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## **A Scenario Building Methodology to Support the Definition of Sustainable Development Strategies: the Case of the Azores Region**

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### **Abstract**

The concept of Sustainable Development implies a discussion about the future in the next 20-50 years. In that regard, a Scenario Building Methodology was developed to encourage an active participation of citizens in the debate of sustainable models. Scenario building is not a forecast neither a future prevision, but, instead, is an exploration of the possible unfolding of events based on current social, economic and environmental drivers. The methodology was applied in Azores Region (Portugal), where five qualitative scenarios for 2030 were discussed in the context of feasibility studies aimed at the definition of a local Sustainable Development Strategy: *Hotelandia* - a scenario based on tourism development; *Lactogenia* - a scenario based on agricultural progress; *Ecotopia* - a scenario based on environmental protection; *Sociopolis* - a scenario based on social cohesion and; *Infocracia* – a scenario based on an information society. After an intensive public discussion in several fora, these scenarios were redefined, built and presented for discussion and voting in the project website. An heterogeneous expert panel was also asked to comment on. The results obtained during this process indicate that scenario building is an interesting bridge between citizens and decision makers, helping to identify present critical branch points for a sustainable future.

**Keywords:** sustainable development, scenario building, public participation, information and communication technologies

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## 1. Introduction

The concept of Sustainable Development implies a discussion about the future in the next 20-50 years. To create a better future for the younger generations we need to look beyond tomorrow. In fact, according to Swart *et al* (2004), examining the range of possible future pathways of combined social and environmental systems under conditions of uncertainty, surprise, human choice and complexity is a key challenge for sustainability science<sup>1</sup>. In this respect, building scenarios is a structured way to explore and think about long-term futures.

There are a considerable number of scenario definitions available in the literature. Originally, Kahn and Wiener (1967) defined scenarios “as hypothetical sequences of events constructed for the purpose of focusing attention on causal processes and decision points”. More recently, Rotmans *et al* (2000) stated that “scenarios are archetypal descriptions of alternative images of the future, created from mental maps or models that reflect different perspectives on past, present and future developments”.

Scenarios are not about predicting the future, they have little to do with previsions or forecasts usually applied to short term analysis, instead, they are about perceiving long-term futures in the present (Schwartz, 1991). The importance of considering scenarios as courses of events is that this directs attention to the unfolding of alternatives and to branch points at which human actions can significantly affect the future (Guimarães Pereira *et al*, 2001). Scenario building is also important as a powerful tool to broaden perspectives and to explore the universe of possibilities for the future. It helps to raise questions, challenge conventional thinking and encourage debate (Guimarães Pereira *et al*, 2001; Greeuw *et al*, 2000).

This concept of scenario is the basis for the Scenario Building Methodology that we present here. It was applied to the Azores Region (Portugal) that is described briefly in the next section. Then the scenario building exercise is explained. Preliminary results from the participation of citizens in the debate of sustainable models are presented and we conclude indicating the importance of scenarios for the definition of sustainable development strategies.

## 2. The Azores in a brief

The Azores Region is located in the middle of the Atlantic Ocean between Europe and North America. It's composed by nine islands that have a total surface area of 2.333 km<sup>2</sup> and an Exclusive Economic Zone extending over 984.300 km<sup>2</sup>. São Miguel is the bigger island with 747 km<sup>2</sup> and more or less half of the region's population (total of 237.795 inhabitants)<sup>2</sup>. The natural beauty of the region is one of its key features and the main attractive for visitors. The lagoons of São Miguel island, the Pico Mountain or the small Corvo island are just a few of the Azorean beautiful places. Another typical characteristic of the Region is the farming activity. In fact there are as many cows as people in the islands and milk production has almost doubled in the last ten years representing one third of the total national production. There is a growing conflict between this activity and environmental protection due to diffuse pollution that provokes the degradation of the aquatic ecosystems (ex: the lagoons in São Miguel). Tourism is also rising in the Region with an increase in lodging capacity and other services. In Faial and Pico there are more or less 25 firms dedicated to whale watching and other marine activities. Several daily flights connect the Azores with the mainland. From a social point of view the popular traditions continue to play an important role associated with typical regional products and religious festivities. Some problems of extreme

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<sup>1</sup> See Kates *et al* (2001) for more on the concept of Sustainability Science.

