Strategic Business Case
Models for Telecare

July 2005
Strategic Business Case Models for Telecare

Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Contents</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Overview</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>An Introduction to Telecare Infrastructure and Operational Costs</td>
<td>3</td>
</tr>
<tr>
<td>2.1</td>
<td>Direct Costs</td>
<td>3</td>
</tr>
<tr>
<td>2.2</td>
<td>Indirect Costs</td>
<td>5</td>
</tr>
<tr>
<td>2.3</td>
<td>Operational Experience</td>
<td>5</td>
</tr>
<tr>
<td>2.4</td>
<td>Indirect Operational Costs</td>
<td>6</td>
</tr>
<tr>
<td>2.5</td>
<td>Other Cost Considerations</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>The Balance of Care Model</td>
<td>7</td>
</tr>
<tr>
<td>3.1</td>
<td>Using This Guide</td>
<td>7</td>
</tr>
<tr>
<td>3.2</td>
<td>Data Entry Conventions</td>
<td>7</td>
</tr>
<tr>
<td>3.3</td>
<td>Pre-Defined data in the Model</td>
<td>8</td>
</tr>
<tr>
<td>3.4</td>
<td>Starting the Model</td>
<td>8</td>
</tr>
<tr>
<td>3.5</td>
<td>Saving and Exiting the Model</td>
<td>8</td>
</tr>
<tr>
<td>3.6</td>
<td>The Balance of Care Model Section by Section</td>
<td>9</td>
</tr>
<tr>
<td>3.7</td>
<td>Definitions and Data</td>
<td>10</td>
</tr>
<tr>
<td>3.8</td>
<td>Care Options</td>
<td>15</td>
</tr>
<tr>
<td>3.9</td>
<td>Results</td>
<td>18</td>
</tr>
<tr>
<td>3.10</td>
<td>Graphs</td>
<td>20</td>
</tr>
<tr>
<td>3.11</td>
<td>Scenario Menu</td>
<td>21</td>
</tr>
<tr>
<td>3.12</td>
<td>Values Used for Illustrative Model</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>The Telecare Business Case Model</td>
<td>28</td>
</tr>
<tr>
<td>4.1</td>
<td>Input</td>
<td>28</td>
</tr>
<tr>
<td>4.2</td>
<td>Baseline Activity</td>
<td>30</td>
</tr>
<tr>
<td>4.3</td>
<td>Operating Costs without Telecare (Notelec)</td>
<td>31</td>
</tr>
<tr>
<td>4.4</td>
<td>New Activity</td>
<td>32</td>
</tr>
<tr>
<td>4.5</td>
<td>Telecare Investment</td>
<td>32</td>
</tr>
<tr>
<td>4.6</td>
<td>Impact of telecare Investment (Telec)</td>
<td>33</td>
</tr>
<tr>
<td>4.7</td>
<td>Summary</td>
<td>33</td>
</tr>
<tr>
<td>4.8</td>
<td>Quality Assessment</td>
<td>33</td>
</tr>
</tbody>
</table>
1. Overview

This manual describes two separate - but linked – models developed to support social service departments in the development of strategy and business cases for local telecare projects. This is to support councils in making decisions about how to spend the Preventative Technology Grant.

The models enable individual local councils to develop their business cases for telecare using local data centred on local issues which, in turn, shape the requirement for local telecare development. They are designed to be flexible and straightforward to use and to enable the potential resource and financial consequences of a wide range of assumptions and ideas to be explored in a short period of time.

Following this introduction the document is divided into three sections:

- A brief introduction to telecare infrastructure and operating costs which provides a background for the use of the two models.
- The Balance of Care Model, which supports the development of a local strategic direction for telecare. Outputs from this model can then be used as inputs to: –
  - The Telecare Business Case Model. This enables more detailed financial flow implications of the investment to be assessed.

Particular attention has been paid in the development of the modelling components to obtaining appropriate definitions of client groups and services, and to providing valid working assumptions. These form a starting point for local applications and are capable of being easily amended to local circumstances using locally routinely available data.

These models are intended as a tool for councils, to help them use telecare in the most effective way for their own area. They are not intended to be a perfect model, only an aid, which councils are free to use if they so wish. The Department does not intend to provide councils with training and/or ongoing support in the use of these models. However, these detailed guidance notes are designed to support the use of the model by councils.
2. An Introduction to Telecare Infrastructure and Operating Costs

It is important to be clear about the telecare infrastructure and operating costs to be able to understand and use the models.

The infrastructure needed for a community care service that incorporates telecare is in two parts, the technical and the organisational.

*Technical infrastructure* includes a telecommunications network, a data collection, storage, and retrieval system at the call centre and a home hub. For most users the telecommunications network is the telephone. In some metropolitan areas, telecommunications is provided over broadband fibre and integrated with Internet access and television. This will expand over the coming years, as will the use of mobile telecommunications to the home. The home hub is the device that plugs into the users telephone line or any other telecommunications network in the home. It interfaces between the wide variety of sensors in the home and the telephone network. It can also interface between a computer and the telephone network. Examples of home hubs and sensors are described in more detail in the Audit Commission report *Implementing Telecare: Strategic Guidelines for Policy Makers, Commissioners and Providers* (Audit Commission Public Sector National Report, 2004) and in the information pack associated with the grant *Getting Started with Telecare*. Data from the sensors are collected at the call centre, stored, and presented to the call handler by the data storage system.

*Organisational infrastructure* includes the call centre, call handlers, call centre protocols, the supply and maintenance of the equipment and links to existing service providers. Telecare is a new option in the delivery of community care. Its use will have repercussions on existing service design and many of the small scale trials of telecare have found that this is a more complex area than the technology itself.

2.1 Direct Costs

Each of these infrastructure items has a cost. The cost of establishing and operating a telecare service as part of a complete community care service for a council depends on three decisions. First is the decision on the scale and scope of the service that has to be delivered. Scale includes the number and type of people to be supported. Scope is the type of service and includes identifying the important boundaries between social care and healthcare. Second is whether to use, or expand, an existing service. Examples are the choices can be made between the community alarm service (CAS), a third party supplier, or a new call centre and service. Third is whether to buy or lease equipment or to procure a service from a third party.

