > new technologies and
  - > different and changing requirements during the product life cycle.

> The consideration and integration of economic, ecological, and social requirements, the development of innovative products and services, and the comprehensive usage of available knowledge are core factors for business success and sustainable development.

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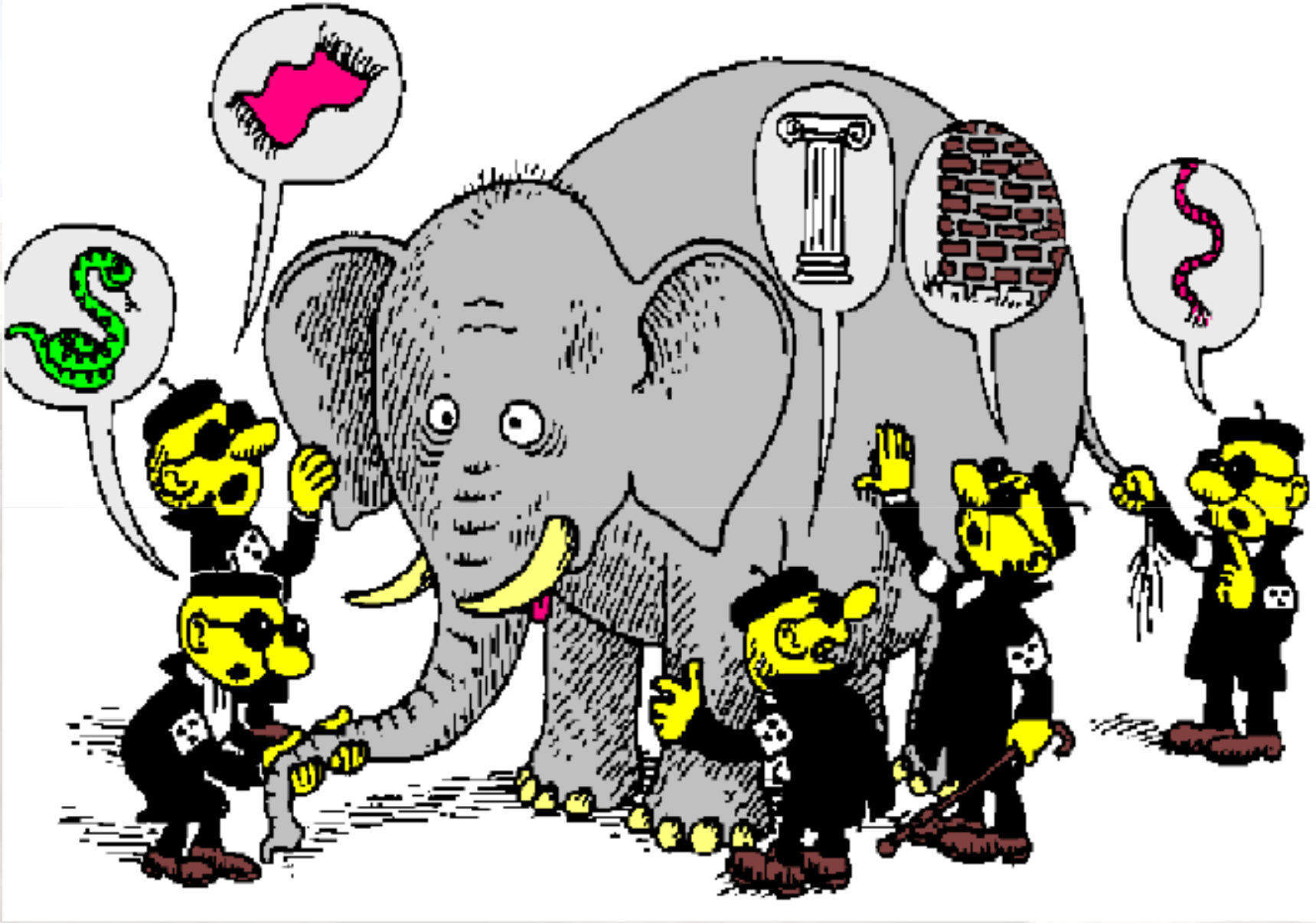

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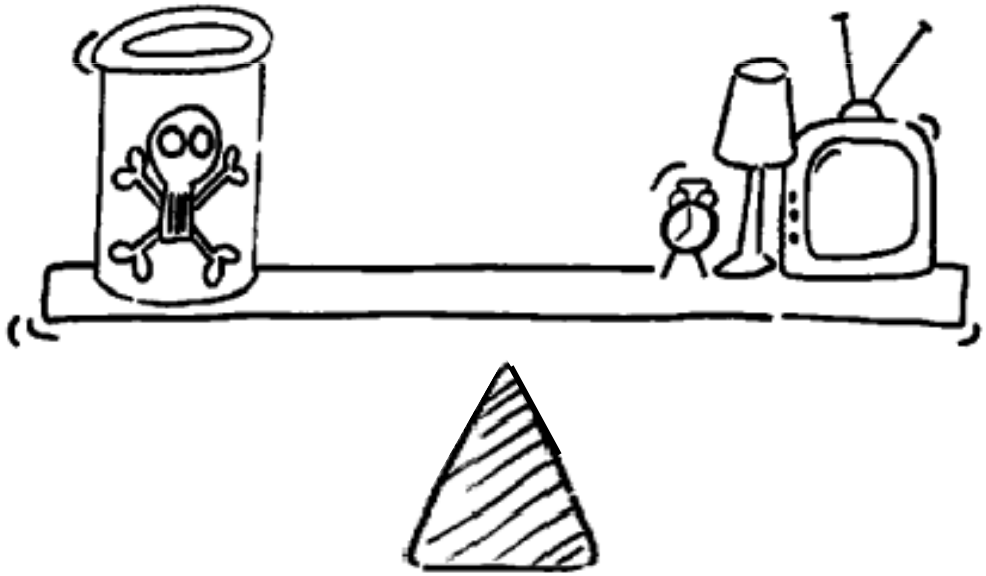
ECODESIGN is:

"the integration of environmental aspects into the product development process, by balancing ecological and economic requirements during its whole lifecycle"



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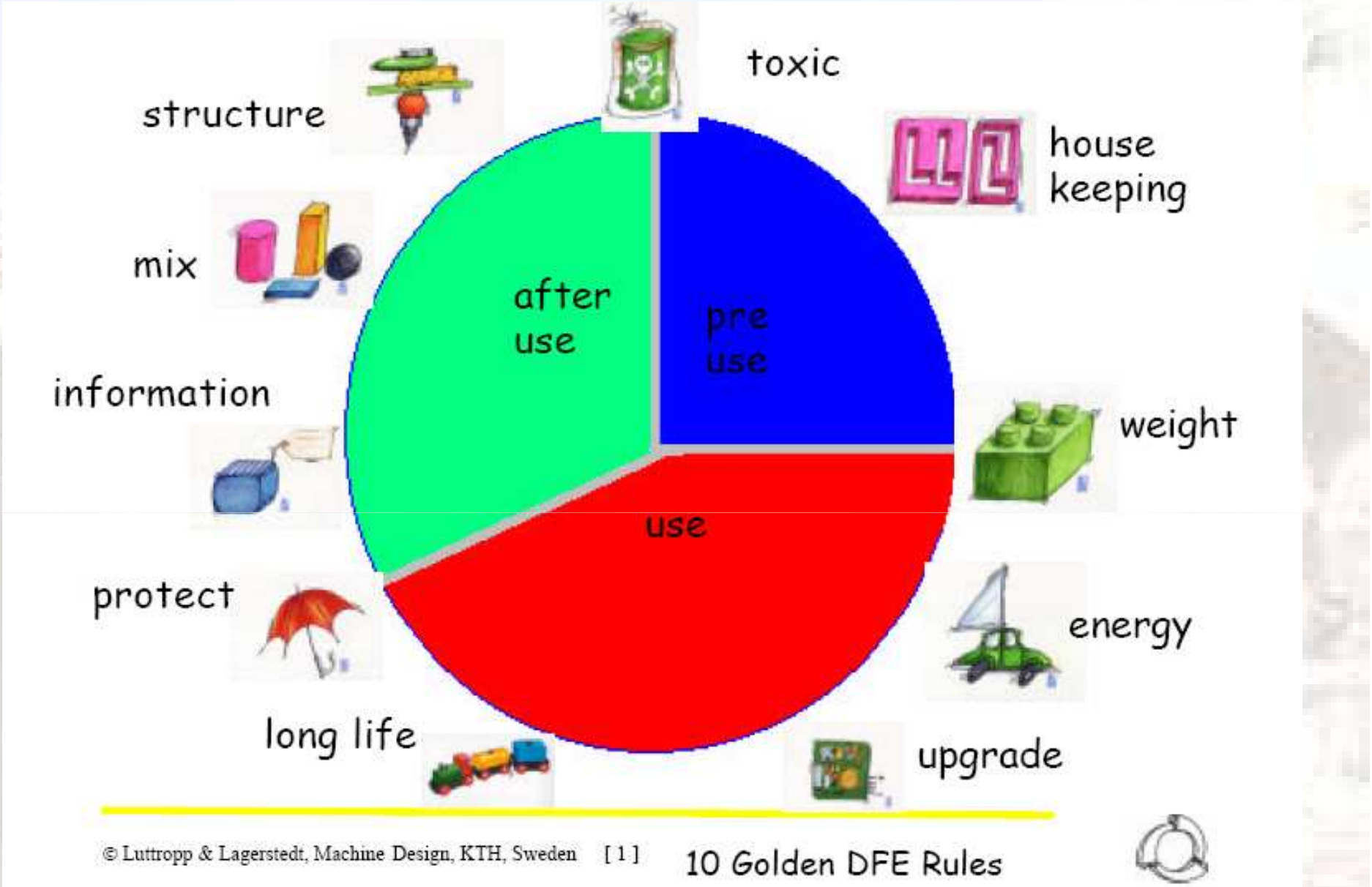

