Oslo School of Architecture and Design
Oslo / Norway / 2.2011

SYSTEM DESIGN FOR SUSTAINABILITY

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Learning Network on Sustainability

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CONTENTS

1. Design for sustainability: towards a system approach
2. Product-Service System: opportunities for sustainable innovations
3. System Design for Sustainability (LeNS approach)
4. MSDS Method for System Design for Sustainability
5. Sustainability Design-Orienting (SDO) toolkit
6. (stakeholder) System map
7. Projects and consultancies on System Design for Sustainability
8. Final remarks

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1. DESIGN FOR SUSTAINABILITY: TOWARDS A SYSTEM APPROACH

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1.a SUSTAINABLE DEVELOPMENT

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SUSTAINABILITY: SIZE OF CHANGE

IN 50 YEARS WORLD-WIDE EQUITABLE AND ENVIRONMENTALLY SUSTAINABLE SYSTEMS OF PRODUCTION AND CONSUMPTION SHOULD USE ~90% LESS RESOURCES THAN THE INDUSTRIALISED CONTEXTS ARE DOING TODAY

. 1993: Wuppertal institute,vari report
. 1993: WBCSD, Getting Eco-Efficient
....
. 2004: Meadows, Meadows, Randers, Behrens, Limits to Growth: The 30-Year Update
. 2007: IPCC, Climate change report
...

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SUSTAINABILITY: QUALITY OF CHANGE

RADICAL CHANGE (DISCONTINUITY)
PROMOTE (EVEN) SYSTEM INNOVATIONS
broader than product innovation, even infrastructural, organisational and socio-cultural innovations

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1.b SUSTAINABILITY: INCREASING (POTENTIAL) ROLE OF DESIGN

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APPROACHES TO SUSTAINABILITY

intervening after processes' damages

intervening on processes

intervening on products and services

intervening consumption patterns (SCP)

INCREASING (POTENTIAL) ROLE FOR DESIGN

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WHAT DO THE DESIGN COMMUNITY (IN GENERAL) KNOWS OF DESIGN FOR SUSTAINABILITY?

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cardboard seat

HOW MANY (IN THE DESIGN COMMUNITY)

WOULD THINK IT IS WITH A LOW ENVIRONMENTAL IMPACT?

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Savonarola seat

walnut-wood, so far
500 years life span

MADE WITHOUT ANY
CONCERN FOR THE ENVIRONMENT, BUT ...

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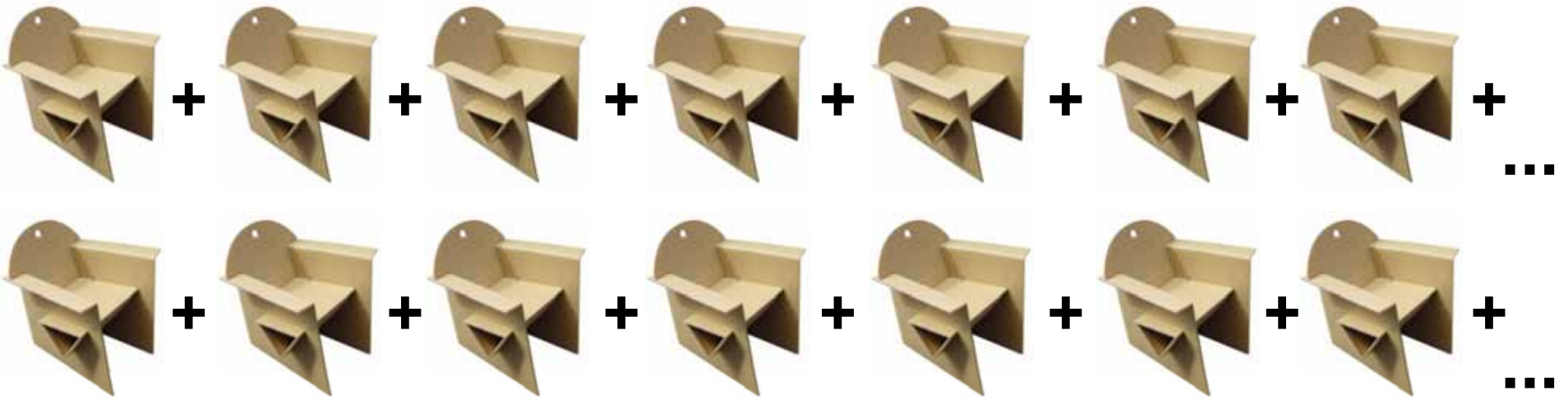

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time/function

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Chadwick , Stumpf
Aeron, Herman Miller

seat steel and plastics,
12 years warranty
even
in use commodatum

DESIGNED TODAY WITH A
RIGHT CONCERN FOR THE ENVIRONMENT

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pen,
biodegradable material
(from corn starch)

HOW MANY (IN THE DESIGN COMMUNITY) WOULD THINK IT IS WITH A LOW ENVIRONMENTAL IMPACT?

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Pen,
MONTBLANC

DESIGNED WITHOUT ANY CONCERN FOR THE ENVIRONMENT, BUT ...

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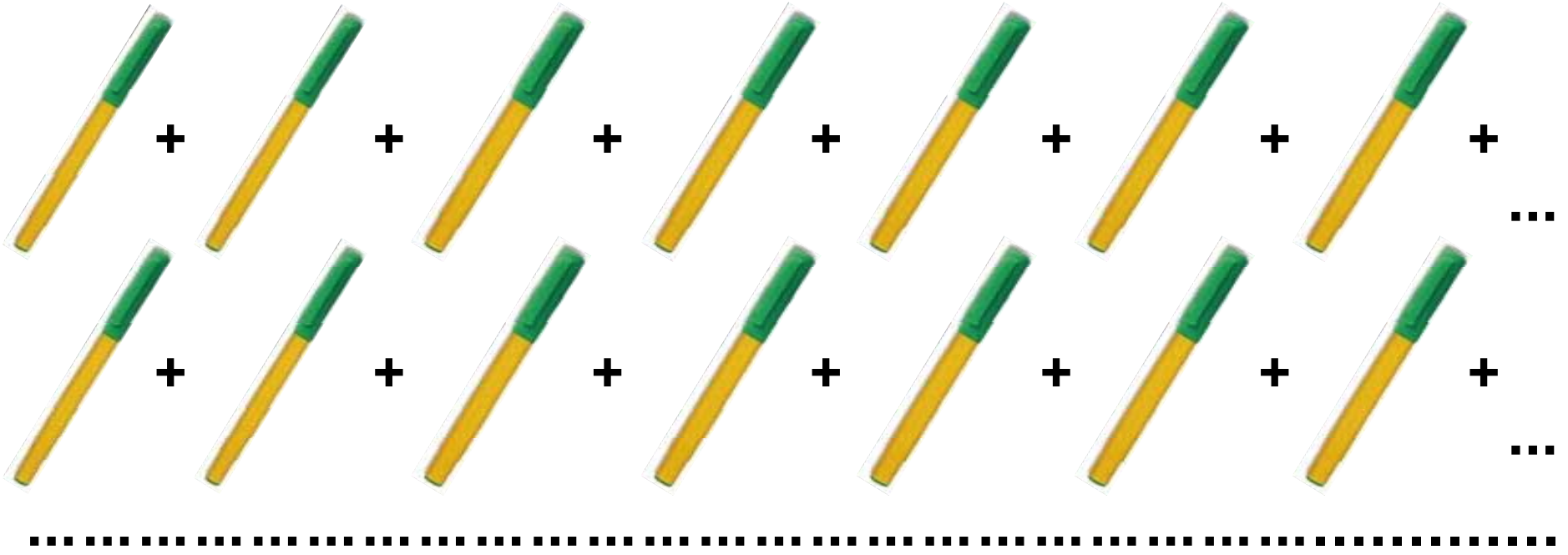

=

time/function

“Natural” materials

HOW MANY
(IN THE DESIGN COMMUNITY)
WOULD THINK THEY ARE
ALWAYS WITH A LOW
ENVIRONMENTAL IMPACT?

Asbestos (amianto) is a natural material!
(and one of the most cancerogenic!)

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how many persons within the design community would evalaute correctly the environmantal sustaianbility?

HOW MANY COULD CORRECTLY DESIGN FOR SUSTAINABILITY?

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THE TRUTH IS ...

... TODAY STILL FEW WHTIN THE DESIGN COMMUNITY ARE WELL “EQUIPPED” WITH A SOLID KNOWLEDGE-BASE AND KNOW-HOW (METHODS AND TOOLS) ON DESIGN FOR SUSTAINABILITY

... TODAY THE DESIGN COMMUNITY (AS A WHOLE) IS STILL MORE PART OF THE PROBLEM THEN PART OF THE SOLUTION!

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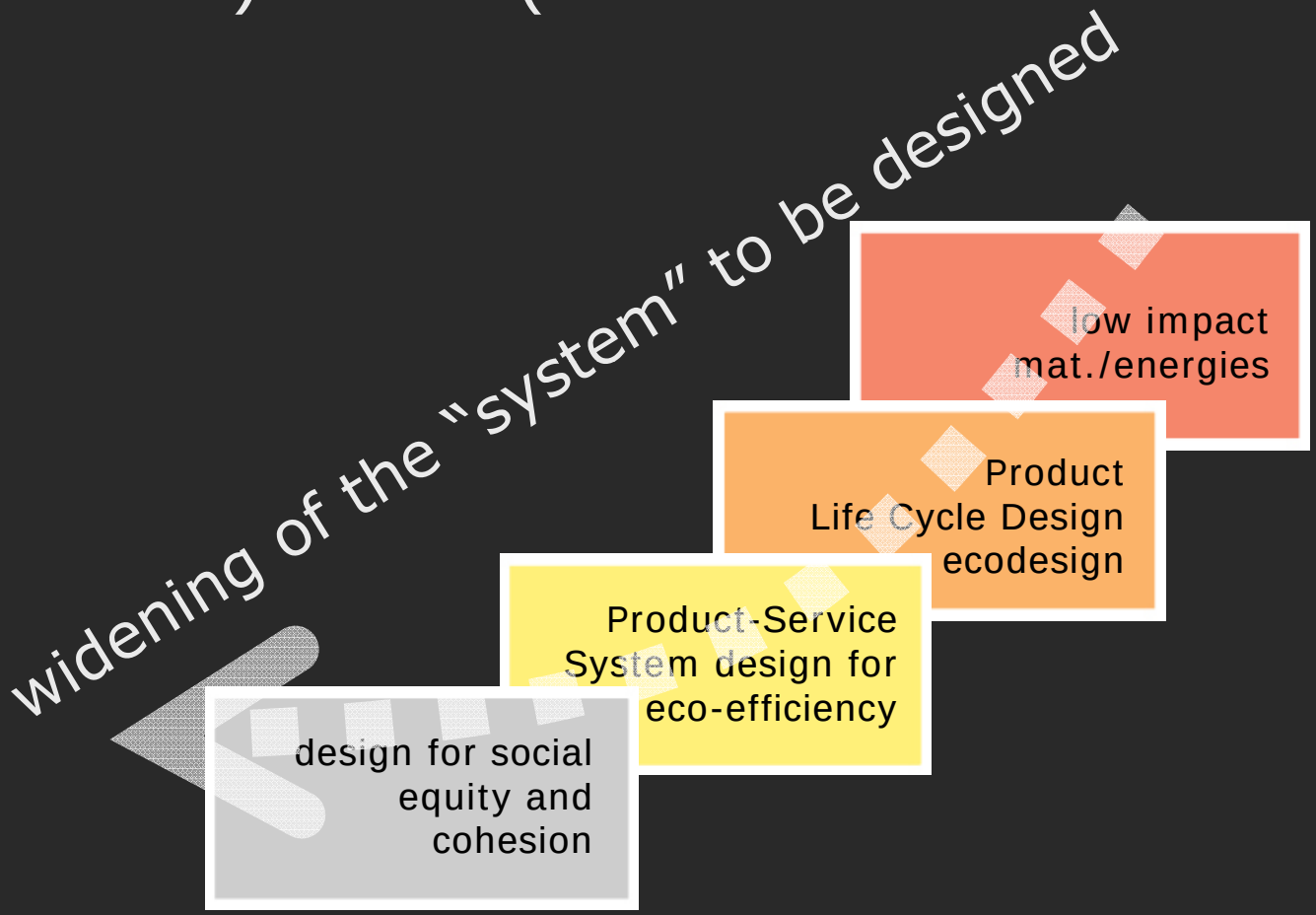
SUSTAINABILITY: EVOLUTION OF DESIGN (POTENTIAL) ROLE (industrialised contexts)



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2. PRODUCT-SERVICE SYSTEM: OPPORTUNITIES FOR SUSTAINABLE INNOVATIONS

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2.a ECO-EFFICIENT PRODUCT-SERVICE SYSTEM

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SOME EXAMPLES OF ECO-EFFICENT PRODUCT-SERVICE SYSTEM INNOVATIONS

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AMG: SOLAR HEAT SERVICE

methane + boiler > hot water

hot water itself is sold as an entire service (payment x litre); hot water is produced by sun energy + methane; service include: methane supply (not directly paid), equipments and meter (not owned) transportation, installation and maintenance.

the innovative interaction between the company and the user, make the company's economic interest to provide (and design) equipment minimising methane consumption (maximises the income) and increase solar energy, i.e. environmentally sustainable

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XEROX

photocopiers > COPIED PAPER

Xerox offers a package deal and installs, maintain and collect at the end-of-life the photocopiers, may even make and delivers copies. The customer pays for the package (don't buy photocopiers, Xerox remains the owner)

the innovative interaction between the company and the client, make the companies' economic interest to provide (and design) long lasting, reusable and recyclable photocopiers, i.e. environmentally sustain.

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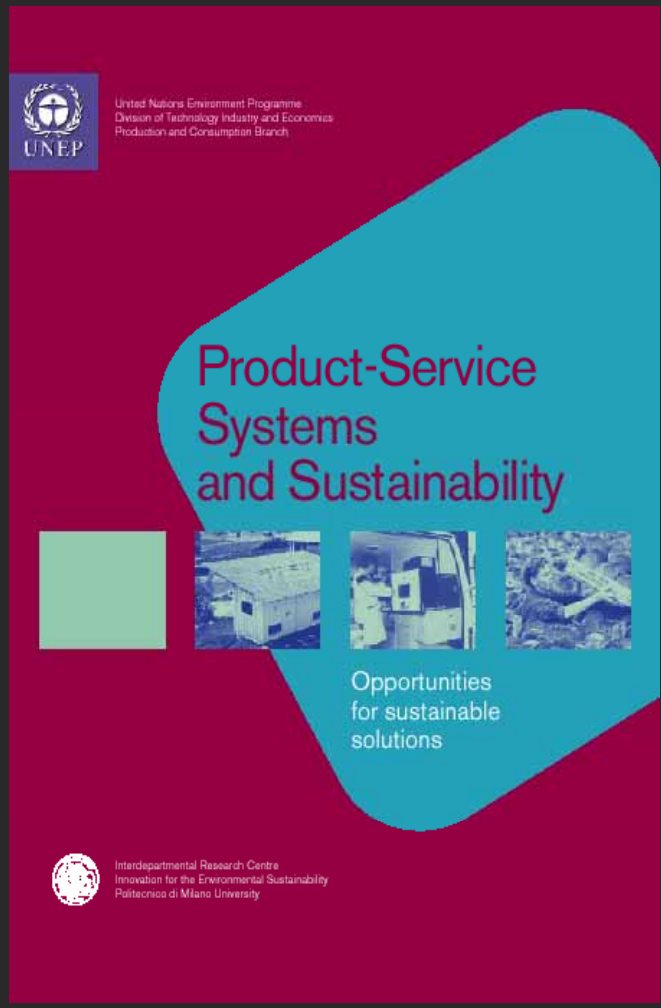
PRODUCT-SERVICE SYSTEM INNOVATION: A DEFINITION

"the result of an innovation strategy, shifting the business focus from designing and selling physical products only, to designing and selling a system of products and services which are jointly capable of fulfilling specific client demands (satisfactions)."

"system innovation can decouple the creation of value from resources consumption, i.e. can lead to system eco-efficiency."

[UNEP, 2002]



free pdf at: http://www.unep.fr/scp/publications/details.asp?id=WEB/0081/PA

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2.a PRODUCT-SERVICE SYSTEM: OPPORTUNITIES FOR LOW-INCOME AND EMERGING CONTEXTS

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... in terms of (social-ethical) sustainability a question has been (UNEP, EU LeNS, ...):

IS A SYSTEM INNOVATION APPROACH APPLICABLE TO EMERGING/LOW-INCOME CONTEXTS TOO?

IF SO, COULD IT ALSO FACILITATE (TOGHETHER WITH ECO-EFFICENCY) SOCIO-ETHICAL ENHANCEMENT IN THESE CONTEXTS?

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EXAMPLE OF SYSTEM INNOVATIONS COUPLING SOCIOETHICAL + ENVIRONMENTAL + ECONOMICAL SUSTAINABILITY

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SOLAR HOME KITS, Brasil

TSSFA company offers to Brasilian rural people a solar home kits that include the hardware to generate solar energy, the installation service and products that use the electricity, e.g. lighting and electrical outlets. Customers sign a three-year service contract (all of the tangible inputs are owned by the provider).

environmentally sustainable because it uses the solar energy + socioethically sustainable because give to poor people access to useful services + it is economically sustainable because in a business for TSSFA company.

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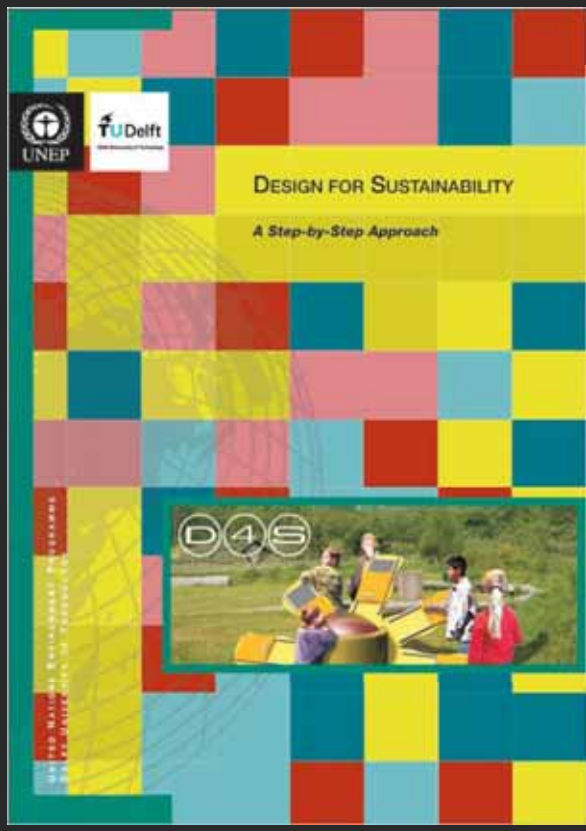
WORKING HYPOTHESIS: SYSTEM INNOVATION IS AN OPPORTUNITY EVEN FOR EMERGING AND LOW-INCOME CONTEXTS

"a Product-Service System innovation may act as an eco-efficient business opportunity to facilitate the process of social-economical development in emerging and low-income contexts - by jumping over the stage characterised by individual consumption/ownership of mass produced goods - towards a "satisfaction-based", low resource-intensity, distributed service-economy"

[UNEP, 2009 free http://www.d4s-sbs.org

LeNS book: "PSS design for Sustainability", Greenleaf, 2011 (to be published)]



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SYSTEM INNOVATION CHARACTERISTICS

ROOTED IN A "SATISFACTION-BASED" ECONOMIC MODEL

each offer is developed/designed and delivered in relation to a particular customer "satisfaction" ("unit of satisfaction")

STAKEHOLDER INTERACTIONS-BASED INNOVATION

radical innovations, not so much as technological ones, as new interactions/partnerships between the stakeholders of a particular value (satisfaction) production system

INTRINSIC SUSTAINABILITY POTENTIAL

innovation in which is the company/companies' economic and competitive interest that may leads to an environmental impact reduction and/or social equity and cohesion improvement

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3. SYSTEM DESIGN FOR SUSTAINABILITY (LeNS APPROACH)

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SYSTEM DESIGN FOR SUSTAINABILITY: DEFINITION (A NEW DESIGN ROLE)

"the design for social equity and cohesion of an eco-efficient system of products and services that are together able to fulfil a particular demand (unit) of "satisfaction", as well as the design of the interactions of the stakeholders directly and indirectly linked to that "satisfaction" system"

[*LeNS book: "PSS design for Sustainability", Greenleaf, 2011 (to be published)*]

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SYSTEM DESIGN FOR SUSTAINABILITY: NEW APPROACHES AND SKILLS

A. "SATISFACTION-SYSTEM" APPROACH

design the satisfaction of a particular demand (satisfaction unit) and all its related products and services

B. "STAKEHOLDER CONFIGURATION" APPROACH

design the interactions of the stakeholder of a particular satisfaction-system

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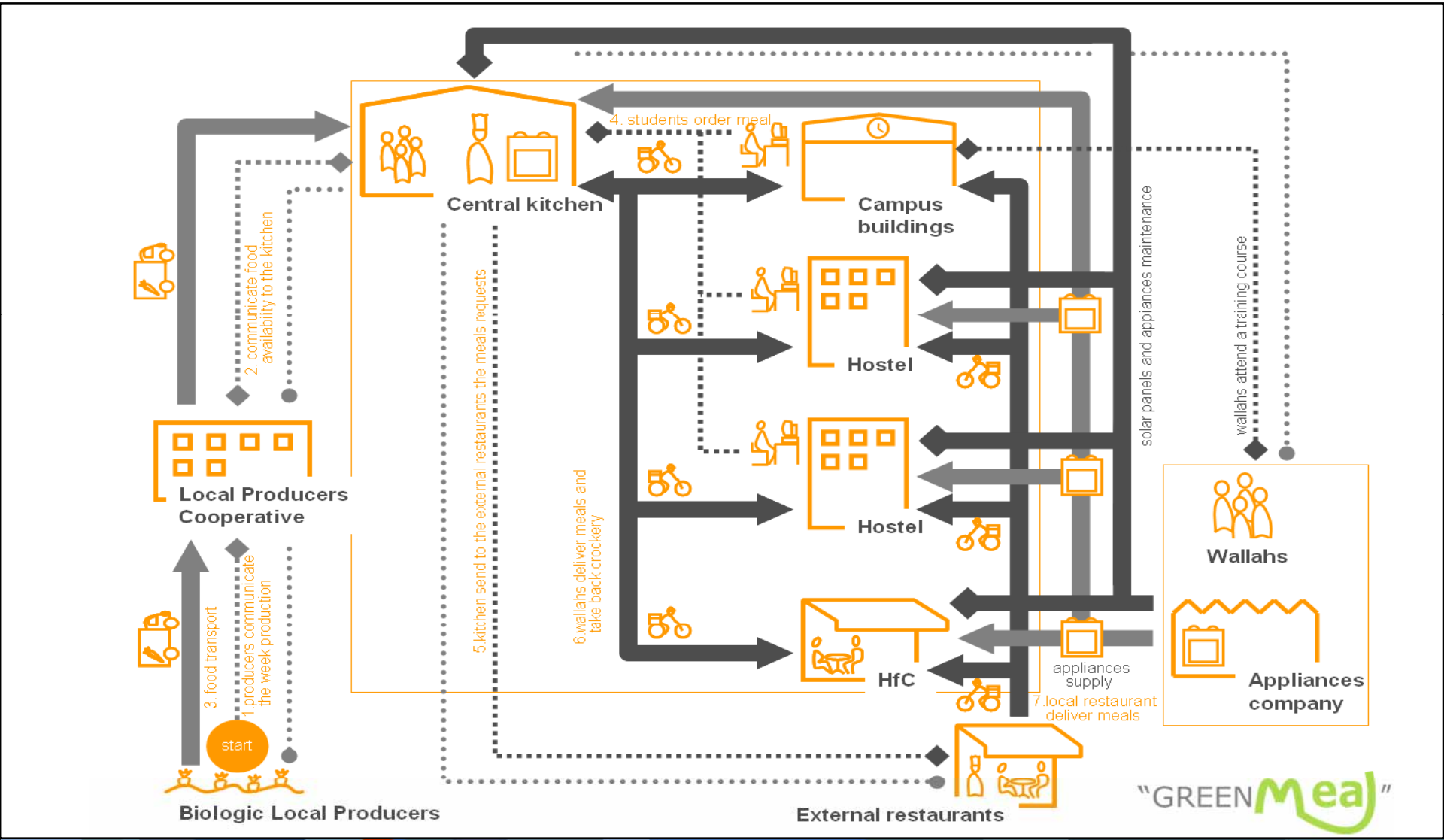
STAKEHOLDERS SYSTEM MAP



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SYSTEM DESIGN FOR SUSTAINABILITY: NEW APPROACH AND SKILLS

A. "SATISFACTION-SYSTEM" APPROACH

design the satisfaction of a particular demand (satisfaction unit) and all its related products and services

B. "STAKEHOLDER CONFIGURATION" APPROACH

design the interactions of the stakeholder of a particular satisfaction-system

C. "SYSTEM SUSTAINABILITY" APPROACH

design such a stakeholder interactions (offer model) that continuously seek after both eco-efficient and socio-ethical new beneficial solutions

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NOT ALL SYSTEM INNOVATIONS ARE ECO-EFFICIENT!

to orientate system design towards such stakeholder interactions (offer model) being eco-efficient

WE NEED

> CRITERIA AND GUIDELINES

> METHODS AND TOOLS

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SYSTEM DESIGN FOR ECO-EFFICIENCY CRITERIA (GUIDELINES)
(TO REDUCE THE ENVIRONMENTAL IMPACT)

