THE CAMBRIDGE FUTURES PROCESS: COMMUNICATING MODEL RESULTS

by Marcial Echenique[1]

1.   INTRODUCTION

Perhaps one of the most important challenges faced by the planning profession is securing public acceptance of plans. This is particularly the case in booming regions such as Cambridge which now hosts the largest concentration of high technology firms in Europe and is one of the centres of the so-called knowledge based economy.

The public and their democratically elected representatives oppose changes to the local environment. A few years ago local newspapers ran a ' Cambridge is full' campaign in which local residents advocated development elsewhere, but not in their own backyards. But the real reason for opposition to change is <u>fear of the unknown</u>. The public worry about changes to their environment and lifestyles. They worry about the effect of change on the value of their greatest investment – their homes.

The Cambridge Futures group, set up in 1997 to address the question of transforming the unknown into the predictable, explored seven possible alternatives for the future of the Cambridge Sub-Region. In this unprecedented exercise, started by the then Mayor of Cambridge, the City joined forces with the University to analyse and evaluate options for Cambridge. Politicians, council officials, business people and all interested parties were invited to join together, in a non-confrontational context, to discuss possible futures. A sum of £200,000 was raised by public donations in cash and kind, which allowed a proper investigation of the options.

The method

The research programme included the development of a computer simulation model of land use and transport and an innovative three dimensional computer animation to illustrate the impact of each development option.

The land use model –MENTOR[2]– which simulates the working of the land market, estimates the location of households by different socio-economic groups and the location of firms by different economic sectors. The data which is input to the model includes forecasts of changes in regional housing and employment, the constraints imposed by planners in terms of land available for

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[2] MENTOR is a Windows-based computer package developed by Marcial Echenique & Partners Ltd, using the well known MEPLAN software as the engine for the model.

development to simulate the alternative options, and conditions in the multi-modal transport network (ie, time, cost and comfort of travel between zones in the region). The outputs produced through time include housing and non-residential building location, rental levels (and thus property prices), living and production costs (including labour, transport, etc).
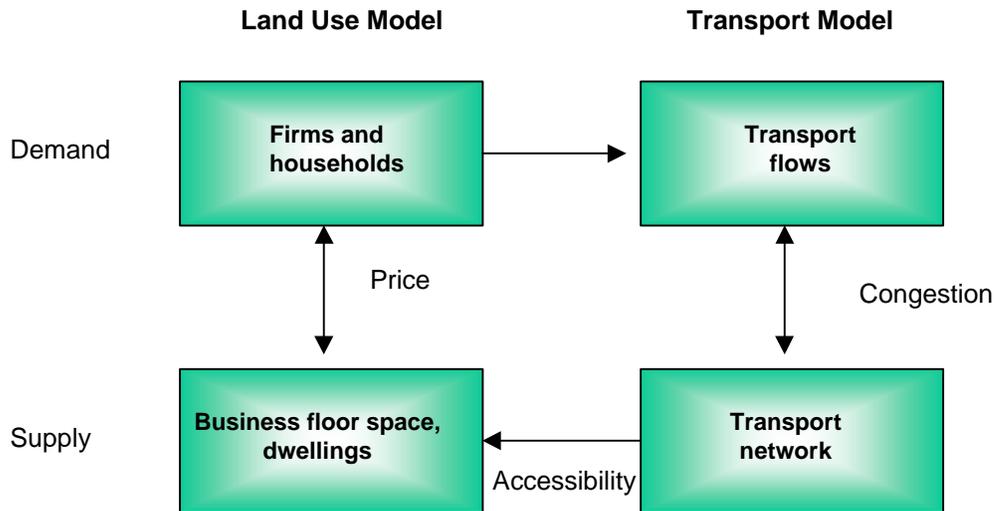
Land Use Model   **Transport Model**

Demand	**Firms and households** → **Transport flows**	

Price   Congestion

Supply	**Business floor space, dwellings** ← **Transport network**	

Accessibility

Figure 1.   Model used: MENTOR

The model which has been developed is now being used by Cambridgeshire County Council for the revision of the Structure Plan and is a powerful tool for estimating the economic and social impact of alternative policies.

The transport model (MEPLAN) which receives input from the MENTOR land use model, integrates with the Cambridge SATURN[3] highway model run for the County by W.S. Atkins. The transport model forecasts the pattern of traffic and also estimates the cost and time of travelling between zones by different modes. Outputs from the transport model are fed back into the MENTOR model which adjusts the location of firms and households over the next time period.

A full appraisal in terms of economic efficiency, social equity and environmental impact can be obtained from the model outputs. However, changes in the appearance of the environment brought about by each of the options need further illustration and for that a 3-D model of the region was produced[4]. By combining actual video footage (taken from a helicopter) with the 3-D model, it was possible to illustrate the impact of each alternative in a realistic manner. Therefore the results from

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[3] SATURN is a standard traffic simulation model.