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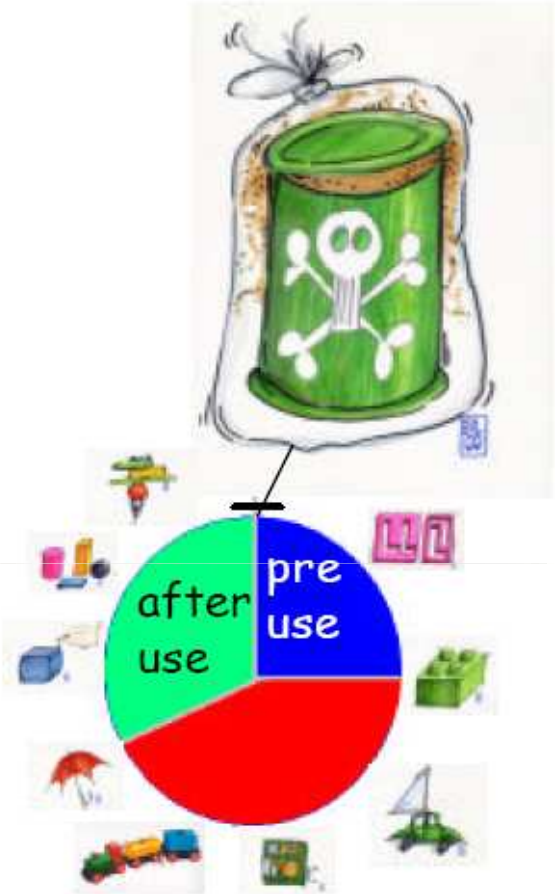

1

Don't use TOXIC substances and arrange closed loops for necessary but toxic ones.

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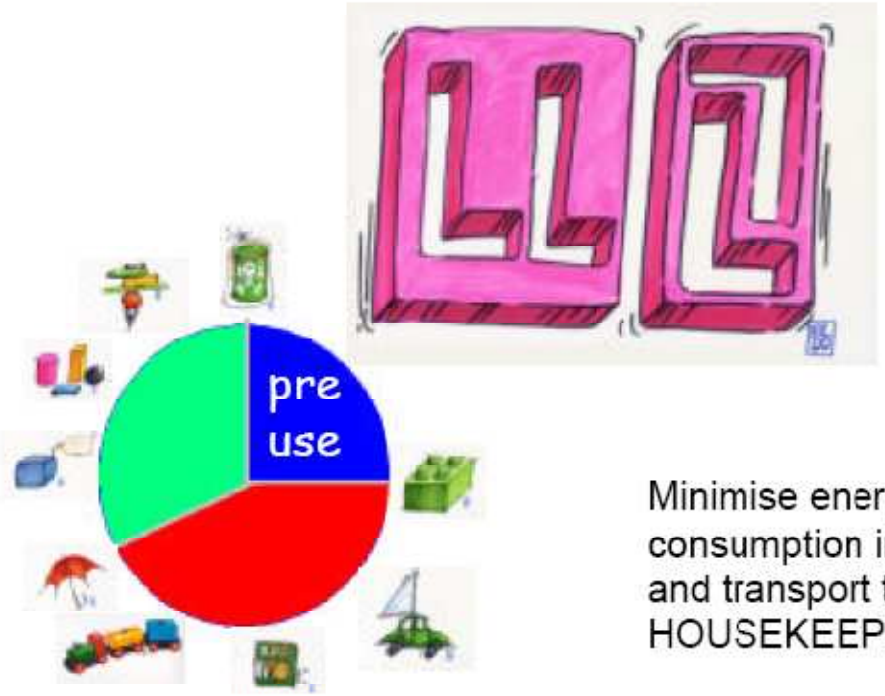

2

Minimise energy and resource consumption in production phase and transport through HOUSEKEEPING.

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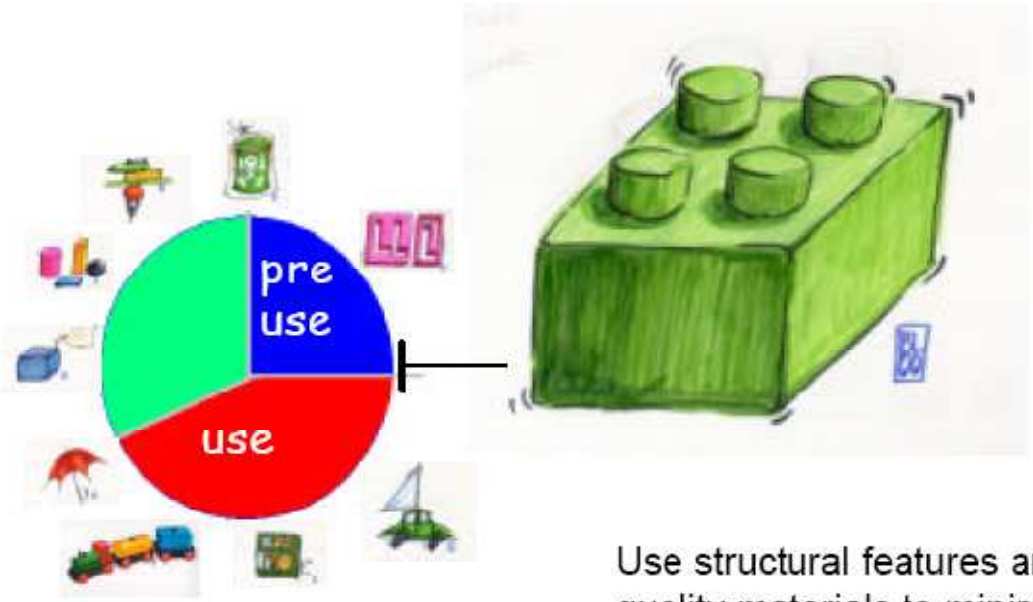

3

Use structural features and high quality materials to minimise WEIGHT ..in products…if not interfering with necessary flexibility, impact strength or functional priorities.

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MINIMISE energy and resource consumption in the usage phase, especially for products with most significant aspects in the usage phase.

4

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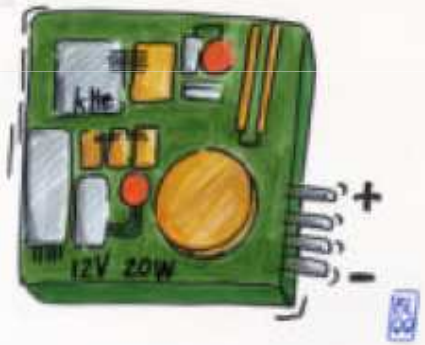
Promote repair and upgrading, especially for SYSTEM dependent products

5



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Promote LONG LIFE for products…..
especially for products with most significant environmental aspects OUT of usage phase.

6

 [12] 10 Golden DFE Rules

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Invest in better materials, surface treatments or structural arrangements to PROTECT products for dirt, corrosion and wear, giving long life and minimised maintenance.

7

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PREARRANGE upgrading, repair and recycling trough access ability, labelling, modules, breaking points, manuals.

8

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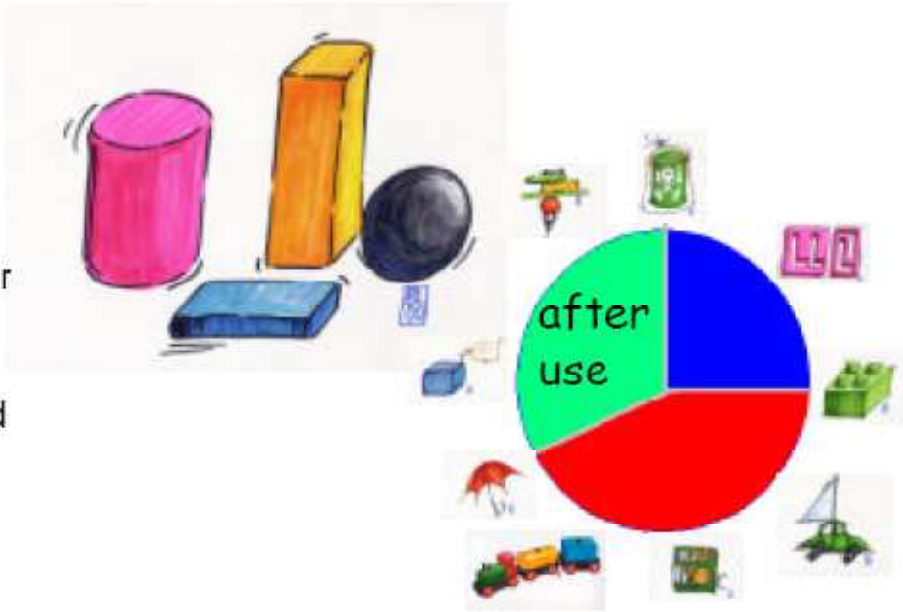
9

Promote upgrading, repair and recycling by using few, SIMPLE, recycled, not blended materials and no alloys.