. System life optimisation
. Transportation-distribution reduction
. Resources reduction
. Waste minimisation-valorisation
. Conservation-biocompatibility
. Toxic reduction

[ADOPTED WITHIN LeNS PROJECT AND INTEGRATED INTO THE "SDO" TOOLKIT]

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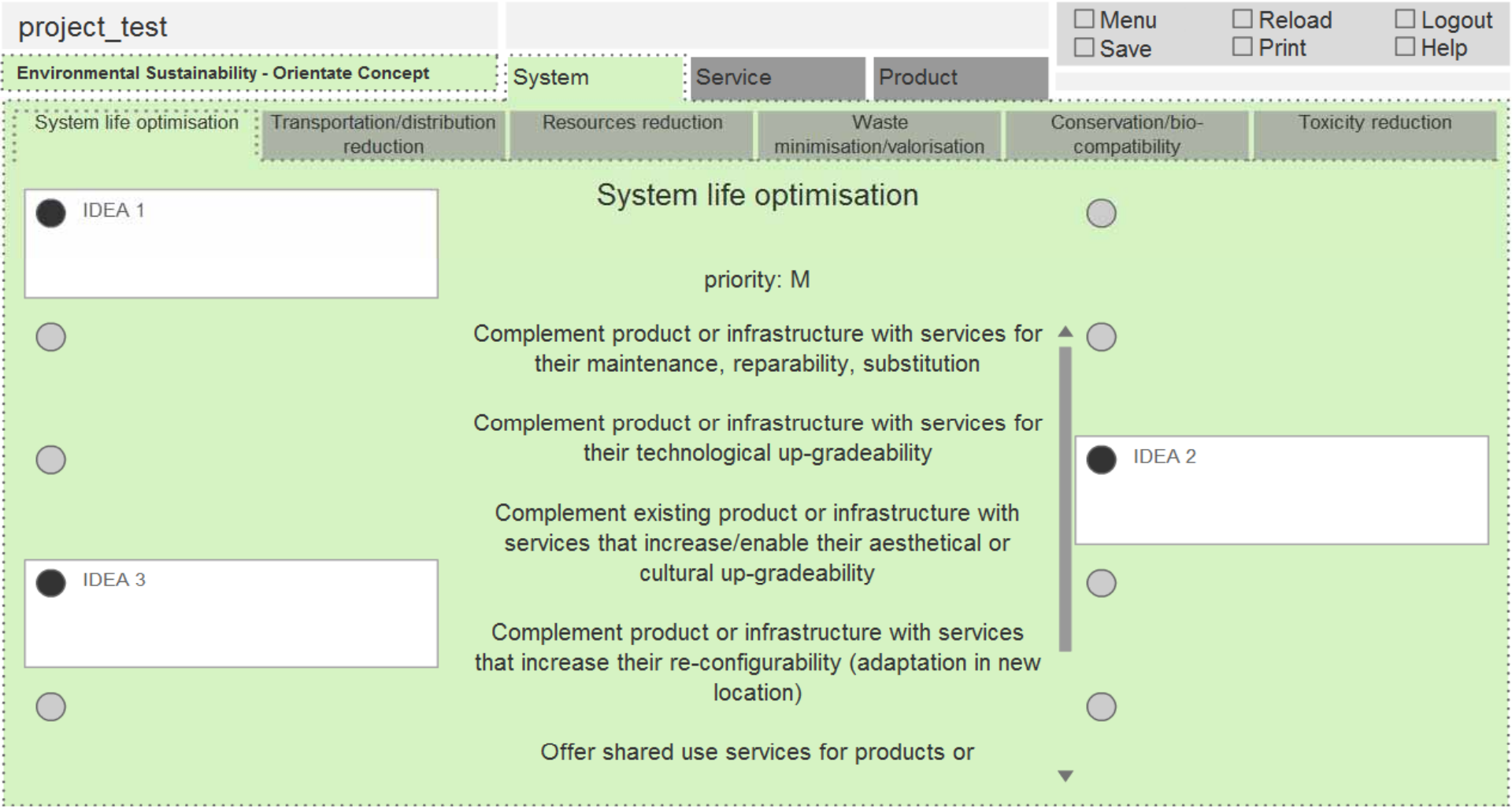
SDO SUSTAINABILITY DESIGN-ORIENTING TOOLKIT

(free use at www.sdo-lens.polimi.it; free download at www.lens.polimi.it)

ENVIRONMENTAL DIMENSION / IDEA GENERATION TABLES



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NOT ALL SYSTEM INNOVATIONS ARE SOCIOETHICALLY SUSTAINABLE!

to orientate system design towards such stakeholder interactions (offer model) being socioethically sustainable

WE NEED

> CRITERIA AND GUIDELINES

> METHODS AND TOOLS

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SYSTEM DESIGN FOR SOCIAL EQUITY AND COHESION CRITERIA (GUIDELINES)

. improve employment/working conditions
. increase equity and justice in relation to stakeholders
. enable a responsible/sustainable consumption
. favor/integrate the weak and marginalized
. improve social cohesion
. empower/enhance local resources

[ADOPTED BY LENS PROJECT AND INTEGRATED INTO THE "SDO" TOOLKIT]

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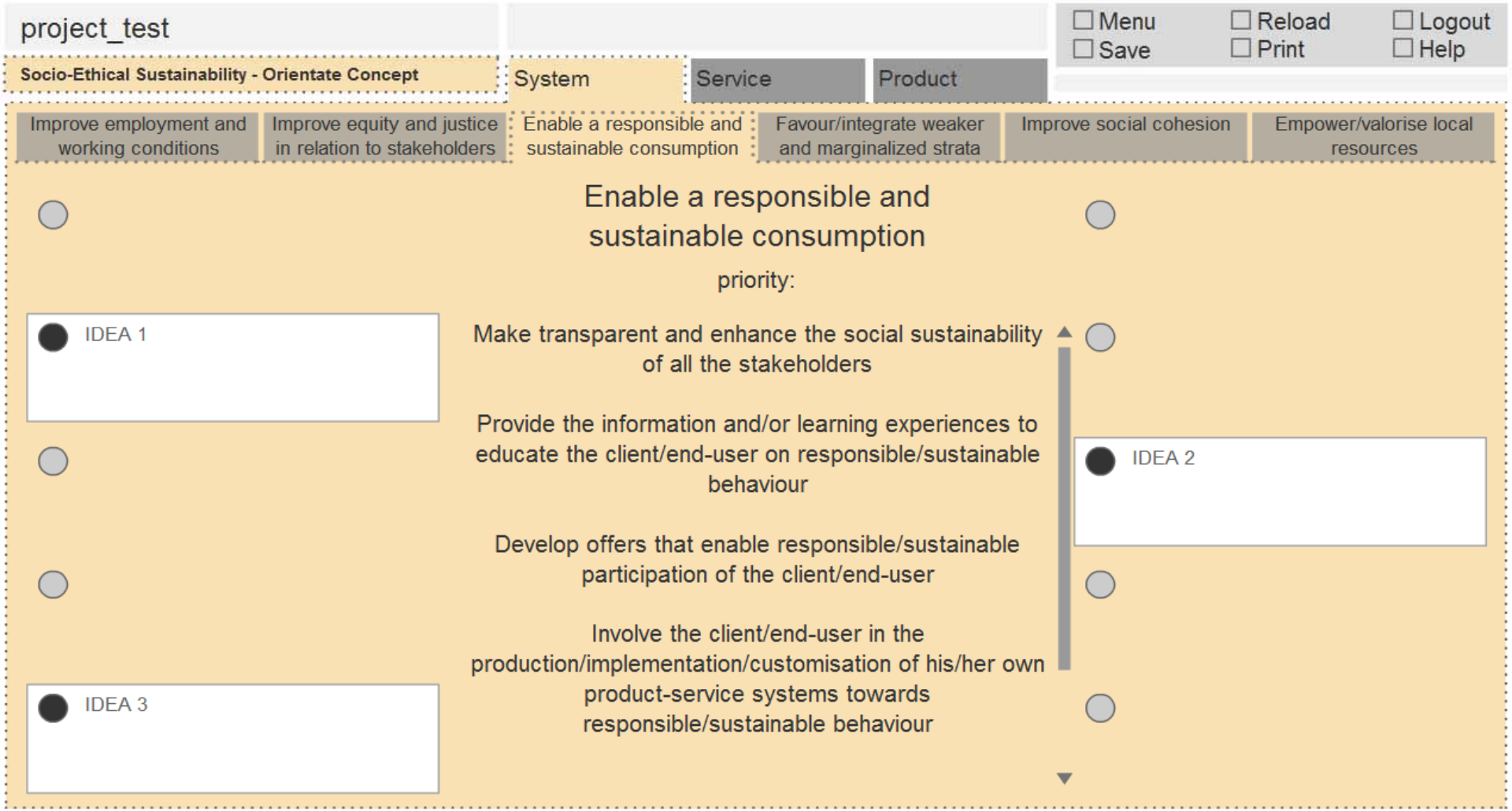
SDO SUSTAINABILITY DESIGN-ORIENTING TOOLKIT

(free use at www.sdo-lens.polimi.it; free download at www.lens.polimi.it)

SOCIOETHICAL DIMENSION / IDEA GENERATION TABLE



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4. MSDS METHOD FOR SYSTEM DESIGN FOR SUSTAINABILITY [ADOPTED WITHIN THE LeNS PROJECT]

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NEW METHODS/TOOLS

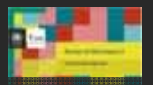
SOME methods/tools developed to design PSS and to orientate them towards eco-efficient solutions:

HiCS, Highly Customerised Solutions
[EU funded research, 2004]

MEPSS, MEthodology for Product Service System development
[EU funded research, 2005]

ProSecCo, Product Service Co-design
[EU funded research, 2005]

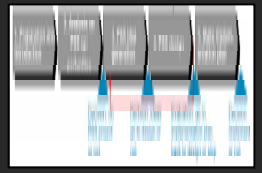
SusProNet, Network on sustainable PSS development
[EU funded research, 2006]



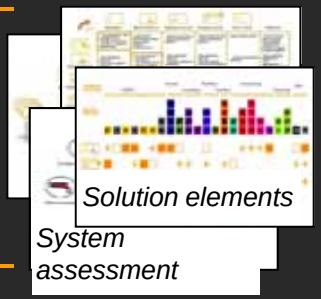
Design4Sustainability Step by step approach
[UNEP funded research, 2009]

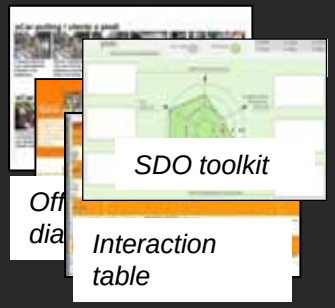
DESIGN

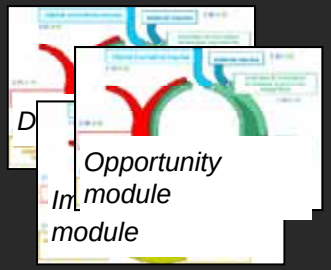
METHODS

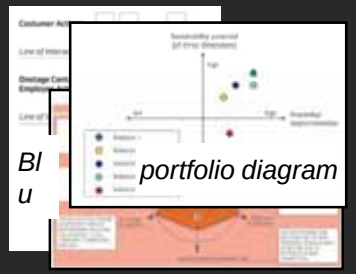


TOOLS









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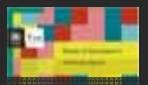
NEW METHODS/TOOLS

FEW methods/tools developed to design PSS and to orientate them towards socioethically solutions

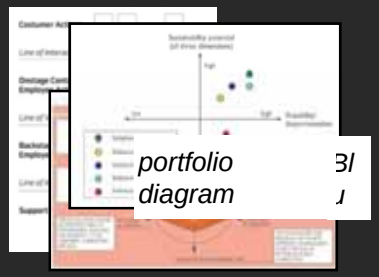
MEPSS, MEthodology for Product Service System development
[EU funded project]



Design4Sustainability Step by step approach
[UNEP funded project]

DESIGN METHOD

DESIGN TOOLS



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MSDS: Method for System Design for Sustainability

SCOPE: support design processes for the development of sustainable systems, adaptable to specific design requirements and usable in existing design processes

USERS: designer, design office, designer within a company

TOOLS: free to download at www.lens.polimi.it

...

MSDS PHASES/PROCESSES

STRATEGIC ANALYSIS
- ANALYSIS OF THE PROJECT PROMOTERS
- ANALYSIS OF THE REFERENCE CONTEXT
- ANALYSIS OF THE REFERENCE STRUCTURE
- ANALYSIS OF BEST PRACTICES
- DEFINITION OF SUSTAINABILITY DESIGN PRIORITIES

EXPLORING OPPORTUNITIES
- IDEAS GENERATION ORIENTED TO SUSTAINABILITY
- DEVELEPMENT OF THE SUSTAINABILITY DESIGN ORIENTING SCENARIO - VISIONS/CLUSTERS/IDEAS

SYSTEM CONCEPT DESIGN
- VISIONS, CLUSTERS AND IDEAS SELECTION
- SYSTEM CONCEPT DEVELOPMENT
- ENV., SOC. & ECON. CHECK

SYSTEM DESIGN (AND ENGIN.)
- SYSTEM DEVELOPMENT (EXECUTIVE LEVEL)
- ENV., SOC. & ECON. CHECK

COMMUNICATION
- DOCUMENTS EDITING

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MSDS: PHASES/PROCESSES OBJECTIVES

STRATEGIC ANALYSIS

- ANALYSIS OF THE PROJECT PROMOTERS
- ANALYSIS OF THE REFERENCE CONTEXT
- ANALYSIS OF THE REFERENCE STRUCTURE
- ANALYSIS OF BEST PRACTICES
- DEFINITION OF SUSTAINABILITY DESIGN PRIORITIES

Gaining the information needed to facilitate the generation of sustainable ideas and scenarios for system innovations

EXPLORING OPPORTUNITIES

- IDEAS GENERATION ORIENTED TO SUSTAINABILITY
- DEVELEPMENT OF THE SUSTAINABILITY DESIGN ORIENTING SCENARIO - VISIONS/CLUSTERS/IDEAS

Producing a “catalogue” of promising strategic possibilities, i.e. a sustainability design-orienting sceanario and/or a set of promising ideas

SYSTEM CONCEPT DESIGN

- VISIONS, CLUSTERS AND IDEAS SELECTION
- SYSTEM CONCEPT DEVELOPMENT
- ENV, SOCIO-ET. & ECON. CHECK/VISUALISATION

Defining and designing one or more system concept potentially sustainable

SYSTEM DESIGN (AND ENGIN.)

- SYSTEM DEVELOPMENT (EXECUTIVE LEVEL)
- ENV, SOCIO-ET. & ECON. CHECK/VISUALISATION

Developing the most promising sustainable system concept in a detailed version necessariy to its implementation

COMMUNICATION

- MULTIMEDIA REPORTING: OVERALL QUALITIES
- MULTIMEDIA REPORTING: STAINABILITY QUALITIES

Producing the documents for the external communication of the solution’s characteristics (general characteristics but above all the sustainability ones)

MSDS: MODULAR APPROACH

STRATEGIC ANALYSIS

- ANALYSIS OF THE PROJECT PROMOTERS
- ANALYSIS OF THE REFERENCE CONTEXT
- ANALYSIS OF THE REFERENCE STRUCTURE
- ANALYSIS OF BEST PRACTICES
- DEFINITION OF SUSTAINABILITY DESIGN PRIORITIES

EXPLORING OPPORTUNITIES

- IDEAS GENERATION ORIENTED TO SUSTAINABILITY
- DEVELEPMENT OF THE SUSTAINABILITY DESIGN ORIENTING SCENARIO - VISIONS/CLUSTERS/IDEAS

SYSTEM CONCEPT DESIGN

- VISIONS, CLUSTERS AND IDEAS SELECTION
- SYSTEM CONCEPT DEVELOPMENT
- ENV, SOCIO-ET. & ECON. CHECK/VISUALISATION

SYSTEM DESIGN (AND ENGIN.)

- SYSTEM DEVELOPMENT (EXECUTIVE LEVEL)
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MODULAR METHOD:

1. enabling to START up the process at any phase

2. enabling to use a SELECTED set of processes and tools

3. Enabling to work on one, two or all the sustainability DIMENSIONS

MSDS MAIN TOOLS:

1. Sustainability Design-Orienting toolkit (SDO)
2. sustainability interaction story-spot

3. system map
4. interaction table / interaction story-board
5. satisfaction offering diagram
6. stakeholder motivation matrix
7. solution element brief

LEGENDA
sustainability-orienting system design tools
(other) system design tools

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OVERVIEW OF THE MSDS METHOD

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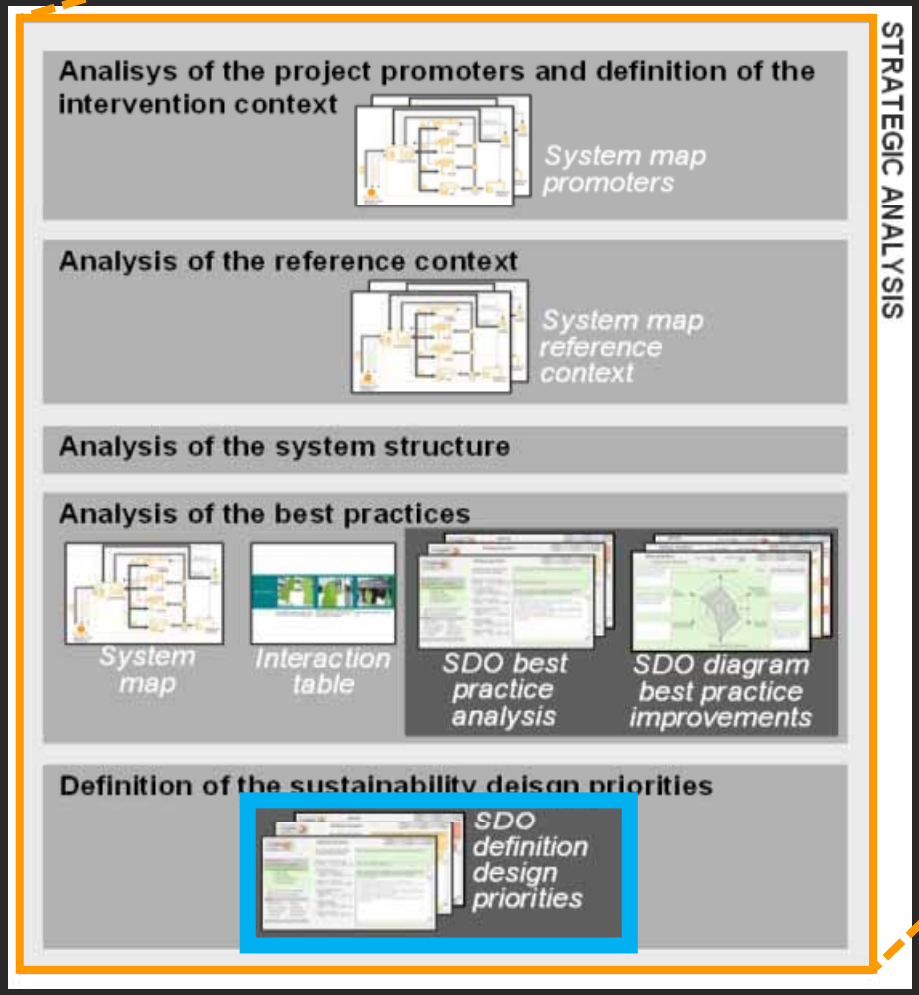
STRATEGIC ANALISYS

Identify the sustainability design priorities



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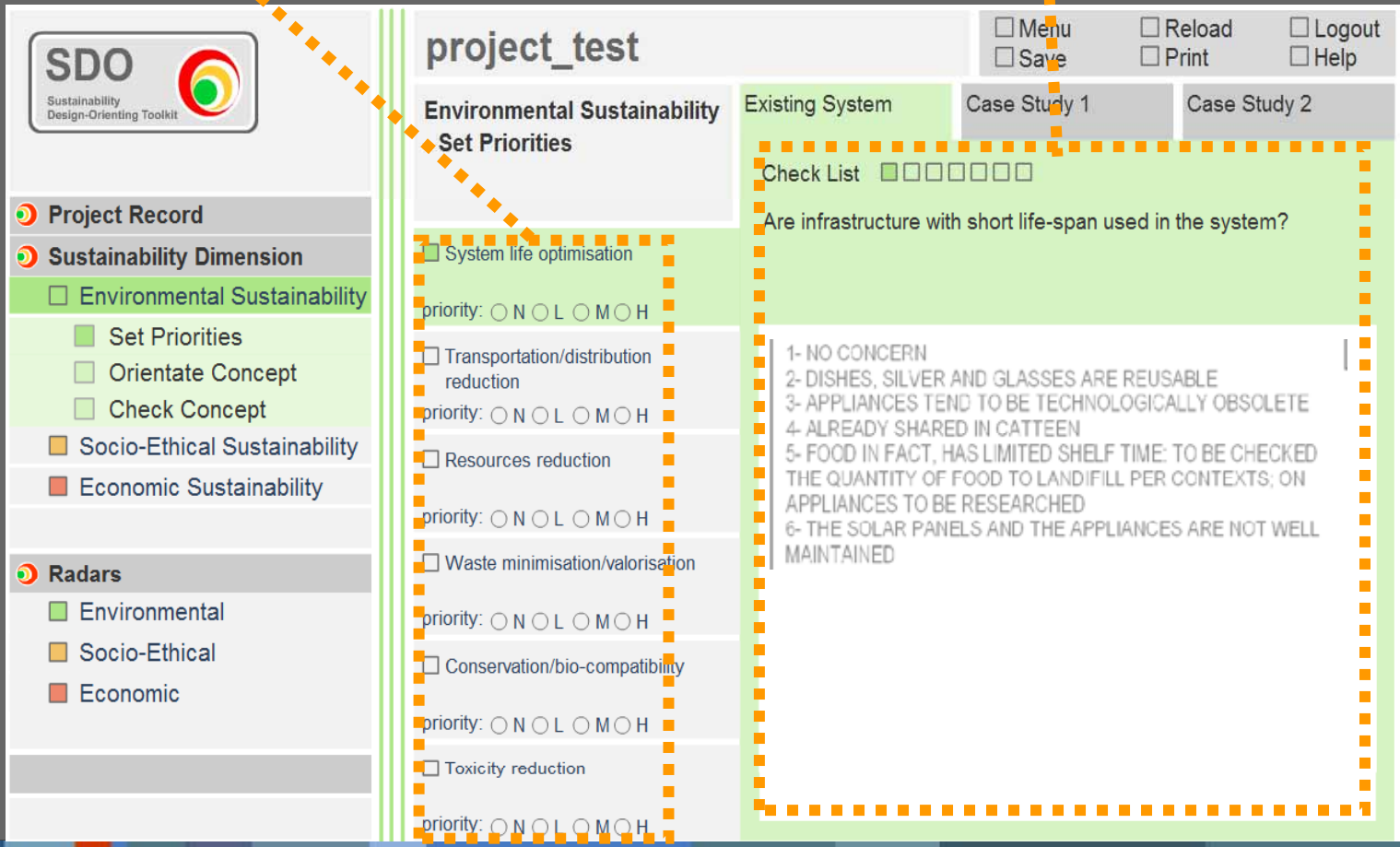
. ENVIRONMENTAL/SUSTAINABILITY PRIORITIES DEF.