<sup>2</sup> Data from <http://www.drtacores.pt/>

poverty at certain places still exist. Another very important characteristic is the volcanic origin of the islands and the inherent risk associated. Several seismic activities occur from time to time, sometimes with causing huge socio economic problems.

### 3. Building Scenarios for 2030

There are several scenario types depending on its characteristics. However, according to Alcamo (2001), the principal elements of a typical scenario are:

1. Description of step-wise changes in the future state of society and the environment;
2. Driving forces, the main factors that influence the changes described;
3. Base year;
4. Time horizon and time steps;
5. Storyline, a narrative description that highlights the scenario main features including the relationship with the driving forces.

Rotmans et al (2000) refer also common characteristics normally found in scenarios:

- scenarios are hypothetical, describing possible future pathways;
- scenarios describe dynamic processes, representing sequences of events over a period of time;
- scenarios consist of states, driving forces, events, consequences and actions which are causally related;
- scenarios start from an initial state (usually the present), depicting a final state at a fixed time horizon.

Both the principal elements and the common characteristics referred were taken into account in the Scenario Building Methodology. Five hypothetical scenarios were developed for 2030 (base year 2003). They unfold from a common set of driving forces that result in causal-effect actions and events that are represented in a diagram<sup>3</sup>. The scenarios are also described qualitatively by storylines or narratives that highlight their main features. Unlike other scenario building studies this methodology is not based on quantitative models, since its main objective is to encourage the participation of the citizens in the debate about alternative pathways to sustainability, specially in the identification of critical branch points where human action needs to be taken, issues that constitute the core of the sustainability strategy to be developed.

The scenarios were designed for the horizon of 2030 and start from the present state. The current set of driving forces was obtained through a participatory process. In an early stage of the process, six one day workshops were conducted in some of the islands involving citizens from different socio-economic sectors in the preparation of the sustainable development strategy. A very challenging work performed was a SWOT<sup>4</sup> Analysis for the Region.

A joint SWOT Analysis resulting from the several participatory exercises constitutes the basis of the driving forces considered for scenario building. In Table 1, the final set of driving forces for the Azores Region is presented.

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<sup>3</sup> See Gallopin *et al*, 1997; Raskin *et al*, 1998; Guimarães Pereira *et al*, 2001 or Raskin *et al*, 2002 for good examples of unfolding diagrams.

<sup>4</sup> SWOT stands for strengths, weaknesses, opportunities and threats. Strengths and weaknesses are internal factors. Opportunities and threats are external causes. It's a tool normally used in strategic planning. See Hill and Westbrook (1997) for a critical assessment of the use of SWOT analysis.