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10

Use as FEW joining elements as possible and use screws, adhesives, welding, snap fits, geometric locking etc. according to the life cycle scenario.

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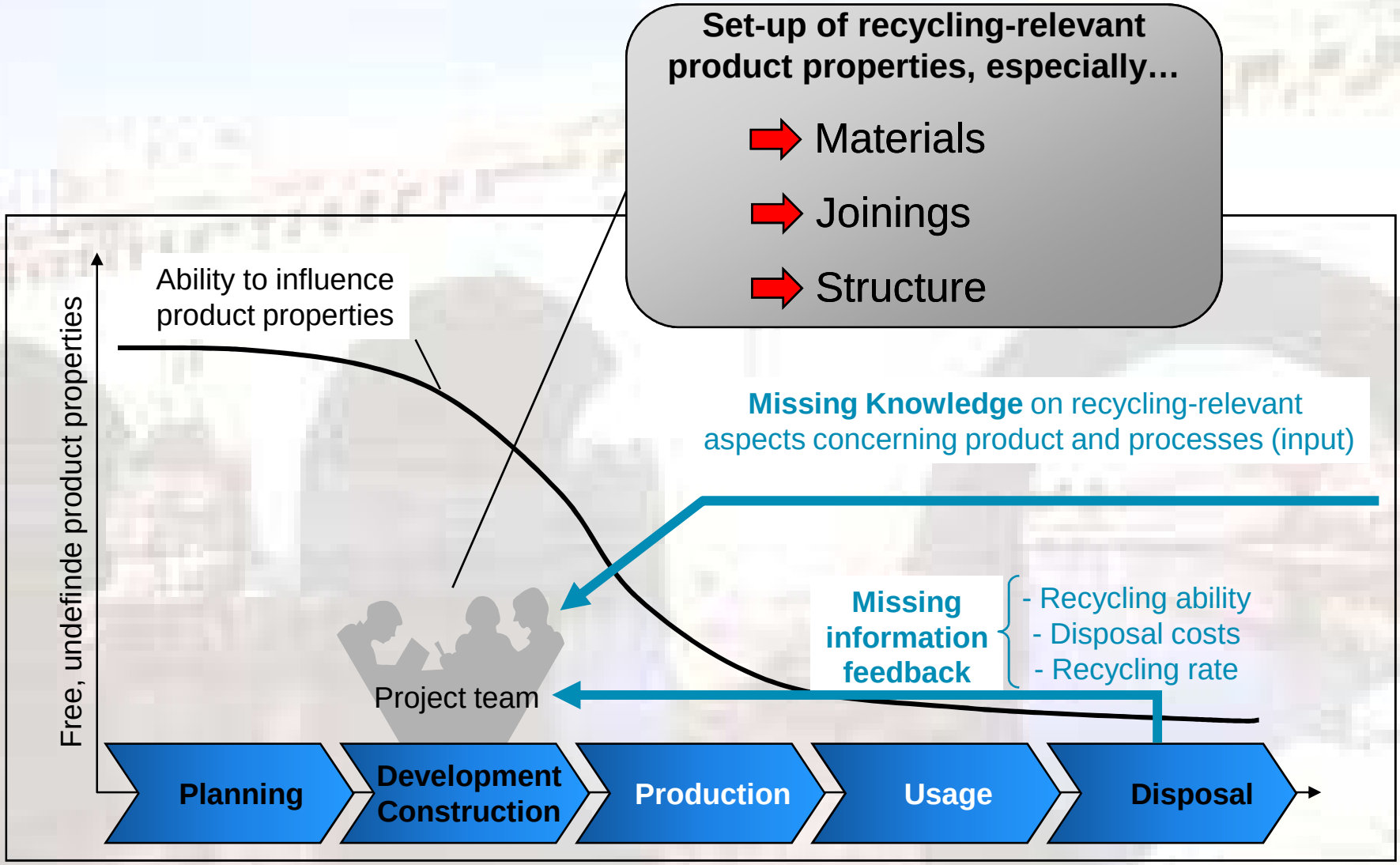

[source: Hesselbach, Kühn, 1998]

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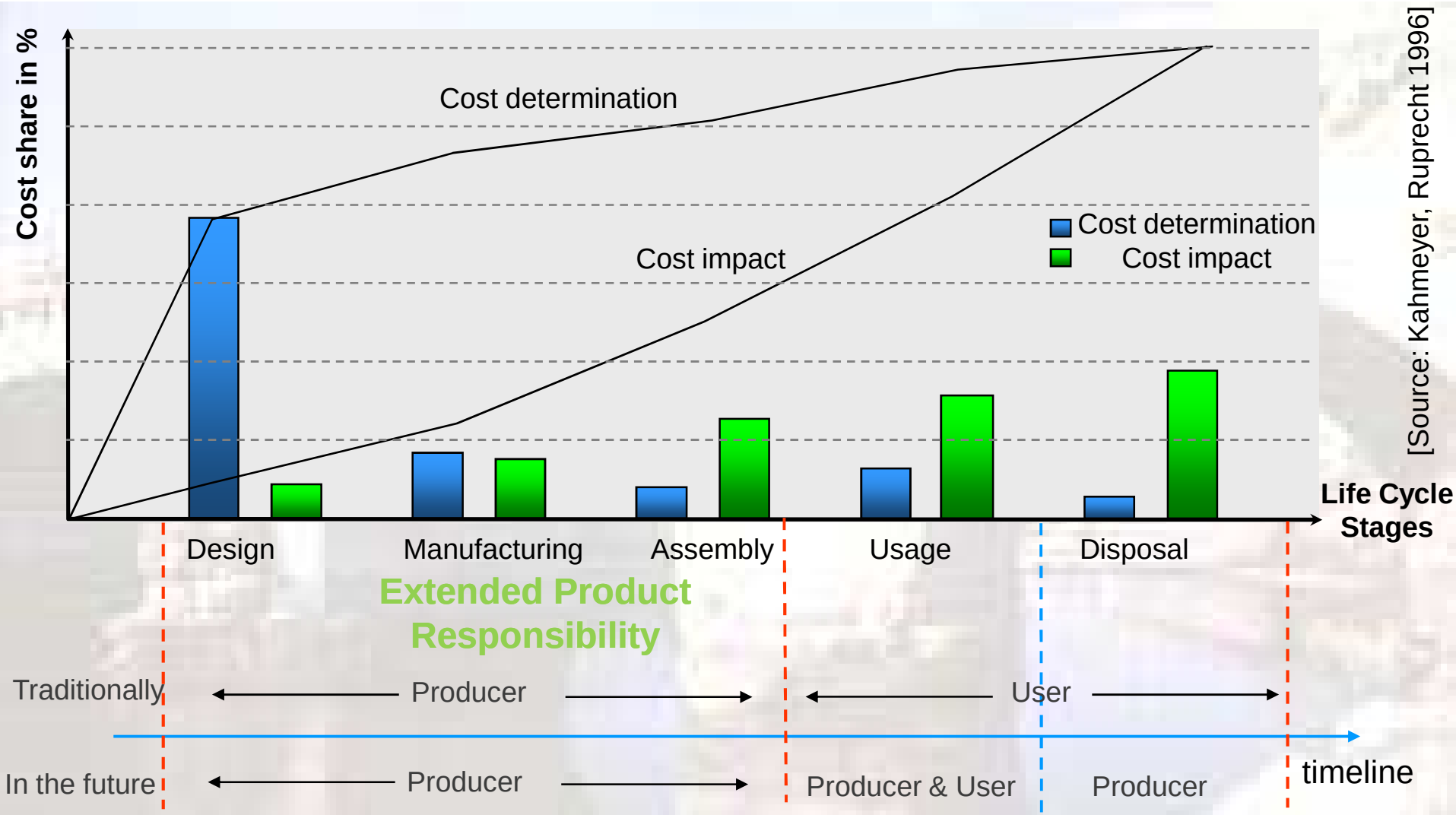

"The concept of Extended Product Responsibility (ERP) imposes to the manufacturers the responsibility for the environmental impact and performances of their product during its later life cycle stages [OECD]."