. tool: SUSTAINABILITY DESIGN-ORIENTING / PRIORITY DEFINITION

priority identification among criteria: No, Low, Medium, High

qualitative assessment (report) of the existing system supported by a set of checklists for a (for each criteria)



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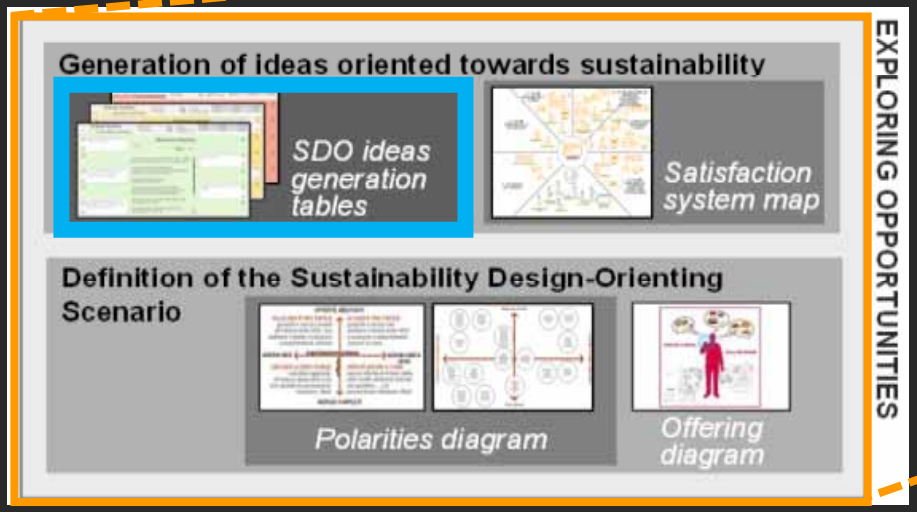
EXPLORING OPPORTUNITIES

Generate sustainable-focused ideas on a stakeholder system intaraction level (1)



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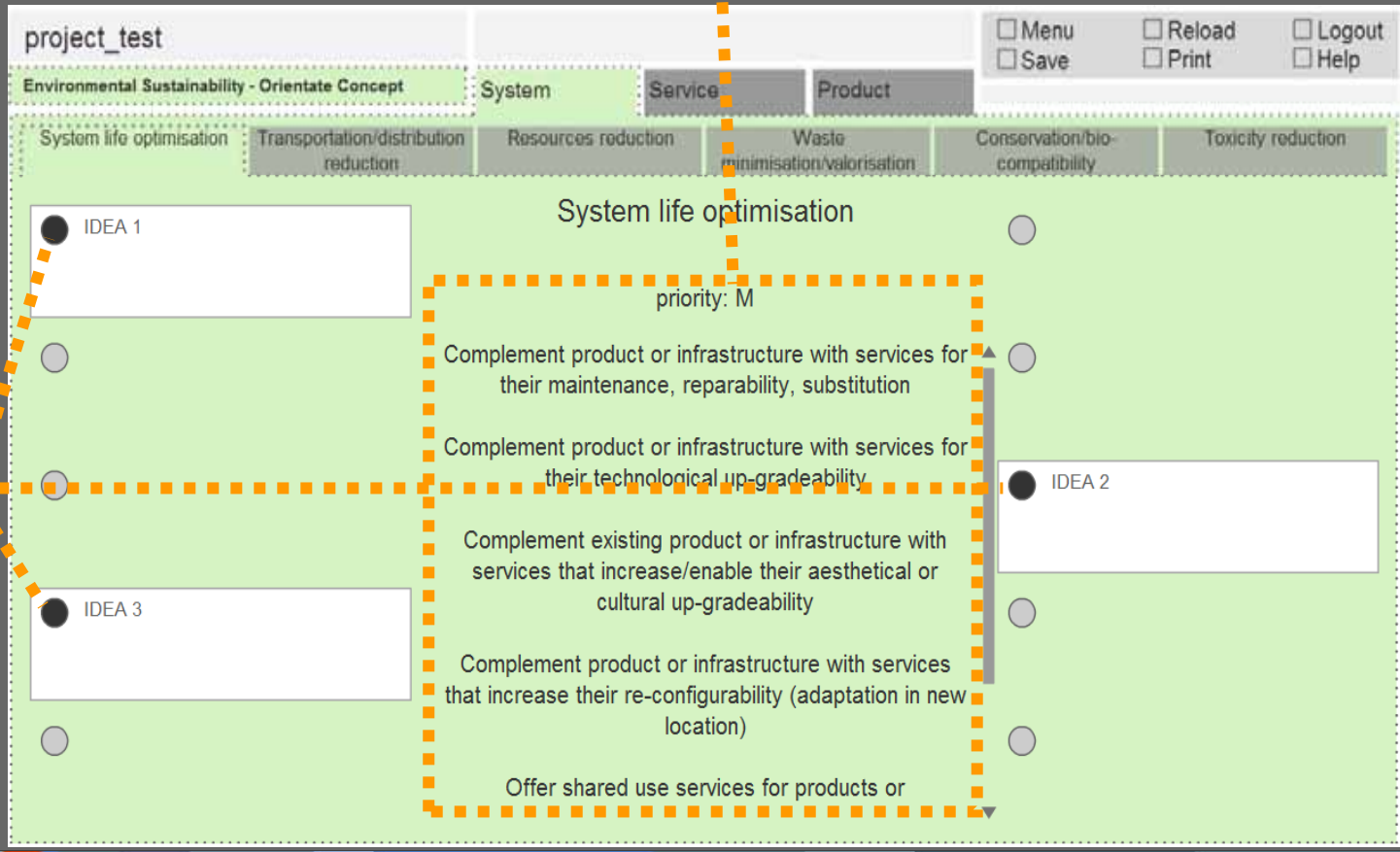
. GENERATE “ENV./SUSTAINABLE IDEAS” BY BRAINSTORMING

. tool: SUSTAINABILITY DESIGN-ORIENTING / ORIENTATE CONCEPT

guidelinees at system level (1)
(for each criteria)

typed emerged system ideas
(for each criteria)



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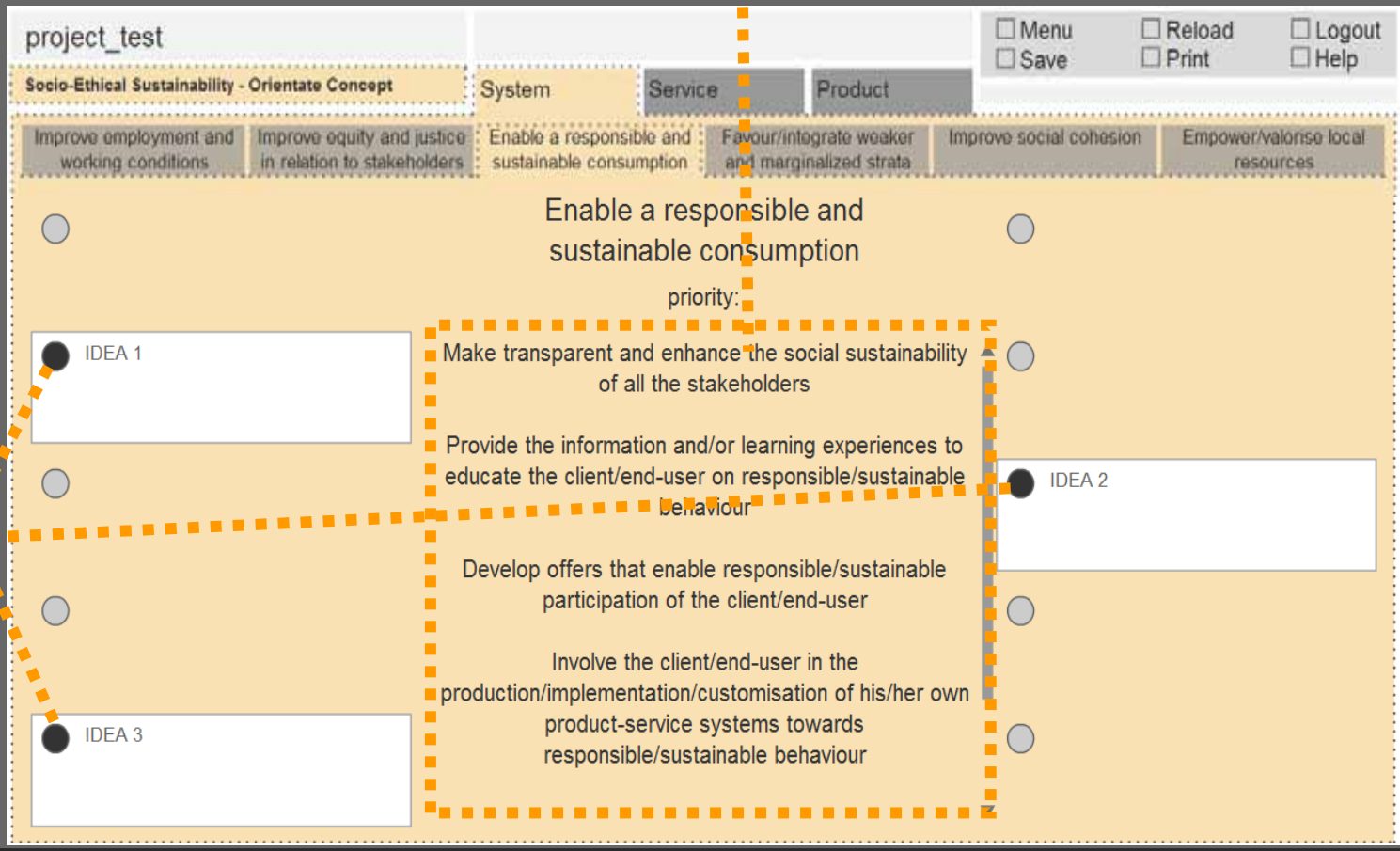
. GENERATE SOCIOETHICAL/SUSTAIN. IDEAS" BY BRAINSTORMING

. tool: SUSTAINABILITY DESIGN-ORIENTING / ORIENTATE CONCEPT

guidelinees at system level (1)
(for each criteria)

typed emerged system ideas
(for each criteria)



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SYSTEM CONCEPT DESIGN

Design and formalisation of the system concepts

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. tool:
SATISFACTION OFFERING DIAGRAMM

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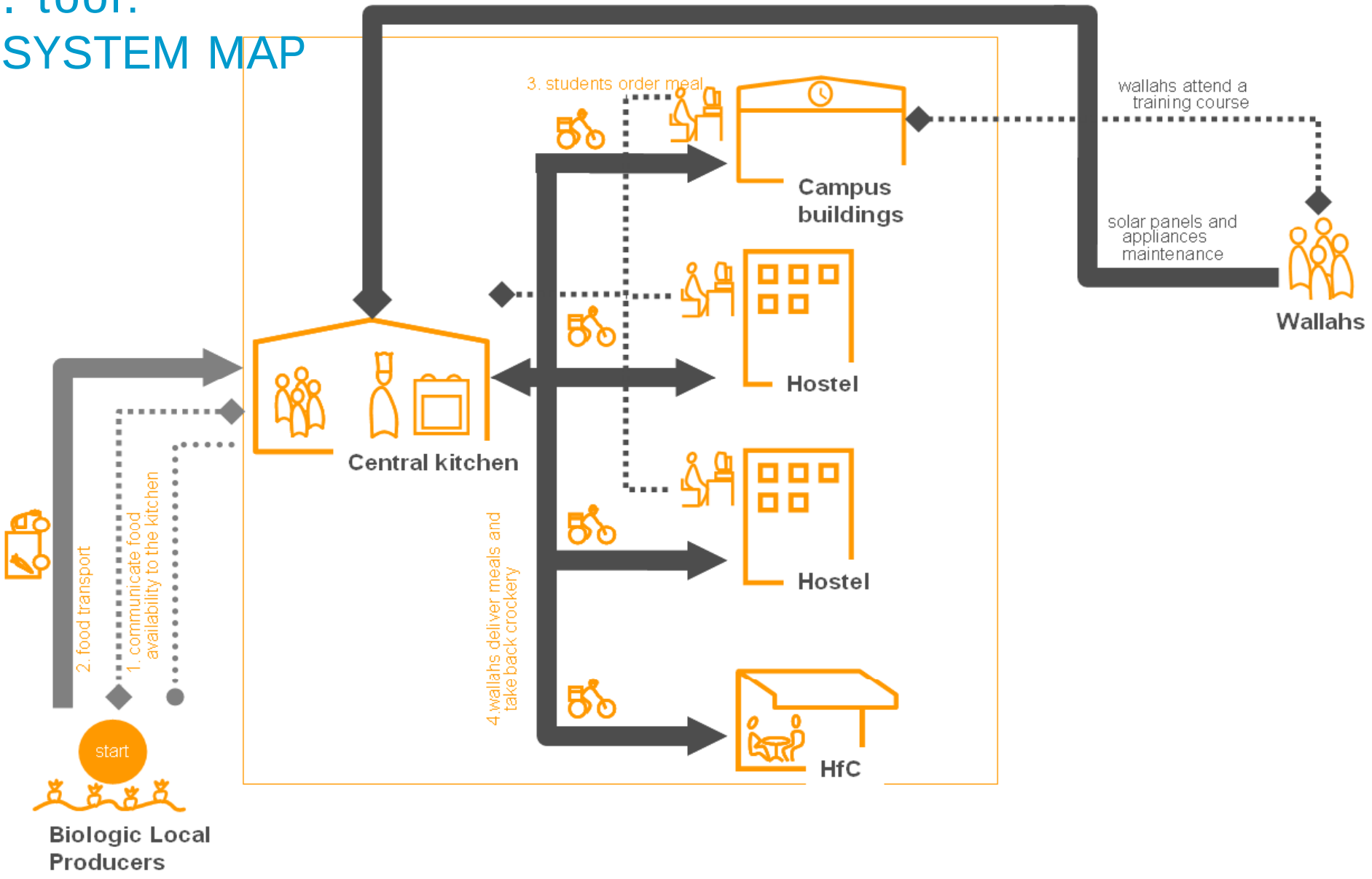
. tool:
SYSTEM MAP



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. tool: INTERACTION STORY BOARD

LINE OF INTERACTION

Representative of students chooses the weekly menus, basing on local producers disponibility

Students, using internet, communicate their weekly menu and the place where they will eat. The system return them a code/ticket

Students, using their code/ticket, receive their meal

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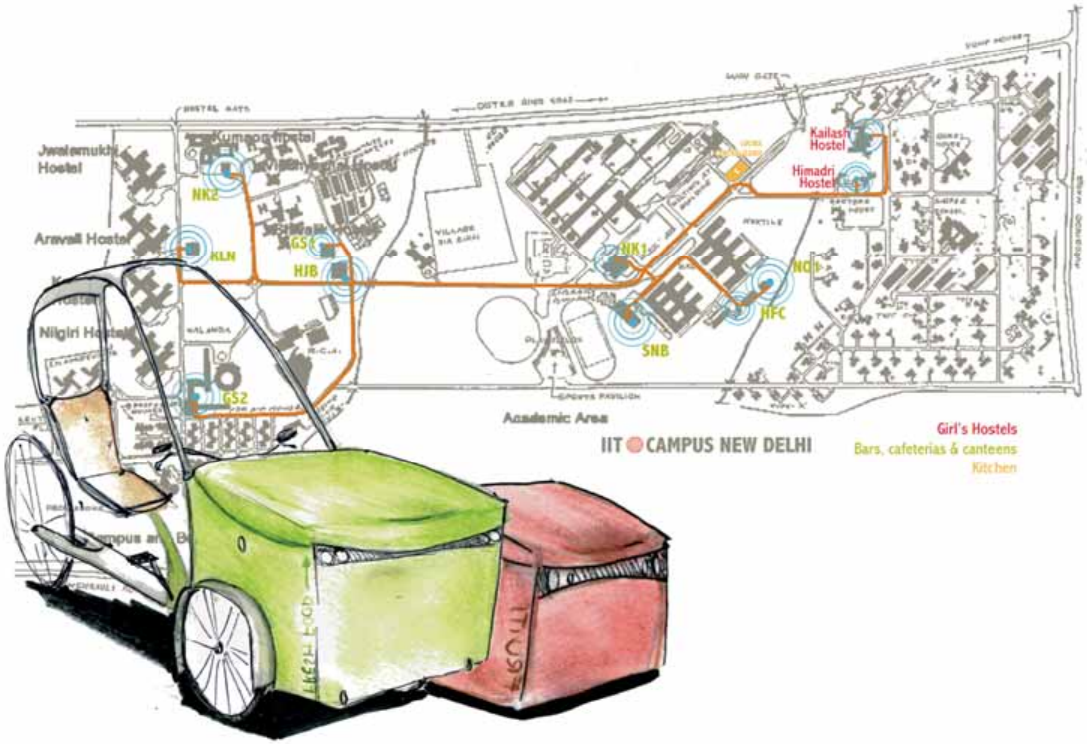
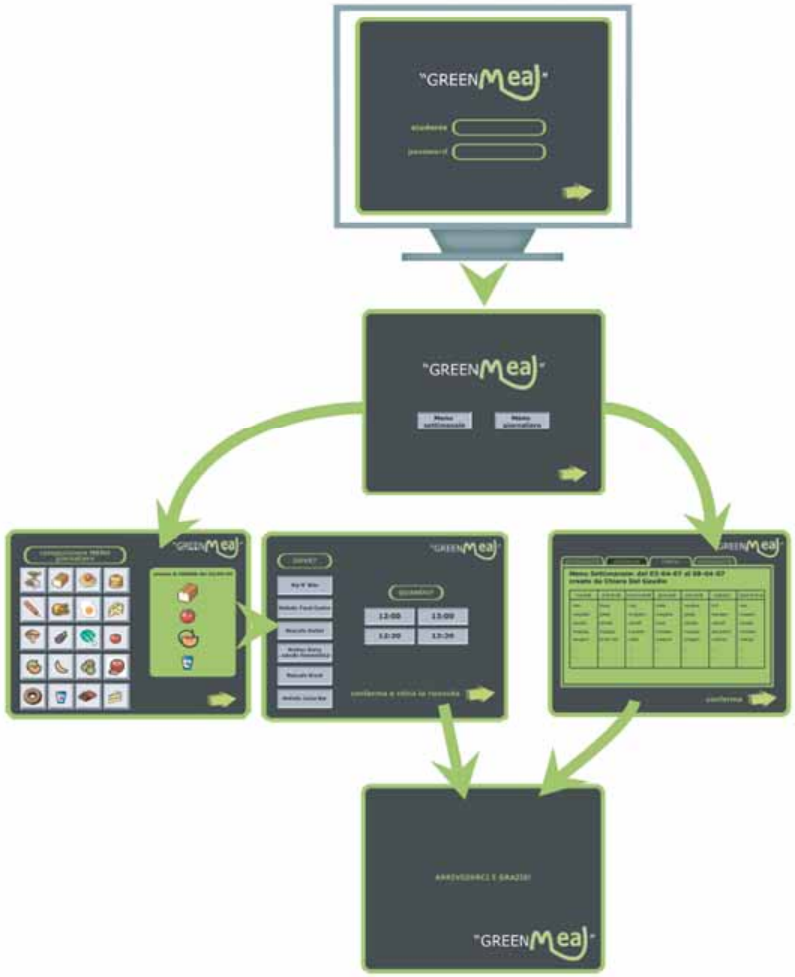
. PRODUCT AND SUPPORT-PRODUCT CONCEPTS





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SYSTEM CONCEPT DESIGN

check and visualise achieved sustainability improvements/worsening

> up-date priorities

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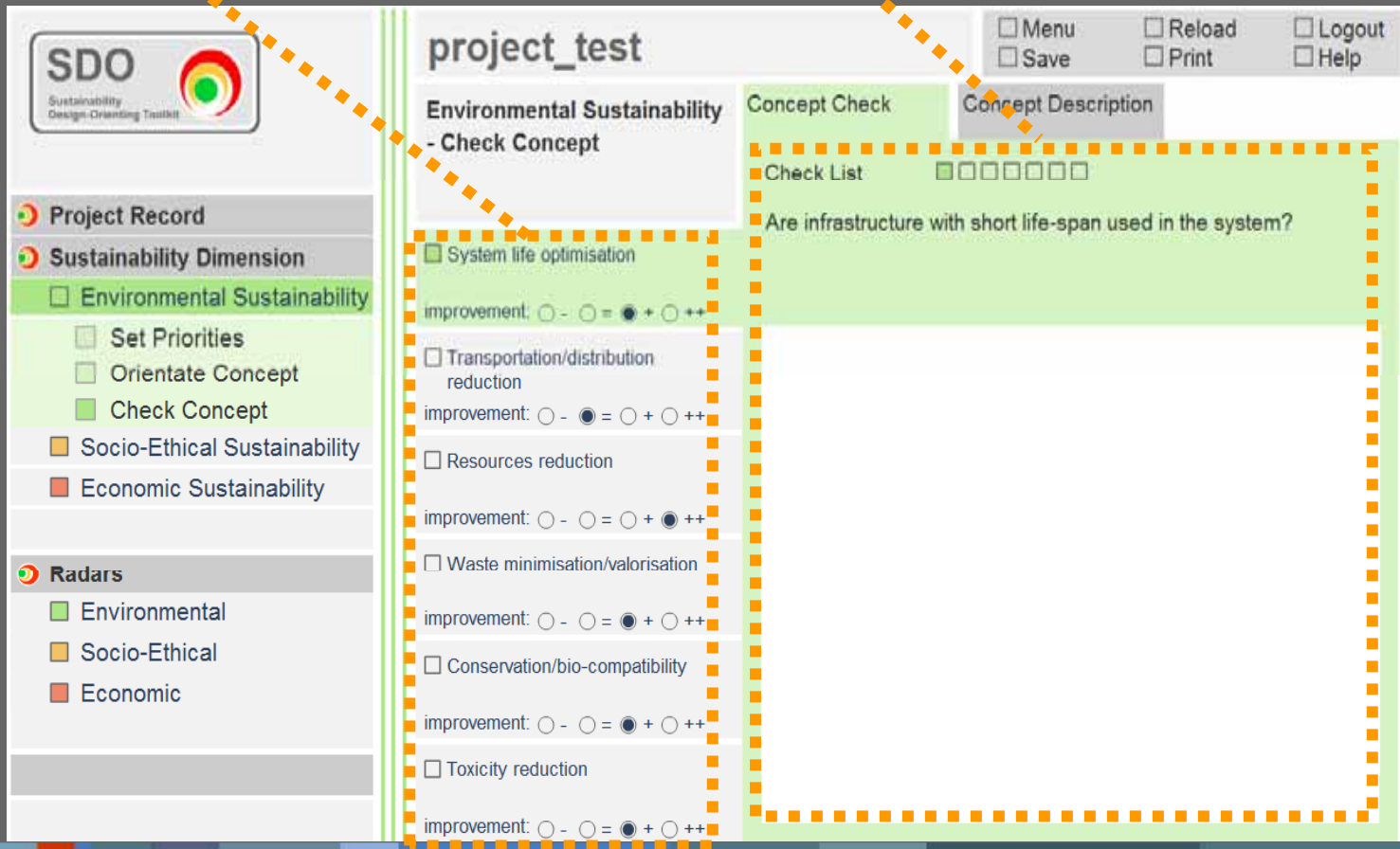
. CHECK IN PROGRESS CONCEPT ENVIRONMENTAL/SUSTAINABILITY

. tool: SUSTAINABILITY DESIGN-ORIENTING / CHECK CONCEPT

improvemnts levels definition per aech criteria: -, =, +, ++

qualitative assessment of the concept improvements (for each criteria) as compared with the existing system supported by checklists



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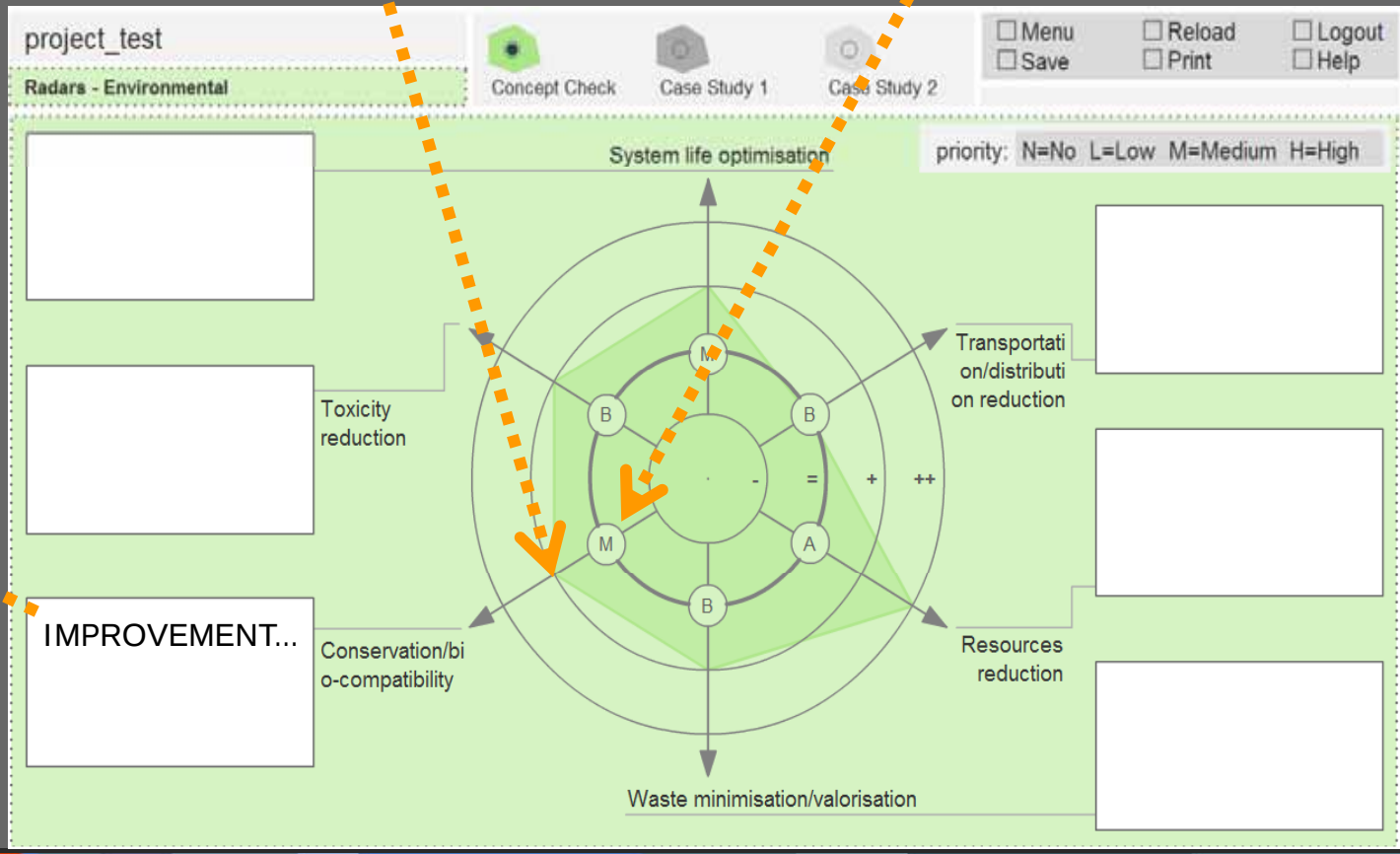
. VISUALISE CONCEPT ENVIRONMENTAL/SUSTAINABILITY POTENT.