[4] Computer animation by Metaphorm

the MENTOR model in terms of location of firms and households were illustrated in 3-D. The animation model afforded an aerial view of the impact of each option on the City and the surrounding region, producing realistic and thus readily understandable images.

2. THE PRESENT SITUATION

For the past fifty years Cambridge has been constrained by a Green Belt (growth boundary) to preserve the historical university town within a rural setting.
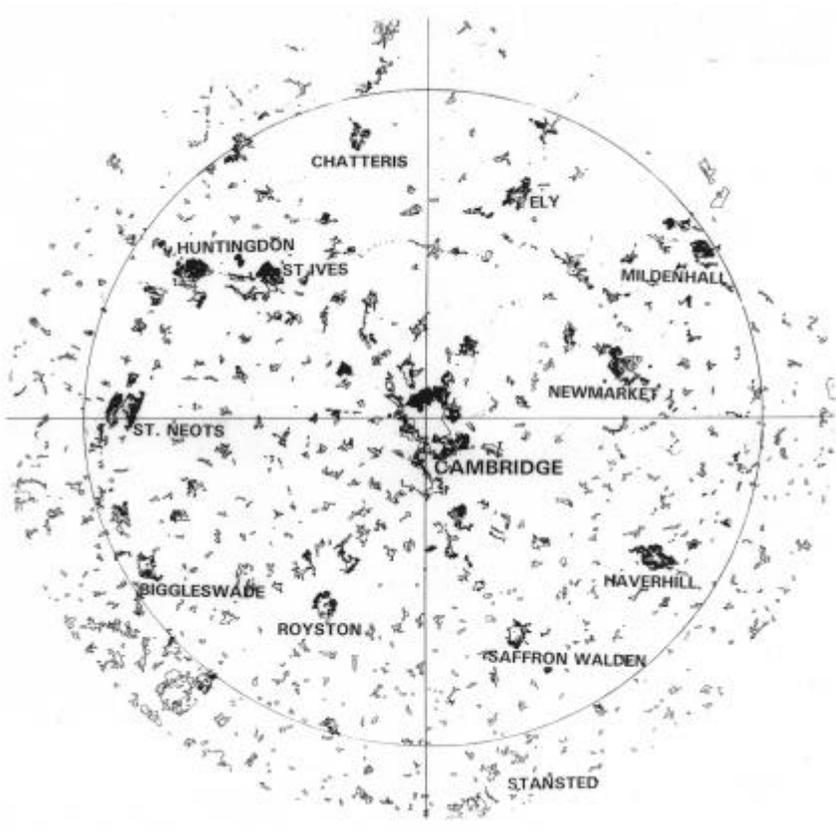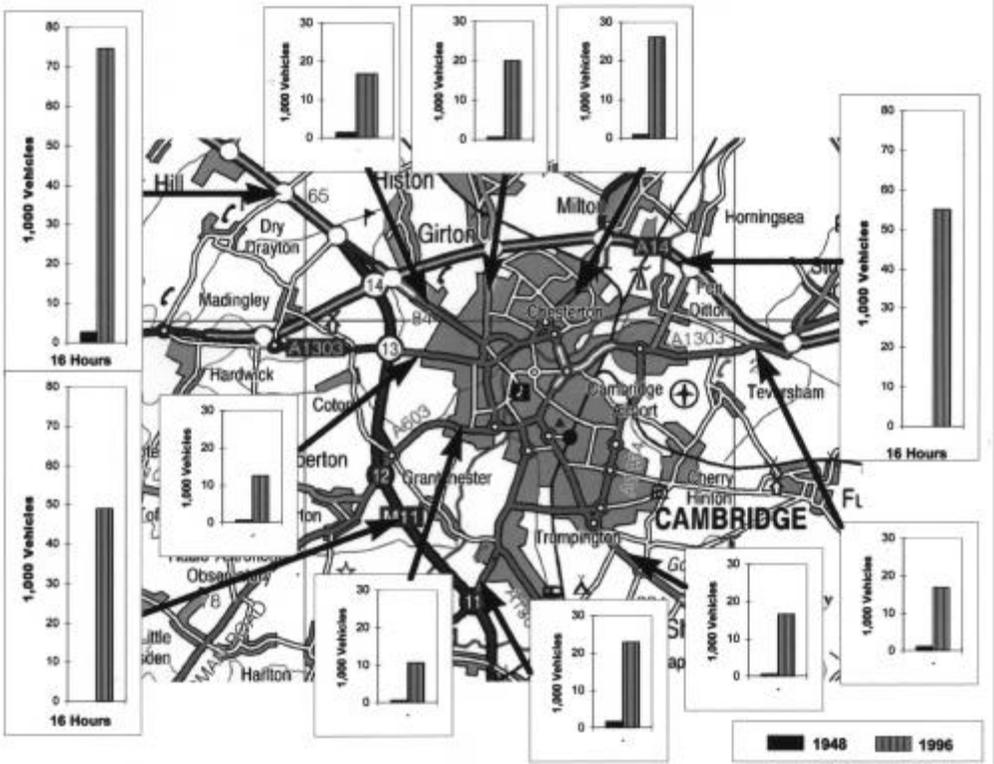

Figure 2.   Land developed over the last fifty years within twenty-five miles from the centre of Cambridge.