These three decisions are shown in Figure 2.1, with some steps that follow from them. Options for local councils may be limited, and previous decisions may have to be revisited in the light of subsequent cost consequences. Decisions at this early stage will impact on the final costs.
Figure 2.1. Decision Tree on Setting up and Operating Telecare

<table>
<thead>
<tr>
<th>Decision 1</th>
<th>Scale and Scope of the service:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>e.g. Examine local care priorities and needs</td>
</tr>
<tr>
<td></td>
<td>Discuss options and engage all stakeholders</td>
</tr>
<tr>
<td></td>
<td>Identify target populations etc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decision 2</th>
<th>Use existing CAS provided by council</th>
<th>Use existing CAS provided by third party</th>
<th>Establish new call centre (probably as joint venture between health, housing and social services)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Expand technical capacity with record keeping and call handling</th>
<th>Specify building and technical requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2</td>
<td>Recruit and train staff *</td>
<td>Recruit and train staff *</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decision 3</th>
<th>Purchase or lease equipment</th>
<th>Contract with service provider</th>
<th>Purchase or lease equipment</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Step 3</th>
<th>Write equipment procurement specification</th>
<th>Write service procurement specification</th>
<th>Write equipment procurement specification</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Step 4</th>
<th>Provide facilities to store and maintain equipment</th>
<th>Provide facilities to store and maintain equipment</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Step 5</th>
<th>Write local response protocols</th>
<th>Write local response protocols</th>
<th>Write local response protocols</th>
</tr>
</thead>
</table>

* Staff can include call handlers or operators, home surveyors, equipment installers, and equipment maintenance staff. In a small-scale service some of these roles could be combined.

Decisions on the scale and scope of proposed telecare services will be initially be influenced by local objectives on care priorities and how to meet local needs, and affected by external influences such as the council’s experience of telecare and the degree of joint working that exists across local statutory services. The Balance of Care model is designed to help councils refine the initial decisions of councils by providing guidance on their implications for care system resources and costs.

The second key decision involves choices about the use or expansion of existing services. Options here are to either to use an existing CAS provided by the council or by a third party, such as an adjoining council or a private sector supplier, or to establish a new call centre – essentially whether to provide the service ‘in house’, or to sub-contract it. The decision to establish a new call centre may be taken jointly by health, housing and social services
so that it can service needs across the statutory sector in that area. Establishing a new call centre is probably the most expensive of the three options available in the short term because of the high capital and set up cost, though it may be viable over the longer term.

Where the decision is to use the existing council service, the next step is to expand it as necessary to meet the scale and the scope of the service to be provided. A new centre would be sized and equipped appropriately at this design stage. Using an existing ‘in-house’ CAS or a third party may require an upgrade and recruitment and training of extra staff. The attraction of the decision to use a third party provided service is that capital and set up costs will be its responsibility.

The third decision is to select a financing option, either to purchase or lease the equipment. Where an existing call centre or a new call centre is preferred, the next step is to write the procurement specification, and then provide facilities to hold a sufficient stock of equipment locally to meet the projected need. Where the scale of the proposed service is small, maintaining stock may not be a significant cost. As the service grows, stockholding will need to be addressed. Where a third party provided service is preferred, step 3 is to write the service procurement specification.

In all cases, call centre staff must write the local response protocols, step 5, with the local community care staff who will be providing the service to users.

The Telecare Business Model is designed to allow these options to be tested.

2.2 Indirect Costs

In addition, there are also indirect costs. These include training existing community care staff on the role and use of telecare, and how, and when, to prescribe telecare as part of community care. Creating a local demonstration facility may be one way of providing the setting for training.

Experience shows that the training resources are critical to the speed of uptake of telecare, and the success or failure of the implementation. Other costs include producing staff manuals.

2.3 Operational Experience

Telecare pilots that have been conducted across England have all used existing CAS, either provided by local council or a third party. Figure 2.2 summarises typical costs incurred in these pilots. It shows costs for individual telecare sensor packages and the additional costs that a call centre would incur in providing the equipment, installation, maintenance and call handling. These are small-scale services so facilities to store equipment were not needed.

Figure 2.2: Telecare Packages, Costs and Applications.
<table>
<thead>
<tr>
<th>Telecare Package</th>
<th>Equipment Cost</th>
<th>Monitoring Cost</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Safety and Security</td>
<td>£360</td>
<td>£5/week</td>
<td>reduce residential home placements, reduce bed blocking, reduce care hour packages in the community</td>
</tr>
<tr>
<td>Additional sensors</td>
<td>£80</td>
<td>£1/week/sensor</td>
<td></td>
</tr>
<tr>
<td>Home Health Monitoring</td>
<td>£700</td>
<td>£10/week</td>
<td>maintain people in the community, manage long term conditions in community</td>
</tr>
<tr>
<td>Additional health monitoring Sensors</td>
<td>£150</td>
<td>£1/week/sensor</td>
<td></td>
</tr>
<tr>
<td>Home Safety and Security sensors to work with Health Monitoring</td>
<td>£80/sensor</td>
<td>£1/week/sensor</td>
<td></td>
</tr>
</tbody>
</table>

2.4 Indirect Operational Costs

In the same way that professional’s need training, the public will have to be provided with a means to understand telecare - its potential to support them and its role in community care. In a small service, this can probably be combined with a discussion with the care professional who prescribes telecare, reinforced by a discussion with the people who complete the home survey and install the sensors. A bigger service would have to consider this issue, and probably finance a separate activity.

2.5 Other Cost Considerations

Costs of using the service are borne by the user themselves through their telephone bill, and so this does not represent a cost to the council. Equipment provision is, however, a cost to the council. Councils will need to consider their charging policy in relation to telecare. Most users who subscribe to a CAS currently pay a weekly or monthly charge.
3. The Balance of Care Model

The Balance of Care model (developed by Tom Bowen and Paul Forte of the Balance of Care Group [www.balanceofcare.com](http://www.balanceofcare.com)) is designed to assist in the resource planning decision making process - not to replace it. It is a tool which can help focus attention on relevant data and organise it in such a way that it can assist in discussion and negotiations between all groups involved in decision making.

The model supports the shaping and setting of the local strategic direction for telecare: what might the potential impact of telecare be at a future point in time in terms of consequences for services in the local health and social care economy for older people? Figure 3.1 illustrates the model in a simplified diagram. For example, a patient with medium-level dependency requirements might potentially receive a variety of different packages of care each involving different types and volumes of services from a range of providers. The potential use of telecare may then, in turn, have a bearing on the viability of particular care options or the level of input required from different services.