. tool: SUSTAINAB. DESIGN-ORIENTING / ENVIRONMENTAL RADAR

visualisation concept improvement (for each criteraia)

visualisation of existing system priorities (for each criteraia)

text synthethising improvement (for each criteraia)



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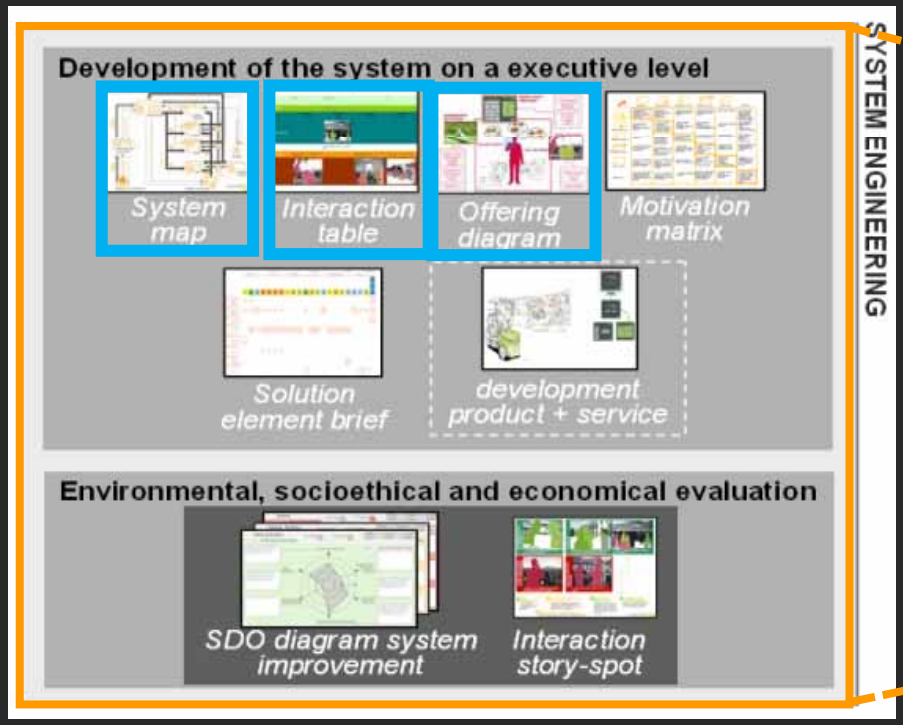
SYSTEM DESIGN (AND ENGINEERING)

development of the system organization



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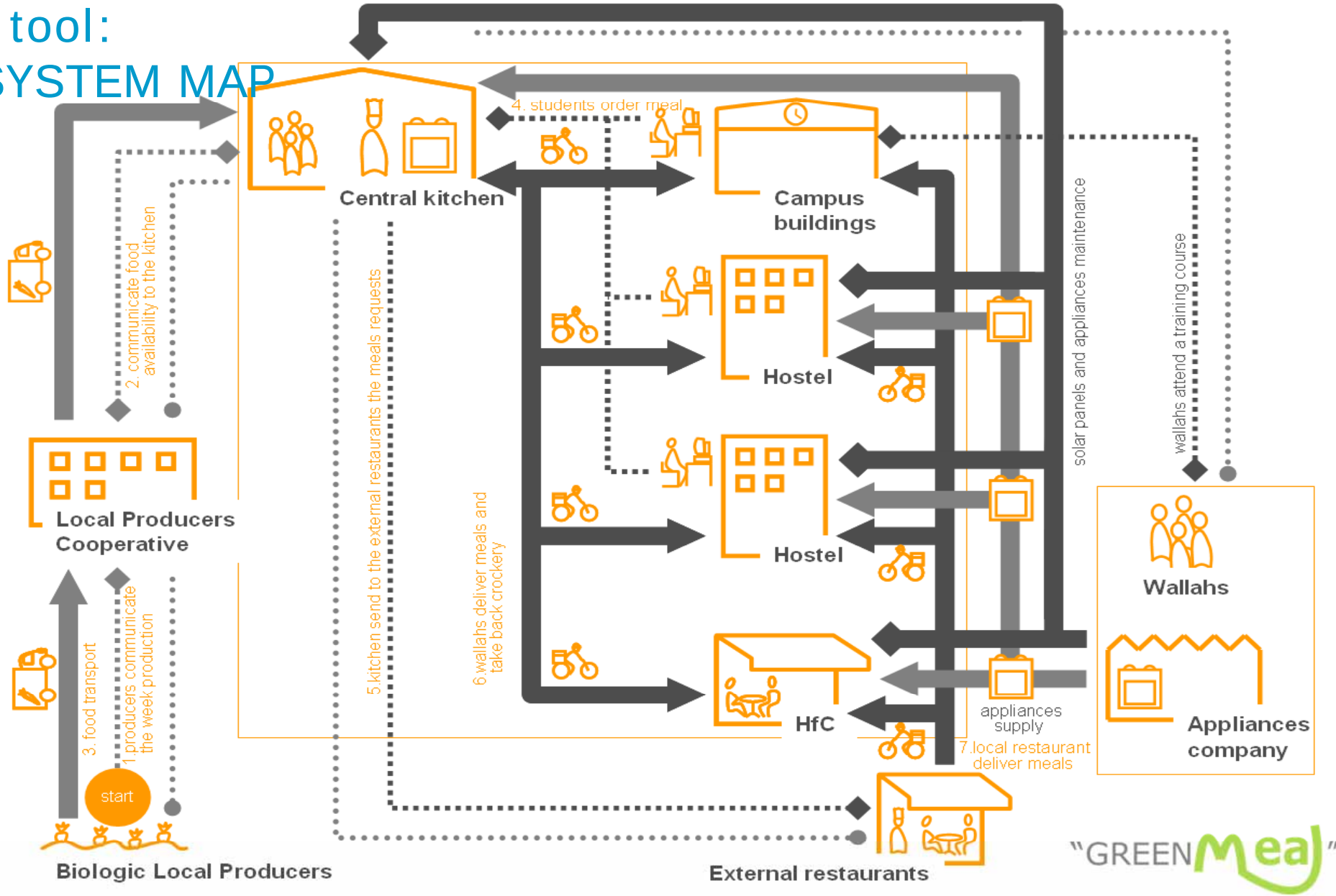

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. SATISFACTION OFFERING DIAGRAMM

INGREDIENTS SELECTION

- Students select food basing on seasonal availability
- Cooperatives of local producers provide the campus
- Biologic food

WEEKLY/DAILY PREORDER

- On line preorder based on the disponibility
- Using internet or campus' information points

FOOD DELIVERY

- Where you want inside the campus
- Using rickshaws

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. tool: INTERACTION STORY BOARD

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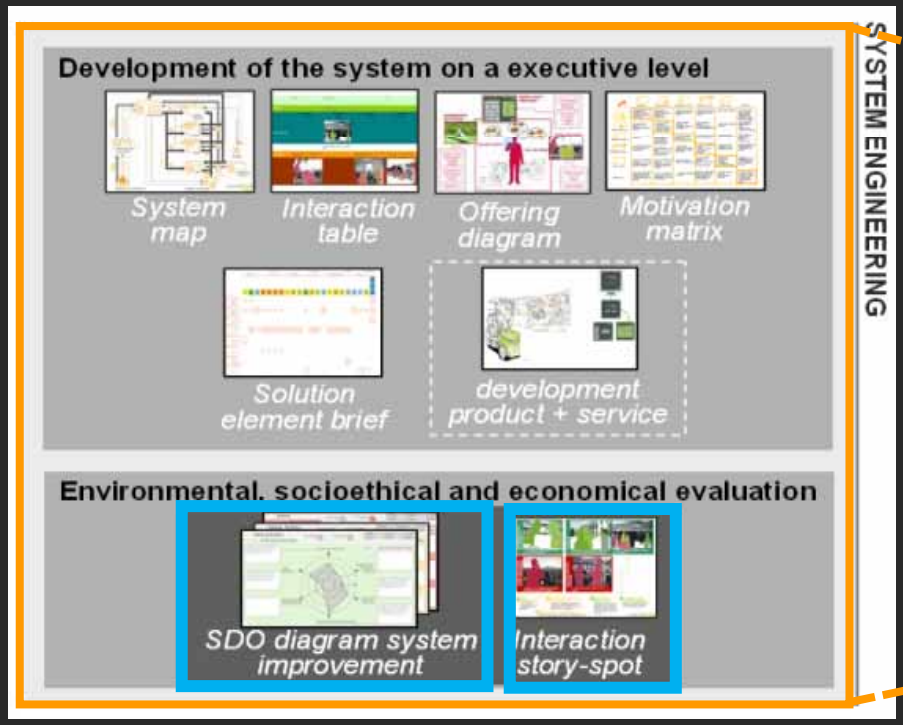
SYSTEM DESIGN (AND ENGINEERING)

Check and visualise the achieved sustainability improvements



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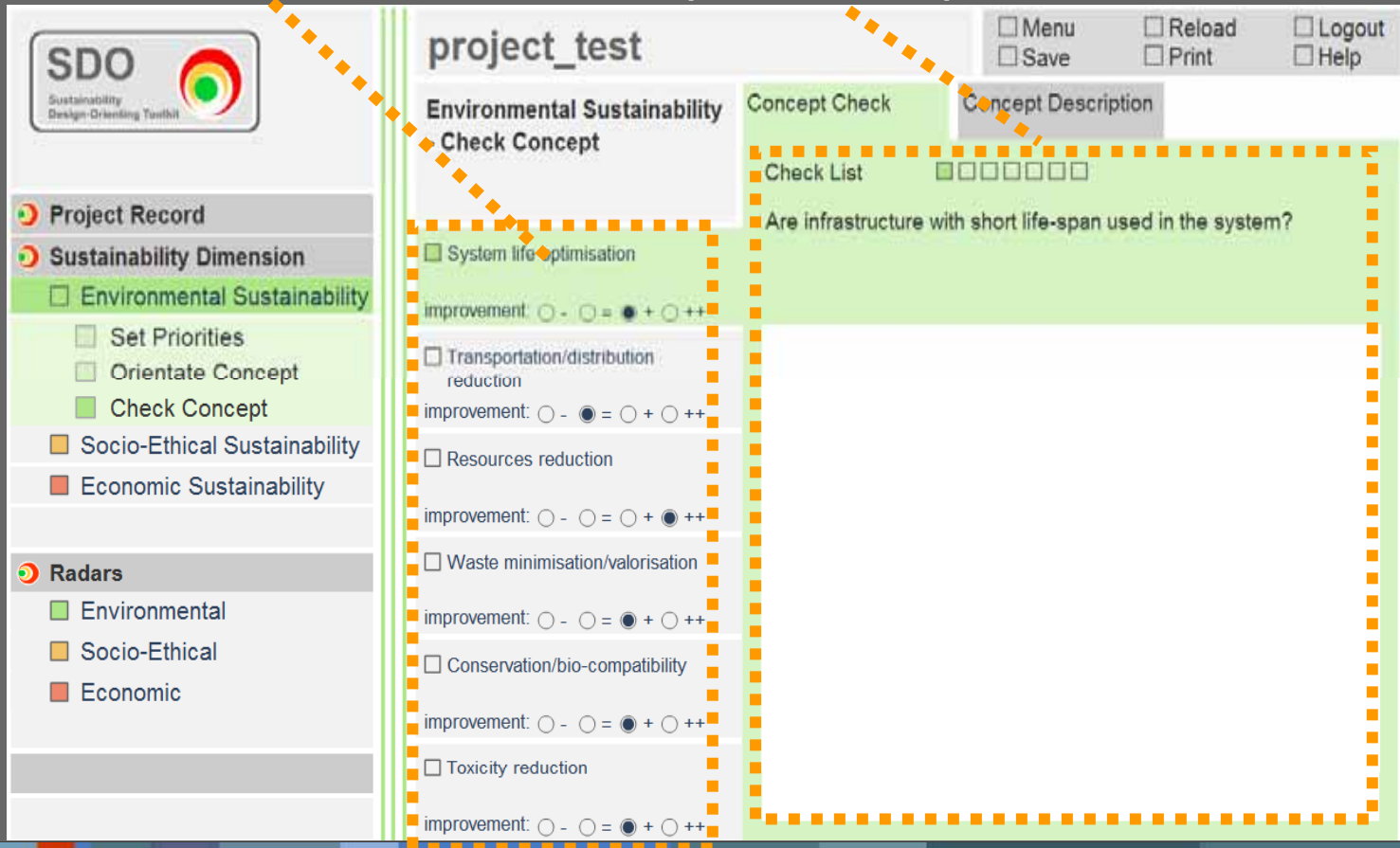
up-date improvemnts levels definition per aech criteria: -, =, +, ++

up-date qualitative assessment of the concept improvements (for each criteria) as compared with the existing system (checklists)



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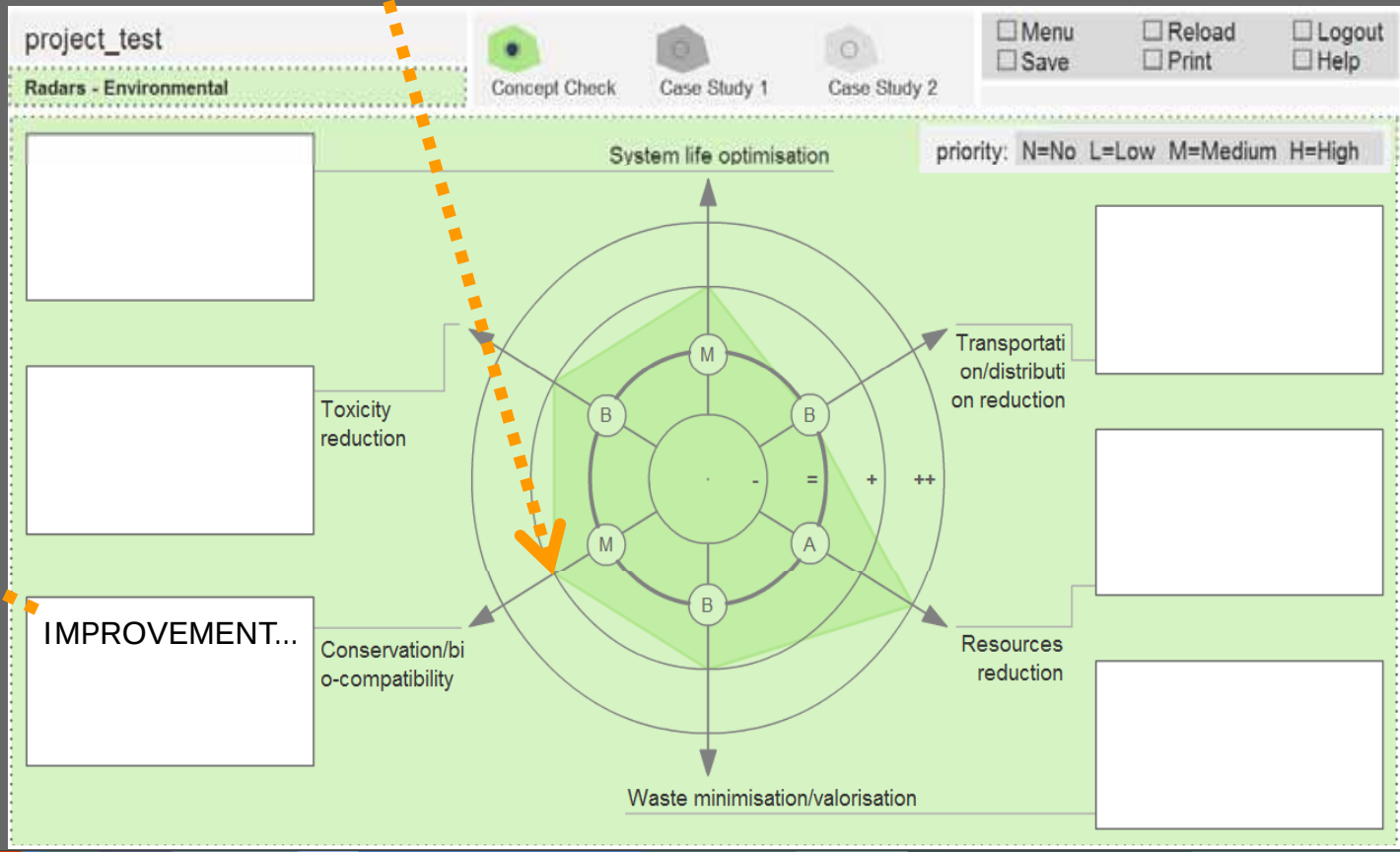
. (up-date) VISUALISE SYSTEM ENVIRONMENTAL/SUSTAINABILITY

. tool: SUSTAINABILITY DESIGN-ORIENTING / RADAR

up-dated visualisation
concept improvement
(for each criteraia)

up-dated text
synthethising
improvement
(for each
criteraia)



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(for each criteraia)

up-dated text
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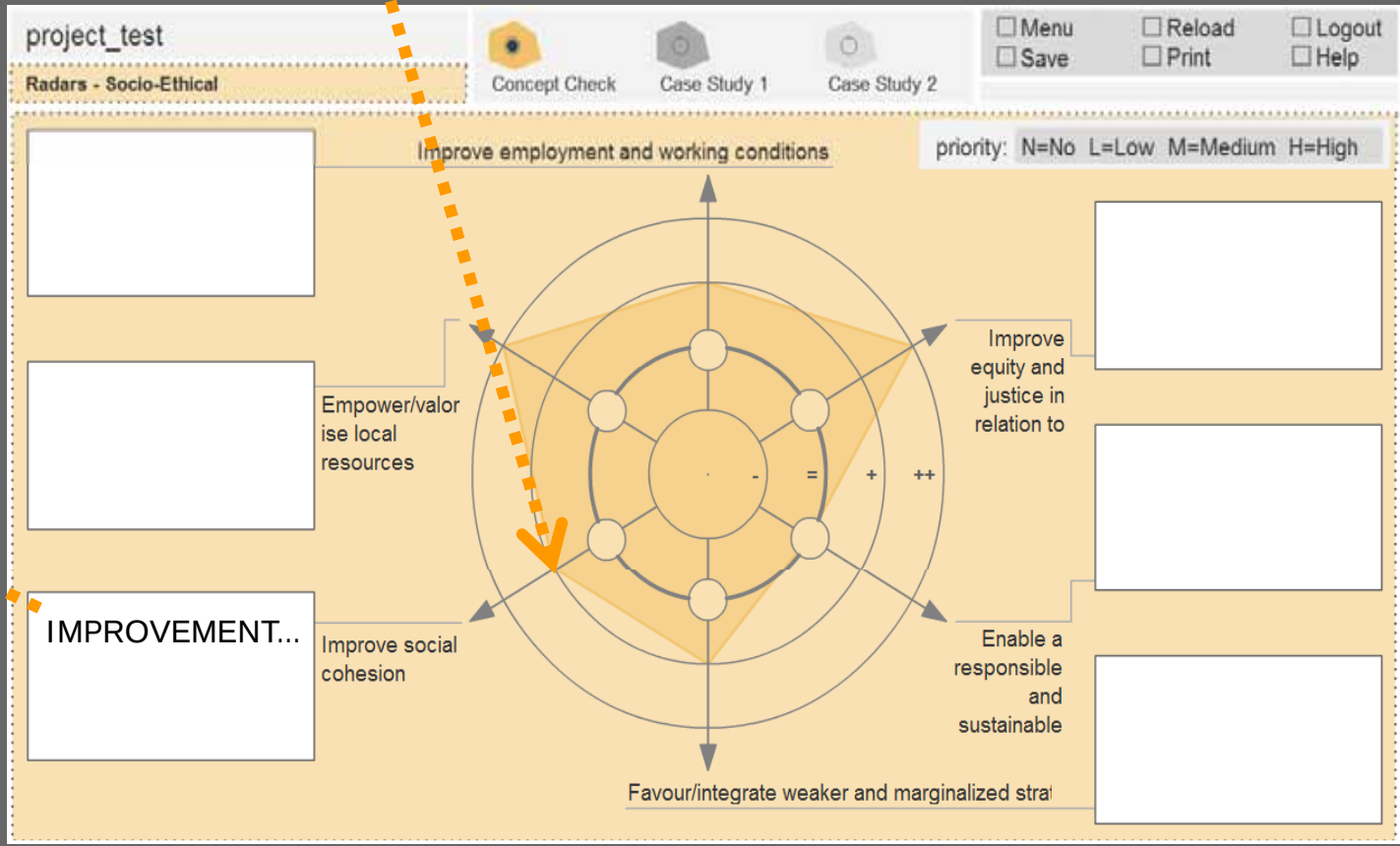

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. tool: SUSTAINABILITY INTERACTION STORY-SPOT

REPRESENTATIVE OF STUDENTS

1. They select the ingredients to be used for the meals realization…

STUDENTS

2. Students communicate their weekly/daily menu and the place where they will eat,…

…which are delivered inside the campus using rickshaws

LOCAL BIOLOGICAL FOOD PRODUCERS

…basing on the seasonal disponibility of the local associated food provider.

CAMPUS CENTRAL KITCHEN

…the central kitchen prepare all the meals…

TOXIC REDUCTION
The biological cultivations avoid pesticids

ENABLE RESPONSIBLE CONSUMPTION
Students' awareness about the importance of empowering local resources is increased

EMPOWER LOCAL RESOURCES
Meal are prepared using local and biological food

RESOURCES REDUCTION
The meals preordering permits to cook only the needed meals, avoiding the production of food in eccesso

CONSERVATION BIOCOMPATIBILITY
Meals are delivered using zero emissions vehicles

"GREENMeal"

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5. SUSTAINABILITY DESIGN-ORIENTING TOOLKIT

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SUSTAINABILITY DESIGN-ORIENTING (SDO) TOOL

SCOPE

orientate system design process towards sustainable solutions (environmental, socio-ethical, economic)

WHAT IS:

a modular software toolkit supporting the following processes:

- A: identify priorities of sustainability criteria/guidelines (qualitative analysis of existing system)
- B: identify existing sustainable options (best practices analysis)
- C: generate sustainability-focused idea
- D: check/visualise sustainability improvement/worsening of developed concept/s

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SDO STRUCTURE:
SUSTAINABILITY DIMENSIONS<CRITERIA<GUIDELINES

sustainability principles	dimensions *distinguished areas*	criteria *designer-BRIDGE-analys*	guidelines (2 levels) *addressing potential improvement*
future generation *environmental preservation* *social equity and cohesion* *economic prosperity*	environmental	criteria 1 *(e.g. transportation reduction)*	• guideline *(e.g. on-site production/assembly)* • guideline *(e.g. use local resources)* • ...
		criteria 2 *(e.g. system life optim.)*	• ...
		... criteria 3-6	• ...
	socio-ethical	... criteria 1-6	• ...
	economic	... criteria 1-6	• ...