Table 1 – Current driving forces for the Azores Region

Positive	Negative
<p><u>Strategic location</u>: in the middle of the Atlantic Ocean, between Europe and America. There is an extra incentive for the use and development of new information and communication technologies that can improve communication and minimize the peripheral factor.</p> <p><u>Geothermal resources</u>: of high enthalpy, due to the islands volcanic origin. It's certainly an added value in a global economy strongly based on fossil fuels.</p> <p><u>Young population</u>: important in a national and European context of accelerated aging.</p> <p><u>Regional products</u>: of natural origin, typical and of high quality, such as the agricultural ones (pineapple, tea, wood products), derived from cattle (milk, cheese, meat), fish (ex. tuna), mineral and thermal waters, etc. All with high commercial potential and added value for tourism activities.</p> <p><u>Natural heritage</u>: a unique landscape of great beauty, balanced with the human use; the biodiversity; the strong presence of the sea, with excellent conditions for leisure activities and commercial exploration of resources.</p> <p><u>Cultural heritage</u>: a characteristic and diversified culture, with festivities, traditions, gastronomy, ethnography, with strong expression in the local communities and associations. Places designated as World Heritage by UNESCO such as the historical center of Ângra do Heroísmo town (since 1983) and the cultural landscape of the Pico vineyards (since 2004).</p> <p><u>Diaspora</u>: a result of an emigration past, mainly to the American continent (USA and Canada). The region can gain a lot with the emigrant community socially and also economically (e.g. business chances).</p> <p><u>European Union funds</u>: a chance to support strongly the strategic sectors of the azorian society and economy.</p> <p><u>Farming</u>: of strong socio-economic importance, with a regional production of increased quality that is gaining expression in the national context. The Azores has good climatic conditions for this activity.</p>	<p><u>Transportation</u>: airplane fares are considerably high affecting the mobility between the islands and the connections outside the region.</p> <p><u>Ultra-periphery</u>: the isolation, the geographic fragmentation in nine small islands and the typical problems that affect the islands are difficult to overcome. The islands have different dimensions which adds a problem of scale, with repercussion in a balanced development.</p> <p><u>Education</u>: the low level of qualifications at different levels is caused by deficiencies in the educational system. This problem is not exclusive of the Region, but constitutes a problem of national level. There is a lack of qualified people in some areas and islands.</p> <p><u>Pressure on the natural resources</u>: wastewater without the adequate treatment, deficient solid waste system, lack of enforcement and application of the legal instruments. Urban pressure is also rising in some of the islands.</p> <p><u>Geologic risks</u>: medium/high probability of seismic activity and earthquakes due to the volcanic origin of the islands. It's a reality in the region and it will be always a threat.</p> <p><u>Situations of social exclusion</u>: some situations of poverty and exclusion persist despite the significant improvements in the last years.</p> <p><u>European Union Policy</u>: can interfere with the development process, not only in terms of funds for the Region, but also with new strategic options such as the one on fisheries (reduction of the Exclusive Economic Zone) or on agriculture policy (e.g. milk quotas).</p>

Each scenario unfolds from this set of driving forces, but some are more crucial to a certain scenario than to others which allows the deployment of different events and action that are clearly distinguishable in each scenario. Five scenarios were developed, all with positive and negative sustainability aspects. It was decided not to present an ideal sustainable development scenario for the Region in order to promote discussion and debate among different alternatives that in the end can contribute to a shared and sustainable vision for the Azores. The scenarios proposed are: *Hotelandia* - a scenario based on tourism development; *Lactogenia* - a scenario based on agricultural progress; *Ecotopia* - a scenario based on environmental protection; *Sociopolis* - a scenario based on social cohesion and; *Infocracia* – a scenario based on an information society.

### **3.1. Hotelandia – a scenario based on tourism development**

#### Motto

*The natural and cultural heritage and the quality of the regional products are excellent characteristics to be explored by the tourism sector that should be the motor of the regional economy. There's a strong investment in lodging infrastructures and transportation (both by air and sea).*

#### Dominant driving forces

- Regional products
- Natural heritage
- Cultural heritage
- Transportation

#### Storyline

The strength of the Region is the beauty and high quality of its natural environment. The strong presence of the sea, the splendor of the landscape, the gastronomy and the traditions form a vast and diversified set of features with great richness and a lot of potential for the tourism industry. The way to development was clear: value and harness what the Region has to offer. Based on this principle the Regional Government decided to stimulate the tourism economic sector, investing in lodging infrastructures and transportation capacity (both by air and sea). The old bureaucratic processes of licensing needed by tourism entrepreneurs, were attenuated, namely processes related with environmental impacts that in the past used to block many of the projects located in environmental sensitive places. There were also big changes in the transportation sector. Currently, there's a diverse set of low cost airlines flying to the Azores from many places around Europe and the USA. Also there are incentives, by the regional authorities, to decrease the traveling costs. Nowadays, one can say that it's cheap traveling to and in the Azores.

As time passed by, the pressure over the environment (due to tourism exploitation) is increasing all around the Azores, but specially in the bigger islands such as São Miguel and Terceira. Here, not only the occupation of the coast is a problem - with relatively recent works already in risk of collapsing - but, also there-se construction of hotels and resorts near the Lagoons of Furnas and Sete Cidades. The economic growth is quite high compared to the beginning of the XXI century, specially due to the construction sector associated with the tourism industry and its revenues. On the other hand, in the farming industry (that was the base of the economy in the second half of the XX century) there's a strong stagnation, in part due to the investment in tourism. However, some small scale and private initiatives related to rural tourism are having success. The traditional process of milk and cheese production is seen as an attractive for tourism.