All of the key variables in the model can be changed to enable a wide range of local assumptions, opinions and data to be tested. Outputs from this modelling process can then be used as a basis for planning, financial modelling and business case development and for specifying further, more detailed information requirements. The results are based on the estimated planning population for a particular planning year horizon (for example, five or ten years ahead; both the planning population and desired time horizon are determined by local users).

![Figure 3.1](image-url)
Once a strategic direction is established, outputs from the Balance of Care model can then be entered into the Business Case Model to enable the strategic planning objectives to be costed in detail.

3.1 Using this guide

This section serves as a practical guide to the Balance of Care model. Full definitions of the variables, data and planning assumptions used in it are provided and should be regarded as a starting point for substitution by local data and assumptions as required.

3.2 Data Entry Conventions

1. You can enter or change data or text in areas of the model which have a yellow background and blue text or numbers. All other areas with a white background and black text are protected as they contain the results of calculations. You should not attempt to change any text or data here.

2. To delete existing text or data, use the delete key only to clear the contents of a cell; do not use the space bar to ‘blank out’ entries. If you want to remove any service elements or client categories from the master lists, you must first ensure that there are no values for them remaining in the ‘care options’ screens as removing the descriptive label does not automatically delete these values.

3. In all data entry screens it is important not to leave any blank rows between data entries. This is because, when automatically setting the screens for display, it is assumed that the first blank line in a data entry table represents the end of the text or data entries. Anything entered after a blank line will therefore be ignored. The same rule applies in the scenario menu where new scenarios must be defined sequentially.

4. You will find it helpful to record separately any assumptions you are putting into the model, or data sources as you go along.

3.3 Pre-defined data in the model

The Balance of Care Model is made available with pre-defined client categories and service lists for which data should be readily available in all local councils with social services responsibilities. The definitions of the variables defined in the model, the sources of pre-loaded data items and underlying assumptions are described in section 3.12.

Note: these numbers are purely indicative. The Balance of Care model is completely adaptable to local circumstances; you can amend or replace any data items, definitions of client groups or services currently in the model as required.

3.4 Starting the model

Begin by starting Excel and opening ‘Balance of Care Telecare Model v1.0’. Once the model is loaded you are presented with the screen shown in figure 1 and, from this point onwards, you should use the menu buttons to move between different parts of the model. The Excel main menu always remains
on display and can be used at any time to copy and paste data into and from the model as required and generally enable you to carry out normal Excel activities.

Important note: as the Balance of Care model is macro-driven, you will need to ensure that your Excel system is enabled for ‘medium level’ macro security. This is the normal Excel default. If necessary it can be changed using the ‘Tools, Macro, Security’ commands from the main Excel menu.

3.5 Saving and Exiting the model

As you work through the model it is a good idea to periodically save what you are doing. If you use the Excel menu ‘File Save’ option to do this the model version you are working on will be updated and remain on the screen.

When you want to leave the model completely, the preferred way to do so is to save it and close it down via the Close button on the Balance of Care model Main Menu. You will be prompted to save changes before quitting.

If you want to save the model under a different name (and thus build up a library of different model versions), use the Excel menu ‘File Save As’ option. You will be prompted to type in a new name after which the model you are using on the screen will be renamed. You can exit from the model using the Close button as above.

Note that you can, of course, cut and paste data from the model at any time to another Excel worksheet to undertake other analyses outside of the model itself.

3.6 The Balance of Care Model section by section

Main Menu
The Main Menu (figure 3.2) is the ‘home page’ of the Balance of Care model and links all of its five main sections: Definitions and Data, Model, Scenarios, Results - tables, Results - graphs. They are described briefly here (and in more detail below) in the order you are likely to find most convenient when setting up and working through your own application.

**Definitions and Data**

The menu options here enable you to define the population being planned for (Client Categories), information on the resources to be modelled (Service Details), and planning populations and baseline service details for each geographical area you want to consider (Locations).

**Care Options**

The Care Options area of the model enables you to explore the relationship between demand and supply, such as the implications of different treatment options, or of different levels of demand or the trade-offs between cost and quantity.

It is also where you can – optionally - explore ‘quality’ issues between the care options. This is enabled by means of a simple weighting factor which you can assign and is described in more detail in section 3.8 below.

**Results - tables**

The options available here present tables of results at both Summary and more detailed levels (Service Units and Service Costs).

**Results - graphs**

These are summary (Cost by Service Group) and detailed (Cost by Service) bar graphs of planned service expenditure resulting from the plan. There is also a pie chart of planned expenditure by client category (Cost by Client Category).

**Scenarios**

The Scenario Menu enables you to save and compare different runs of the model on occasions when you might want to consider a range of different assumptions and compare their potential impacts.
3.7. Definitions and Data

3.7.1 Client Category Definitions

This is the usual starting point for any application and where the population groups to be modelled are defined. Any definitions can be established as required (at least one, and up to a maximum of 16) but you will also need to provide a population (whether actual or estimates) for each category. Therefore the groups should be mutually exclusive to avoid problems of double-counting. Remember not to leave a blank line in the middle of the list. The definitions already contained in this model are those which the Expert Group consider are the most meaningful for planning telecare developments and for which local population data or estimates should be relatively straightforward to obtain – see section 3.12.

You can enter different populations for each geographical location you may wish to define via the 'Locations' option (see below), but the client category definitions for each location will always be the same as those defined here (figure 3.3).

3.7.2 Service Definitions
Figure 3.4

Return to the main menu and select the **Service Details** button. Here you define the 'master list' of resources you wish to model (figure 3.4). This is likely to include existing key services, but it could also include services which do not currently exist locally but which you might want to introduce. As with the Client Categories screen, do not leave a blank line in the middle of the service list. All items on this screen can be changed as required.

Each row describes the components of an individual service element. Taking ‘Care Assistant’ as an example, and reading from left to right:

**Service description**

This label describes the resource or service; in this case ‘Care Assistant’. Note that this role is often described in different ways in different councils (eg Home Carer). You should always use the appropriate local definitions and labels for services in order to facilitate discussion of alternatives and their impact.

**Unit**

This is how you want to describe the way in which the resource is normally used. The workload of care assistants, for example, is typically referred to in terms of ‘hours’.
Costs
The next two columns describe average unit costs of the service element per unit of time which you have defined (i.e. per hour, per week, etc). The left-hand column is labelled ‘current unit cost’ and is used in the model only to calculate current spend based on the current service levels entered in Location Details (see below).

The right-hand cost column (labelled ‘projected unit cost’) can be set to current levels or adjusted for anticipated changes. Note that all cost calculations in the Balance of Care model based on specified Care Options are based on the figures in this column.