Figure 2 illustrates land development over the fifty year period. It can be seen that only land to the north of Cambridge has been developed to accommodate Trinity Science Park and St John's Innovation Centre. The City's population has been maintained at about 100,000 people. Most of the residential development has gone to markets towns in the region, such as Ely, Mildenhall, Newmarket, Haverhill, Saffron Walden, Royston, Biggleswade, St Neots, Huntingdon, St Ives and Chatteris. Beyond the Green Belt new villages have been developed to the north (Milton), the north-west (Bar Hill) and the south (Sawston). As a result the population of the region within twenty-five miles of Cambridge has gone up from 250,000 to 500,000 people.

Land and property prices have trebled in real terms during the period, while the income of a substantial number of the working population who are on fixed salaries, such as teachers, hospital employees, etc. has not grown. Employment in Cambridge and its immediate surroundings has doubled due to the growth of the high tech sector and, as a result, commuting into the City has grown by five hundred per cent over the last fifty years.

(map Ordnance Survey © Crown copyright 1998)

Figure 3.   Traffic increases over the last fifty years within twenty-five miles from the centre of Cambridge

Figure 3 illustrates the increase in traffic coming in and out of the City over the fifty year period under consideration. Congestion and, therefore, emission levels are substantial. It will be difficult to accommodate more car-based commuters in the future.
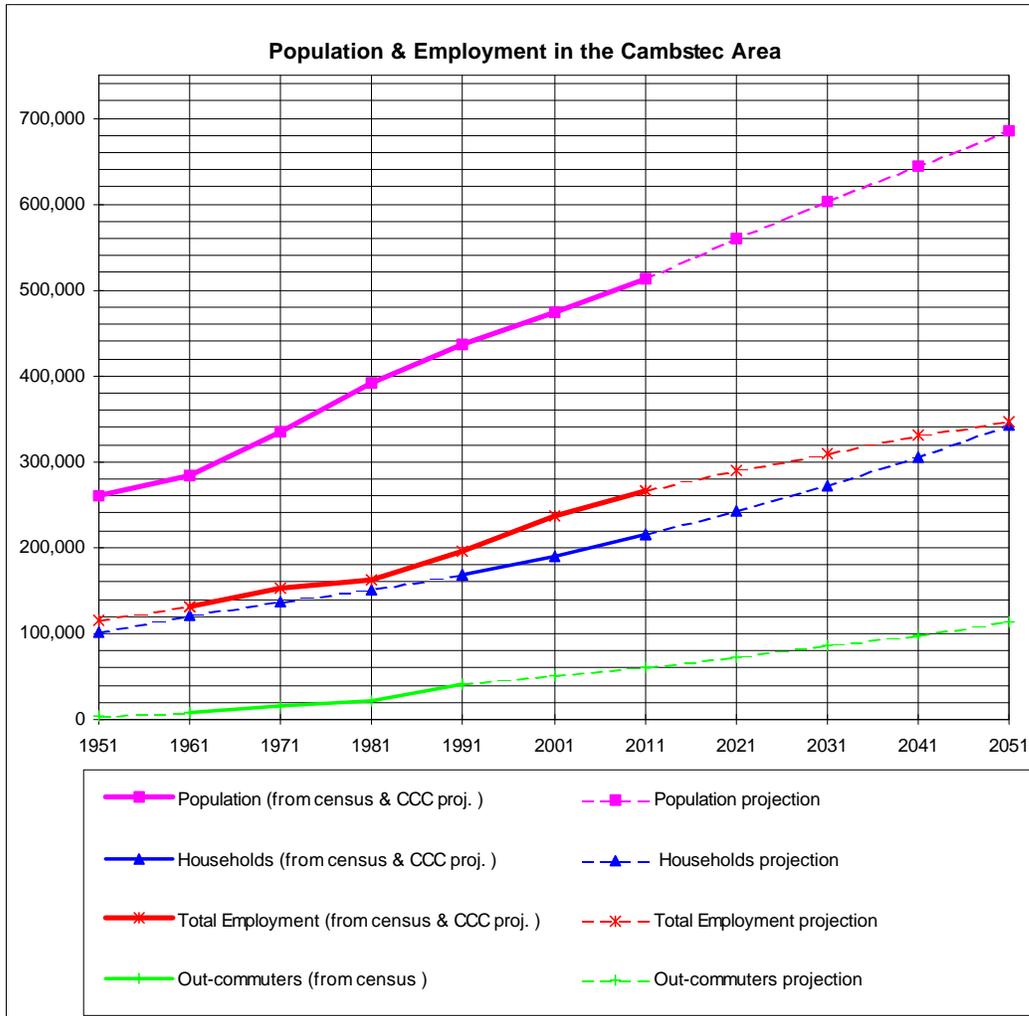
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Figure 4   Population and employment in the Cambstec area

Because of the national and international importance of Cambridge, it was considered that the area should grow in a sustainable manner to accommodate fifty per cent more people during the next fifty years. Figure 4 illustrates the basic forecast for the Cambridge Sub-Region (also known as the Cambstec area).