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ENVIRONMENTAL CRITERIA (GUIDELINES)

to suggest system eco-efficency
(stakeholder innovative interactions)

. system life optimisation
. transportation/distribution reduction
. resources reduction
. waste minimisation/valorisation
. conservation/biocompatibility
. toxic reduction

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SOCIO-ETHIC CRITERIA (GUIDELINES)

to suggest system social equity and cohesion (stakeholder innovative interactions)

. improve employment/working conditions
. increase equity and justice in relation to stakeholders
. enable responsible/sustainable consumption
. favour/integrate the weak and marginalized
. improve social cohesion
. empower/enhance local resources

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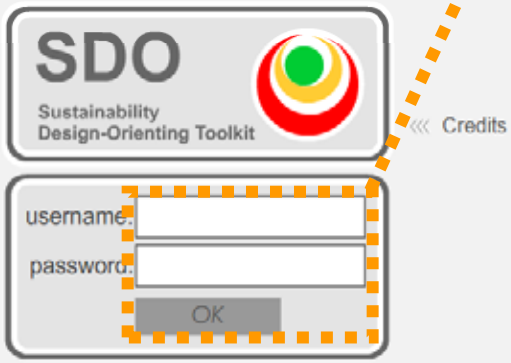
0. LOGIN

[if requested]
to start type:
username and password
and click on OK



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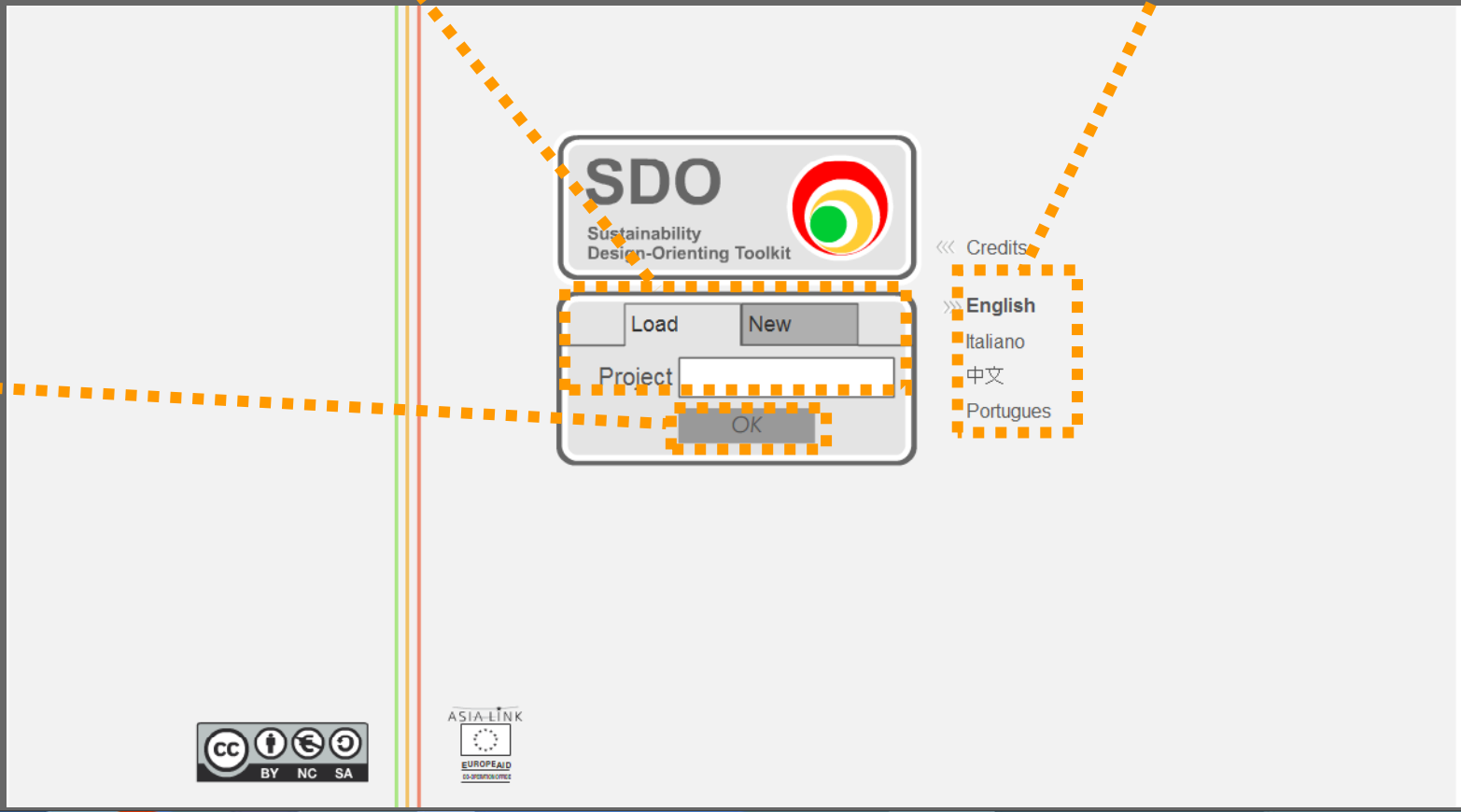
0. LOAD/NEW PROJECT

select a language

type projct name to be loaded (if existing) or created (if new)

click on OK



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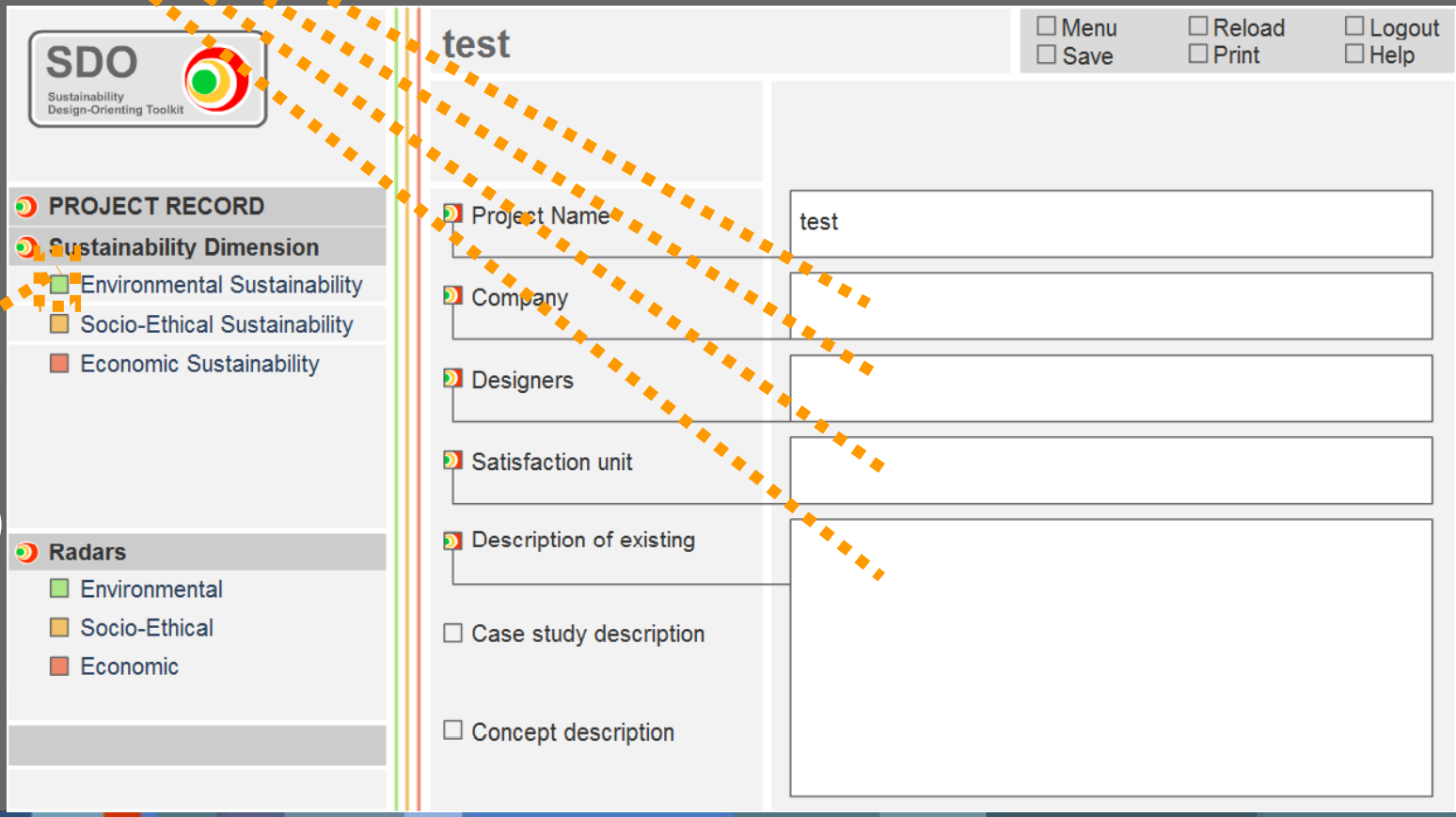
0. STARTING DATA (MENÙ)

fields to be filled

select the sustainability dimension to work on and click (e.g. environmen.)



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A. ENVIRONMENTAL/SUSTAINABILITY PRIORITIES DEF.

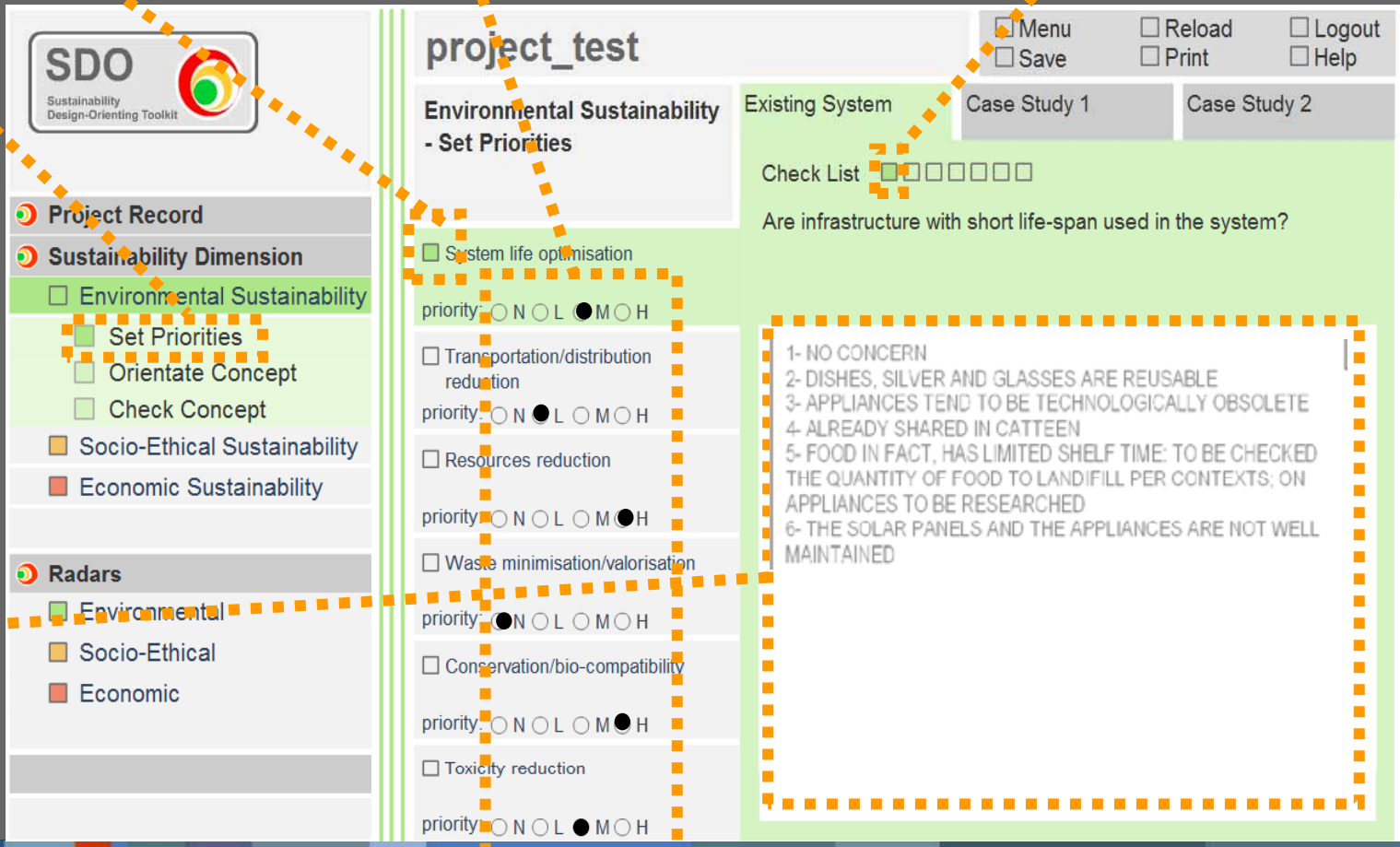
select a criterion

define priorities

visualise one by one the evaluation checklists (for each critera)

cliclk on set priotities

write answers (one for each checklist of each critera)



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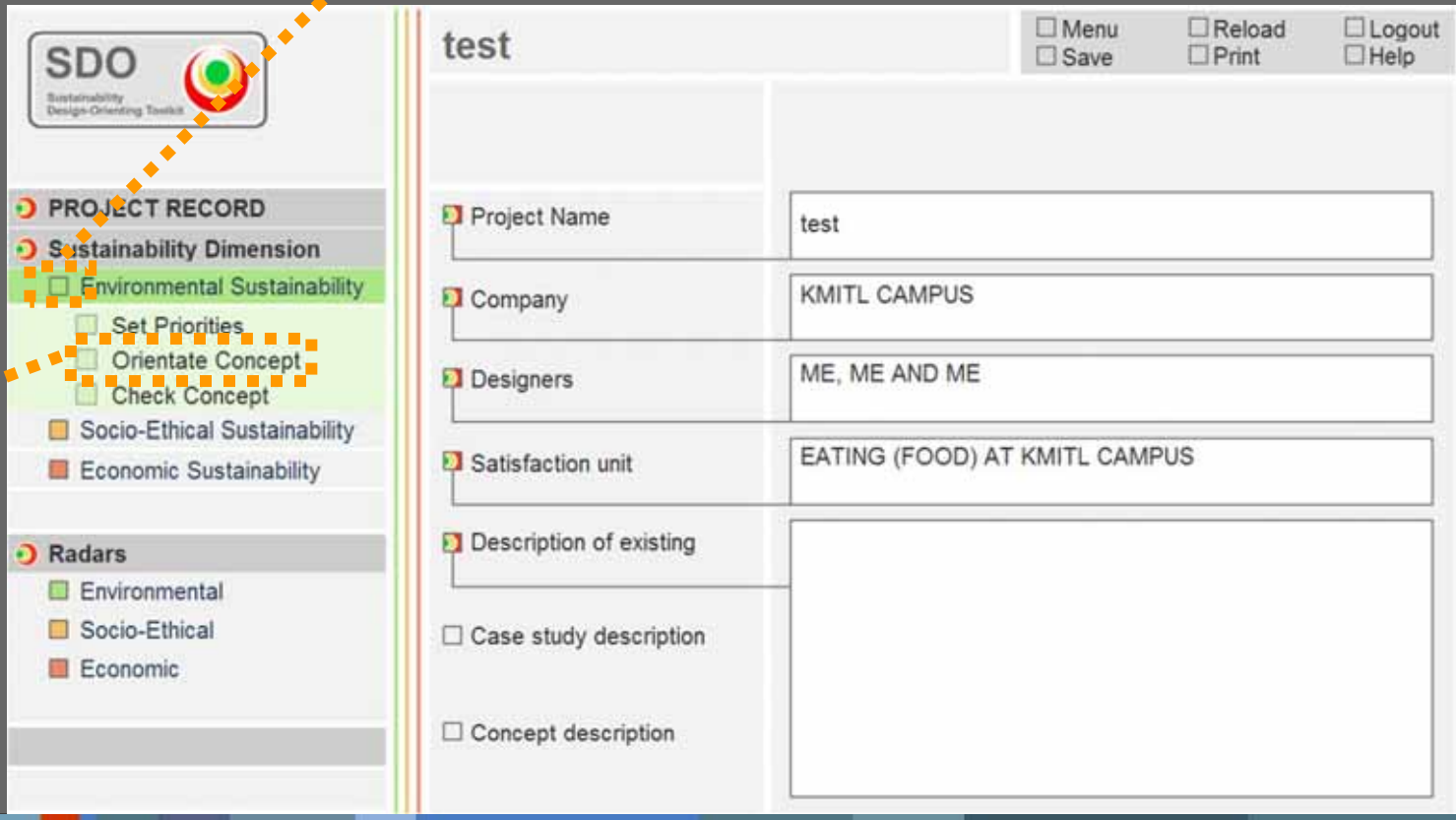
C. GENERATE “SUSTAINABLE IDEAS” BY BRAINSTORM.

cliclk on the sustainability dimension (e.g. environmental)

cliclk on orientate concept



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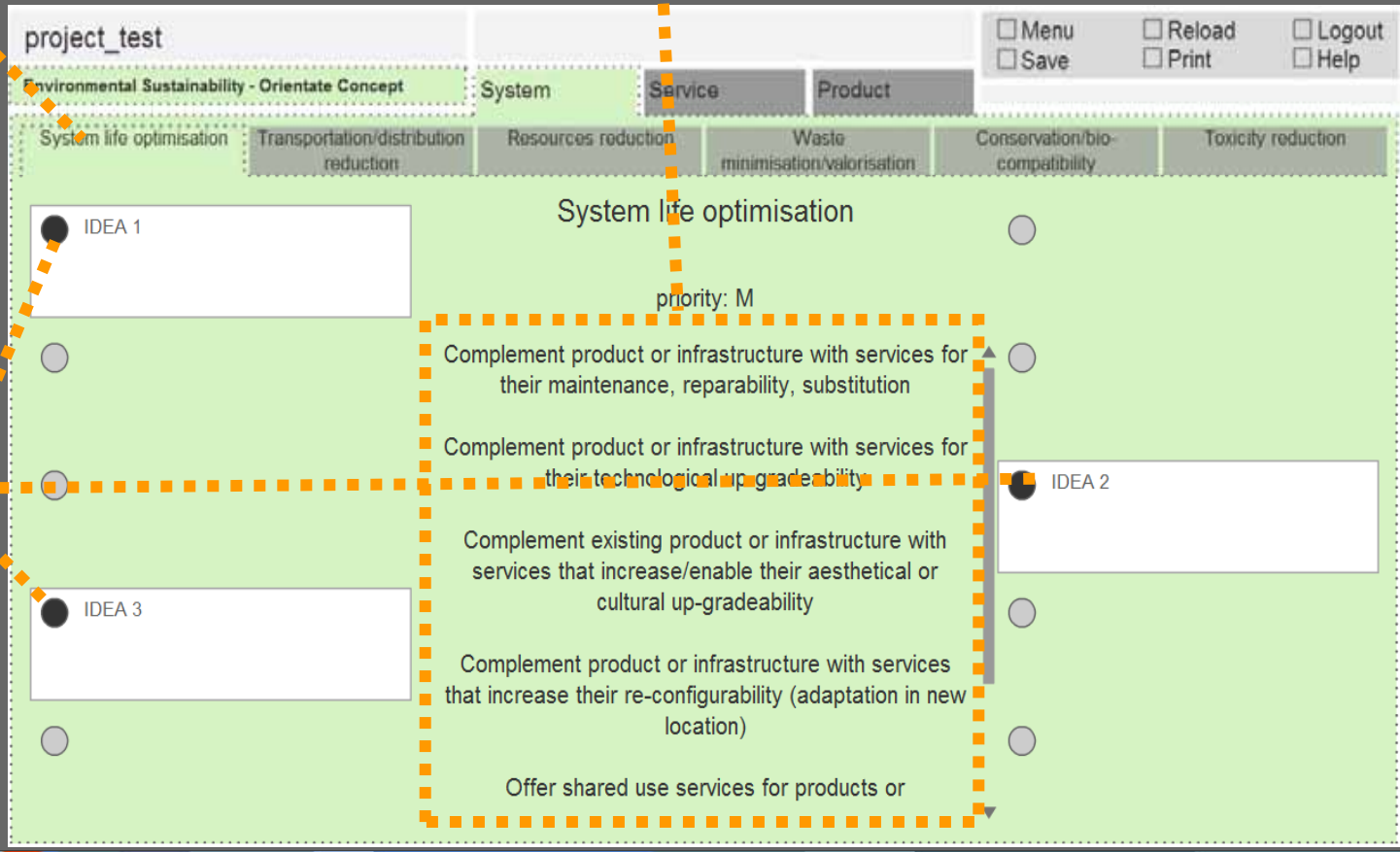
C. GENERATE “SUSTAINABLE IDEAS” BY BRAINSTORM.

select one of the idea table starting form those with higher prioriitiies (one for each criteria)

read the guidelinees at the system level (one for each critaeria)

click on the button and type emerged ideas



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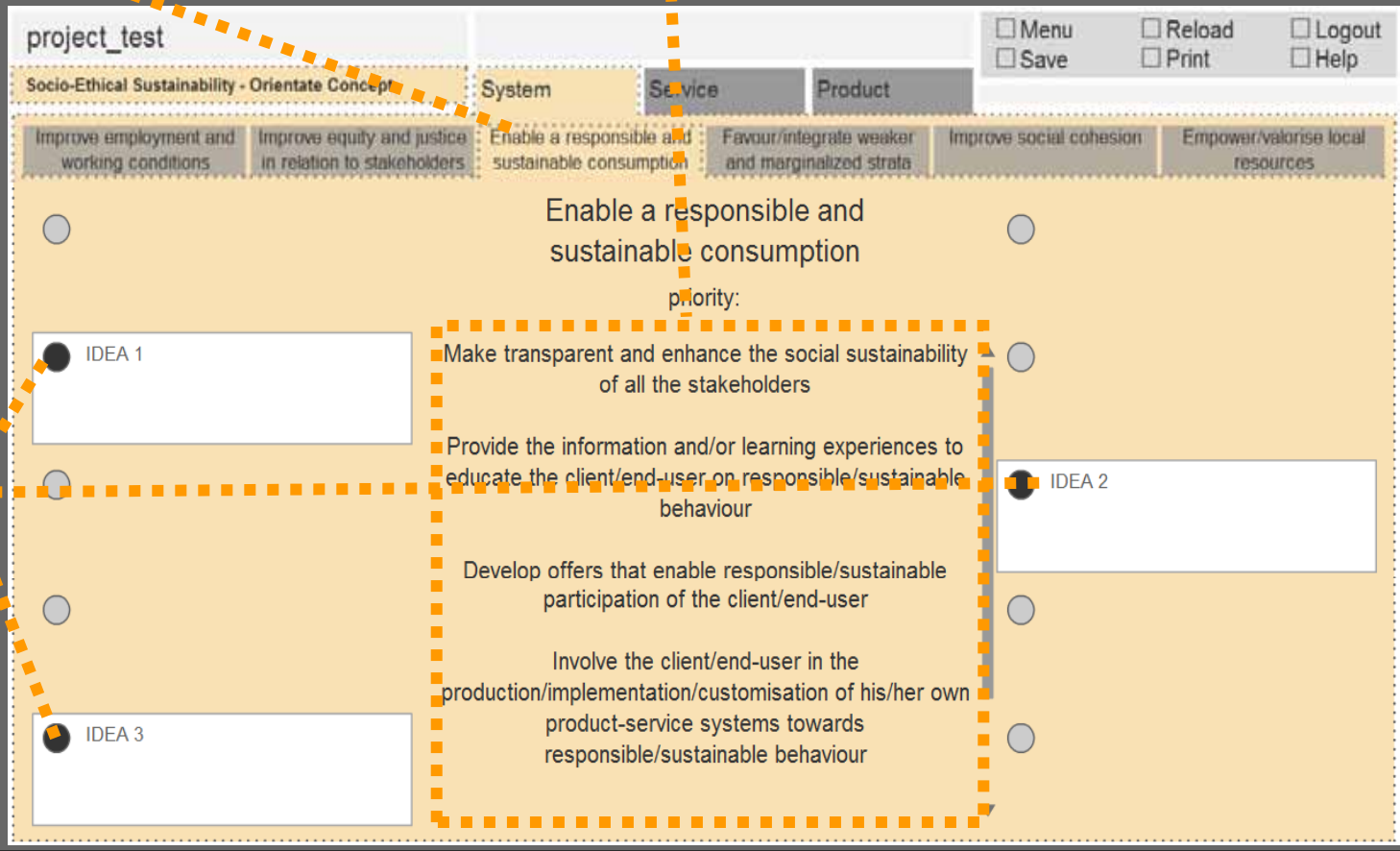
C. GENERATE “SUSTAINABLE IDEAS” BY BRAINSTORM.

select one of the idea table (one for each criteria)

read the guidelinees at the system level (one for each critaeria)

click on the button and type emerged ideas



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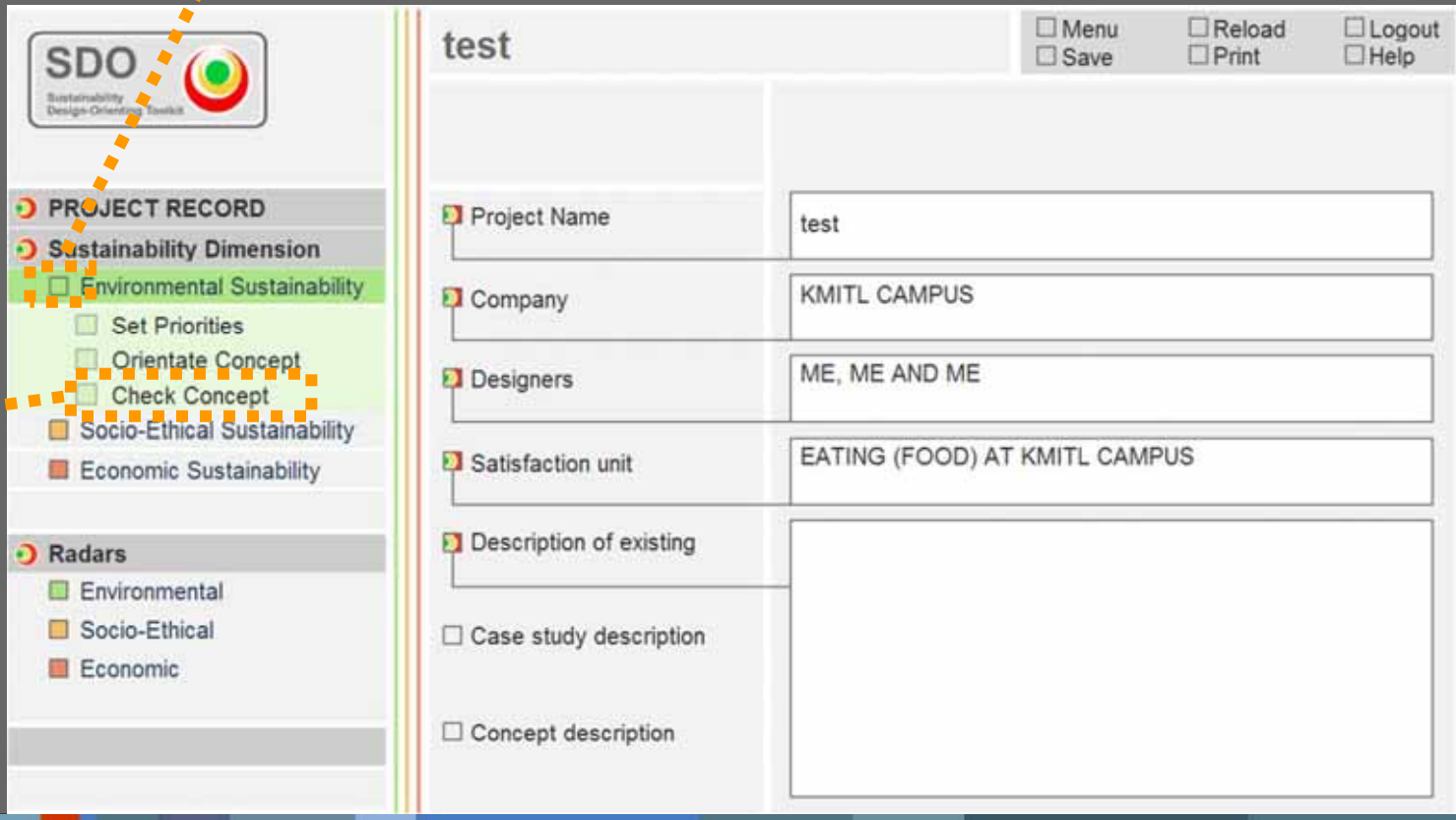
D. SUSTAINABILITY CHECK OF IN PROGRESS SYSTEM CONCEPT

cliclk on sustainability dimension (e.g. environmental)

cliclk on check concept



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D. CHECK IN PROGRESS SYSTEM CONCEPT