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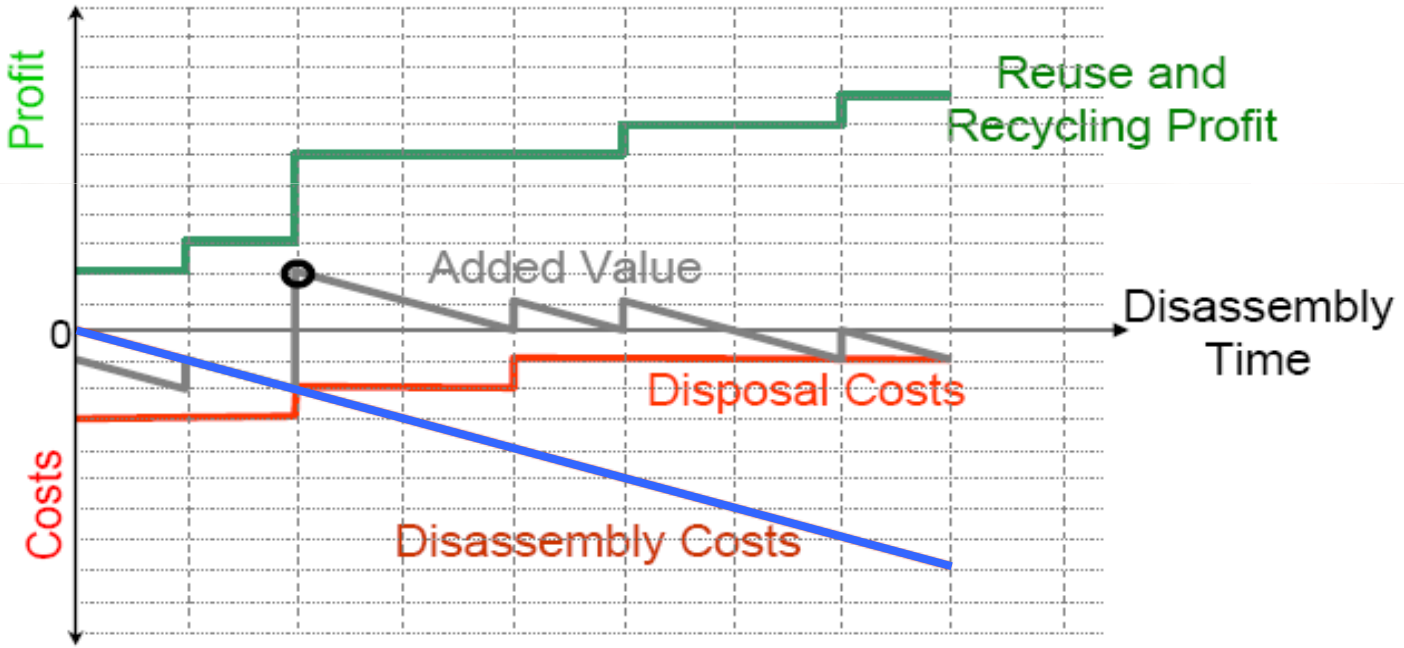
End-of-Life Cost $= C_{Disassembly} + C_{Disposal} - P_{Recycle}$

$C_{Disassembly}$ Labor cost for disassembling the component

$C_{Disposal}$ Cost for possible normal or hazardous wastes of the component

$P_{Recycle}$ Profit of reusing or recycling the component



[source: Meißner et al., 1999, mod.]

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KERP Research Elektronik & Umwelt

IWF

ProdTect Automotive

- an effective simulation tool
  - calculation of ISO 22628 performance during designing phase
  - cost effective simulation of various models
  - gives clear indications for improvement
- fully integrated into virtual product design
- substitutes physical dismantling of prototypes
  - for parts
  - for the model

www.prodtect.com

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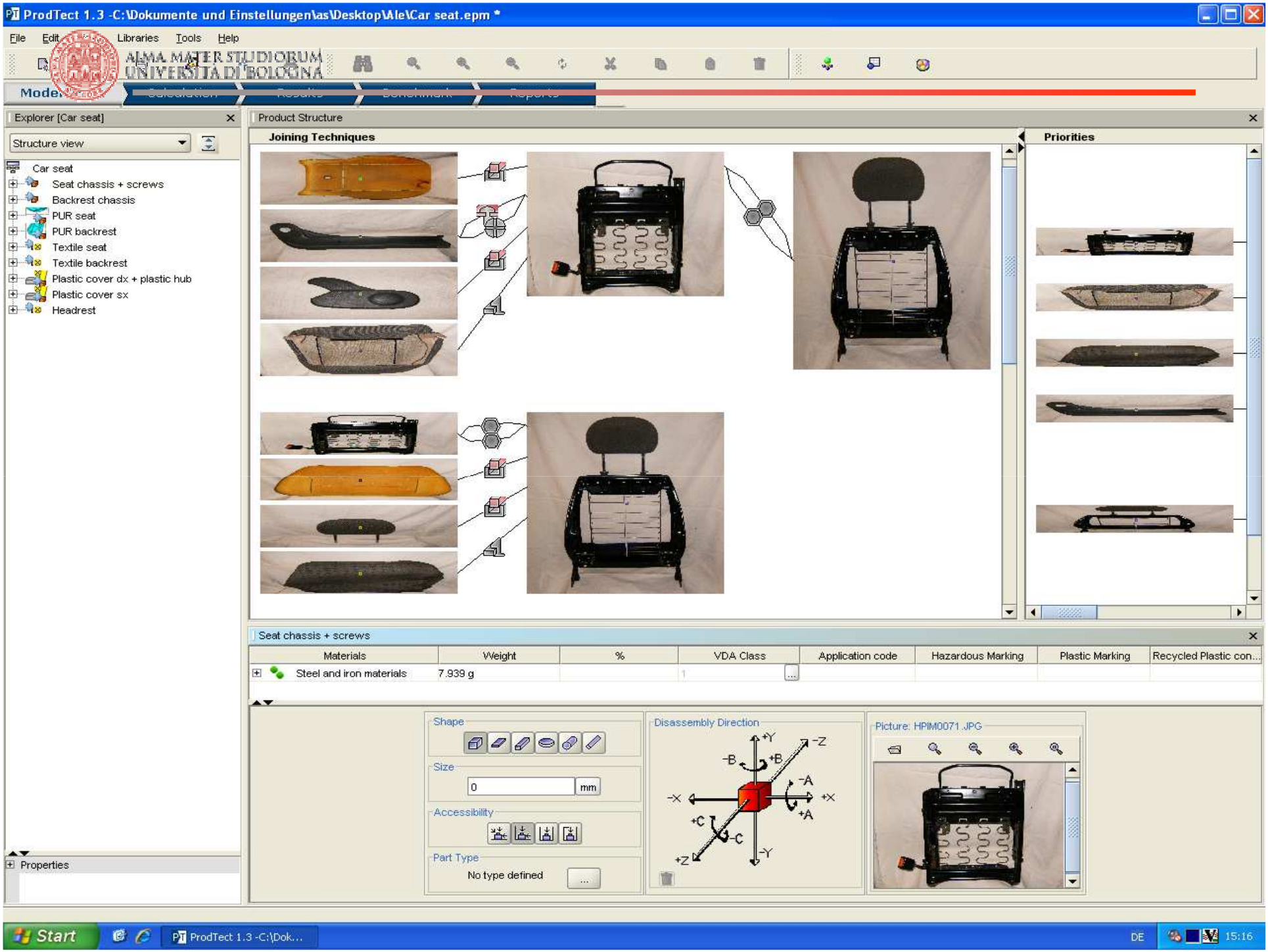
ProdTect 1.3 -C:\Dokumente und Einstellungen\as\Desktop\Ale\Car seat.epm *
File
Edit
Libraries
Tools
Help
ALMA MATER STUDIORUM
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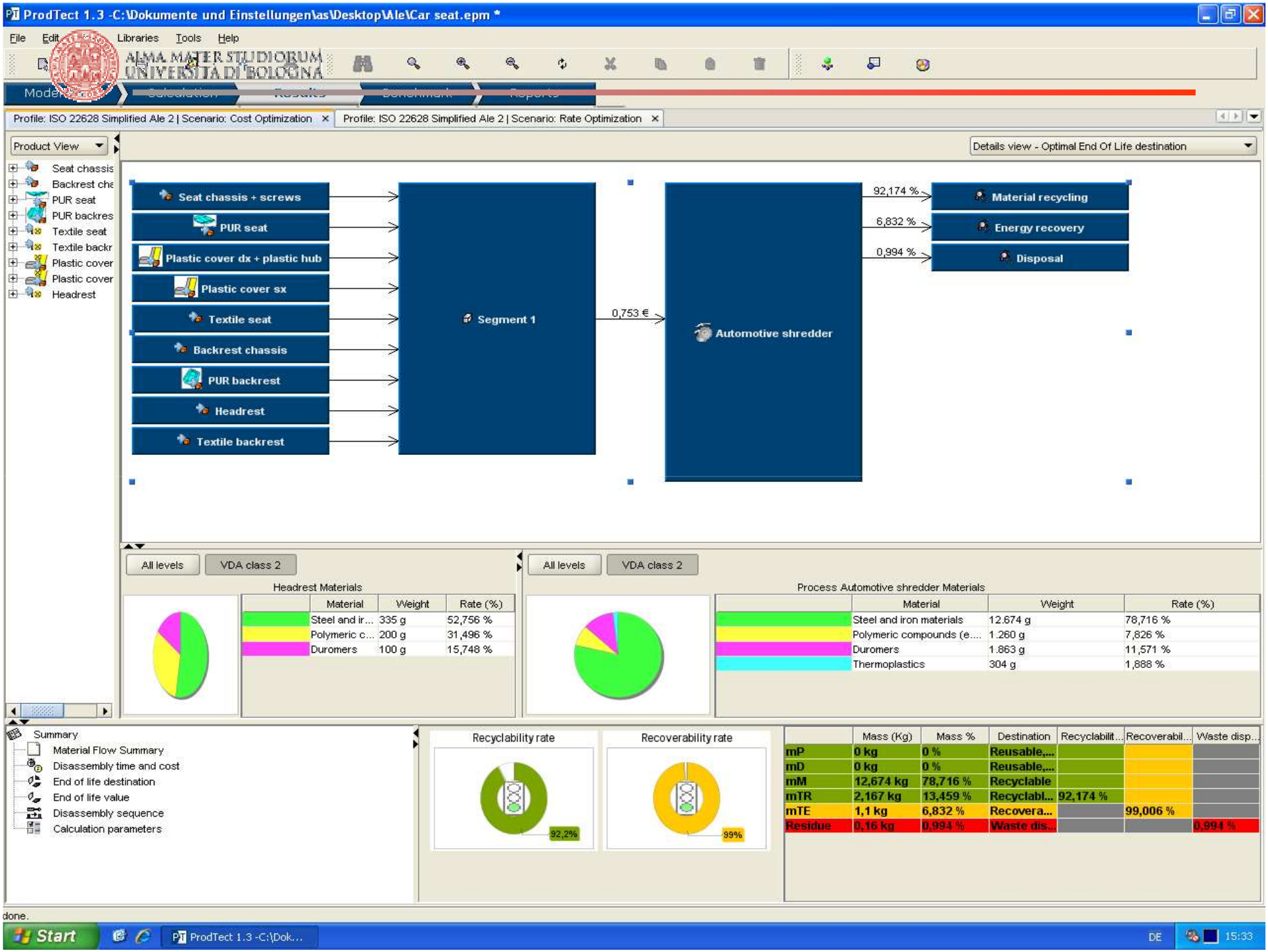
Explorer [Car seat]
Structure view
Car seat
Seat chassis + screws
Backrest chassis
PUR seat
PUR backrest
Textile seat
Textile backrest
Plastic cover dx + plastic hub
Plastic cover sx
Headrest
Properties
Product Structure
Joining Techniques
Priorities
Seat chassis + screws
Materials
Weight
%
VDA Class
Application code
Hazardous Marking
Plastic Marking
Recycled Plastic con...
Steel and iron materials
7.939 g
Shape
Size
0
mm
Accessibility
Part Type
No type defined
Disassembly Direction
+Y
-Z
-B
+B
-A
-X
+X
+A
+C
-C
+Z
-Y
Picture: HPIM0071.JPG
Start
ProdTect 1.3 -C:\Dok...
DE
15:16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File
Edit
Libraries
Tools
Help
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Profile: ISO 22628 Simplified Ale 2 | Scenario: Cost Optimization
Profile: ISO 22628 Simplified Ale 2 | Scenario: Rate Optimization
Product View
Seat chassis
Backrest che
PUR seat
PUR backres
Textile seat
Textile backr
Plastic cover
Plastic cover
Headrest
Details view - Optimal End Of Life destination
Seat chassis + screws
PUR seat
Plastic cover dx + plastic hub
Plastic cover sx
Textile seat
Backrest chassis
PUR backrest
Headrest
Textile backrest
Segment 1
0,753 €
Automotive shredder
92,174 %
6,832 %
0,994 %
Material recycling
Energy recovery
Disposal
All levels
VDA class 2
Headrest Materials
Material
Weight
Rate (%)
Steel and ir...
335 g
52,756 %
Polymeric c...
200 g
31,496 %
Duromers
100 g
15,748 %
All levels
VDA class 2
Process Automotive shredder Materials
Material
Weight
Rate (%)
Steel and iron materials
12.674 g
78,716 %
Polymeric compounds (e....
1.260 g
7,826 %
Duromers
1.863 g
11,571 %
Thermoplastics
304 g
1,888 %
Summary
Material Flow Summary
Disassembly time and cost
End of life destination
End of life value
Disassembly sequence
Calculation parameters
Recyclability rate
92,2%
Recoverability rate
99%
Mass (Kg)
Mass %
Destination
Recyclabilit...
Recoverabil...
Waste disp...
mP
0 kg
0 %
Reusable,...
mD
0 kg
0 %
Reusable,...
mM
12,674 kg
78,716 %
Recyclable
mTR
2,167 kg
13,459 %
Recyclabl...
92,174 %
mTE
1,1 kg
6,832 %
Recovera...
99,006 %
Residue
0,16 kg
0,994 %
Waste dis...
0,994 %
done.
Start
ProdTect 1.3 -C:\Dok...
DE
15:33