3. THE ALTERNATIVES

The Futures group envisaged seven options, all of which were deliberately kept simple so that their implications could be clearly understood. The options ranged from Minimum Growth within the City of Cambridge and the surrounding district to maximum development by Densification within the City. Intermediate solutions included the revision of the Green Belt in the Green Swap option (see Figure 5), development in public transport corridors in Transport Links (see Figure 6), development in the

Figure 5   Example of alternative development options

The Green Swap option (showing the current Cambridge Airport) before .....

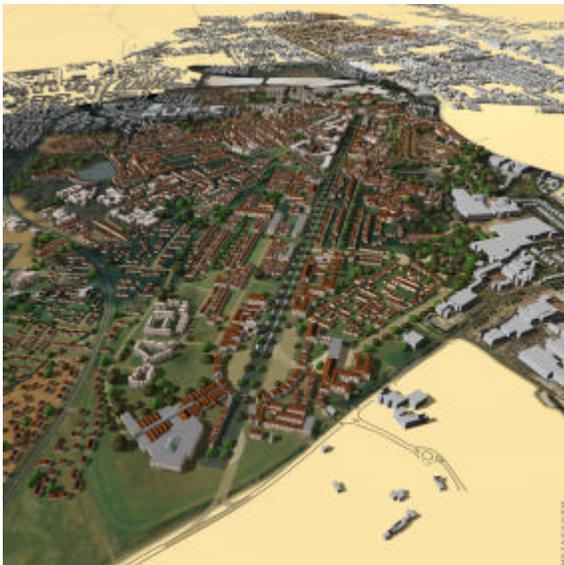and after (with new development in place).....

Figure 6   Example of alternative development option

The Transport Links option

Before (showing existing brownfield sites, consisting of disused railway sidings and a water treatment plant) ....


and after (showing new railway station and mixed use development)

ring of villages surrounding Cambridge in the Necklace option, a New Town option and a Virtual Highway option which included a broad band telecommunications system.

Each option was simulated by the computer models through time, assessed in terms of their economic, social and environmental sustainability and illustrated through the 3-D animation model. As an example, the forecasts for one alternative, Minimum Growth, are illustrated in Figures 7 to 12. This option does not allow more development in the City of Cambridge or in the surrounding South Cambridgeshire District.
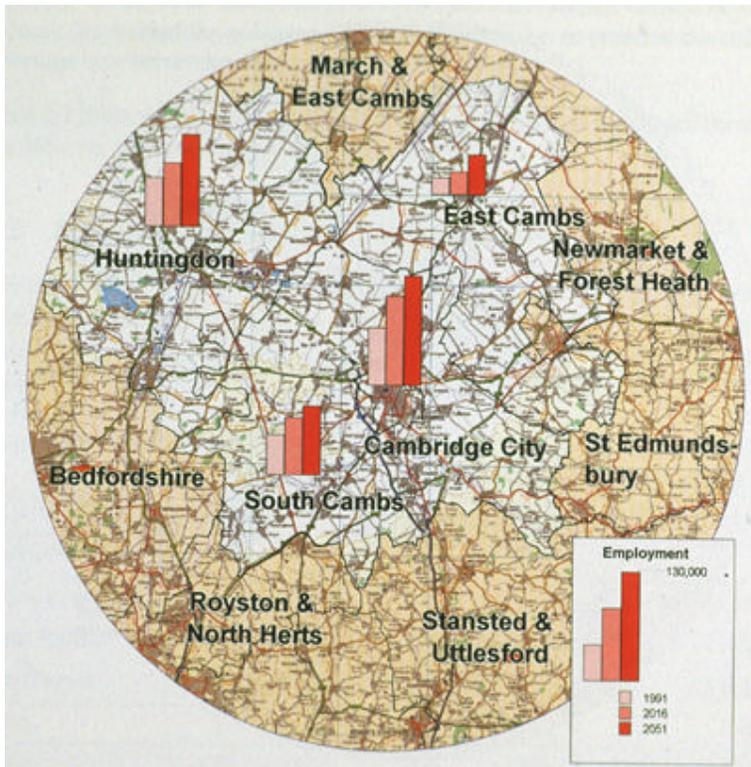
Figure 7.   Minimum Growth Option: Employment Growth Forecast, 1991 to 2051