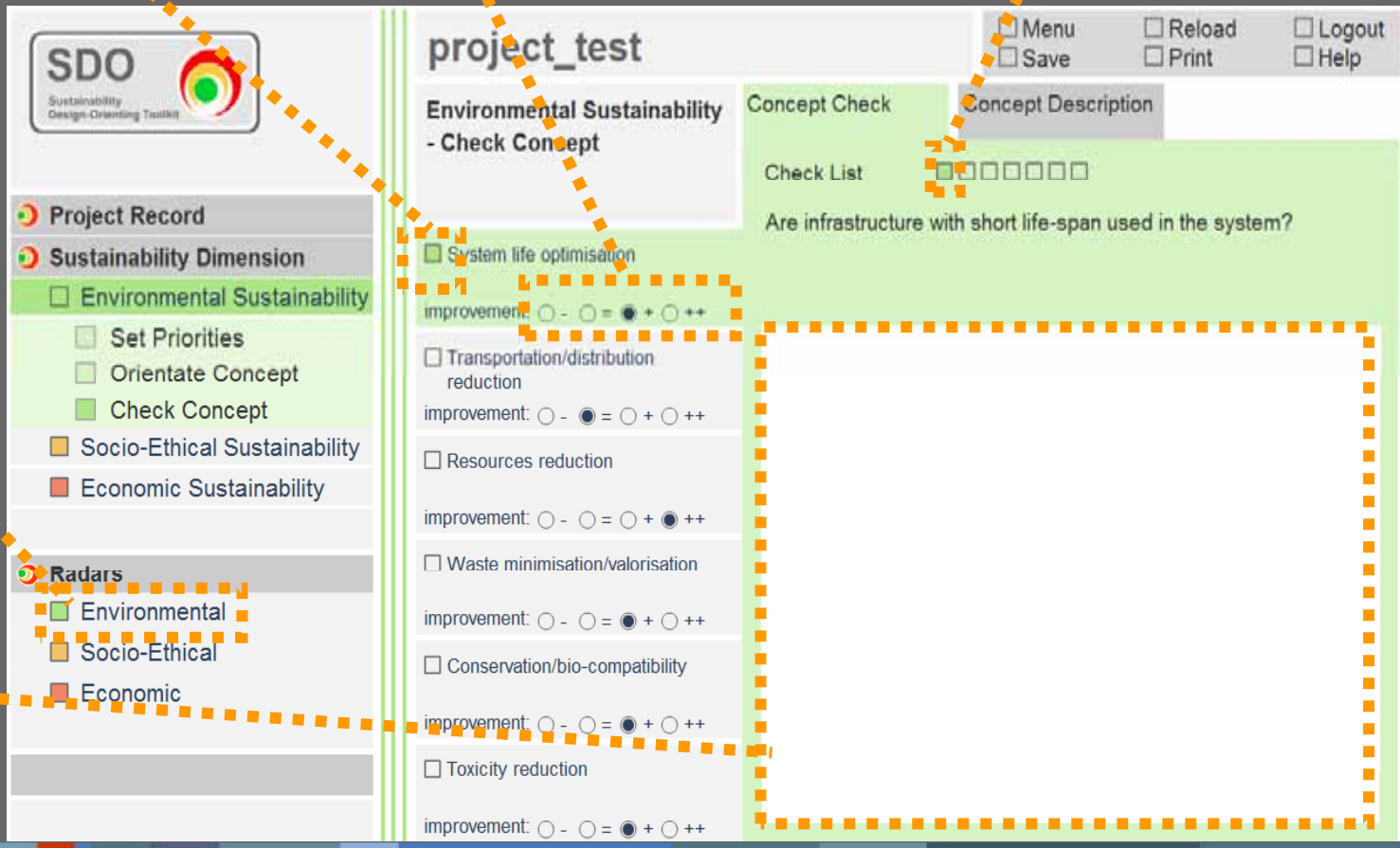
select a criterion

define improvement

visualise one by one the evaluation checklists (for each critera)

Radar env.

write answers (for each checklist of each criteria)



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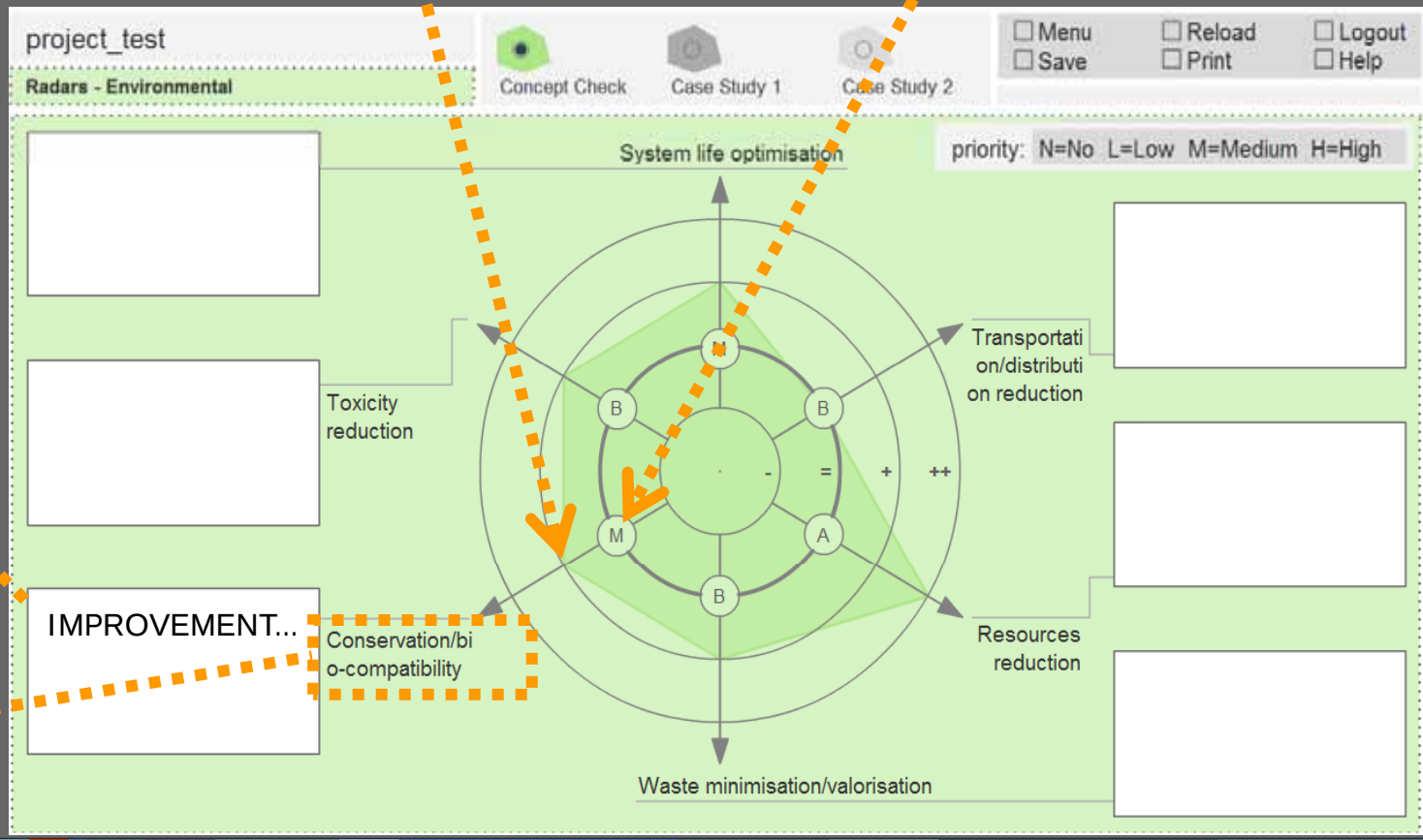
D. VISUALISE IN PROGRESS SYSTEM CONCEPT

priority of existing system (e.g. Medium)

concept improvement (e.g. +)

type text synthethising improvement

for each criterion (sust. dimension)



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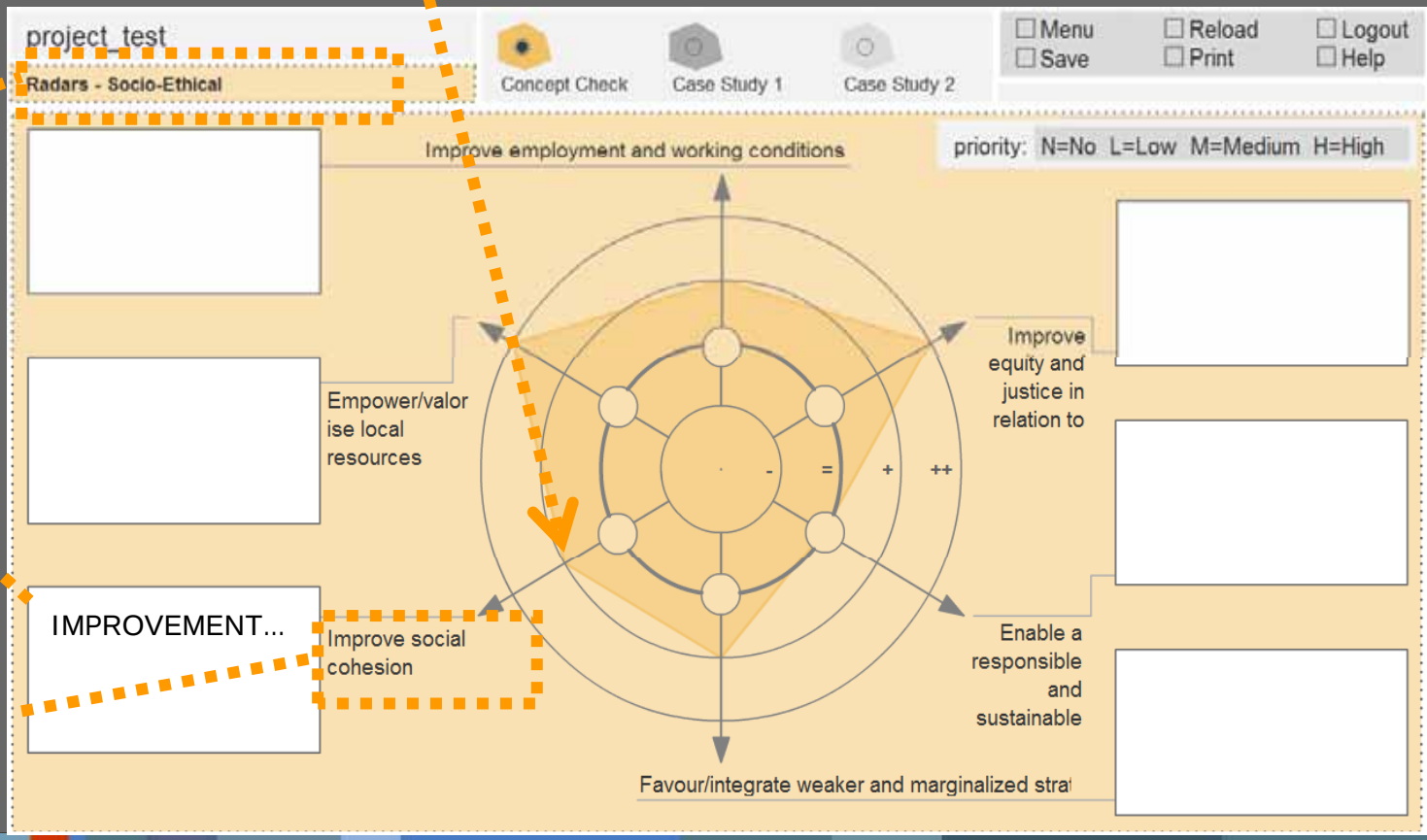
D. VISUALISE IN PROGRESS SYSTEM CONCEPT

concept improvement
(e.g. +)

per other sustanibility dimension, e.g. socio-ethical

type text synthethising improvement

for each criterion (sust. dimension)



SDO

integration in the design process

per each sustainability dimension increasing the detail level

A: priorities sustain. criteria/guidelines

[tool: checklist/existing system]

B: analysis of sustainab. best practices

[tool: checklist/case study; radars]

C: sustainability-focused idea generation

[tool: idea tables + guidelines]

D:sustainab. improv. check/visualisat.

[tool: checklist/concept; radars]

STRATEGIC ANALYSIS

- ANALYSIS OF THE PROJECT PROMOTERS
- ANALYSIS OF THE REFERENCE CONTEXT
- ANALYSIS OF THE REFERENCE STRUCTURE
- ANALYSIS OF BEST PRACTICES
- DEFINITION OF SUSTAINABILITY DESIGN PRIORITIES

EXPLORING OPPORTUNITIES

- IDEAS GENERATION ORIENTED TO SUSTAINABILITY
- DEVELEPMENT OF THE SUSTAINABILITY DESIGN ORIENTING SCENARIO - VISIONS/CLUSTERS/IDEAS

SYSTEM CONCEPT DESIGN

- VISIONS, CLUSTERS AND IDEAS SELECTION
- SYSTEM CONCEPT DEVELOPMENT
- ENV, SOCIO-ET. & ECON. CHECK/VISUALISATION

SYSTEM DESIGN (AND ENGIN.)

- SYSTEM DEVELOPMENT (EXECUTIVE LEVEL)
- ENV, SOCIO-ET. & ECON. CHECK/VISUALISATION

COMMUNICATION

- MULTIMEDIA REPORTING: OVERALL QUALITIES
- MULTIMEDIA REPORTING: STAINABILITY QUALITIES

SUSTAINABILITY DESIGN-ORIENTING (SDO)

TOOL AVAILABILITY:

. downloadable from the tool section of www.lens.polimi.it for local installation

. usable on-line at www.sdo-lens.polimi.it

. open source and copy left (admin section to change and/or texts, e.g. criteria, guidelines, checklists, etc.)

. languages on-line: english, italian, portughese, chinese, spanish

6. (STAKEHOLDER) SYSTEM MAP

(STAKEHOLDER) SYSTEM MAP

AIM:

to visualise (to design and co-design) the configuration of the system

WHAT IT CONSISTS OF:

a graphical representation containing:

> stakeholders involved

> flows/interactions: physical, financial informational, and labor performance

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HOW TO BUILD UP A SYSTEM MAP?

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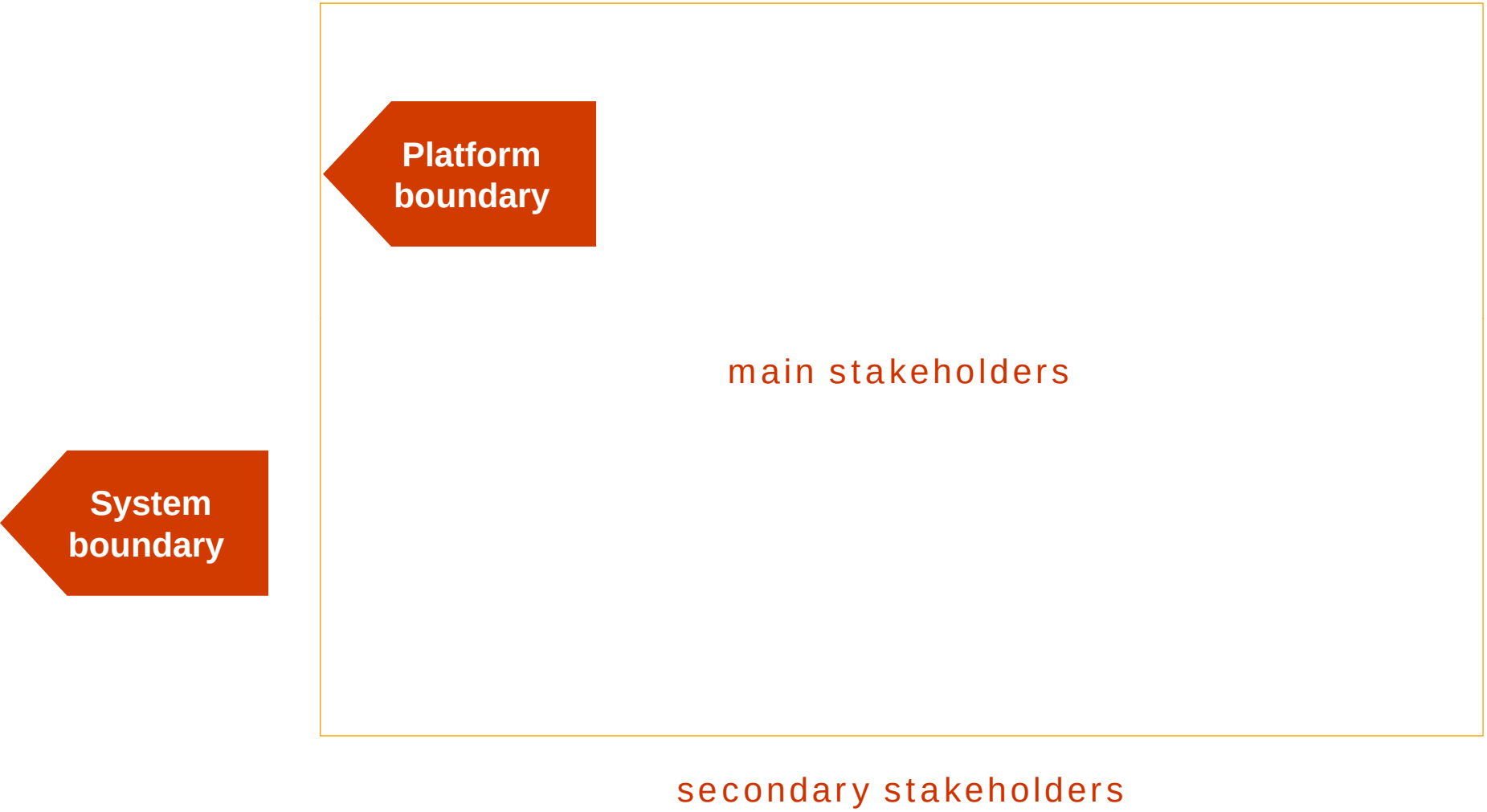
(STAKEHOLDER) SYSTEM MAP



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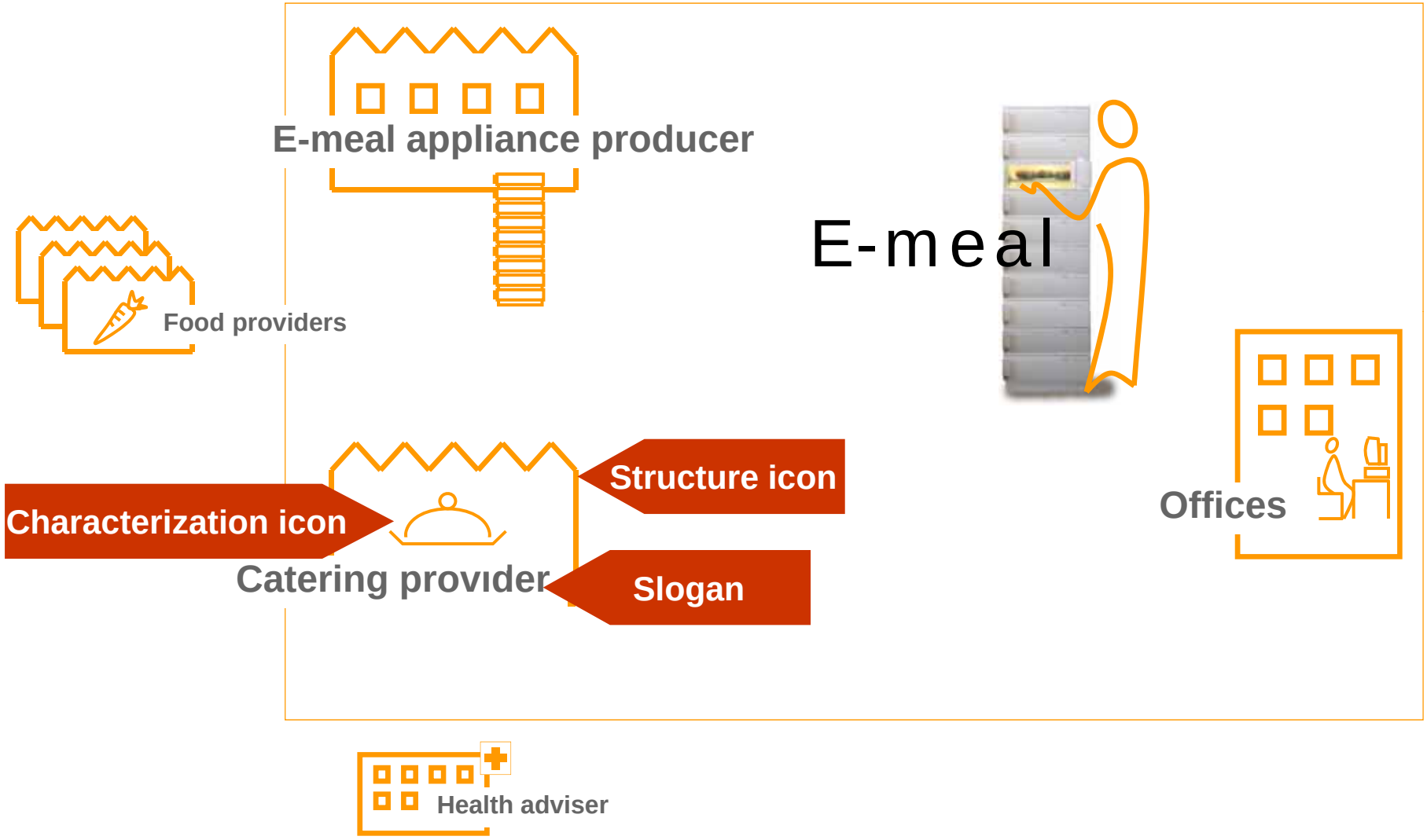
(STAKEHOLDER) SYSTEM MAP



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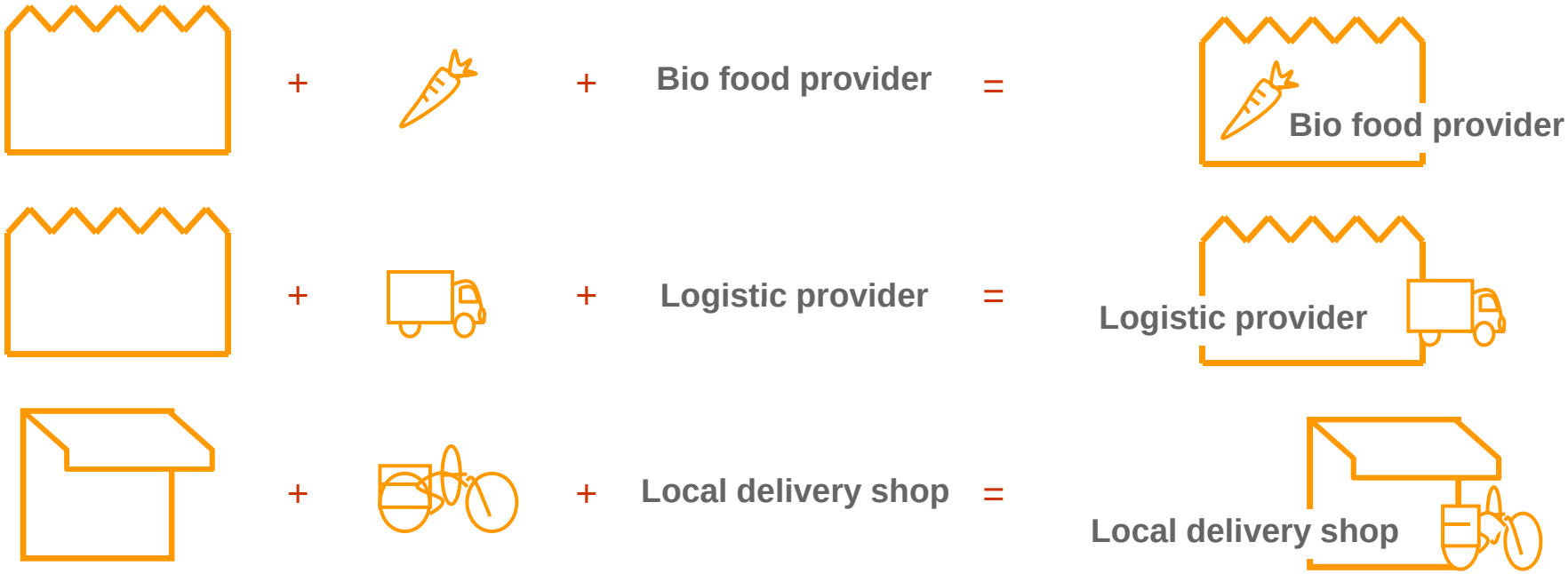
(STAKEHOLDER) SYSTEM MAP