Annual factor
The model results are expressed as volumes and costs for a one-year period and the annual factor is a simple multiplier to ensure that all service volumes and costs are annualised. Of course, the simplest way to do this is to have them annualised in the first place by means of the conversion factor (see below). If the conversion factor calculation is done on an annual basis then, as you can see in figure 3.4, the annual factor is simply ‘1’. If, for example, it were on a monthly or weekly basis then the annual factor would be ‘12’ or ‘52’ accordingly. The annual factor is service-specific so it is perfectly feasible to have a mix of different annual factors in the same table. For simplicity, however, we recommend the approach as shown in figure 3.4.

Annual unit
The measurement of care assistant usage in ‘hours’ is meaningful when considering the inputs to care options. However, for planning purposes it is usually helpful to express them in volume terms (rather than the ‘total number of hours’). In the case of care assistants (and most personnel-based services) Whole Time Equivalents (WTEs) are conventional units.

Conversion factor
This is factor needed to convert the total number of hours (across all client categories) into the total number of care assistant personnel required (i.e. the annual unit above). In this case the factor is ‘1500’ which represents a 37.5 hour week multiplied by the average number of working weeks in a year. Allowing for leave, sickness, training, we have assumed 40 working weeks (40*37.5 = 1500). You can change these parameters as required locally. The basis on which you make the calculation (weekly, monthly, annually, etc.) will affect the number you put in the ‘annual factor’ column (see above).

3.7.3 Group Description and ‘Service to Group’ Assignment
In this pair of tables (figure 3.5) you can define up to 11 separate ‘groupings’ of services (in this case five have been specified in the left-hand table) and then assign individual services to each of these summary headings (right-hand table).
In this example we have chosen to identify telecare under its own separate heading, but it would be equally valid to subsume it within one of the other group headings; it depends on how you want to view it within the local planning context.

**Figure 3.5**

**Figure 3.6**
3.7.4 Locations

The locations screen (figure 3.6) is where you define the geographical area(s) you wish to model and where one of them is chosen by you as the basis for the current model run (in the example shown, there is only one location ‘Telecare Valley’). If you wanted to define other areas or subdivisions of a larger area then these names can be entered here as well. Once an area is selected, clicking on the Location Details button enables detailed information about that currently selected location only to be entered. These details are stored - even when that location is not currently selected for modelling - and they can be amended at any time as required. Note that at least one location must be defined and selected; any more than this is optional.

You can only model one location at a time, but you can make comparisons between up to four locations within the model using the scenario setting function (described further below). Alternatively, you can copy results directly from the model into a separate spreadsheet for further analysis.

NB: The name of the location assigned to ‘L1’ will be the default name which appears on the model’s ‘home page’ – in this case ‘Telecare Valley’.

3.7.5 Location Specific Client Populations and Service Levels

Clicking on this button brings you to two data entry areas (figure 3.7). One is for the estimated planning population in each of the previously defined client categories for the area under consideration and the time horizon chosen. The other is the current volume of service in that location for the services. If the defined services do not currently exist in a particular area you can enter zero or leave it blank.

The model comes with ‘starting values’ already supplied here. These are based on published data for England and Wales and represent figures for an ‘average’ local council in the country (see section 3.12 for definitions and sources used).

The Bar Graph and Pie Chart options show the relative local population proportions in each client category. The Return button brings you back to the Locations sub-menu.

The model takes a ‘snapshot’ view of resource implications which means that the category population data entered will be assumed to match or be in keeping with whatever forward planning horizon you wish to work towards (for example, three years, five years, etc). You may want to take this into account if you are using current population estimates. NB: the population of P6 (the client category ‘unsupported at home >65’) is set to zero here. As the largest single group in any locality (approximately 48,000 in an ‘average’ council) its scale overwhelms the other client groups for whom telecare is a more important feature. As including the P6 population makes it difficult to focus on groups P1-P5 in the results graphs, its population has been set to zero here (see section 3.12).
### Client Category Populations for Telecare Valley

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Care home residents - other than EMH</td>
<td>3724</td>
<td>51%</td>
</tr>
<tr>
<td>P2</td>
<td>Care home residents - EMH</td>
<td>210</td>
<td>6%</td>
</tr>
<tr>
<td>P3</td>
<td>Care management - frail older people</td>
<td>550</td>
<td>15%</td>
</tr>
<tr>
<td>P4</td>
<td>Other long term care needs</td>
<td>550</td>
<td>15%</td>
</tr>
<tr>
<td>P5</td>
<td>Other low intensity needs</td>
<td>1030</td>
<td>15%</td>
</tr>
<tr>
<td>P6</td>
<td>Unsupported at home - 65</td>
<td>3</td>
<td>0%</td>
</tr>
<tr>
<td>P7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P8</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>P9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P12</td>
<td></td>
<td>17</td>
<td>0%</td>
</tr>
<tr>
<td>P13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Current Service Levels for Telecare Valley

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Current Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Community nurse</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>Physiotherapist</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>Care Assistant</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>OT</td>
<td></td>
</tr>
<tr>
<td>S5</td>
<td>Renal care</td>
<td></td>
</tr>
<tr>
<td>S6</td>
<td>Rehab assist</td>
<td></td>
</tr>
<tr>
<td>S7</td>
<td>Care home EMH</td>
<td></td>
</tr>
<tr>
<td>S8</td>
<td>Care home (non-EMH)</td>
<td></td>
</tr>
<tr>
<td>S9</td>
<td>Acute bed</td>
<td></td>
</tr>
<tr>
<td>S10</td>
<td>Common hospital bed</td>
<td></td>
</tr>
<tr>
<td>S11</td>
<td>Telecare</td>
<td></td>
</tr>
<tr>
<td>S12</td>
<td>CFN</td>
<td></td>
</tr>
<tr>
<td>S13</td>
<td>Night sitter</td>
<td></td>
</tr>
<tr>
<td>S14</td>
<td>Extra careHosting</td>
<td></td>
</tr>
<tr>
<td>S15</td>
<td>Day care</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3.7**
3.8. Care options

This is the set of screens where modelling of different assumptions and perspectives about care for each client group is carried out.

When you select this option, the care options screen for the first client category is displayed. Use the left and right chevron buttons beside the word ‘menu’ to move to the equivalent windows for each of the other client categories. Figure 3.8 shows three potential care options for client group 1.