Forecast from the model of employment growth in the four main districts of Cambridge City, South Cambridgeshire, East Cambridgeshire and Huntingdon.   It can be seen that the City continues to attract more employment and utilises floorspace in an efficient manner (by substituting industrial and warehousing employment for high tech and service employment).
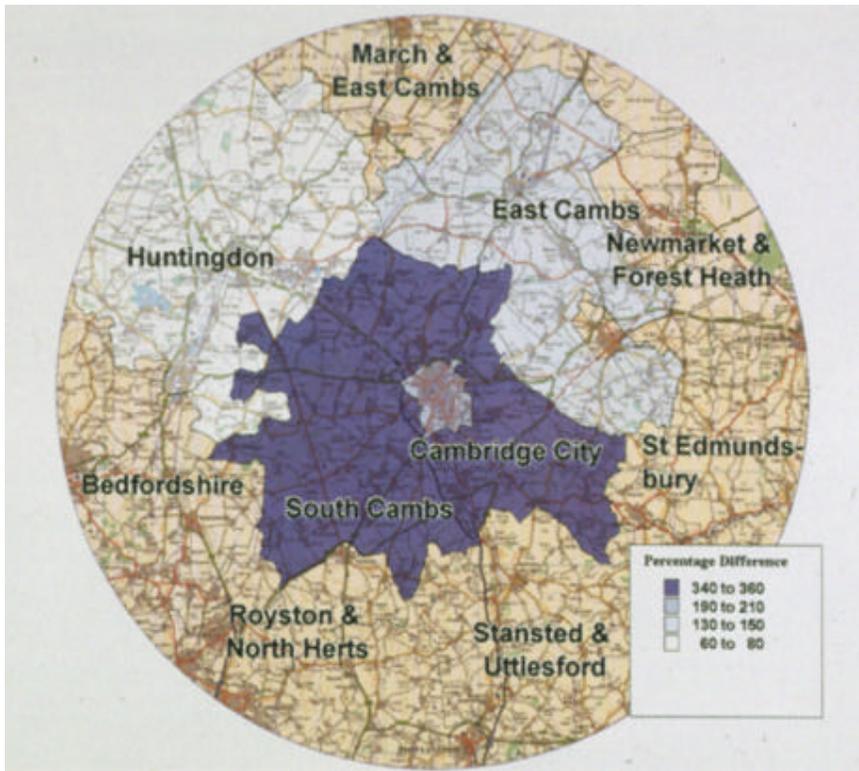
Figure 8.   Minimum Growth Option: Forecast of Housing Prices 2001 - 2016.

It can be seen that there is a great jump in the cost of housing in South Cambridgeshire District, where the most desirable suburban and village housing exists.
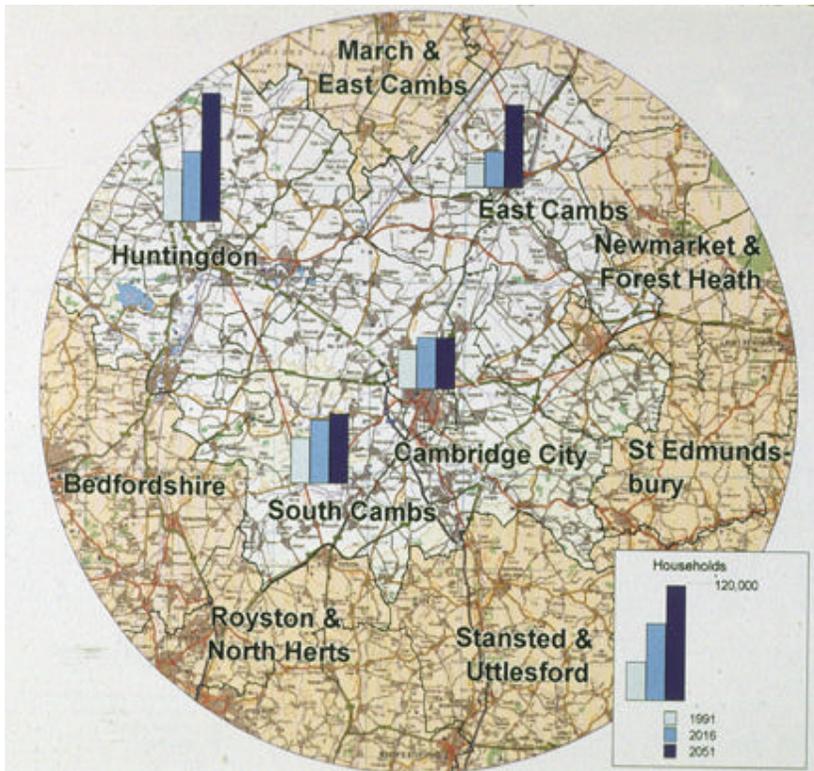
Figure 9.   Minimum Growth Option: Forecast of Household Growth 1991 to 2051