ProdTect 1.3 -C:\Dokumente und Einstellungen\as\Desktop\Ale\Car seat.epm *

File Edit

Mode

Profile: IS

Disassembly time

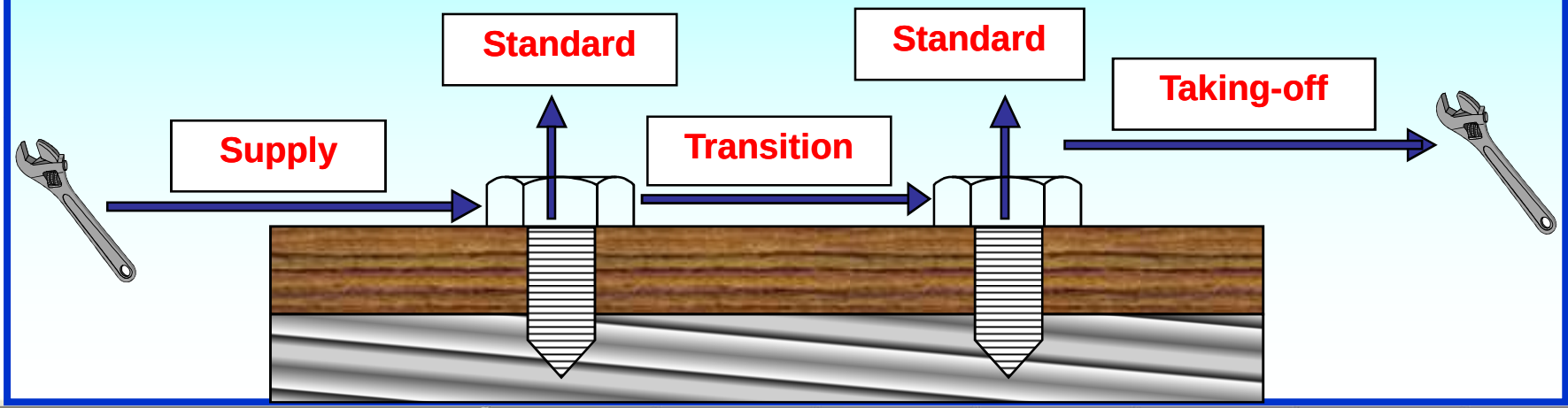
$$= T_{Supply} + T_{Standard} + T_{Transition} + T_{Taking\text{-}off}$$

T_{supply} Time required to take and position the tool

$T_{standard}$ Time required to disassemble a joining element

$T_{Transition}$ Time required to get to the next joining element

$T_{Taking\text{-}off}$ Time required to put the tool and part away



Summary
- Material Flow Summary
- Disassembly time and cost
- End of life destination
- End of life value
- Disassembly sequence
- Calculation parameters

From part	To part	Joining	Tool	Disassembly time	Cumulated disassembl...	Resulting segment(s)
Seat chassis + scre...	Backrest chassis	Hexagon head s...	Screw-breaker f...	12,38 s	12,38 s	
		Hexagon head s...	Screw-breaker f...	12,685 s	25,066 s	
Textile backrest	PUR backrest	Distort	Diagonal cutting ...	21,852 s	46,918 s	
Textile backrest	Backrest chassis	Form A	Chisel & hammer	11,916 s	58,834 s	Segment 7
Plastic cover sx	Seat chassis + scre...	Insert	Without tool	2,52 s	61,354 s	Segment 8
Headrest	Backrest chassis	Insert	Without tool	2,52 s	63,874 s	Segment 9
PUR backrest	Backrest chassis	Insert	Without tool	2,52 s	66,394 s	Segment 2; Segm...
Plastic cover dx + pl...	Seat chassis + scre...	Pivot riveted con...	Bolt cutter	6,012 s	72,406 s	Segment 5
		Phillips screw	Screw-breaker f...	8,802 s	81,208 s	
Textile seat	PUR seat	Distort	Diagonal cutting ...	84,852 s	166,06 s	
Textile seat	Seat chassis + scre...	Form A	Chisel & hammer	15,084 s	181,144 s	Segment 6
PUR seat	Seat chassis + scre...	Insert	Without tool	2,52 s	183,664 s	Segment 1; Segm...