Up to six care options (in vertical columns) can be described for clients in each client category, and you can allocate a percentage (0-100%) of that category’s population to one or more of them. This percentage is entered in the allocation line towards the top of the screen and the number of clients this represents is automatically displayed beneath. **(NB: It is up to you to ensure that exactly 100% of clients are allocated within each category).**

Each care option is described in terms of ‘per person, per year’. You decide which combination of services, and their volume over a one-year period, are appropriate or desirable for a person in that care option and enter the amount under each option heading (you can define the heading label as required – it is useful as a reminder of the predominant model of care you are defining – eg. ‘Extra Care’).

Care options can reflect current activity or best practice, but they can also be used to model the potential impact of new or alternative services not yet introduced locally or perhaps only currently given to a small proportion of client in the group. In this way the model provides an opportunity to explore a wide range of options and assumptions.

As allocations are made, the total cost for all clients, unit costs per client of each care option, and the total cost of each service element across all care options are automatically calculated in the various row and column totals. You do not need to enter ‘zero’ for services which you do not want to include in
that care option. Any numbers entered can easily be updated by over-typing, but remember that if you want to delete a number use only the delete key; do not use the space bar to delete the contents of a cell.

As you move between the client groups you will notice that the list of services remains the same. However you will be changing the quantities and combinations of the services as appropriate for the client group characteristics and requirements.

The bottom row of the table (quality score) is there for optional use. The aim is to provide a means of describing a qualitative dimension to the care option above. How ‘quality’ is defined is entirely up to you; it could be based on expert opinion, on local or national data sources. In the model it becomes a simple weighting device which can take values between 0-100% for each individual care option. The average quality score for that client group is automatically displayed in the bottom right hand corner of the screen and reflects the individual quality weighting and the number of clients allocated to that particular option.

**NB:** the quality percentages currently shown in the model are for illustrative purposes only.

**Some important notes about defining care options**

In the case of the ‘Telecare Valley’ care options, which have been generalised from actual case study examples, we are assuming that the telecare initiatives do actually have the projected impact on other services as set out. This should be regarded as indicative for any particular locality; however, the true impact in any place will be affected by local circumstances.

In particular, the extent to which informal support from family and friends is available will have an important role to play in affecting the volume and types of services required from statutory sector agencies. In some cases this may reduce the demand for those services; in others it may lead to an increased demand for carer support services (such as respite care). It some cases it may be worth considering a care option ‘twice over’ – in one version assuming the client has informal support at home (eg. spouse, immediate family), and in the second assuming no informal support is available.

Other agencies may also have an important role to play locally such as local council housing departments, or the voluntary sector (neither of which are explicitly shown in the Telecare Valley example).

The ability of the model to accommodate ‘quality’ (as outlined in the preceding section) is an important one when developing an all-round approach to care provision locally as it can provide a useful counter-balance to cost-driven pressures in exploring appropriate care options.
3.9 Results

Figure 3.9

3.9.1 Summary

This summary level results screen (figure 3.9) presents both the total current and projected service units and costs across all client categories given the plans specified and the total weighted quality score for the chosen location. This quality score (if this facility is being used) is calculated by averaging the quality scores for the client categories weighted by the population of each client category.

In this example the current cost is zero because no current baseline volumes of services have been supplied (For an individual locality you would enter these in the ‘location details’ screen).

The service costs can be viewed as a bar graph by clicking on the graph button. This is the same one as that accessed by clicking on the **Cost by Service** graph button from the Main Menu.
### 3.9.2 Service Units

#### Figure 3.10

The **Service Units** results screen (figure 3.10) shows the total projected volume for each service by each client group. This can be used to highlight which client categories are generating demand for particular services and, if necessary, pinpoint where further changes to assumptions might be made.

If there are a larger number of client groups specified, this table will extend to the right of the screen and a scroll bar will appear to enable you to access it.

### 3.9.3 Service Costs
The Service Costs results screen (figure 3.11) similarly shows the projected total annual expenditure on each service, by client category. It also show the summary ‘quality score’ for each client category (see section 3 above for a description of the quality scoring facility).

Again, if there are a larger number of client groups specified, this table will extend to the right of the screen and a scroll bar will appear to enable you to access it.

3.10. Graphs
3.10.1 Cost by Service
Bar graph of total current and projected service costs. (This graph can also be accessed via the Summary table - see above).

3.10.2 Cost by Service Group
Bar graph of total current and projected costs by service group (ie by summary service element groups).

3.10.3 Cost by Client Category
Pie chart of the total planned expenditure by each client category.

3.11 Scenario Menu
The scenario sub menu (figure 3.12) enables you to save up to four separate sets of changes you have made during the course of your deliberations and to compare summary totals of volumes and costs against each other. Current levels of service are also shown in order to act as a benchmark for comparison of scenarios (although none are entered in this example). It is accessed by the Scenario Menu button on the Main Menu.

Note that the scenario comparisons are only between previously saved scenarios and the current levels of service if entered. The results of the current 'live' version of the model you may be working on are not automatically included; they need to be specifically saved as one of the four scenarios before they can be compared with any others.

There are two sets of buttons on the scenario menu screen itself. Those inside the frame, arranged vertically on the right, control the definition, saving and deletion of individual scenarios. Those along the bottom of the screen control the different views by which you can compare the scenario results. The scenario control buttons inside the frame have the following functions:

3.11.1 Save
To save the set of assumptions and results you are currently working with, click first of all on the scenario number which you want to save it as (in the centre section of the screen) and the click the Save button. You will be prompted to enter a title and short description of the scenario. If you are overwriting an existing scenario you will be prompted for confirmation of these changes.

You should always start with the first scenario slot and save additional scenarios sequentially below; do not to leave any gaps in the scenario list. Scenario tables and graphs will automatically adjust to show only those scenarios you have defined.

3.11.2 Rename
To change the title of a previously saved scenario, select the scenario to be changed and click the Rename button. When prompted enter the new title and a short description.

3.11.3 Delete
To delete a scenario, select the one to be deleted and then click the Delete button. You will be asked to confirm this and the slot will then display the description [Empty].

3.11.4 Move
To move a scenario to a different slot, select the scenario and click the **Move** button. When prompted enter the number (1-4) of the new slot you want to move it to.

The buttons along the bottom of the screen have the following functions:

3.11.5 Total Cost Graph

This shows a bar graph of the total planned cost of each of the scenarios (ie. costs across all client categories).

3.11.6 Compare Cost

This screen shows the total planned costs of each service under each of the saved scenarios compared with the current cost of services.

