Creating visions for the future: the use of back-casting scenarios in defining sustainable change in universities

Mesa redonda: *O Conceito de sustentabilidade para a psicologia ambiental: aspectos teóricos, práticos e de método*

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What are back-casting scenarios?

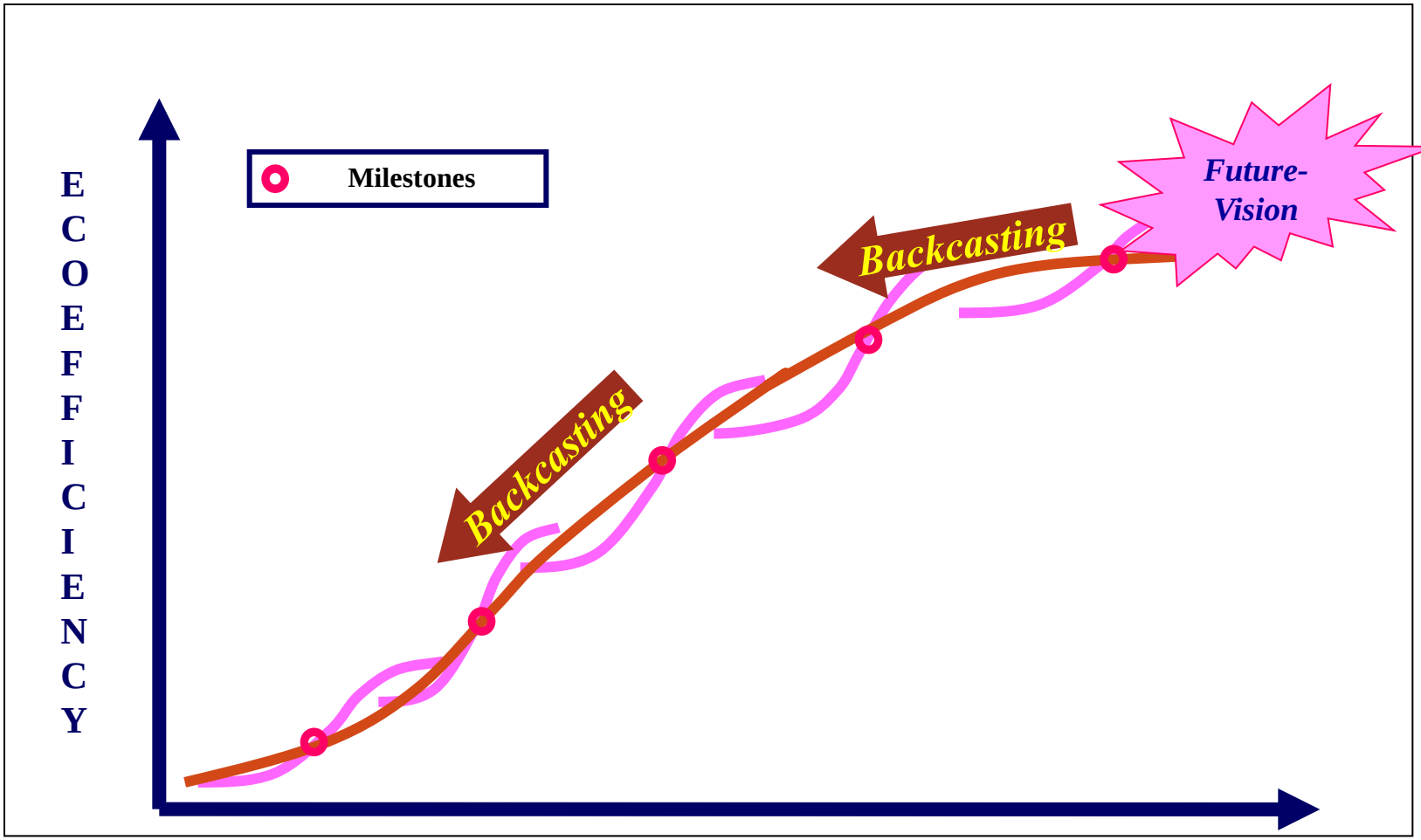
- A relatively new methodology in the fields of sustainability and climate change, which can support complex transitions to sustainable futures

- Back-casting scenarios represent (Vergragt & Quist, 2011):
  - A useful instrument for political decision-making
  - Appeared in response to the discontent with the traditional methods of trend extrapolation in energy forecasting
  - Useful qualitative tool in going toward alternative futures in issues of climate change (Giddens, 2009)
  - Participatory versions of it ensure early commitment to goals and facilitate complex problem-solving.