This type of initiatives is an example of an alternative tourism that is slowly emerging in the Azores, based on the direct contact with nature and the rural world. The small islands (like Flores and Corvo) are particularly appreciated by this type of visitors, who avoid the big tourist centers of São Miguel and Terceira islands where the lodging capacity grew exponentially over the last decade. We can say that there are clearly two different types of tourism in the Azores, with very distinct quality and dimension. In any case, there's tourism in the Region all over the year and not only in summer season like it used to be in the past.

We are in 2030 and despite the improvement in the quality of life, many inhabitants would prefer to conciliate it with the romantic notion of the Azores from the end of the last century...

### **3.2. Lactogenia - a scenario based on agricultural progress**

#### Motto

*The European Union funds available for the farming sector should be directed to an increase in the production of high quality products like milk, butter, cheese and meat, typical products of the Azores.*

#### Dominant driving forces

- Regional products
- Farming
- European Union funds
- European Union policy

#### Storyline

The most important productive activity in the Region is the farming industry, due to the availability of exceptional conditions for this activity. For this reason, milk and cheese industries are the economy motor in the Azores. It is probably the only activity that can overcome the problems of scale due to a territory broken up in nine small islands and located far away from the main economic centers in Europe. It was decided to invest strongly in this industry, with incentives for higher production both in quantity and quality. The industry's growth has been blocked by the system of quota for milk production imposed by the European Union. However, this policy is being revised. The funding available and the milk quota will be based on quality of product criteria and not in quantitative terms, anymore. Nevertheless, the battle for an increase in milk quota is still the main issue in the regional political agenda, that had successes and failures during the last thirty years. After tough negotiations with the National Government and the European Union, an increase in milk quota of about 50% between 2025 and 2035 was obtained! Unexpectedly, this increase took place due to the rigorous quality criteria demanded by the European Union. At an European level it's hardly possible to find milk products with the quality of the Azorean ones. So, the European Union reduced the milk quota of other European regions in benefit of the Azores. It will be a solid and sustainable growth in time, without major changes in the way the sector works in order to assure the quality of the final product. It was definitely a political victory for the Azores after several years of hard negotiations.

With this new framework, all the farming related activities gain new hope and prosperity that reflects in economic growth, higher employment rates in the sector and a generalized raise in the living conditions of the population. There's progress in the eradication of poverty and situations of exclusion, but in other areas, like the education, there's lack of investment, and things remain as they were in the beginning of the century.

There are concerns with the environmental quality, namely the lagoons (in São Miguel, but also other islands), but that seems to be insufficient due to the high environmental pressure from the farming activities. An effective restoration of the lagoons natural ecosystems is certainly a huge problem.

We are in 2030 and the economy depends almost exclusively on the farming sector. It's a modern and profitable industry, but still dependent on the European Union policy. The pressure over the natural environment is increasing leading to several protests by local environmental activist organizations and even complaints at a European level...

### **3.3. Ecotopia - a scenario based on environmental protection**

#### Motto

*The natural environment is what is more precious in the Azores and should be protected and valued. The geothermal resources should be optimized and the geologic risks minimized.*

#### Dominant driving forces:

- Geothermal resources
- Natural heritage
- Pressure on the natural resources
- Geologic risks

#### Storyline

The recognition of the natural beauty and high environmental value of the Azores, at an international level resulted in the designation of the Region as a “Natural Reserve” and accordingly all economic activities become more regulated. The restrictions imposed are not only of ecological basis, but also due to concerns with geologic risk minimization. With this strategic option, construction (either for houses or other activities) is today limited to specific zones, very circumscribed.