3.11.7 Compare Quantity

This screen compares the total projected volumes of each service under each of the saved scenarios against the current service volumes.

3.11.8 Service Group Costs

This displays - for an individual service element - a comparison of the volume required under each scenario. Once selected, click the cursor on the cell with the description of the service you want to graph Click the graph button to compare the volume of that service required under each scenario with the current service volume.

3.12 Values used for Illustrative Model based on National Data

The Balance of Care Model has been configured to consider telecare related options. The client categories have been chosen to reflect key groups of people for whom telecare may open up alternatives, and the definitions aligned with existing characteristics for which data are routinely available at both national and local authority level.

Telecare options shown in the example are all intended to represent the more limited types of ‘reactive’ or ‘responsive’ monitoring (sometimes called ‘r-mode’) rather than more complex ‘preventive’ types of telecare (p-mode). The impact of these options in terms of the requirement for other services has been assumed based on interpretation of research findings.

Alternative care packages that involve or require informal carers are not shown in the example, but may be significant in local developments and could be explored using the model. Similarly the involvement of housing departments (now sometimes combined with social care) could also be explored.

There are 150 Councils with in England. We have estimated values for an imaginary council called **Telecare Valley**, whose population and service levels are exactly the England total divided by 150.
3.12.1 Client Category Definitions

The first five categories are intended to cover all older people receiving social care support by or partly funded by the local authority. The sixth category includes the remainder of the older population: although these people do not by definition have a need for social care that could be expedited by telecare, there is potential for more preventive approaches, and people may wish to fund their own telecare (figure 3.13).

Definitions can be found from Menu, Categories. Data for Telecare Valley can be found from Menu, Locations, Location Details.

<table>
<thead>
<tr>
<th>Category Label</th>
<th>Intended Population Base</th>
<th>Data Source for Telecare Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 Care home residents - not EMH</td>
<td>Permanent care home residents over 65 supported by council (excluding Elderly Mental Health)</td>
<td>England residents at 31-03-2004 / 150 = 1124</td>
</tr>
<tr>
<td>P2 Care home residents - EMH</td>
<td>Permanent care home residents over 65 supported by council (Elderly Mental Health)</td>
<td>England residents at 31-03-2004 / 150 = 218</td>
</tr>
<tr>
<td>P3 Case management - frail older people</td>
<td>Numbers over 65 receiving intensive home care (&gt; 10 hours per week). These are assumed to be the people who would be included in case management schemes for frail older people.</td>
<td>Based on England number receiving intensive home care (over 10 hours) at 31-03-2004 / 150 = 550</td>
</tr>
<tr>
<td>P4 Other long term care needs</td>
<td>Numbers over 65 receiving home care (5-10 hours per week). These are assumed to be the people who require continuing social care support, but do not have chronic healthcare needs appropriate for case management.</td>
<td>Based on England number receiving 5-10 hours of home care at 31-03-2004 / 150 = 550</td>
</tr>
<tr>
<td>P5 Other low intensity needs</td>
<td>Numbers over 65 receiving home care (&lt;5 hours per week)</td>
<td>Other England low intensity home care (&lt;5hrs per week) at 31-03-2004 / 150 = 1300</td>
</tr>
<tr>
<td>P6 Unsupported at home &gt;65</td>
<td>Total resident population 65 years and over, not receiving a social care service. <strong>Note:</strong> Since no services have been defined for this category in any of the scenarios explored, in illustrative model runs this has been set to zero.</td>
<td>England 2001 Census, resident population over 65, divided by 150, and net of estimated values for P1 to P5 inclusive. (If shown would total 48,300)</td>
</tr>
</tbody>
</table>

**Figure 3.13**

When looking ahead (the suggested planning horizon for full realisation of benefits of telecare related developments is 10 years), future projected populations could be used rather than the current levels shown here. For England, and hence Telecare Valley, the adjustment could be based on the forward projection of category populations (P1 to P5) based on age specific service use.
For example, given that the service user population defined above tend to be over 75 years old, we could estimate the future category numbers in P1 to P5 at current level plus the growth in numbers of people over 75, which ONS project to be an increase of 13% over the next 10 years. If local councils have more detailed data on the age of service users, and equivalent demographic projections, similar but more detailed adjustments could be used to estimate future category demand.

3.12.2 Service Definitions and Costs

Services included for the Telecare Valley illustration include all current social care services that are provided to older people to meet care needs, and the requirements for which may be affected if telecare support is developed. Unit costs shown are intended to be gross to the council, thus include expenditure shown in local authority financial returns (eg PSS EX1), but exclude expenditure funded by other agencies eg nursing support in care home. Values shown in figure 3.14 are for England 2003-04. The social care services included are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Service Description</th>
<th>Unit Cost (England 2003-04)</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3</td>
<td>Care Assistant</td>
<td>£13.84</td>
<td>PAF indicator 2.22A (B17) Hourly cost per adult for home help care <a href="http://www.publications.doh.gov.uk/public/councilunitdetails2003-04.xls">http://www.publications.doh.gov.uk/public/councilunitdetails2003-04.xls</a></td>
</tr>
<tr>
<td>S4</td>
<td>OT (Occupational Therapist)</td>
<td>£25.00</td>
<td>Assumed level based on gross costs per hour encountered in a number of PCTs</td>
</tr>
<tr>
<td>S7</td>
<td>Care home EMH</td>
<td>£410.00</td>
<td>PAF indicator 2.12A (B15) Weekly expenditure per adult with mental health needs excl NHS supported <a href="http://www.publications.doh.gov.uk/public/councilunitdetails2003-04.xls">http://www.publications.doh.gov.uk/public/councilunitdetails2003-04.xls</a></td>
</tr>
<tr>
<td>S8</td>
<td>Care home (non-EMH)</td>
<td>£364.00</td>
<td>PAF indicator 2.2A (B13) Weekly expenditure per person excl NHS supported <a href="http://www.publications.doh.gov.uk/public/councilunitdetails2003-04.xls">http://www.publications.doh.gov.uk/public/councilunitdetails2003-04.xls</a></td>
</tr>
<tr>
<td>S13</td>
<td>Night sitter</td>
<td>£50.00</td>
<td>Assumed level for one night cover</td>
</tr>
<tr>
<td>S14</td>
<td>Extra care housing</td>
<td>£150.00</td>
<td>Assumed gross cost to LA of extra care provision based on a small number of schemes</td>
</tr>
</tbody>
</table>

Figure 3.14

Similarly NHS and other agency services have been included where there is reason to suppose either that the service may need to be developed
alongside the telecare to ensure that benefits are realised, or where there is likely to be some change in per capita demand. Costs here have been based on assumptions based on experience of typical unit costs encountered in a range of Primary Care Trusts.