Back-casting scenarios

- **Scenarios have been grouped in three different classes (Borjeson et al., 2006; Dunn, 1994)**
  - **"Business as usual scenarios"**
    - - they look at the general trends in policies and markets in a given domain of life (e.g.: energy use) and they assume things will go in the same direction with no major changes or disruptions
  - The second class of scenarios deal with **what could happen** and includes all types of forecasting exercises, fore sighting and strategic scenarios
    - - they were widely used by Shell in the ´70s (Wack, 1985) and they yielded some good results, but also showed they were limited in predicting what is essentially unpredictable
  - The third class of scenarios deal with **what should happen** and this is where back-casting scenarios fit in
    - - they assume that systemic changes in society are needed in order to reach the normative objectives established

Back-casting: from vision to action (Quist, 2011)



When are back-casting scenarios useful?

- Complex and persistent problems
  - Large number of variables involved
  - Large number of actors and interests at stake
  - Combination of technological and non-technological changes
  - Complicated social processes taking place at the same time
- Dominant trends are part of the problem
- There is a need for major change:
  - Multi-actor
  - Multi-level
  - Multiaspect (technical, social – Rotmans *et al.*, 2001; Elzen *et al.*; 2004)
- Externalities cannot be satisfactorily solved in markets (Dreborg, 1996)

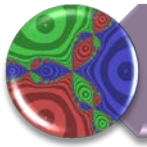
Characteristics of participatory back-casting

Normative

Participatory

System-oriented

Action-oriented



Complex: process, design, analysis

Transdisciplinary

Back-casting scenarios

- A literature review on back-casting scenarios shows **two important on-going debates** on the methodology
  - The first important debate refers to **what** should be given more attention in scenario development
  - Another important debate in the domain of back-casting for sustainability centers on the question of **who** should develop the future vision

- LOCAW has used:

  - stakeholder input to generate the images of the future or desired end-states

  - a back-casting scenario approach that is process-oriented and participatory

Stages of back-casting in LOCAW

First scenario development stage

Objectives:

- Creating a future image
- Enrich it with the perspectives of different actors
- Map the strategic pathways to reach them, identify major uncertainties and potential blockages.

Second scenario development stage

Objectives:

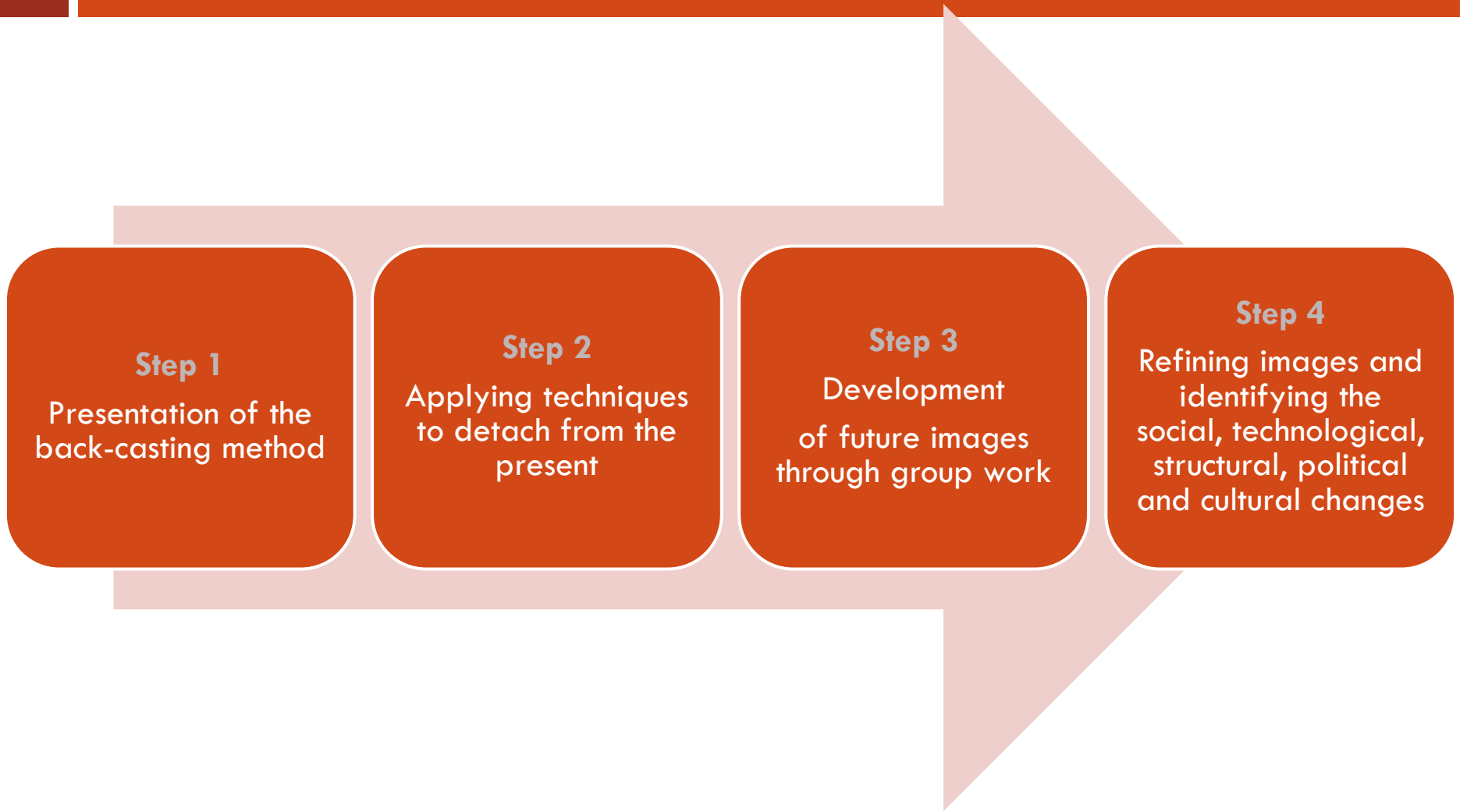
- to provide feedback to the participants on how their measures function in a simulated agent-based model
- to stimulate participants to evaluate the models for their organization and improve them and make them more realistic.

Case study: University of A Coruña

- First group of experts for a first workshop of developing the vision (economists, sociologists, engineers, technology experts etc.)
- Second group of back-casting proper
- Third group of university management to add or modify the scenario and appropriate it
- Forth group of students to provide input into the vision

- Stakeholder analysis

First scenario development phase



First scenario development phase

STEP 2

Detaching from the present

The second step:

- psychological group techniques to make the time dimension salient
- establishing differences with a "business as usual scenario" for the organization for the chosen year (2050) under certain assumed systemic changes in the European and national socio-economic policy environments and international markets in which the organization operates
- can also include suggestions on some technological developments as significant changes in the organizational environment and some assumptions on the type of human (attitudes, demand, lifestyle etc.) changes that are likely to affect the organization by 2050.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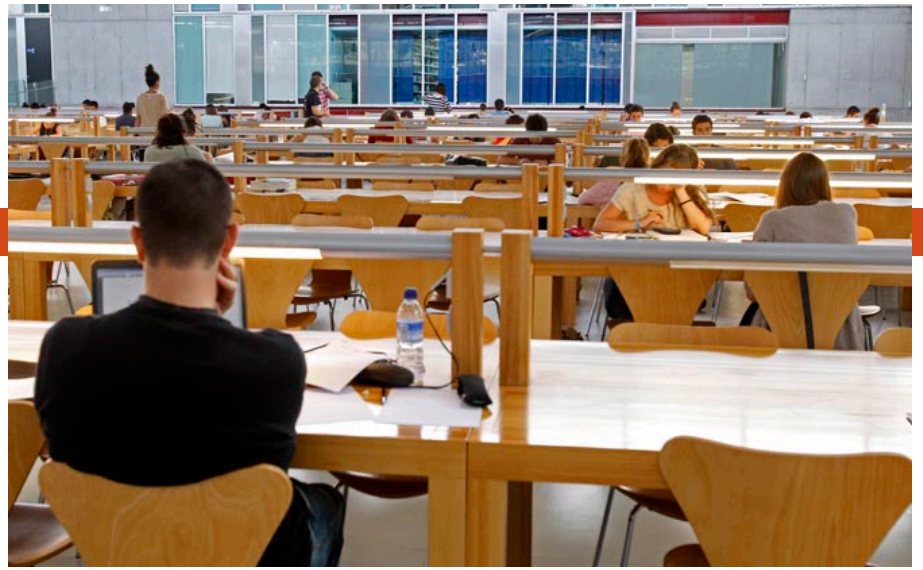


UNIVERSIDAD

Three scenarios for the UDC

Conservative scenario	A "degrowth" model of university	A virtual university model
- The university will remain in the same place and will use the same infrastructure	The university will be taken to the city in the form of small multi-functional rooms in each neighborhood, as support for online teaching	There will be one or a few European universities using online teaching; learning is done at home using advanced technology
Implies technological and human behavior changes	Assumes a mixed model of education with important technological changes	Mostly technological changes are necessary

Conservative scenario (1)

- Infrastructure
  - The university will remain on the existing campus
  - Infrastructure will be optimized; organized functionally; made more flexible
  - Outside spaces will be preserved
  - Better building isolation systems
- Energy
  - Self-sufficiency, self-consumption, clean energy
  - Efficiency measures in each building; energy-generation for each centre
  - Changes in schedules to adapt to seasons and outside climate
  - Maximum technological efficiency: e.j.: temperature sensors/no. of persons, interconnected sensors
  - Green contracting; introducing ecologic parameters within economic calculations

Conservative scenario (2)

- Waste
  - Create small recycling centers for each building
  - Promote return recycling and less cafeterias
  - 0 waste – subproducts
- Consumption
  - Water self-sufficiency
  - No paper
  - Changes in cafeterias: rational menus, vegetarian, local consumption and fair prices;
  - Self-production of food interwoven with educational purposes
- Mobility
  - University residence
  - Using bikes
  - Improving public transport, metro, train

A “degrowth” university model (1)

- Infrastructure
  - The university will be decentralized
  - Infrastructure will consist of small classrooms in neighborhoods with state--of-the-art technology for online teaching; study rooms; 0 emissions
  - Buildings completely adapted to their environment (passive architecture)
  - Schedules adapted to natural light/ 24/7 use with energy efficiency systems
- Energy
  - Self-sufficiency, self-consumption, clean energy
  - Energy self-generation for each classroom
  - Maximum technological efficiency: e.j.: temperature sensors/no. of persons, interconnected sensors
  - Green contracting; introducing ecologic parameters within economic calculations

A “degrowth” university model (2)

- Waste
  - Create small recycling centers for each room
  - Promote return recycling
  - 0 waste – subproducts; 0 dangerous materials
- Consumption
  - Water self-sufficiency
  - No paper
  - Changes in cafeterias: rational menus, vegetarian, local consumption and fair prices;
- Mobility
  - Using bikes
  - Public transport of the city

A virtual university model

- Online teaching with new technologies for allowing interaction from one´s home: holograms, video- and e-conferences
- A few strong European universities
- Less liked model – supposes a loss in cherished values in education.
- Specialized, coordinated research laboratories throughout Europe

Back-casting proper: second phase of back-casting scenario development

- 2 scenarios chosen to work backwards from.
- Use a narrative for the 2050 organization
- Establishment of more specific targets
- Analysis of current situation: stakeholder and researcher input
- Stages of change (2020; 2030; 2050);
- Involved actors and assignment of responsibilities

Specific targets (1)

- Mobility accounts for approximately 50% of all University emissions
  - Reduction of car use to 20% of university staff and students
  - 80 % of the university population would use more sustainable means of transportation: 20% would come on foot; 30 % would use bicycles, and another 30 % would use public transportation such as train or bus.