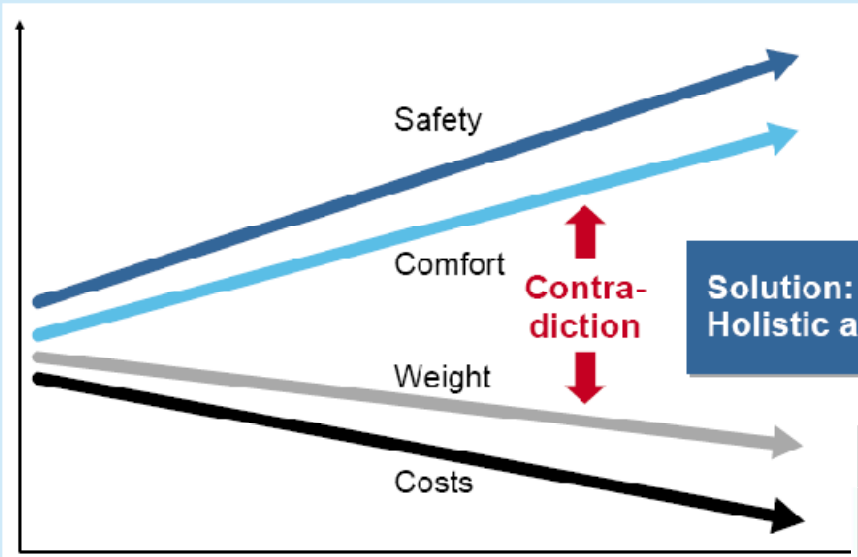
done.

Start ProdTect 1.3 -C:\Dok... DE 09:55

Tomorrow's car seat: Requirements

BASF Plastics key to your success

BASF The Chemical Company



Solution: Holistic approach

Tomorrow's car seat: BASF's seat-related products

BASF Plastics key to your success

BASF The Chemical Company

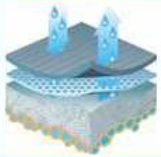
Leather and fabric finish
Lurapret®
Lugafast®
Steron®