BASIC RULE TO REPRESENT EACH STAKEHOLDER

structure + characterisation + slogan = icon



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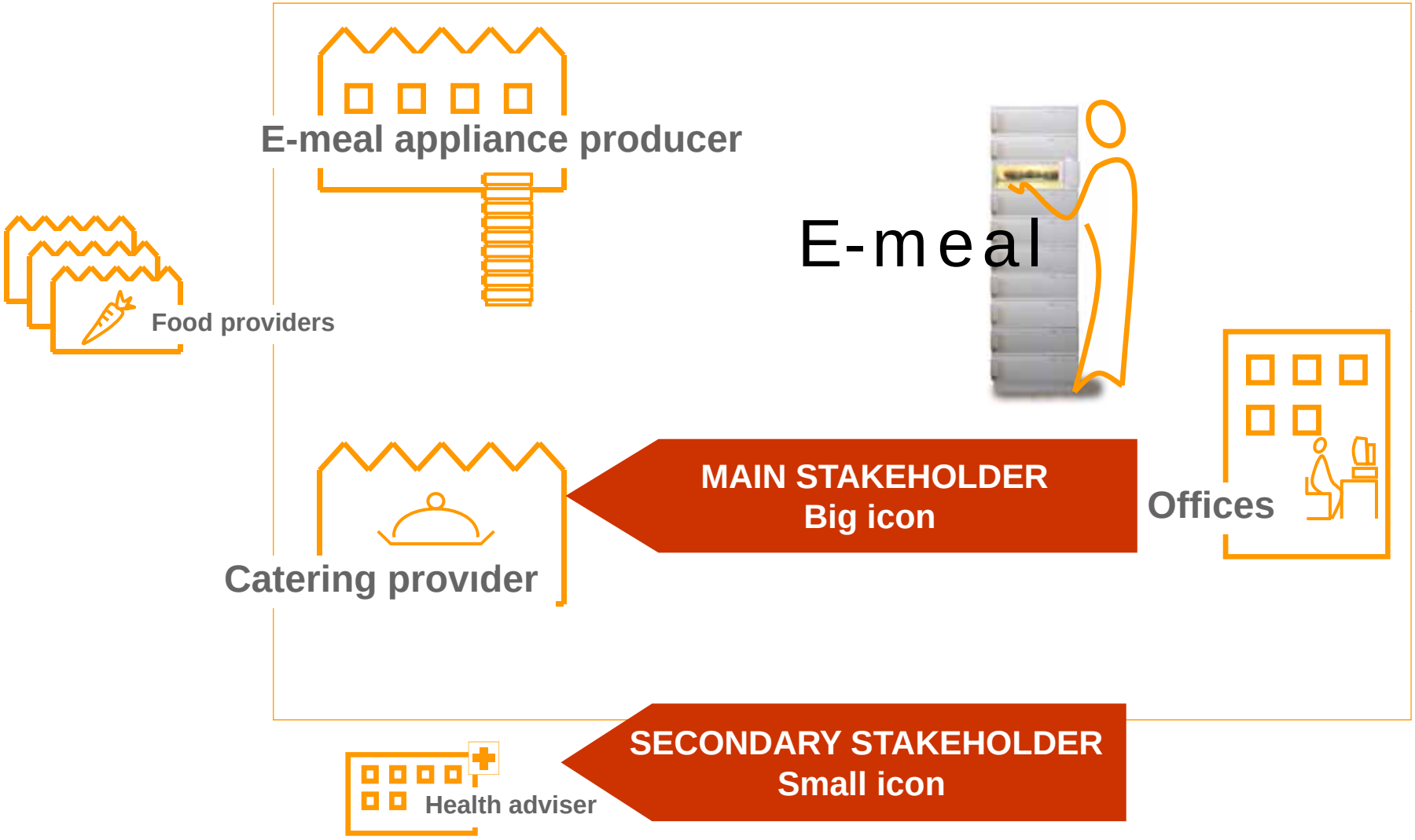
(STAKEHOLDER) SYSTEM MAP



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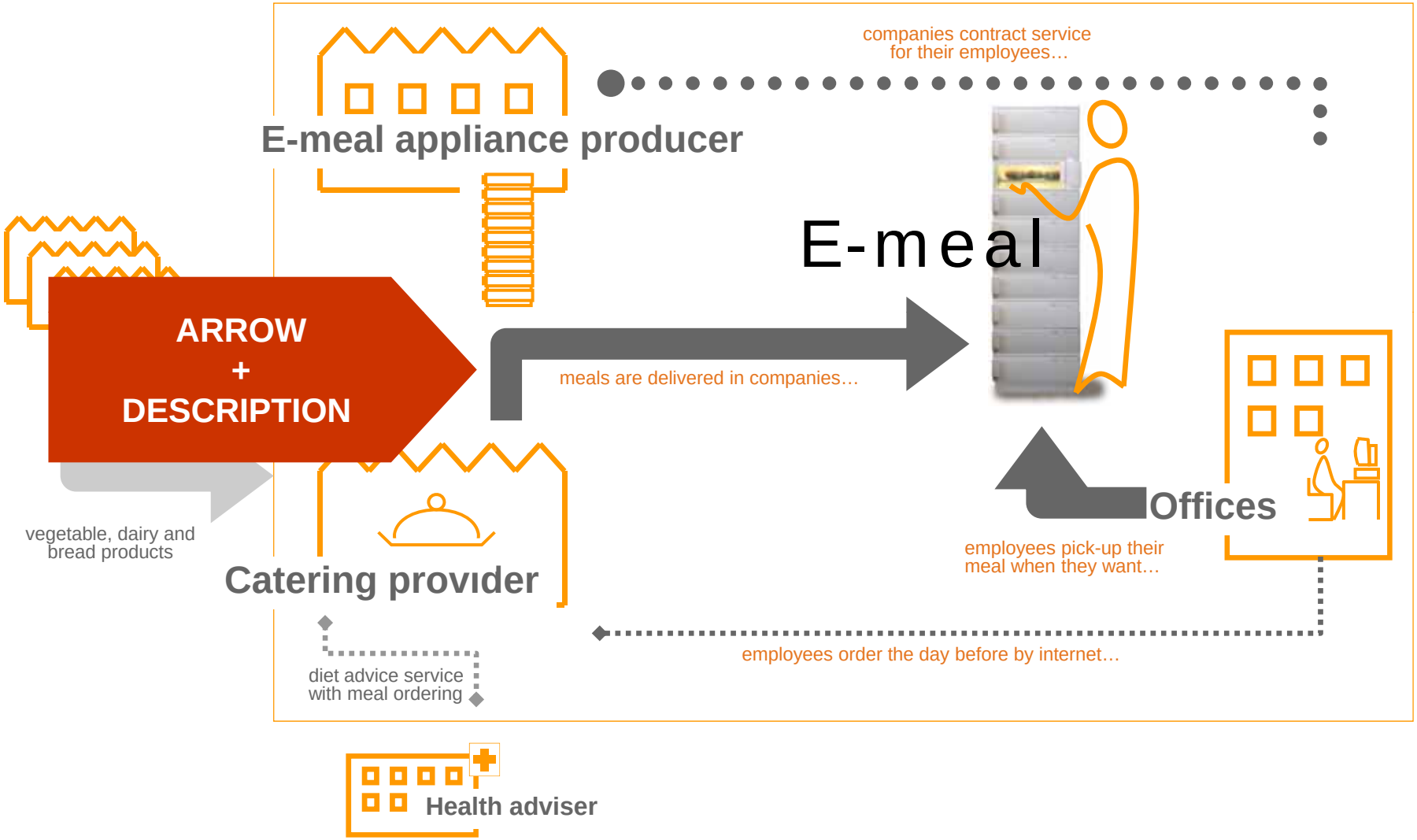
(STAKEHOLDER) SYSTEM MAP



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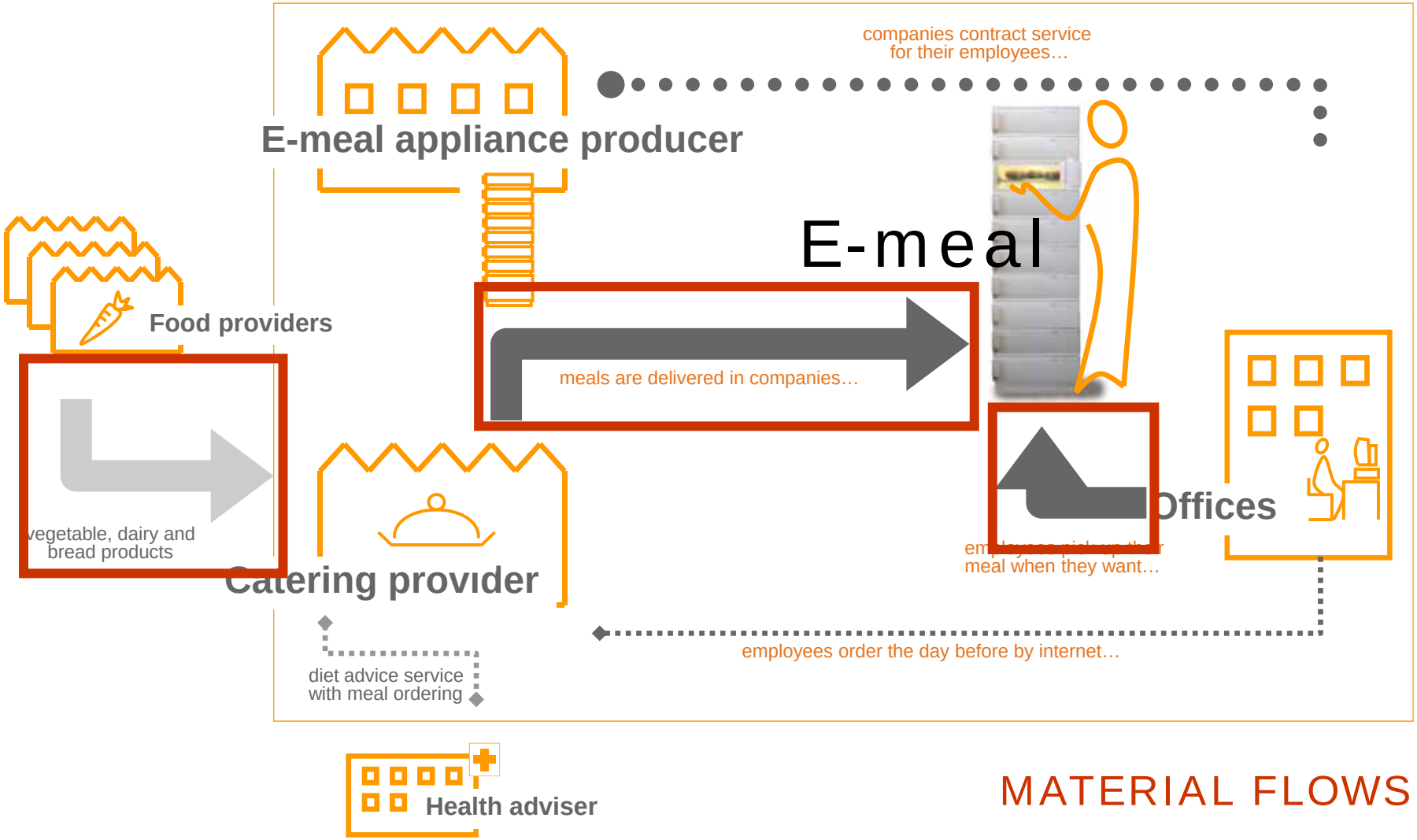
(STAKEHOLDER) SYSTEM MAP



MATERIAL FLOWS

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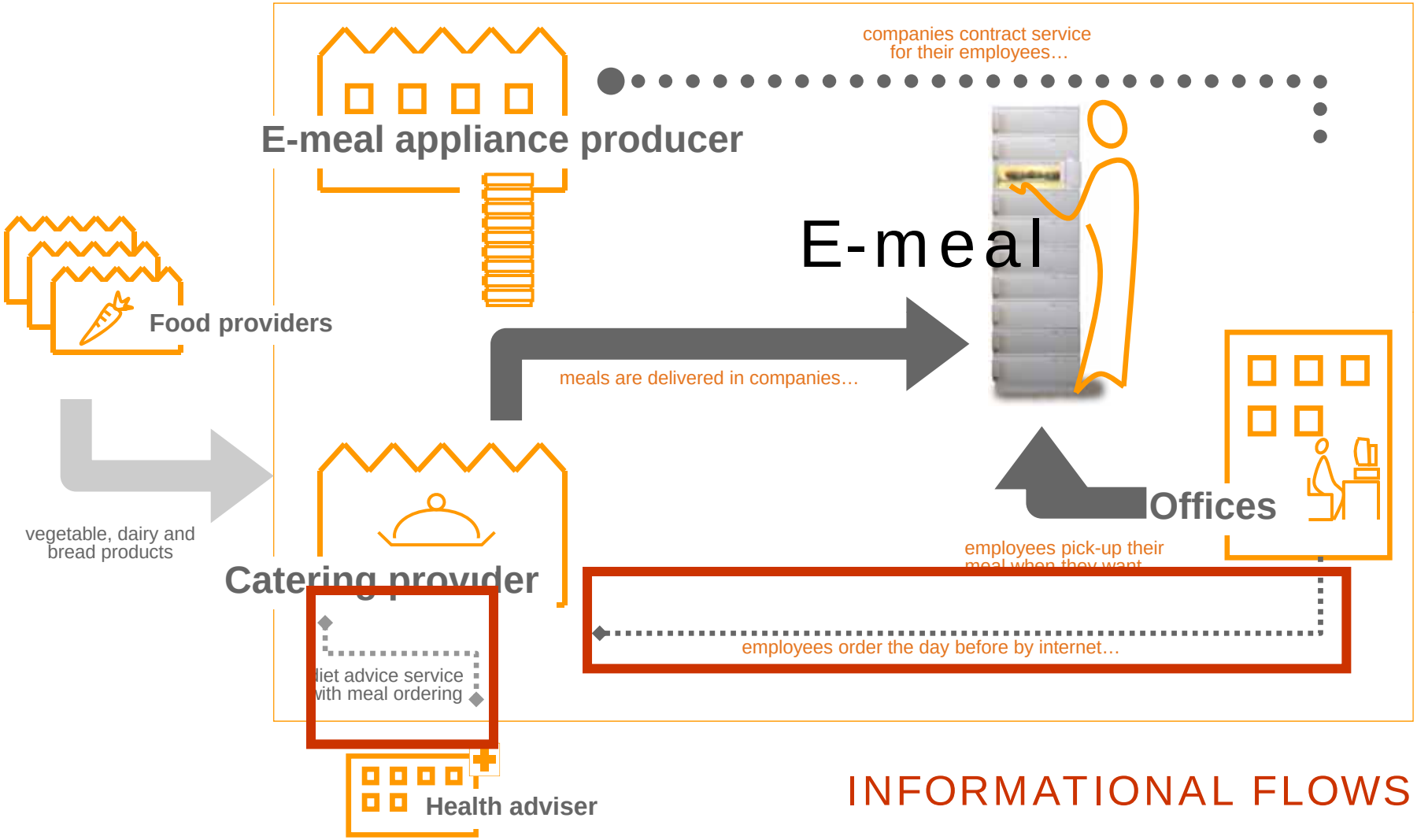
(STAKEHOLDER) SYSTEM MAP



INFORMATIONAL FLOWS

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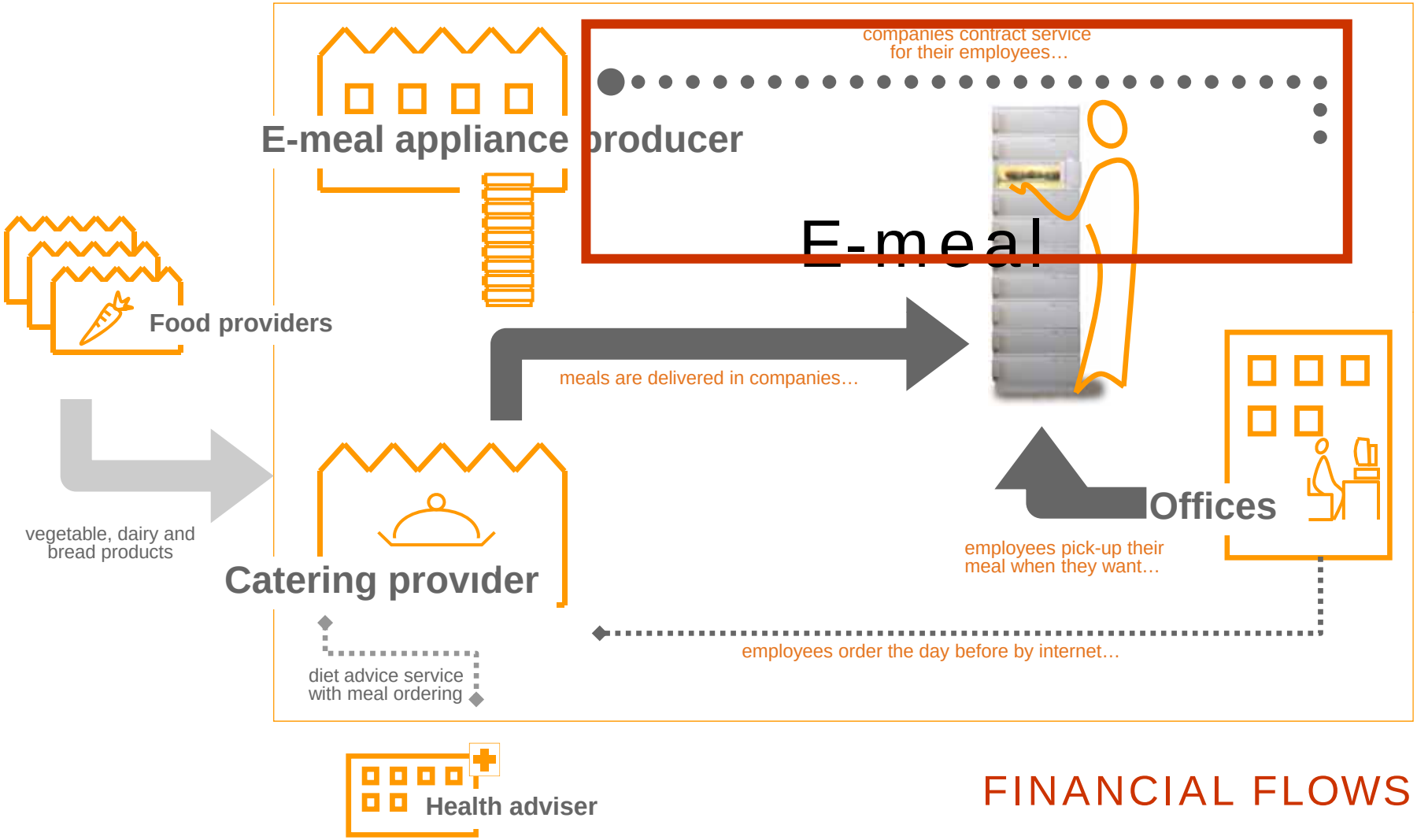
(STAKEHOLDER) SYSTEM MAP



FINANCIAL FLOWS

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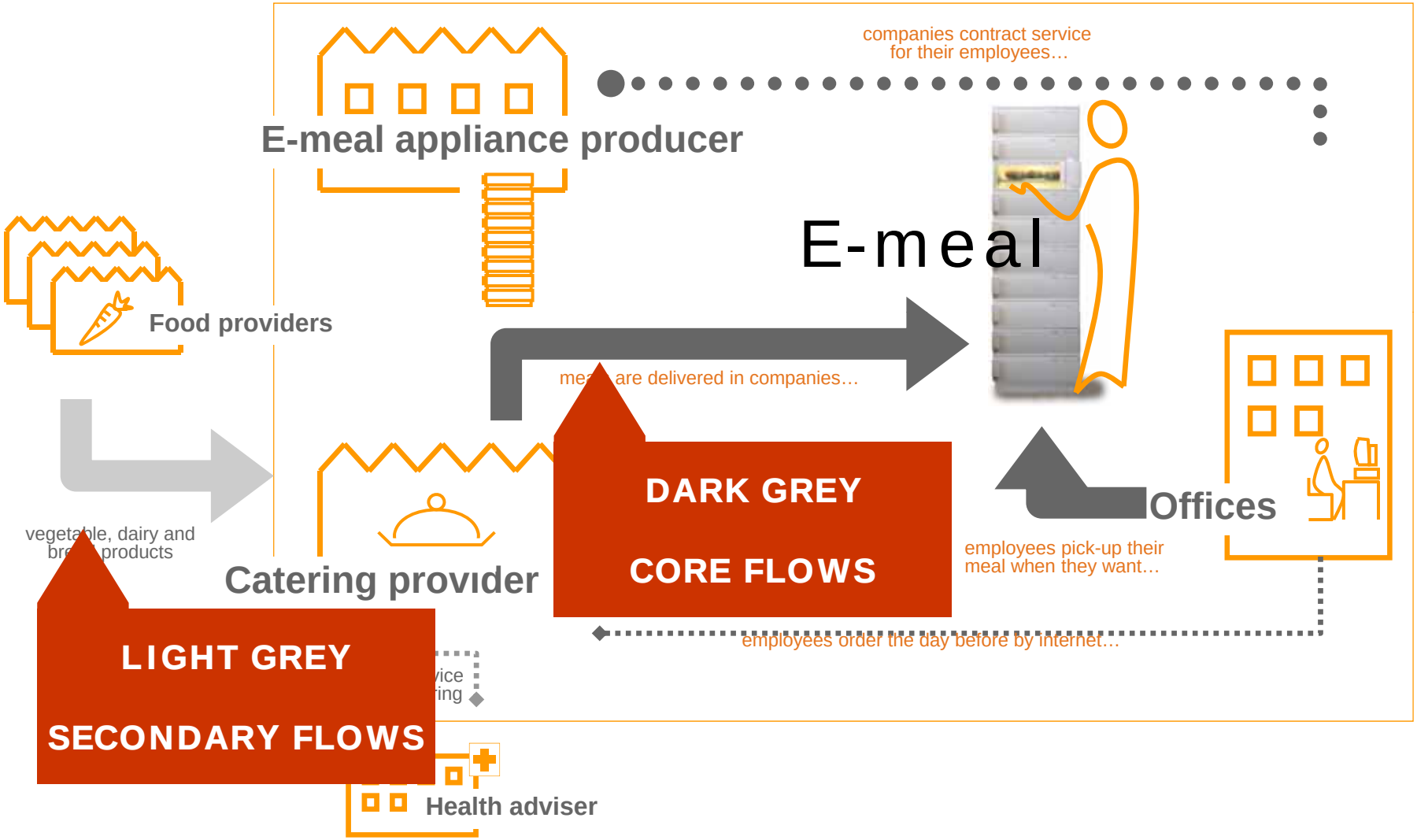
(STAKEHOLDER) SYSTEM MAP



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(STAKEHOLDER) SYSTEM MAP

companies contract service for their employees…

E-meal appliance producer

E-meal

start

Food providers

meals are delivered in companies…

vegetable, dairy and bread products

Offices

employees pick-up their meal when they want…

Catering provider

employees order the day before by internet…

diet advice service with meal ordering

Health adviser

READING ORDER

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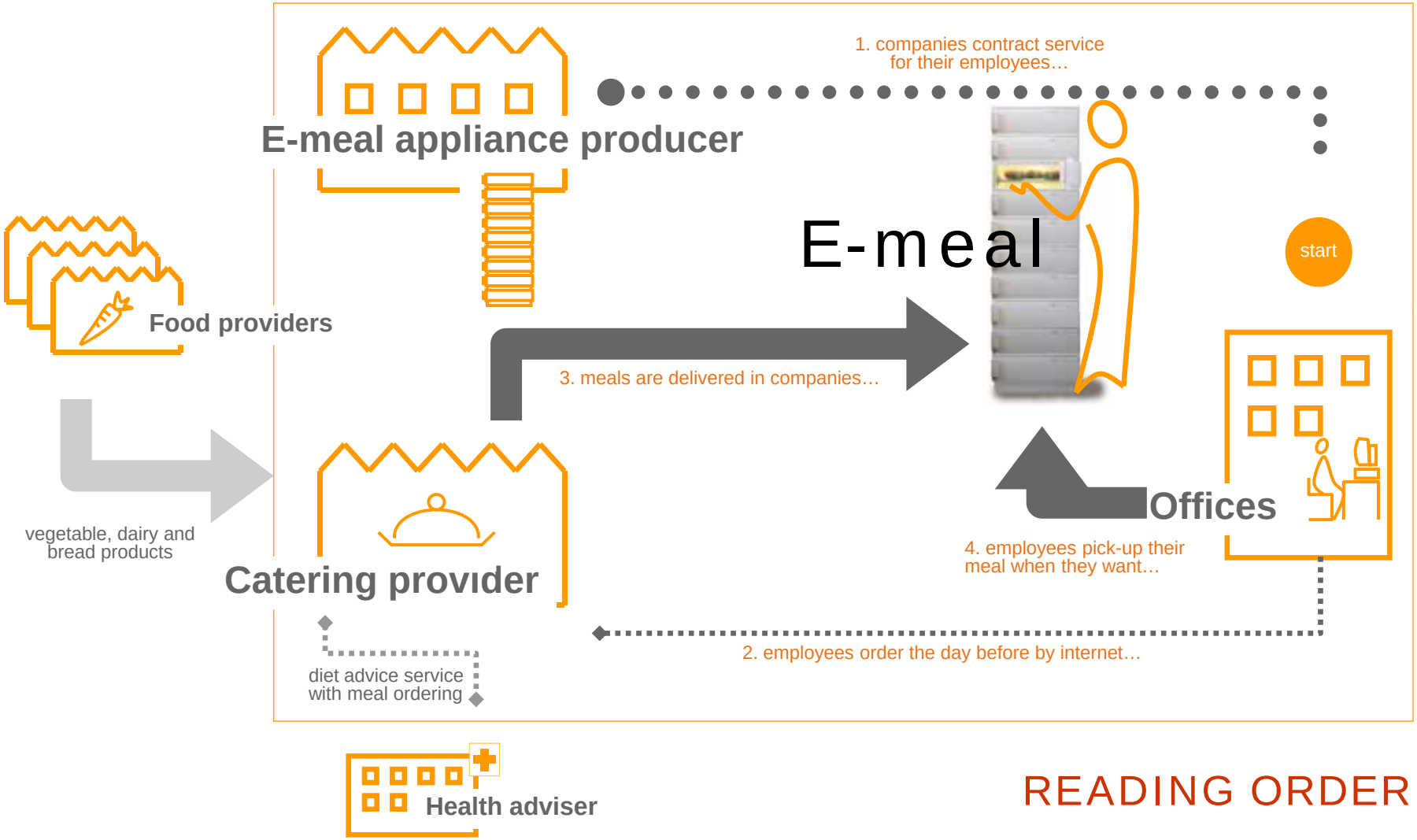
(STAKEHOLDER) SYSTEM MAP



READING ORDER

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(STAKEHOLDER) SYSTEM MAP

integration in the design process

increasing the detail level

describe the system organization related to a best practice

formalisation of the tentative system organization ideas

development of the system organization: stakeholders involved and their interactions

further development (in details) of the system organization

STRATEGIC ANALYSIS

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- ENV., SOC. & ECON. CHECK

SYSTEM DESIGN (AND ENGIN.)