Farming activities were also extremely affected with a significant reduction of the land area available for pasture in order to diminish the organic pollution from agricultural origin. The traditional fishing is also object of significant restrictions converting the sector for aquaculture in high sea. The tourist activity next to the lagoons and other places of environmental sensitivity is restricted. It's only possible to visit these places with a proper authorization in order to be possible to control the number of visitors present. Whale watching activities (very popular in some islands) is also much more restricted than it use to be. Breaking the rules is punished severely by local authorities that are always alert. On the other hand, it is in course, a new research program of valuation and commercial use of endemic species, namely for the production of natural essences.

One of the strengths of this environmental policy is the investment in renewable energies. A big share of the electricity consumed in the Region is of renewable origin, mainly due to the geothermal resources available (80% of the energy share in the region).

Some industries, from several sectors and with different dimensions, have quite high energetic efficiency rates and have been investing in technological processes less pollutant, mainly due to economic incentives available for this purpose. This seems to be the only viable solution for the regional industry. However, some firms have opted to close doors and move to other places, with bad consequences for the employment in the region.

We are in 2030 and the environmental quality of the Region is excellent, with all the problems identified in the beginning of the century solved. However, the economic and social conditions didn't improve, causing some concern and contributing to an increase in emigration that is seen again as a way out towards an improvement in life conditions. On the other hand, another type of economy is starting to emerge, based on technological innovation and in less pollutant industries. It's not easy to know if this new trend is able to stimulate the economic growth...

### **3.4. Sociopolis - a scenario based on social cohesion**

#### Motto

*People first! Cases of social exclusion and poverty should be immediately eliminated. Development should be based on education and on a strong social security system where the European funds available should be directed.*

#### Dominant driving forces

- Young population
- European Union funds
- Education
- Situations of social exclusion

#### Storyline

“People first! Investing in the Azorean people is the best way to promote Regional Development”. Based on this fundamental principle it was decided, in the first place, to eliminate social exclusion situations that still exists in the Region. This was the main political priority and a considerable financial effort took place. In a second phase the priority investment was directed to education and qualification among the young population. It was clearly assumed that this was the only viable way towards a real and solid development.

This strong investment policy in education was very much supported by European funds which are applied mainly in school infrastructures. Also innovative ways of teaching and learning are starting in some pilot schools. At a higher level, the University of the Azores and other regional research centers have also improved a lot, establishing strong partnerships with several universities around the world in areas such as marine and earth sciences.

Support to old people, namely in medical services, has also improved and is responsible for a significant share of the regional budget. It is interesting to notice that some of them have retaken a certain degree of life activity, participating in quite innovative local employment initiatives.

It was known that the practical results of this type of strategy would only be visible in the long run. However, that was a political option that was clearly assumed. Efforts in terms of tax increase and cuts in financial support to some economic activities had to be made. This had an impact on the economic growth that has stagnated. The farming activity has diminished (due to the new Common Agricultural Policy reform) and tourism remains more or less the same as observed in the 90's. Some entrepreneurs threaten to close their firms and move to more attractive regions from a tax perspective...

Some basic environmental problems persist due to lack of investment in infrastructures for waste and wastewater treatment. However, generally the urban pressure on the costal zones has diminished and also the quality of the lagoons has improved due to less pressure from tourism and farming activities.

We are in 2030 and the economic indicators aren't still favorable... nevertheless, the percentage of young people with high qualifications is much higher than was before...



### **3.5. Infocracia - a scenario based on an information society**

#### Motto

*It's difficult to overcome the geographic isolation. However, the Azores don't have to be isolated from the World. The new information and communication technologies can eliminate natural and artificial barriers and bring the Azores closer to the World and closer to its emigrant community.*

#### Dominant driving forces

- Strategic location
- Young population
- Diaspora
- Ultra-periphery

#### Storyline

The Azores is geographically isolated from the rest of the world, and, because of that the regional development has been affected and sometimes blocked. From another point of view the Azores are strategically located in the heart of the Atlantic Ocean and can have an important diplomatic role between Europe and America. But, how to establish this bridge in an effective way? The emigrant community resident in the United States and Canada can have an important role to play in this relationship. In fact the Azores are a social reality much bigger than the nine small islands, with a large emigrant community that should be seen as an opportunity for development. Given this context it was considered of primary importance the diffusion and exchange of knowledge inside the community, for which the new Information and Communication Technologies (ICT) can be extremely useful.