Specific targets (2)

- Waste: - targets focused mostly on paper and water.
  - Paper: 80 % reduction of the actual use, the rest should be recycled paper only
  - Water: the target is of 0 waste, or complete re-use of all water. “Superfluous” or “choice” plastic such as water bottles would be reduced drastically as well and plastic used in machinery and other necessary devices would be recycled.
- Consumption: 30% of meals vegetarian; Energy: 30 % reduction from present levels.

A few examples: University of Coruña

- By 2020, public transportation would probably not be drastically improved, due to shortage of public funds and public expenditure, as a result of the economic crisis. Due to this fact, it is likely that mobility emissions would not be reduced drastically, although the plans for a student residence exist and will start building in a few years. Also, the existing plans for bicycle use on campus and increased use of bicycles in Corunna due to a public rental scheme put in place by the local government will likely reduce car use, albeit by a narrow margin. Plans for car sharing will be put in place by then.
- By 2030, the university will have a very convenient car-sharing scheme for those still using the car, and the University will have acquired a few electric vehicles, which will be used for car-sharing when going to scientific or academic events for which other form of public transport is not available. The University will have a very easy-to-use online system that would facilitate car sharing and will use incentives such as a system of acquiring points which can then be exchanged for free entrances to cultural events in the city.

University of Coruña

- 2030-2050 As public transportation systems are increasingly becoming more efficient, and there is a generational change with today´s youth coming into adult age (assuming that their environmental awareness and practice with sustainable practices are higher), acquisitions of private cars will stop being something desirable, and thus a reduction of private car use to move between home and the university of 80 % of present day users will be achieved.

Enel Green Power (Italy)

Technology efficient EGP	**Green office**	**Virtual office**
- EGP will remain in the same place, but the infrastructure will be more efficient, due to important technological changes	EGP offices (small multi-functional offices) will be situated outside of the urban environment in green areas, close to workers residence. Only energy from renewable sources will be used and high recycling rates	The office is totally virtual – telecommuting. Only a small part of the work is done at home, using advanced technology and fast telecommunications
Implies technological and human behavioural changes	Assumes a mixed model of work (online and indoor)	Mostly technological changes are necessary

Enel Green Power: back-casting

- 2022-2032 At the end of the first decade (more or less around the year 2020), there will a pace change in the sector of electric vehicles, due to increased consumer awareness: an increased demand for electric cars which will be accompanied by a reduction in the cost of the batteries. Complete maturity in the sector of the electric cars batteries will likely be reached around the year 2020. The regulatory frame will be crucial in this and can take the form of regulations such as restricting the entrance of vehicles into historical city centres to electric ones only. This will be relevant in a country like Italy.

Enel Green Power: back-casting

- 2040-2050 This decade will be characterized by the radical change in the office settings and structures, with the available technologies, which will be quite likely ready to operate. On a more uncertain level, but still in the domains of likelihood, visualization tools and techniques as well as enhanced brain-screening opportunities capable of driving more efficient human decision and action could become available. Other trends could appear in the realm of producing energy from human movement: e.g., cycles and "tapis roulants" connected to the network, or energy producing shoes.

Implications for policy

- Ensuring stakeholder participation
- Commitment to goals
- Strategies for conflict resolution at early stages
- Mapping of policy tracks for long-term, complex transitions
- Different scenarios can be presented to policy-makers or management of organizations, and they can choose the one that best suits the citizens interests.
- Derive policy measures and test them in a simulated environment.

Thank you for your attention!

Obrigada!

Gracias!

Questions?

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