- SYSTEM DEVELOPMENT (EXECUTIVE LEVEL)
- ENV., SOC. & ECON. CHECK

COMMUNICATION

- DOCUMENTS EDITING

(STAKEHOLDER) SYSTEM MAP

SOFTWARE AND OTHER SUPPORTS:

use of standardized icons built using presentation software (e.g. *open office, powerpoint*).
A basic template facilitate the construction of the System Maps in a systematic and uniform way.

. downloadable from the tool section of www.lens.polimi.it for local installation

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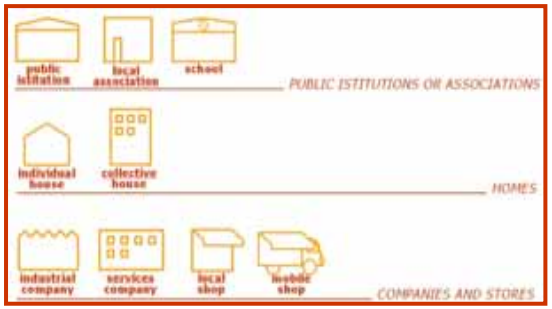
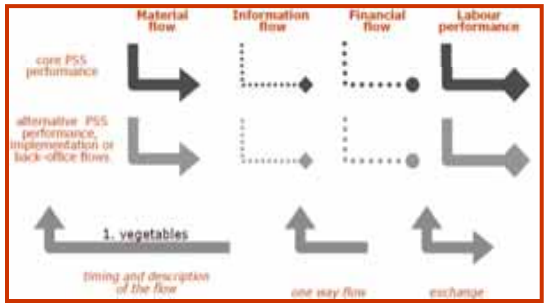
(STAKEHOLDER) SYSTEM MAP

SOFTWARE AND OTHER SUPPORTS:





COPY AND PASTE THE ELEMENTS FROM THE LIBRARIES TO THE LAYOUT

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7. PROJECTS AND CONSULTANCIES ON SYSTEM DESIGN FOR SUSTAINABILITY

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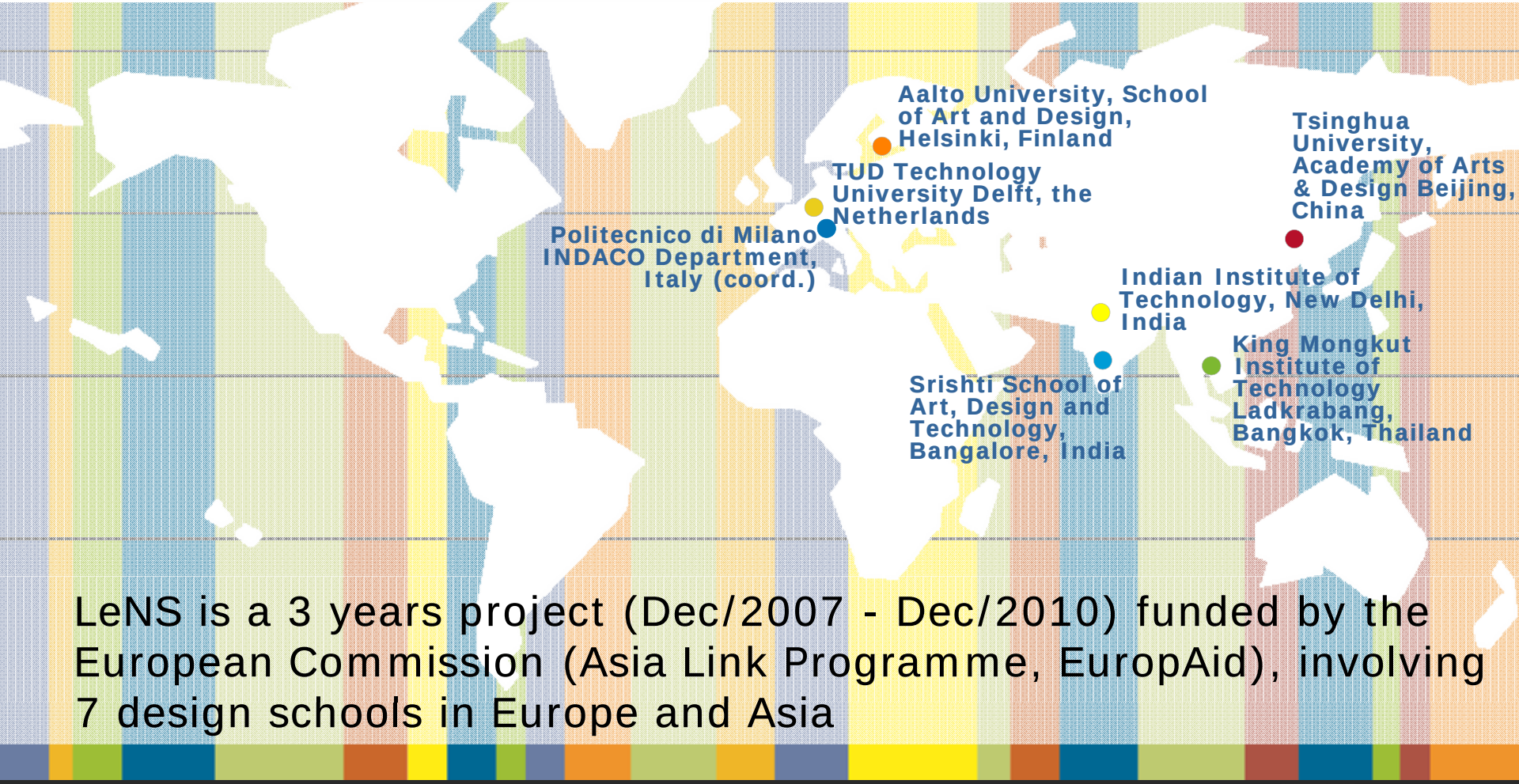
the Learning Network on Sustainability

Asian-European multi-polar network for curricula development on design for sustainability focused on product-service system innovation



LeNS is a 3 years project (Dec/2007 - Dec/2010) funded by the European Commission (Asia Link Programme, EuropAid), involving 7 design schools in Europe and Asia

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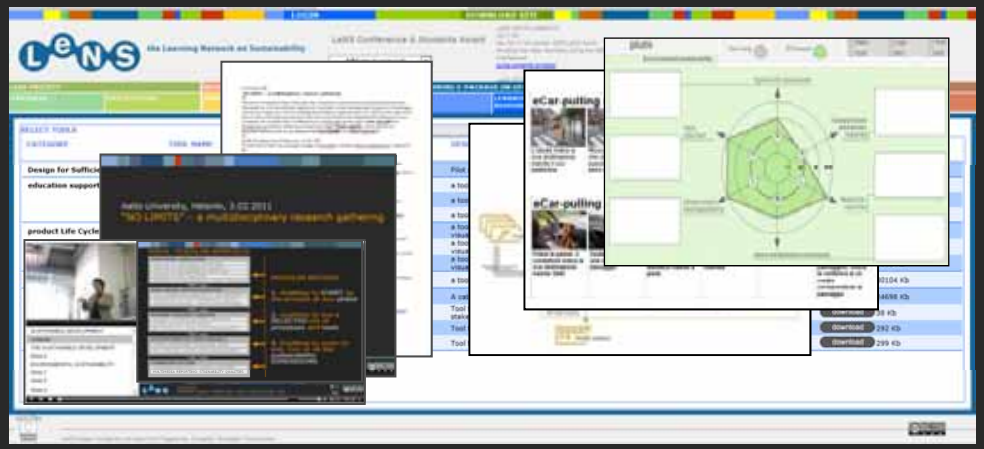
MAIN OUTPUT:

Open Learning E-Package (OLEP) on Design for Sustainability focused on Product-Service System

a web platform allowing interested teachers to freely download open source and copyleft LEARNING RESOURCES (slideshows, texts, audio-videos, etc.) and TOOLS that could be modified/remixed and reused.

LEARNING RESOURCES



TOOLS

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the Learning Network on Sustainability

Asian-European multi-polar network for curricula development on design for sustainability focused on product-service system innovation

ASIA-LINK
EUROPEAID CO-OPERATION OFFICE

world-wide multi-polar network of networks

LeNS NORTH AMERICA / PALSS
launch: 30.07.2010,
USA

LeNS EUROPE-ASIA
launch: 8.03.2008,
Milan, Italy

LeNS CENTRAL AMERICA / MEXICO
launch: 3.6.2010,
Mexico City, Mexico

LeNS AFRICA
launch: 7.09.2009,
Cape Town, South Africa

LeNS SOUTH AMERICA
Launch: 6.11.009,
Sao Paolo, Brasil

LeNS OCEANIA
launch 1.07.2010,
Sidney, Auatralia

LeNS web platform is free to download and modifiable

> regenerated / affiliated LeNS networks

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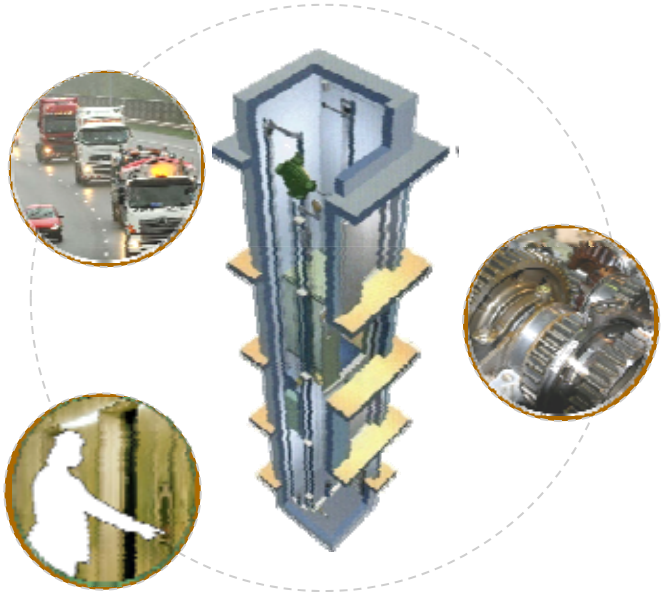


DESIGN OF ECO-EFFICIENT PSS DESIGN-ORIENTING SCENARIOS

DESIGN OF ECO-EFFICIENT PSS CONCEPTS

POLITECNICO DI MILANO

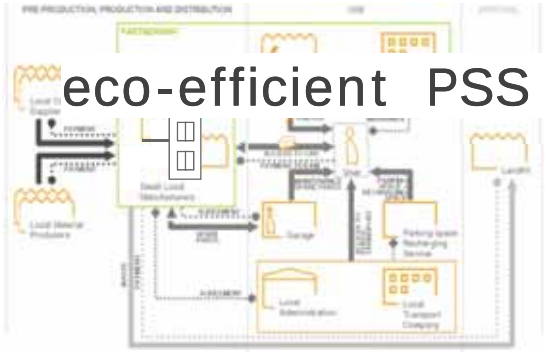
DIPARTIMENTO INDACO

UNITA' DI RICERCA DIS
Design e Innovazione di sistema per la Sostenibilità

commissioned by:

KONE

eco-efficient design orienting scenarios



eco-efficient PSS concept

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ASIA-LINK EUROPEAID CO-OPERATION OFFICE

CC BY NC SA

DESIGN OF ECO-EFFICIENT PSS SCENARIO
DESIGN OF ECO-EFFICIENT PSS CONCEPT
DESIGN OF IMPLEMENTATION STRATEGY

POLITECNICO DI MILANO

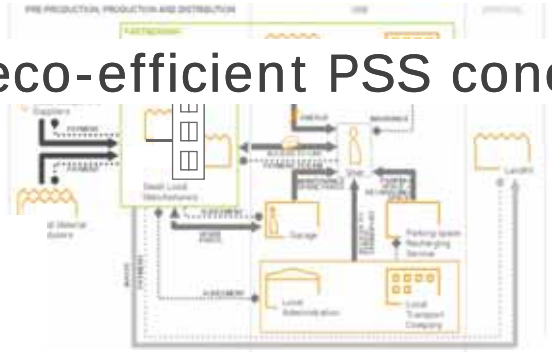
DIPARTIMENTO INDACO

UNITA' DI RICERCA DIS
Design e Innovazione di sistema per la Sostenibilità

commissioned by:

TETRA PAK

eco-efficient design orienting scenarios



eco-efficient PSS concept

transition and diffusion path

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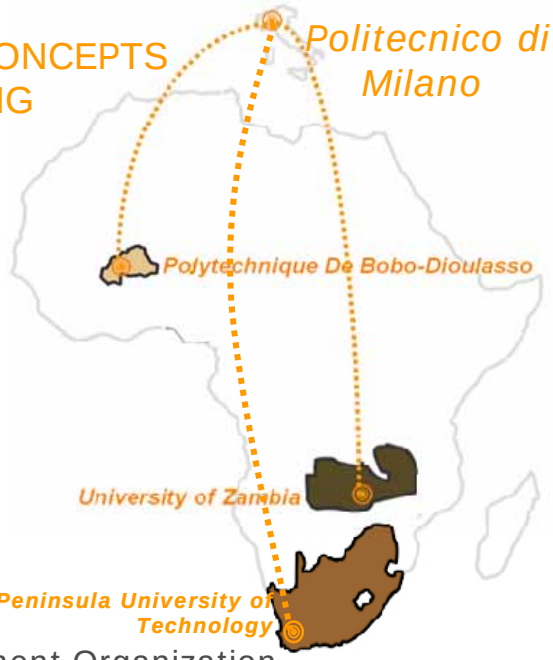
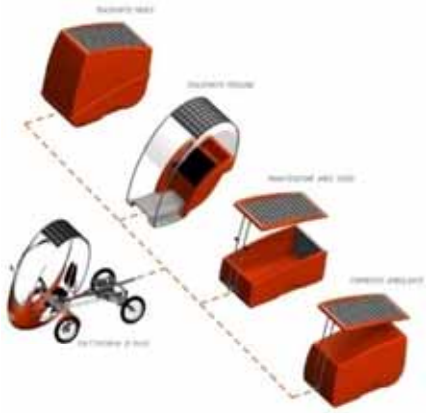
DESIGN FOR SUSTAINABLE SYSTEM CONCEPTS OF LOCALLY-BASED AND LONG LASTING MOBILITY SYSTEM FOR LOW INCOME CONTEXTS IN AFRICA

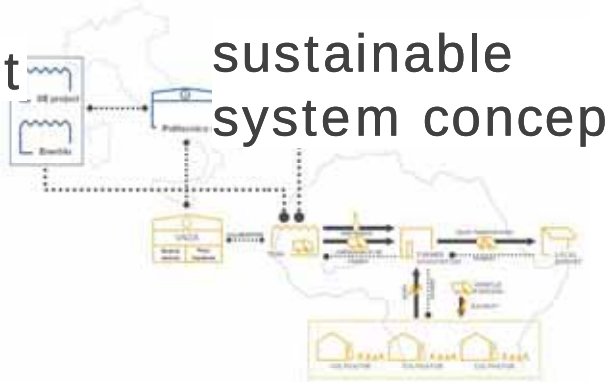
- FARKA, a system concept for drinkable water transportation in Burkina Faso;
- RASMIZ, a system concept for vegetable's transportation in Zambia
– KANGA, a system concept for disabled students transportation in South Africa.



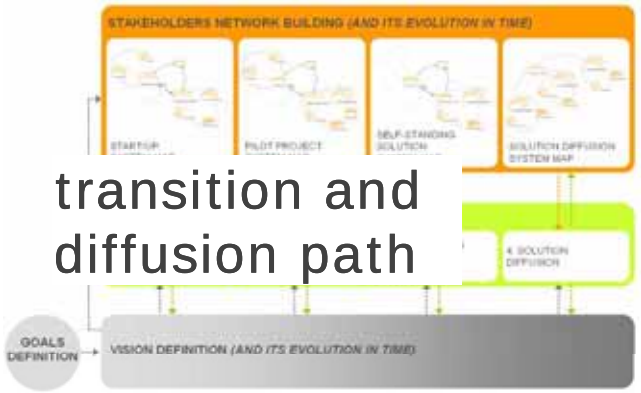


United Nations Industrial Development Organization
UNIVERSITY CHAIR OF INNOVATION

product concept



sustainable system concept



transition and diffusion path

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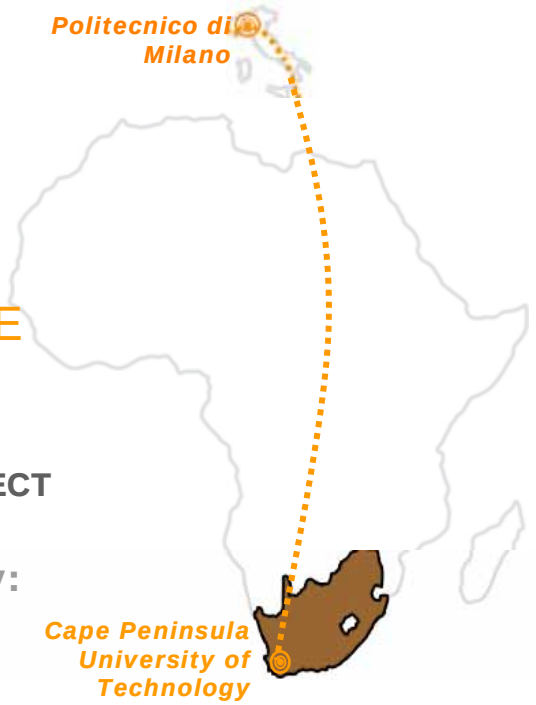
SYSTEM DESIGN AND PILOT PROJECT IMPLEMENTATION OF A SUSTAINABLE MOBILITY SYSTEM FOR THE TRANSPORTATION OF PEOPLE WITH DISABILITIES IN CAPE TOWN SUBURBS, SOUTH AFRICA



POLITECNICO DI MILANO

DIPARTIMENTO INDACO

UNITA' DI RICERCA DIS
Design e Innovazione di sistema per la Sostenibilità

IPSIA MARANELLO "A. Ferrari"

Cape Peninsula University of Technology

SHONAQUIP

IMPACT DIRECT MINISTRIES

DWDE
Disability Workshop Development Enterprise

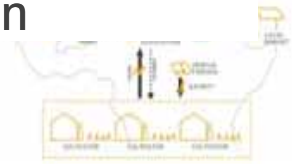
BASED ON MULO SUSTAINABLE MOBILITY PROJECT (Polimi-DIS open project)

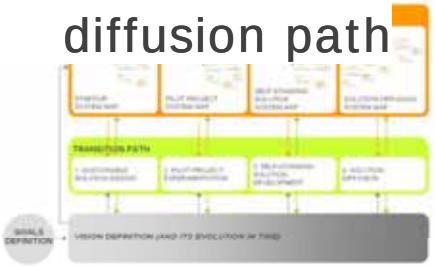
various sponsors + missions supported by:

fondazione cariplo

detailed product design

detailed system design





transition and diffusion path

pilot project implementation

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FINAL REMARKS

SHOULD WE FORGET TO DESIGN PRODUCT WITH A LOW ENVIORMENTAL IMPACT?

NO!

> even designing on a system level, environmentally sustainable product has to be designed (and we have to know how)

DESIGING ON A SYSTEM LEVEL LEAD US FAR FROM THE VERY NATURE OF DESIGN?

NO!

> designing “satisfaction” it is to go to the roots of the design very nature (taking it to the level of designing more sustainable and satisfactory life styles)

cc BY NC SA

if you want to know about POLIMI-DIS approach to
PRODUCT DESIGN FOR ENVIRONMENTAL SUSTAINABILITY

VEZZOLI, MANZINI,

DESIGN FOR ENVIRONMENTAL SUSTAINABILITY

Patronised by the United Nation (DESD)

Springer

London, 2008

Carlo Vezzoli
Politecnico di Milano / INDACO dept. / DIS / School of Design / Italy

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if you want to know more about LeNS approach to

SYSTEM DESIGN FOR SUSTAINABILITY 1/3

System Design for Sustainability

Theory, methods and tools for a sustainable "satisfaction-system" design

carlo vezzoli

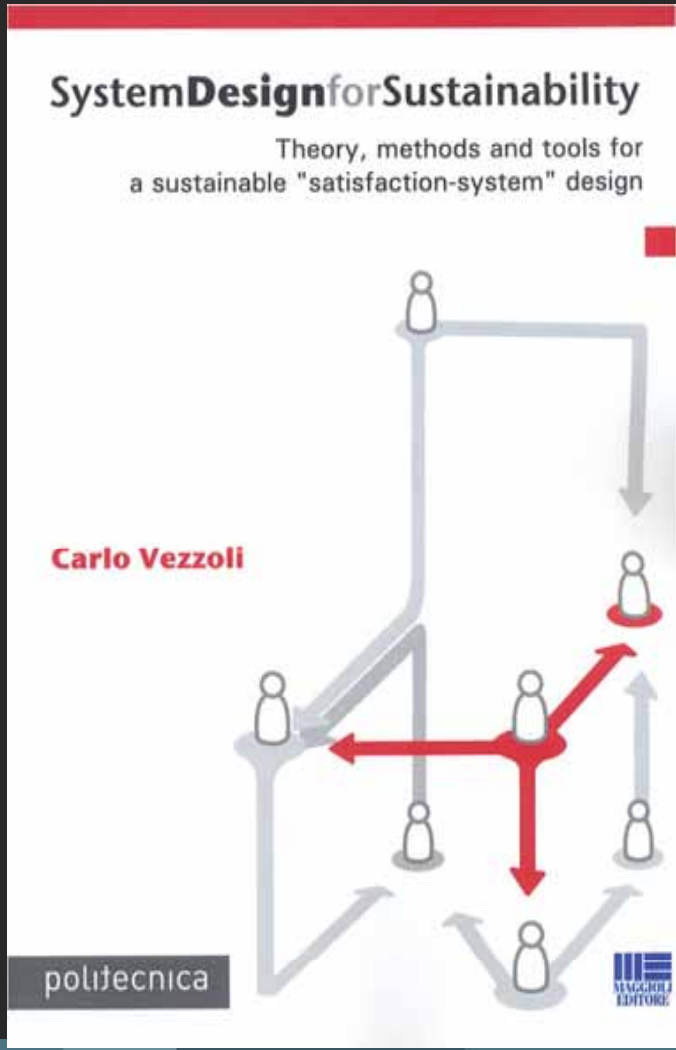
Patronised by the United Nation (DESD)

Maggioli editore

Milan, 2010

digital print

order: gcrespi@maggioli.it



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if you want to know more about LeNS approach to
SYSTEM DESIGN FOR SUSTAINABILITY 2/3

ON-LINE LEARNING RESOURCES/TOOLS

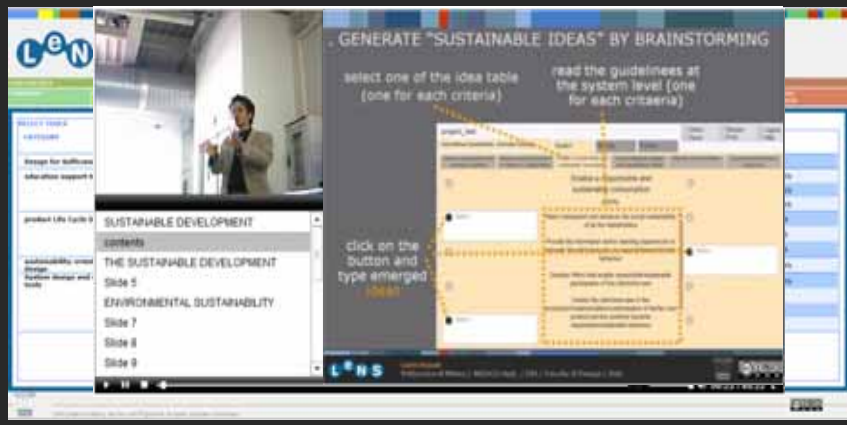
www.lens.polimi.it

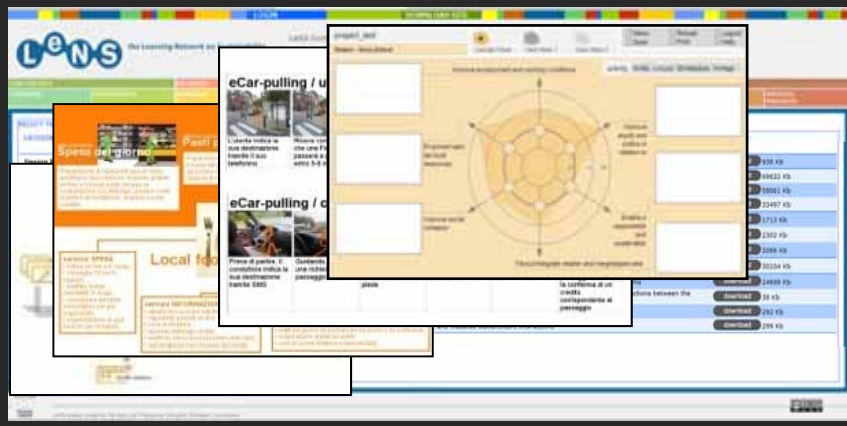
> OLEP / learning resources

- slideshows of full SDS course (vezzoli, 2010)
- video+slide of full SDS course (vezzoli, 2010)

> OLEP / tools

- SDO opensource copy left
- system map
- other MSDS tools





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if you want to know more about LeNS approach to

SYSTEM DESIGN FOR SUSTAINABILITY 3/3

Product-Service System Design for Sustainability

carlo vezzoli et al.

Patronised by the United Nation (DESD)

Greenleaf

(to be pubished) 2011

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