It can be observed that the population of the City and South Cambridgeshire increases, despite severe constraints, because of subdivision of houses into flats.
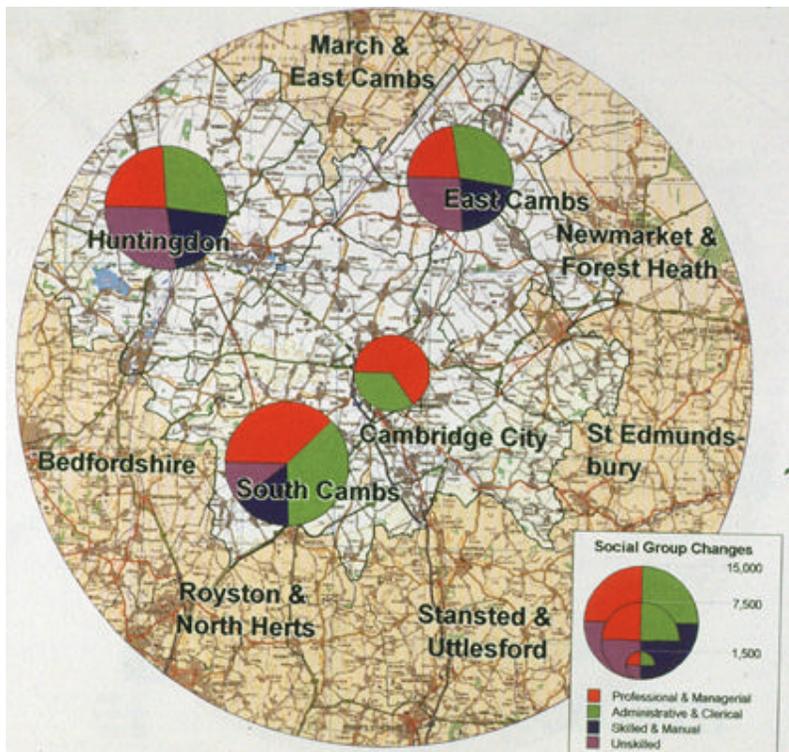
Figure 10.   Minimum Growth Option: Forecast of Socio-Economic Changes Between 1991 and 2016

It can be observed that new households in the City belong to higher economic groups (professional and administrative) while all groups are represented in East Cambridgeshire and Huntingdon.
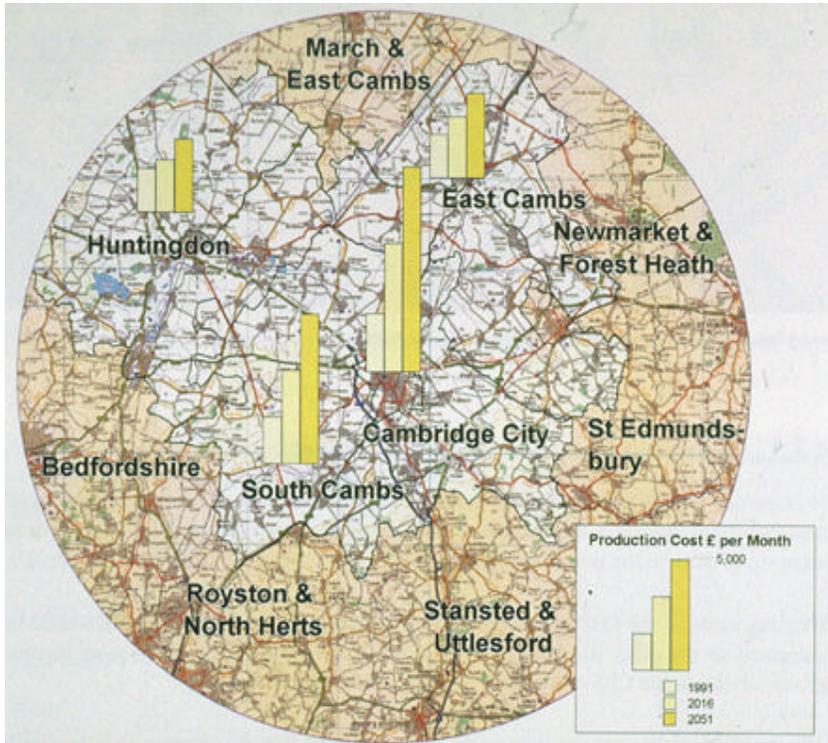
Figure 11: Minimum Growth Option: Forecast of the cost of production per employee.

Large increases in production costs (including labour, building, transport, etc) can be observed in the City and South Cambridgeshire.

Figure 12.   Minimum Growth Option: Congestion

Forecast of increases in congestion at main road junctions in the City of Cambridge.