Structures
Ultramid®
Terluran®
Backrest
Seat shell

Lumbar support

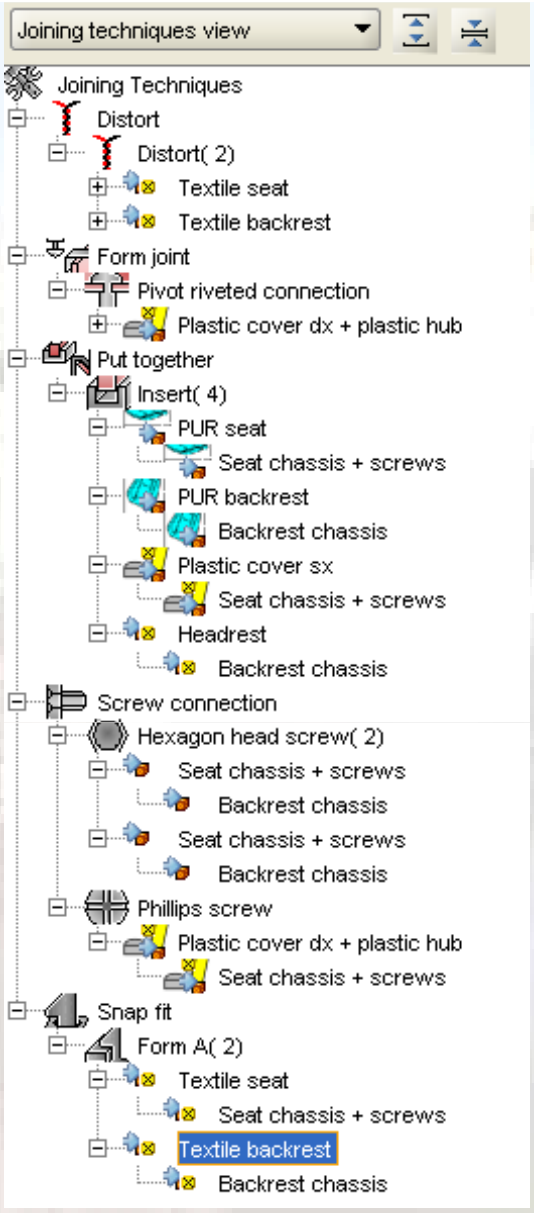
Covers
Elastollan®
Terblend® N

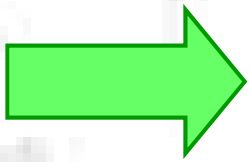
Foams
Elastoflex®
Neopolen® P

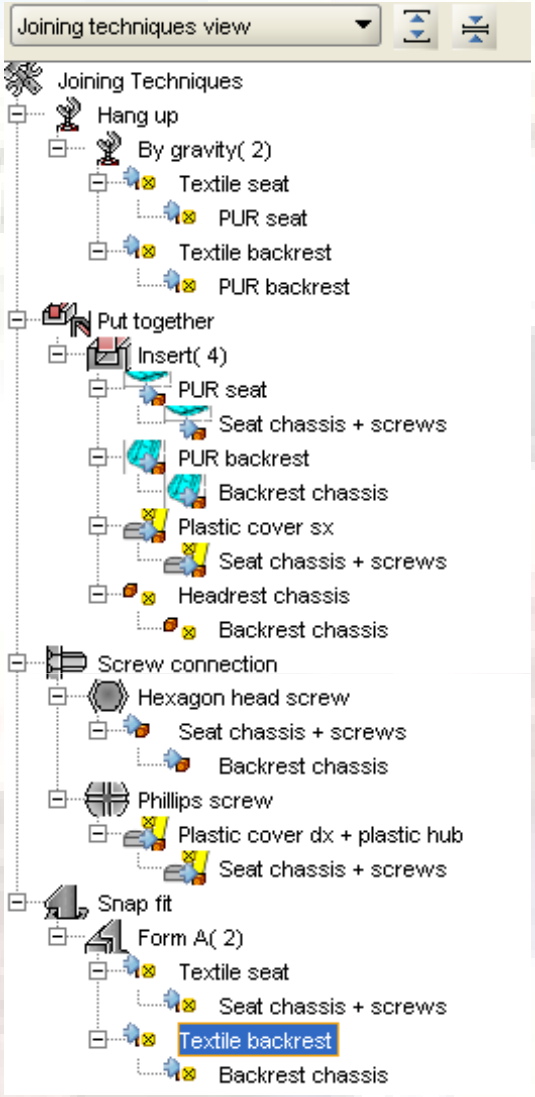


Humidity control
Luquafleece®
Super-absorber

Functional parts
Ultraform®
Belt lock







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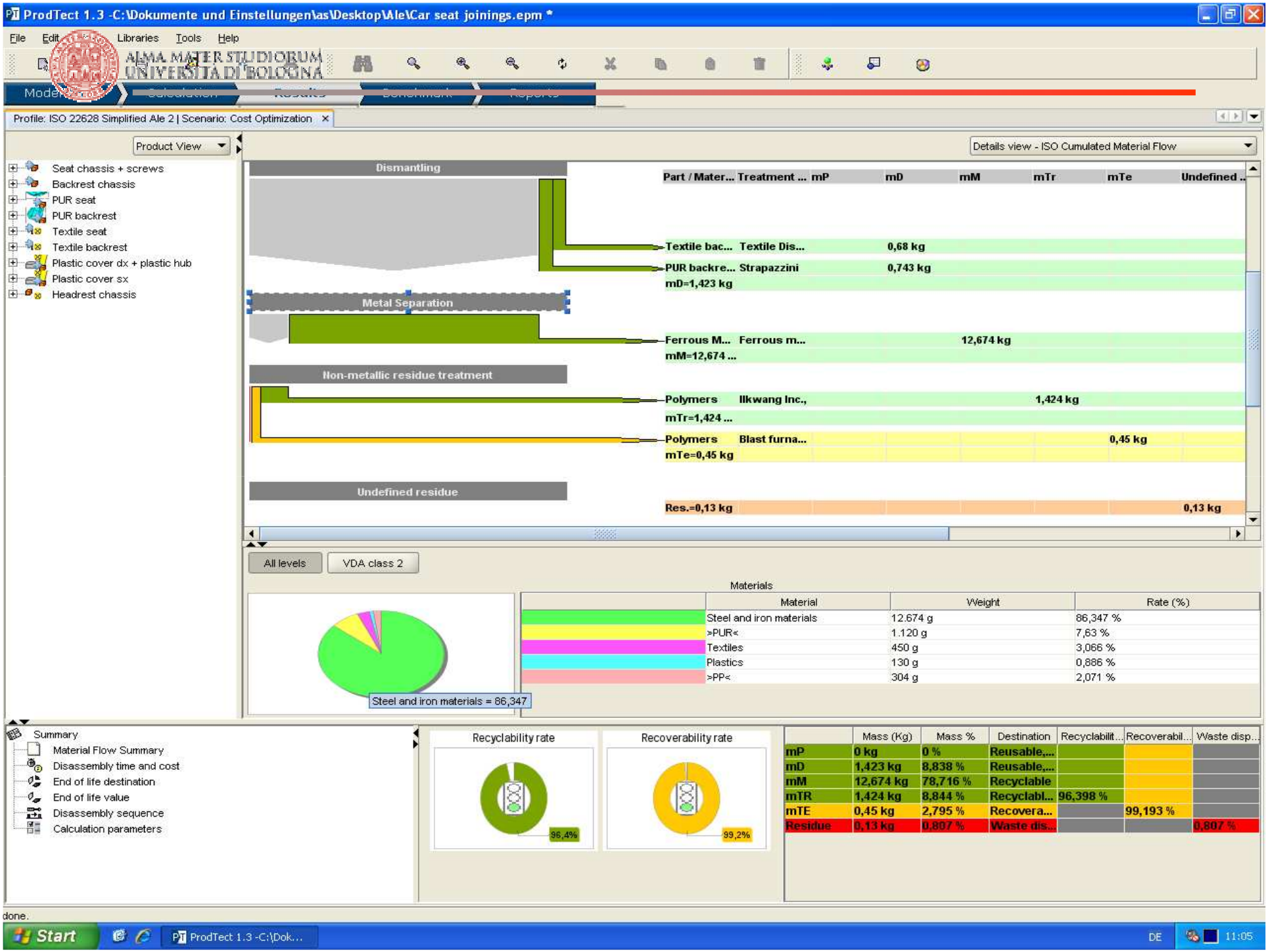
ProdTect 1.3 -C:\Dokumente und Einstellungen\as\Desktop\Ale\Car seat joinings.epm *
File
Edit
Libraries
Tools
Help
ALMA MATER STUDIORUM
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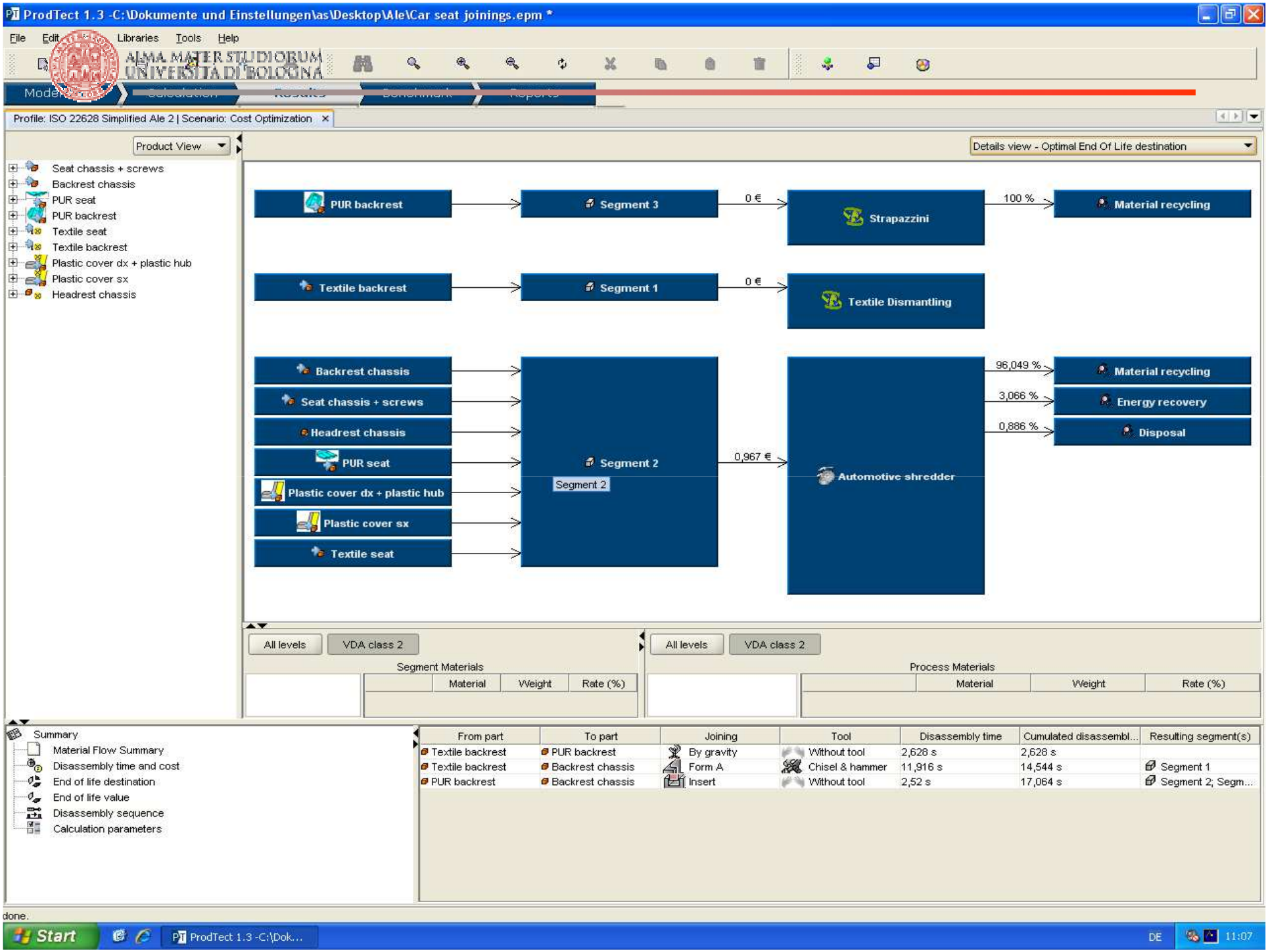
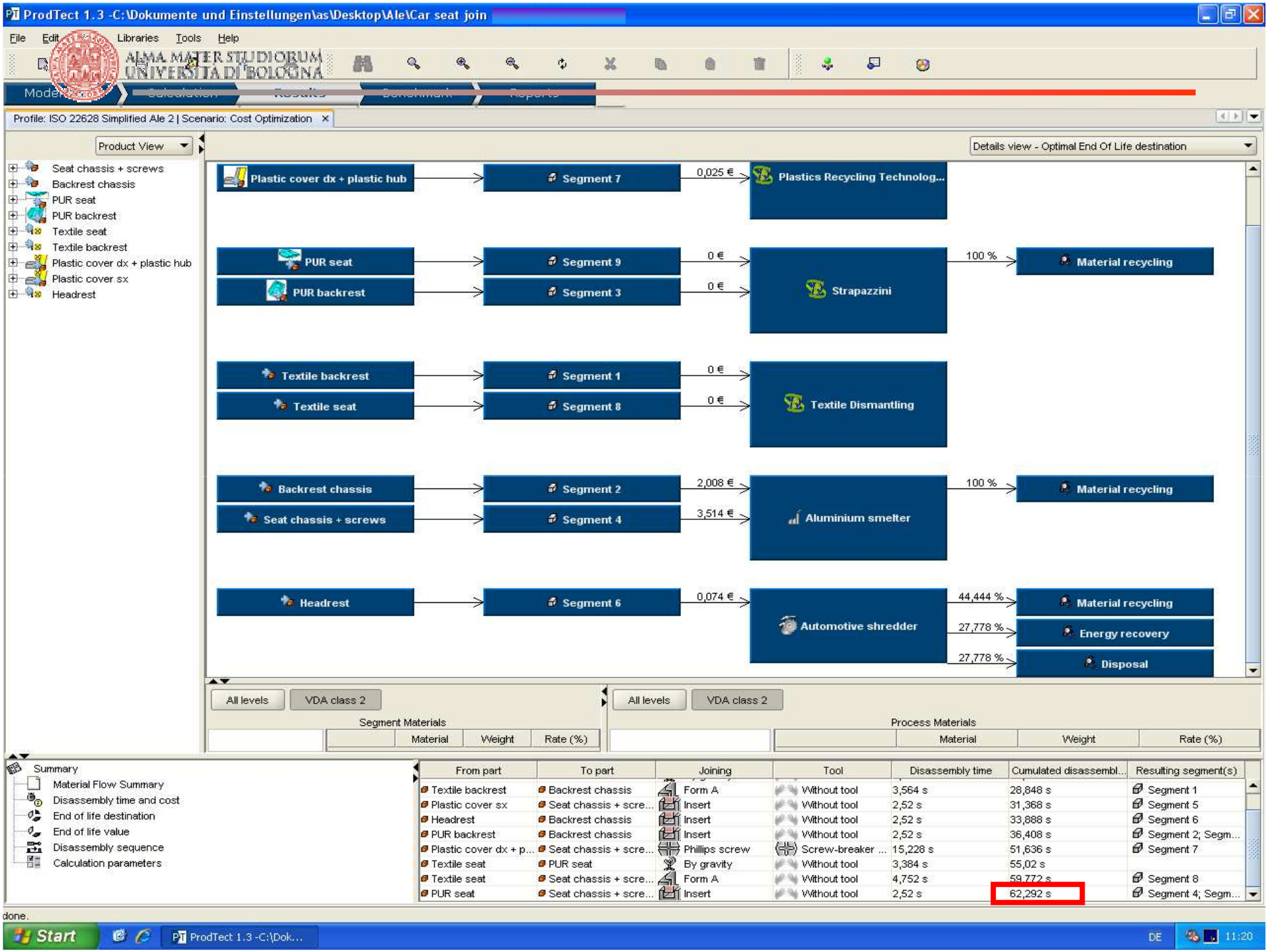
Profile: ISO 22628 Simplified Ale 2 | Scenario: Cost Optimization
Product View
Seat chassis + screws
Backrest chassis
PUR seat
PUR backrest
Textile seat
Textile backrest
Plastic cover dx + plastic hub
Plastic cover sx
Headrest chassis
Details view - ISO Cumulated Material Flow
Dismantling
Part / Mater...
Treatment ...
mP
mD
mM
mTr
mTe
Undefined ...
Textile bac...
Textile Dis...
0,68 kg
PUR backre...
Strapazzini
0,743 kg
mD=1,423 kg
Metal Separation
Ferrous M...
Ferrous m...
12,674 kg
mM=12,674 ...
Non-metallic residue treatment
Polymers
Ilkwang Inc.,
1,424 kg
mTr=1,424 ...
Polymers
Blast furna...
0,45 kg
mTe=0,45 kg
Undefined residue
Res.=0,13 kg
0,13 kg
All levels
VDA class 2
Materials
Material
Weight
Rate (%)
Steel and iron materials
12.674 g
86,347 %
>PUR<
1.120 g
7,63 %
Textiles
450 g
3,066 %
Plastics
130 g
0,886 %
>PP<
304 g
2,071 %
Steel and iron materials = 86,347
Summary
Material Flow Summary
Disassembly time and cost
End of life destination
End of life value
Disassembly sequence
Calculation parameters
Recyclability rate
96,4%
Recoverability rate
99,2%
Mass (Kg)
Mass %
Destination
Recyclabilit...
Recoverabil...
Waste disp...
mP
0 kg
0 %
Reusable,...
mD
1,423 kg
8,838 %
Reusable,...
mM
12,674 kg
78,716 %
Recyclable
mTR
1,424 kg
8,844 %
Recyclabl...
96,398 %
mTE
0,45 kg
2,795 %
Recovera...
99,193 %
Residue
0,13 kg
0,807 %
Waste dis...
0,807 %
done.
Start
ProdTect 1.3 -C:\Dok...
DE
11:05