Assumed telecare unit costs include a capital element spread over 2 years and call centre costs, as detailed in the general introduction to the nature of telecare services.

The 'conversion factor' from the aggregate annual unit (eg WTE) to the unit describing provision of service within care options (eg hours) is assumed based on experience in other studies. Care Option service use (see below) has been quantified to show the total volume per client in a year, hence the 'annual factor' value is set to 1 in all cases; for ease of use we recommend that this practice should be followed when building up local scenarios using the model.

No values have been assumed for the volume of current provision in Telecare Valley (Menu, Locations, Location Details), although a scenario is calculated based on assumed utilisation (see Scenarios below). If users are including current provision at the local level, they should also ensure that the Unit Cost (England 2003-04) is also edited to include local costs, as these variables are used to calculate current expenditure in the model.

3.12.3 Modelling Assumptions

For each client category two or three options have input to the model. In every case the first is labelled 'Current' and indicates the care package being delivered on current practice. The other options are intended to identify alternative feasible options that would become available if telecare was available alongside the other specified services. Note that there may be other alternatives to current care practice that do not involve telecare but these are not shown in this example.

It should be noted that the definition of the categories is in terms of current service use, means that in effect the choice within the model to use an alternative telecare linked option implies that future client numbers are those who 'would have used' those lead services. Most notably the numbers requiring support in a care home is reduced. The assumed allocation percentages shown are based on experience of telecare evaluations, and of surveys of care home residents and hospital inpatients.

Because nursing care costs are excluded from care home costs shown in P1 and P2, no nursing input is shown for the alternative community based care packages, implicitly assuming that nursing input for clients who need it (principally those currently in nursing homes) would be available at the same cost in alternative locations.

P3 is concerned with frail older people who are assumed to be candidates for case management programmes. Including telecare is assumed to reduce the social care input required. Acute bed use is also shown, at an average of 21 days stay per year; option 3 is used to describe an assumed 10% of patients who could now avoid admission. Both values are based on the findings of Balance of Care Group point prevalence surveys of hospital populations, and lengths of stay of potentially avoidable admissions.
3.12.4 Scenarios

Three scenarios are shown:

1. Baseline. This calculates the total services and expenditure to deliver the assumed current care patterns in Telecare Valley.

2. Low invest. This shows the implications of introducing telecare related services to the more dependent population only, where care home or hospital admission may consequently be avoided. The initial values in the model made available are set to the levels of this scenario.

3. Extended. This shows a rollout to the lower dependency group (P5) and increased coverage
4. The Telecare Business Case Model

The business case model is consistent with the Balance of Care model. The Balance of Care model has been used to set a ten year strategic direction of service with generic telecare developments. Its outputs can be used to set the broad economic and financial context at year ten ahead, and provide the inputs for the first year. The business case model then compiles the local council option needed to achieve, and possibly modify, the precise strategic goal.

Two options are used for the business case model. One is social services provision without telecare. The other is with telecare. These are disaggregated into their parts in seven Excel sheets, based purely on social services provision, but not health services. They are:

- Input – for users to enter their data and see the effect on outputs
- B activity – the baseline activity without telecare
- Notelec - estimated costs with no telecare
- N activity – new activity with telecare
- Telec inv – telecare investment profile
- Telec – estimated costs of telecare’s operational impact
- Summ – summary sheets of investment comparisons

The input sheet is mainly for 2005/06. The other six sheets have a time horizon of 10 years beginning in 2005/06. All data to be entered can be provided from each council’s own information sources. Activity data is consistent with the data Balance of Care model.

4.1 Input

All the data needed for the business case model can be entered in the input sheet. The data cells are coloured light yellow. The types of workload data are consistent with equivalent categories in the Balance of Care model. The latest estimate for each type of workload for 2005/06 should be taken from the social services database. Categories in the business case model are:

- Care home cases – not Elderly Mental Health (EMH)
- Care home cases – EMH
- Case management – frail older people
- Other long term care needs
- Other low intensity care needs
- Unsupported at home, mainly private clients who want telecare and will pay for it

The first five categories need estimates for:

- total client contact time in hours during 2005/06
- number of visits made to clients per year
- estimated number of clients per year
- estimated for the total number of telecare users.
• number of care home places estimated to be used in 2005/06

The forecast annual growth in demand for services should be the latest estimate of the average annual increase in each of the workload measures expected for each of the ten years up to 2014/15.

Two estimates are needed for the telecare users that are expected in the period immediately after full implementation of the telecare investment. One is the estimated total number of potential telecare users included in the adjacent number of clients estimate. The other is the estimated number of new, private clients that will arise for social services because telecare will be available, but who will not need social care support.

Whole time equivalents, WTE, for each type of staff\(^1\) should be the latest available data, either from the 2005/06 budget or a later approved statement. The cost of care home should also be input and any other costs associated with the no telecare and with telecare options. Mean cost for each type of staff and for the care home will also be consistent with the Balance of Care cost definitions. Estimated mean costs should include all the overheads for employing and utilising each staff type, and exclude VAT.

Approved extra budgets for each type of service should be entered from the latest social services budget report. All numbers should exclude VAT.

If possible, the budget should match the resources in the business case model for each type of service. These include care home places and social services staff.

The percentage demand for services and the demand for telecare will also be required and input by the local council.

Capital spend on telecare is the estimate, excluding VAT, for the costs of investing in new capacity, enhancing current, spare capacity and installation costs. The start month in 2005/06 is the number of the month in the year, so December 2005 is month 9. The end month in 2006/07 is the number of the month in the year, so January 2007 is month 10. The latest end month is 12, March 2007.

Grants relates to the Preventative Technology Grant from the Department of Health that will be applied to the investment of capital and revenue for each of the two years.

The WTE for the call centre staff should be entered, with their average cost, including all overheads.

Borrowing rate is the current estimated cost of raising money to finance capital projects where the council owns the asset. Space is provided to insert figures for leasing or private finance in the model if local councils require this.

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\(^1\) These include care assistant, occupational therapist, rehabilitation assistant and night sitter.
The **annual user telecare charge** is the amount that the council intends to charge telecare users.

The **notional annual value to user** is a qualitative estimate of the value to each user. It should be the amount that a typical user may be prepared to pay for the service if it was provided commercially, and in line with the council’s charging policy.