The stage was set for the establishment of an “Azorean digital community” spread around the world and linked through the internet. Young people were massively attracted by the initiative that has grown rapidly. Several ICT spots were spread around the region, through which it is possible to communicate in real time using state of the art technology and where the young people helps the entrance of the elderly in the digital world. However, not all people have adapted to this new digital reality, and a new type of social exclusion is starting to emerge caused by the digital divide.

The University of the Azores virtual campus, assured a R&D unit in every island and also scientific internationalization through the use of e-learning platforms and tools.

The investment on the development of innovative information and communication technologies has opened new possibilities for the management of economic activities in the Region. The Virtual Tourism System is an example of this type of initiatives, and was a result of a partnership between the University of the Azores, well known US Universities and small local enterprises. It's possible to do virtual whale watching trips extremely real (using state of the art immersive reality technology)... and without any type of environmental impact.

We are in 2030 and new solutions seem to bring new problems (for example, social exclusion due to digital divide). However, a new world of possibilities and business opportunities, based in new technologies and communication systems, is emerging... the geographic isolation is not a problem anymore...

In Table 2 the five scenarios are compared and evaluated according to key environmental, economic, social and institutional aspects.

Table 2 - Evolution of some key aspects for each scenario

KEY ASPECTS (environmental, economic, social and institutional)	HOTELANDIA	LACTOGENIA	ECOTOPIA	SOCIOPOLIS	INFOCRACIA
waste management					
water resources management					
sustainable land use planning					
intensification of tourism exploration models					
intensification of farming development models					
transportation and accessibilities					
qualification of population					
situations of social exclusion					
infrastructures and cultural activities					
research and development networks					
public participation in decision making processes					
risk prevention					

#### 4. Exploring the Future with the citizens

According to Robinson (2004), “sustainability is more usefully thought of as approach or process of community-based thinking that indicates we need to integrate environmental, social and economic issues in long-term perspective” and that “sustainability is itself the emergent property of a conversation about what kind of world we collectively want to live in now and in the future”.

However, involving effectively the citizens in the debate of alternative futures is not an easy task (Guimarães Pereira & Funtowicz, 2003). One methodology widely used for that purpose is the European Awareness Scenario Workshop<sup>5</sup>, “designed to stimulate social participation and awareness in innovation processes and sustainable urban development”. It consists of one or a two day meeting organised around two different activities: vision-making and idea-generation.