4. PUBLIC PARTICIPATION

The results were summarised in a report and a video[5]. A large scale exhibition toured Cambridge and the surrounding market towns. All local councils were given a presentation. A brochure containing a questionnaire was given to visitors to the exhibition. The public were also able to register their views through a web site[6]. The results were analysed and published in a small brochure[7].

It has been illuminating to see that the public have understood the main issues under debate and rejected the Minimum Growth option. It has been realised that lack of change in the structure of the region does not mean that there will be no change to people's lives – quite the contrary: low and medium income groups will be squeezed out of the City by the high cost of living, those firms which cannot compete may also be squeezed out and move elsewhere and people may lose their jobs. Essential services may be difficult to maintain. Even the University is threatened by the difficulty of recruiting qualified personnel. Figure 13 illustrates the increase in production costs for exporting firms under each option and Figure 14 illustrates the summary results under three main criteria –economic efficiency, social equity and environmental quality– for all options.

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[5] The Cambridge Futures Report and Video can be obtained from The Martin Centre; telephone +44 (0)1223 740564

[6] http://www.arct.cam.ac.uk/CambFut

[7] Cambridge Futures: Survey Report by Cambridge Architectural Research Ltd and Cambridge Media Lab Ltd, October 1999
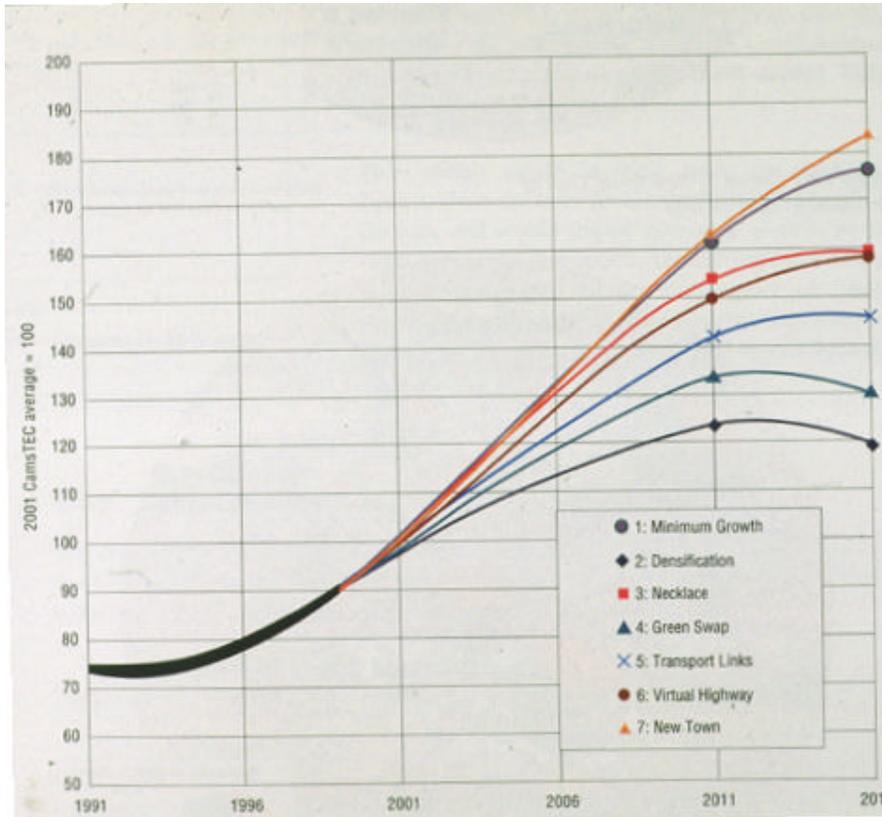
Figure 13   Average CambsTEC export unit cost index 1991 to 2016

	Cambridge Futures: Comparison of Options: Bullet Table		
	Economic Efficiency	Social Equity	Environmental Quality
1: Minimum Growth	•	•	• • •
2: Densification	• • • • •	• • • • •	•
3: Necklace	• •	•	• • •
4: Green Swap	• • • •	• • •	• •
5: Transport Links	• • •	• • •	• • • •
6: Virtual Highway	• •	• •	• • • • •
7: New Town	•	•	• • • •

Figure 14   Comparison of benefit factors in the options as weighted by the research team
(• = minimum to • • • • • = max)

The public gave overwhelming support to the Transport Links option as it allowed growth without too much environmental impact. They also supported the revision of the Green Belt through the development of Cambridge Airport in the Green Swap option. Less support was expressed for the Densification option and little or no support for the Necklace and New Town options. See Figures 15 and 16.

THE OPTIONS

Option 5
Transport Links

This is the clearly preferred option liked by 78% of all respondents. This option would reduce car use the most, minimising increased traffic congestion and pollution, and better protect the quality of life in the city and surrounding area.

Inference
Two issues dominate people's choices: traffic congestion and quality of life.