A **contingency** provision should be entered to reflect the degree of uncertainty in the estimates used for the telecare option. It will be unlikely that it will exceed 15%. The uplift used should reflect the reliance on general assumptions in the model. The more general, the higher the contingency.

For the categories frail older telecare users, **not EMH and EMH**, a percentage performance estimate should be entered to reflect the reduction in demand of care home places.

There is also a provision for local councils to insert **other client groups** if required.

The outputs resulting total monetary impact of telecare is also shown below the inputs. Users should be able to see and assess the impact of changing input estimates of the cost base of the business case model in terms of extra workload with telecare, lower cost of telecare shown in £000, the net present cost difference, also in £000, and estimated percentage economic return.

### 4.2 B activity

This sheet takes input data, and provides the baseline activity and workload for the current financial year, 2005/06, and each subsequent year for ten years. Social services clients are in the six categorised, five of which are taken from the Balance of Care model, with an additional category for private services.

The following are from the inputs sheet and are provided by social services managers for each category:

- Total hours of client contact
- Total number of visits
- Total number of people cared for
- Total number of care home places
- Average forecast growth rates in demand.

For each year, 2006/07 to 2014/15, the workload is multiplied by the annual growth rate and added to the previous year. Average growth rates are transferred from the input sheet and applied to each year from 2006/07 onwards.
A rate for total client time is calculated by taking the total client time in 2005/06 and dividing this by the number of visits in 2005/06. Number of visits is calculated by dividing the number of visits in 2005/06 by the number of clients, or care home places, in 2005/06.

Total workload is provided as total client contact hours, numbers of visits, number of clients and number of telecare users shown as zero. Numbers of extra annual clients are also estimated.

The rates of visits per person and the hours per visits are used to estimate the resources needed after the telecare investment.

4.3 Notelec

This estimates the operating cost in the current financial year, 2005/06, of meeting the needs of the each client group identified in 'b activity', and without the use of telecare. Operating costs are calculated by using data from the input sheet for each type of resource of:

- Care assistant
- Occupational therapist
- Rehabilitation assistant
- Night sitter
- Care home place
- Other costs

The number of WTE and the average total cost of each type of staff is transferred from the 'input' sheet, and used to calculate the whole cost of each service.

All average forecast growth rates in demand are transferred from the 'b activity' sheet and used to adjust the resources to reflect the changing, usually increasing, demand. This gives a forecast cost change from 2005/06 for each client group. These reflect the changes in the numbers of people as clients, visits and hours for each year between 2006/07 and 2014/15.

The impact of the forecasts changes to the income and expenditure account and balance sheet is included. This is compared to an estimate of the approved social services budget provision. This is transferred form the 'input' sheet. Extra income from grants and charges is set at zero.

A contingency, entered into the 'input' sheet is applied to the total estimated costs to reflect optimism bias.

A discount factor of 3.5% has been applied in accordance with the HM Treasury Green Book. It gives the net present cost (NPC) of the current service forecast for ten years ahead.
4.4 N activity

This estimates the new activity and workloads, such as telecare users, arising from the telecare investment. For each social service client group category, new estimates are needed, and these are taken from the ‘input’ sheet and build from the ‘b activity’ forecasts. They are:

- Total potential telecare users arising from the investment
- Total potential extra clients that could increase or decrease from the forecasts in the ‘b activity’ sheet as result of telecare being available.

Several calculations are set in this sheet. Two important calculations are
- the improved productivity rates set from research findings on productivity gains from using telecare
- future reduced the demand for care homes for non EMH clients.

The start year for the initial impact of telecare on home care is set as 2006/07. The first year of full operation is set for 2009/10. The impact is phased in as equal annual changes. The start year for the initial impact of telecare on the need for care home places is set at 2008/09. The first year of full impact is set at 2011/12. The impact is phased in as equal annual changes. These reflect the new performance levels and resulting activity and workload volumes that can be achieved with telecare.

4.5 Telec inv

This estimates the capital, current and revenue costs of the proposed telecare investment. For capital, inputs are estimates of the capital spending on equipment for the call centre, expanding capacity of an existing call centre, such as for housing services, installation costs, and the start and end months of the project. The cost of telecare devices for clients is calculated by using the estimate of number of telecare users, a standard reusable rate from the ‘input’ sheet, and a set estimate of the cost. Other costs can also be added if required by the local council and extra rows are provided for this. Telecare obsolescence rates are set at 3% for each year from 2010/11. The amount of grant applied to the project is deducted from the capital estimates.

Revenue items are calculated directly from the capital estimates, and then uplifted by a standard percentage to reflect the resources needed for implementation, project management, training and change management.

The contingency rate is taken from the ‘input’ sheet and used to increase the capital and current estimates to reflect potential optimism.

Total annual costs are the cash flows that give the current economic costs. These are increased for debt financing and depreciation to give the accounting costs. The effect on the social services income and expenditure account and balance sheet are shown on this sheet. Economic estimates exclude the benefits of grant income. All estimates exclude VAT.
4.6 Telec

This forecasts the impact of the telecare investment on the resources needed to provide the services to each client group. New WTEs are estimated by applying the rates from ‘b activity’ and ‘notelec’ to the ‘n activity’ forecasts. These produce new WTEs compare with the ‘no telec’ WTEs. Estimates for the amount of grant applied to revenue costs are used from the ‘input’ sheet. Income from charges to users is included.

Economic and accounting costs are separated and the equivalent amounts transferred from ‘telec inv’ for the total estimates. Grants are excluded from economic estimates. An estimate of the quality gain from telecare is included as an economic benefit. It is transferred from the ‘input’ sheet. This is consistent with the Balance of Care model methodology.

All income and expenditure exclude VAT, but include the effect of grants.

4.7 Summ

These are summary sheets with charts for comparisons of no telec and telec for:

- Council’s accounting costs, annual and cumulative to show break-even and payback
- Council’s economic costs, annual and cumulative, at net present costs, to show economic break even
- Council’s economic costs plus the quality benefit for clients, at net present costs, to show economic break-even year
- Cumulative economic costs to show paybacks
- Workloads for care home places; visits, hours and people cared for.

4.8 Quality assessment

A rigorous QA has been conducted on the Excel sheets to fully test the model.

General

The model has no provision for sensitivity analysis. This should be completed by copying the workbook into a new version, then changing the inputs to reflect the sensitive variables. Adjustments for risk should be handled in the same way.
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