ProdTect 1.3 -C:\Dokumente und Einstellungen\as\Desktop\Ale\Car seat joinings.epm *
File
Edit
Libraries
Tools
Help
ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA
Profile: ISO 22628 Simplified Ale 2 | Scenario: Cost Optimization
Product View
Seat chassis + screws
Backrest chassis
PUR seat
PUR backrest
Textile seat
Textile backrest
Plastic cover dx + plastic hub
Plastic cover sx
Headrest chassis
Details view - Optimal End Of Life destination
PUR backrest
Segment 3
0 €
Strapazzini
100 %
Material recycling
Textile backrest
Segment 1
0 €
Textile Dismantling
Backrest chassis
Seat chassis + screws
Headrest chassis
PUR seat
Plastic cover dx + plastic hub
Plastic cover sx
Textile seat
Segment 2
Segment 2
0,967 €
Automotive shredder
96,049 %
Material recycling
3,066 %
Energy recovery
0,886 %
Disposal
All levels
VDA class 2
Segment Materials
Material
Weight
Rate (%)
All levels
VDA class 2
Process Materials
Material
Weight
Rate (%)
Summary
Material Flow Summary
Disassembly time and cost
End of life destination
End of life value
Disassembly sequence
Calculation parameters
From part
To part
Joining
Tool
Disassembly time
Cumulated disassembl...
Resulting segment(s)
Textile backrest
PUR backrest
By gravity
Without tool
2,628 s
2,628 s
Textile backrest
Backrest chassis
Form A
Chisel & hammer
11,916 s
14,544 s
Segment 1
PUR backrest
Backrest chassis
Insert
Without tool
2,52 s
17,064 s
Segment 2; Segm...
done.
Start
ProdTect 1.3 -C:\Dok...
DE
11:07


ProdTect 1.3 -C:\Dokumente und Einstellungen\as\Desktop\Ale\Car seat join
File
Edit
Libraries
Tools
Help
ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA
Profile: ISO 22628 Simplified Ale 2 | Scenario: Cost Optimization
Product View
Seat chassis + screws
Backrest chassis
PUR seat
PUR backrest
Textile seat
Textile backrest
Plastic cover dx + plastic hub
Plastic cover sx
Headrest
Details view - Optimal End Of Life destination
Plastic cover dx + plastic hub
Segment 7
0,025 €
Plastics Recycling Technolog...
PUR seat
PUR backrest
Segment 9
Segment 3
0 €
0 €
Strapazzini
100 %
Material recycling
Textile backrest
Textile seat
Segment 1
Segment 8
0 €
0 €
Textile Dismantling
Backrest chassis
Seat chassis + screws
Segment 2
Segment 4
2,008 €
3,514 €
Aluminium smelter
100 %
Material recycling
Headrest
Segment 6
0,074 €
Automotive shredder
44,444 %
27,778 %
27,778 %
Material recycling
Energy recovery
Disposal
All levels
VDA class 2
Segment Materials
Material
Weight
Rate (%)
All levels
VDA class 2
Process Materials
Material
Weight
Rate (%)
Summary
Material Flow Summary
Disassembly time and cost
End of life destination
End of life value
Disassembly sequence
Calculation parameters
From part
To part
Joining
Tool
Disassembly time
Cumulated disassembl...
Resulting segment(s)
Textile backrest
Backrest chassis
Form A
Without tool
3,564 s
28,848 s
Segment 1
Plastic cover sx
Seat chassis + scre...
Insert
Without tool
2,52 s
31,368 s
Segment 5
Headrest
Backrest chassis
Insert
Without tool
2,52 s
33,888 s
Segment 6
PUR backrest
Backrest chassis
Insert
Without tool
2,52 s
36,408 s
Segment 2; Segm...
Plastic cover dx + p...
Seat chassis + scre...
Phillips screw
Screw-breaker ...
15,228 s
51,636 s
Segment 7
Textile seat
PUR seat
By gravity
Without tool
3,384 s
55,02 s
Textile seat
Seat chassis + scre...
Form A
Without tool
4,752 s
59,772 s
Segment 8
PUR seat
Seat chassis + scre...
Insert
Without tool
2,52 s
62,292 s
Segment 4; Segm...
done.
Start
ProdTect 1.3 -C:\Dok...
DE
11:20

Gli Ecodesigner possono contribuire a rallentare il degrado dell'ambiente più degli economisti, dei politici, delle imprese e anche degli ambientalisti (...). Una volta che un certo modello di progettazione più sano dal punto di vista ambientale penetra nel mercato, i suoi effetti benefici si moltiplicano".

Alastair Fuad Luke

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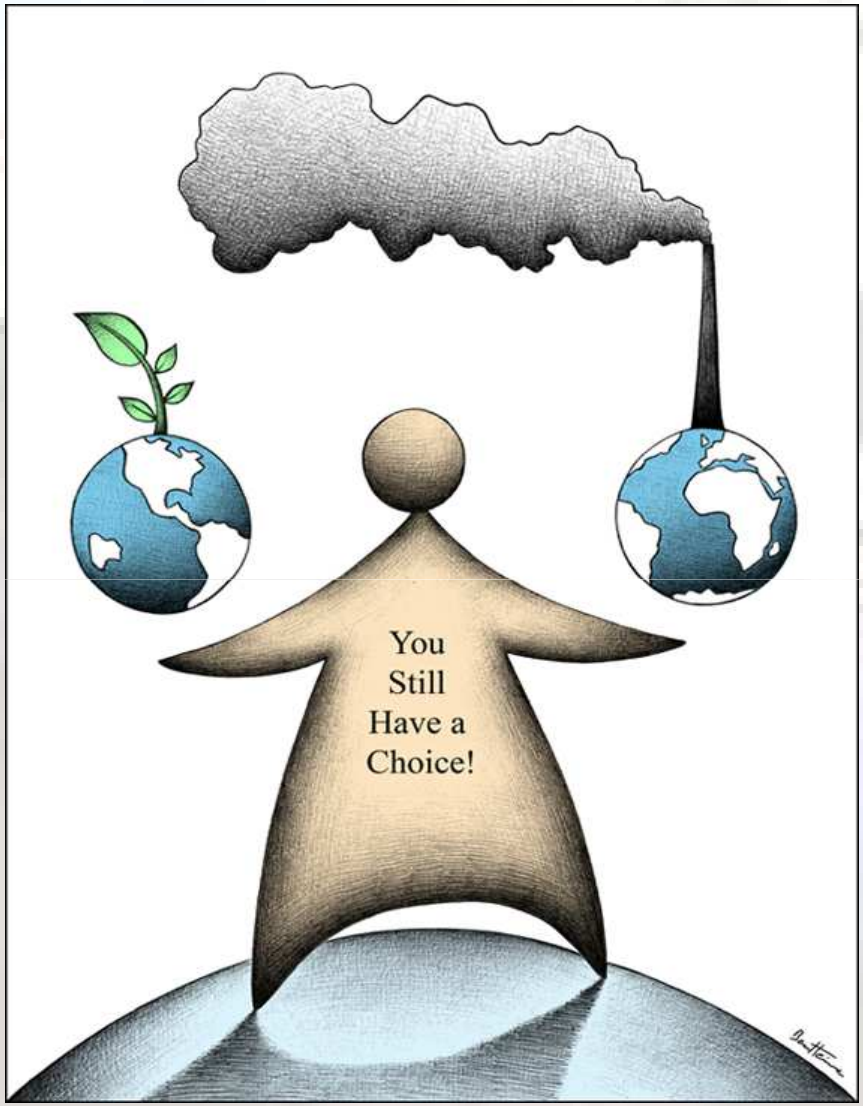
The end



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