Option 4
Green Swap

Marginally more people favour allowing development in selected areas of the green belt of less scenic value than dislike it. Interestingly these differences seem independent of where people live.

Inference
Despite increased traffic congestion in the city, 42% of people favour this option because it produces the lowest increase in the cost of living.

MOST LIKED

Figure 15   Level of public support for the Transport Links and Green Swap options

Option 1
Minimum Growth

Option 3
Necklace

Only 16% of people favour this option since it would only preserve the city at the expense of congestion on access roads and regional stagnation.

Inference
Surprisingly, and most encouragingly in terms of this whole exercise, most people appreciate that minimum growth will not keep things the same.

The current planning policy is the least favoured option, disliked by two-thirds of people.

Inference
People agree that things cannot continue as they are and that we need new policies to reduce traffic congestion whilst maintaining regional prosperity.
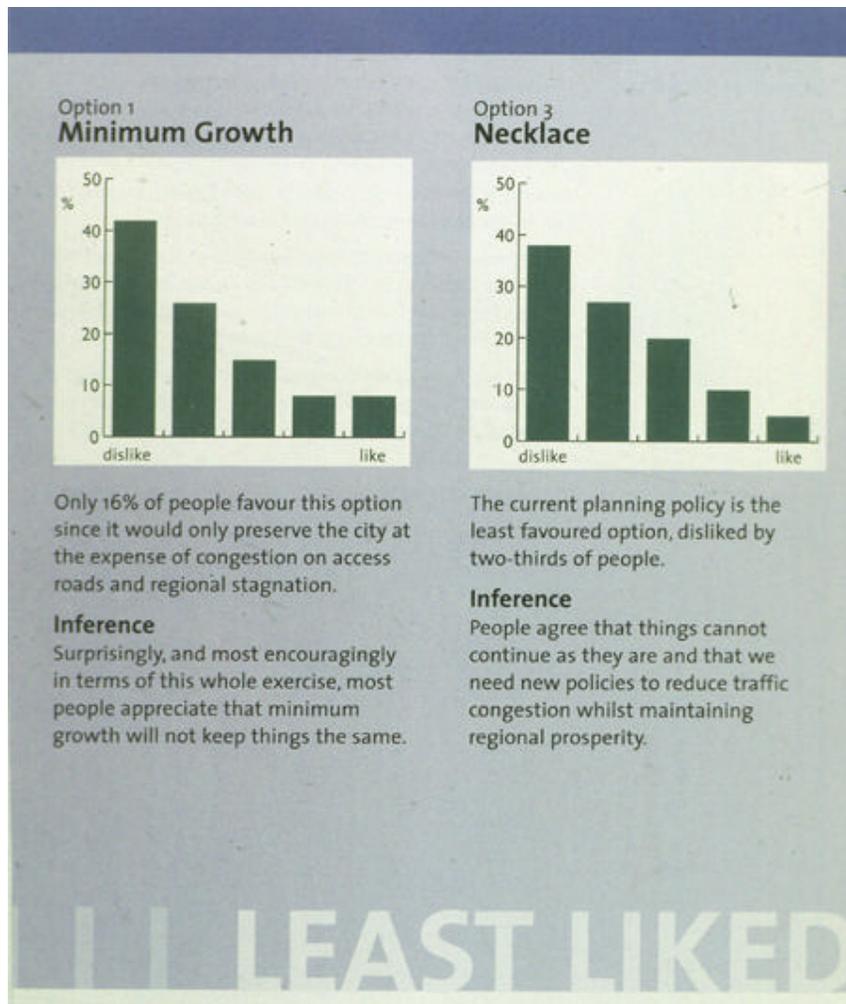
Figure 16   Level of public support for the Minimum Growth and Necklace options

The Draft Regional Planning Guidance[8] has taken on board a number of the issues raised by the Cambridge Futures study, among them the possibility of extending the Cambridge Sub-Region beyond the County and regional boundaries; the importance of the knowledge-based economy, not only for the future of the region but for the nation as well; the interrelationship between the location of housing and of jobs, the resulting pattern of transport and the role of planning constraints in the economic, social and environmental performance of the region.

The Draft Regional Planning Guidance proposes a sequential approach to the future of the Sub-Region, starting with densification, revision of the Green Belt, a new settlement and selective growth in transport corridors. All these options were tested in the Cambridge Futures study. A follow-up study is now taking place, commissioned by the regional body (SCEALA), which will detail the

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[8] Draft Regional Planning Guidance for East Anglia, Government Office for the East of England, March 2000

combinations of policy that, hopefully, will produce a Structure Plan which will be less hotly contested than the previous one.

5. CONCLUSION

It is interesting to point out that those options which involved big changes in the physical fabric of the region were not rejected outright because it became clear that they could improve the environment. A general consensus emerged on the direction of future development: the encouragement of knowledge-based firms but within carefully considered and sustainable – in the widest sense of the word – development.

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