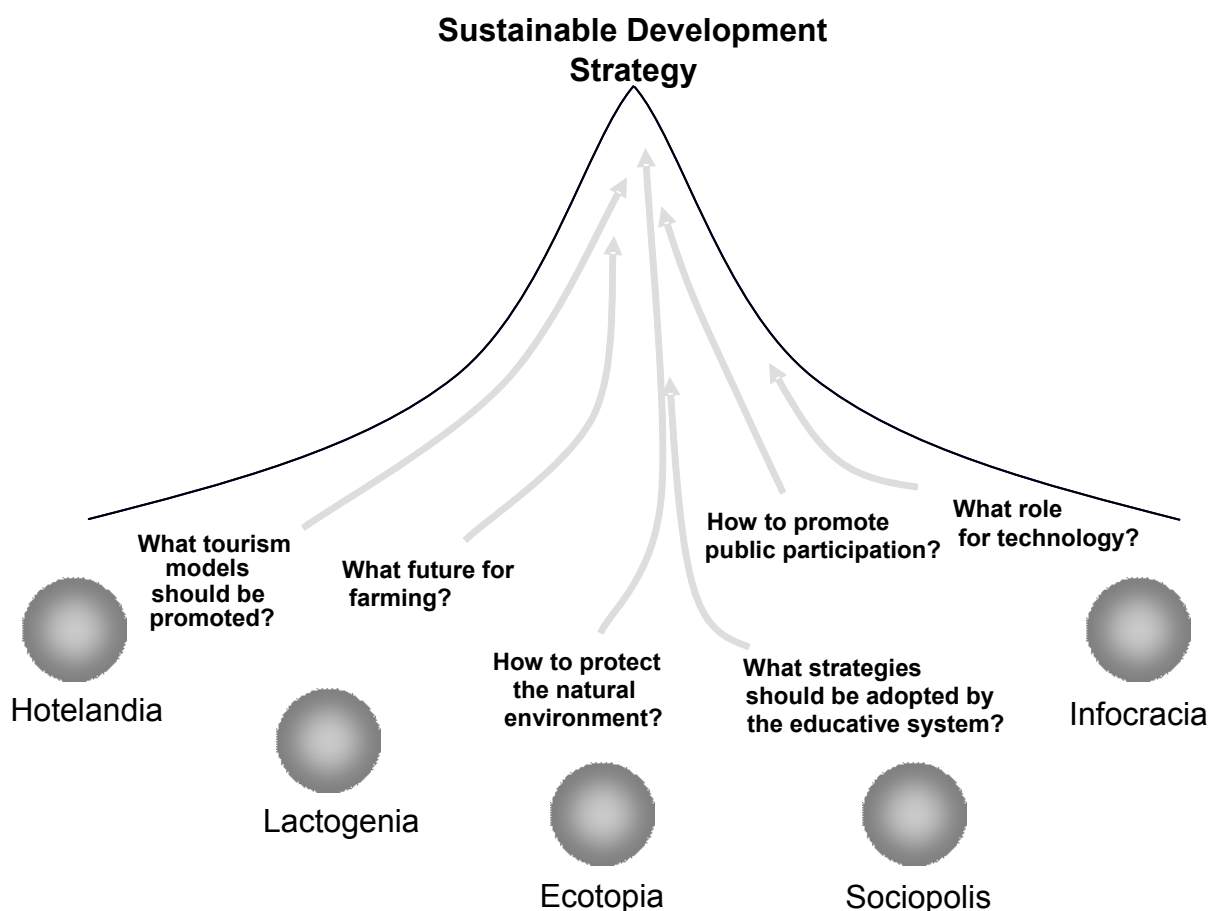
<sup>5</sup> See more at <http://www.cordis.lu/easw/>

In the Scenario Building Methodology applied to the Azores Region it was decided to promote participation in several fora (not only workshops with invited people) aiming for broad participation. First the scenarios were refined by an expert panel that commented on it. Then the scenarios were presented for discussion and voting in the project website where people are asked about how comfortable they feel living in each scenario. This is still an ongoing process, but preliminary results indicate that people react favorably to Ecotopia or Infocracia and more negatively to Hotelandia or Lactogenia. Anyway, from the discussion it is clear that topics like sustainable tourism and sustainable farming are seen as key aspects in an overall sustainability strategy. Many seem to agree that in the Azores is possible to conciliate economic development with social cohesion and environmental protection without significant trade-offs, but for that to happen action needs to be taken towards this pathway.

The active participation of citizens in the debate of sustainable models is a first step towards a shared vision that is both desirable to the vast majority and ecologically sustainable (Costanza, 2000), and that should be the common goal of the sustainable development strategy to be developed.

### 5. From Scenarios to a Sustainable Development Strategy

The discussion of alternative development models helps to identify key questions or critical branch points where in-depth reflections are needed and strategic options should be taken. Answering this questions and establishing priority actions for sustainability should be the core of any sustainable development strategy (see figure below).



After the identification of these critical branch points for the Azores, an emblematic set of 10+1 priorities for sustainability set the stage for a practical and effective sustainable development strategy:

- 1 - The priority investment should be in people
- 2 - A regional economy based on competitive advantages
- 3 - The environment is the main differentiation factor in the Azores
- 4 - Knowledge and innovation are crucial
- 5 - The cultural, social and religious heritage is the spirit of the Region
- 6 - Energetic sustainability is an example
- 7 - Geological risk can be minimized
- 8 - Think globally, decide regionally and act locally
- 9 - Governance practices should be closer to the citizens
- 10 - The Azores in the centre of Europe, with the USA and the Macaronesia
- 10+1 - From words to action

The results obtained during this process indicate that scenario building is an interesting bridge between citizens and decision makers, helping to identify present critical branch points for a sustainable future.

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