



# ISE “Getting Started” Workshop

April 2013

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# 1. Getting started

This session introduces the ISE (Integrated Scenarios Explorer) software tool. The emphasis in this beginner-level workshop lies on what you can see on the screen, how to control the tool, and setting up simple ‘what if’ queries. You will go over several maps and other data available in the system; you will see where policy-oriented users can change drivers and setup ‘what ifs’ and scenarios, where modellers can adapt their parameters, where the controls are to run a simulation, how you can save results and where results can be visualised and analysed.

Whenever an action is required from you this will be indicated by the following bullet:

➤ ...

This will be a guided tour of ISE. We will take you through the actions for each section before you begin. When you go through each section there will be additional information that should also be read to help explain what you are doing and why. Any questions or problems don’t hesitate to ask.

## 1.1 Software and file structure

The ISE system consists of two parts. First, there is the program itself, which includes the models that are used. After installation you will by default find this in C: \ Program Files \ Geonamica \ ISE. However, during this workshop you don’t need to change or access any files in this folder.

The other part of ISE is the data and geoproject files. By default these are stored in My Documents \ Geonamica \ ISE \ Wellington. In that folder, a so-called ‘geoproject’ files is included, specific for the Wellington region, and recognizable by the extension ‘.geoproj’. Geoproject files contain the basic information the software needs to run ‘what ifs’ and scenarios. Additionally, the folders in the ‘Data’ directory contain all the data that is used in the simulation.

Please note that during installation data files are created for both the Wellington and Auckland version of the ISE model. In this tour we will however only be using the Wellington data files.

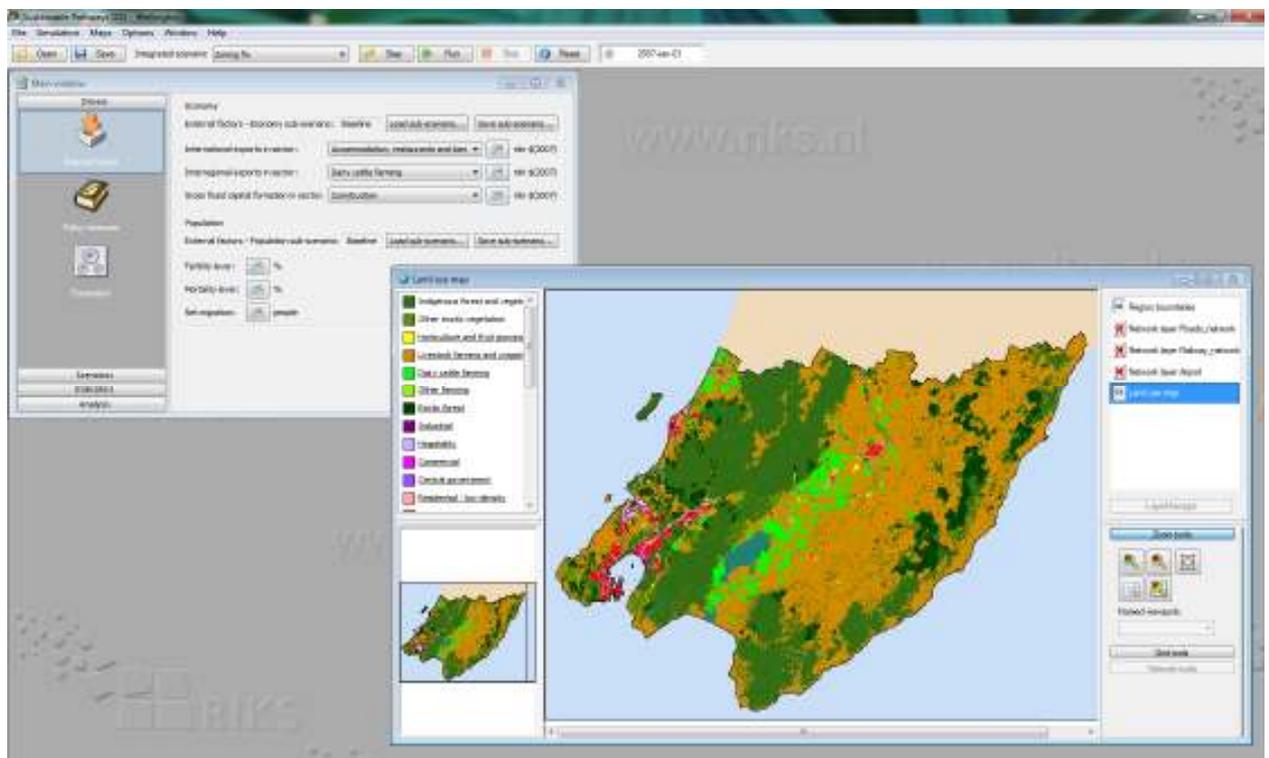
## 1.2 Opening a simulation

The aim of this exercise is to familiarise yourself with ISE and to link the real world to the model, which represents the Wellington region as an integrated geographical, socio-economic and environmental system. Furthermore you will learn how to start, run and save a simulation.

To run ISE,

- Click the ISE icon under Geonamica → ISE in the Start menu. This may take a few minutes to load.
- You may be prompted to find the license file if this is the first time you have started ISE on this computer. If so:
  - Browse to the directory where the licence file is located (ask your facilitator if you don't know where that is) and select the license file. You can recognize ISE licence files by their extension “.lic”. Then click OK.
  - Click OK once you have read the notice in the about box that now appears.

ISE takes a few minutes to start-up. On start-up ISE loads the Main window and the Land use map window. These are crucial to the running of ISE and cannot be closed, but they can be moved and minimised, allowing you to organise your workspace. Additionally you will find dropdown menus on the top of the screen and some buttons that you can use to run and control a simulation. We will begin with a description of the two open windows.



### 1.3 Exploring the land use map

In the land use map information is presented per spatial cell. Cells are the smallest spatial units in ISE, measuring 100 by 100 metres for the Wellington application. The cells on the map represent the predominant land use on a cell. To the left of the land use map you can find a legend that explains the meaning of the colours on the map.

When you would like to see a location in more detail you can use the layer manager on the right hand side of this window. In the layer manager you will find the option zoom tools under which you will find the buttons below:

Button	Function
	Zoom in
	Zoom out
	Pan
	Select area to zoom in on
	Fit whole map to window

When you click on one of these buttons and move the mouse pointer to the map, you are able to carry out the selected option.

- Select from the layer manager the option Zoom in and zoom in on Wellington City.

Besides zoom operations, you can also inspect the main land use on each cell using the Inspect button of the Grid tools option in the layer manager. After activating the Inspect button, you can read the dominant land use on each cell by clicking on the cell in the detailed land use map.

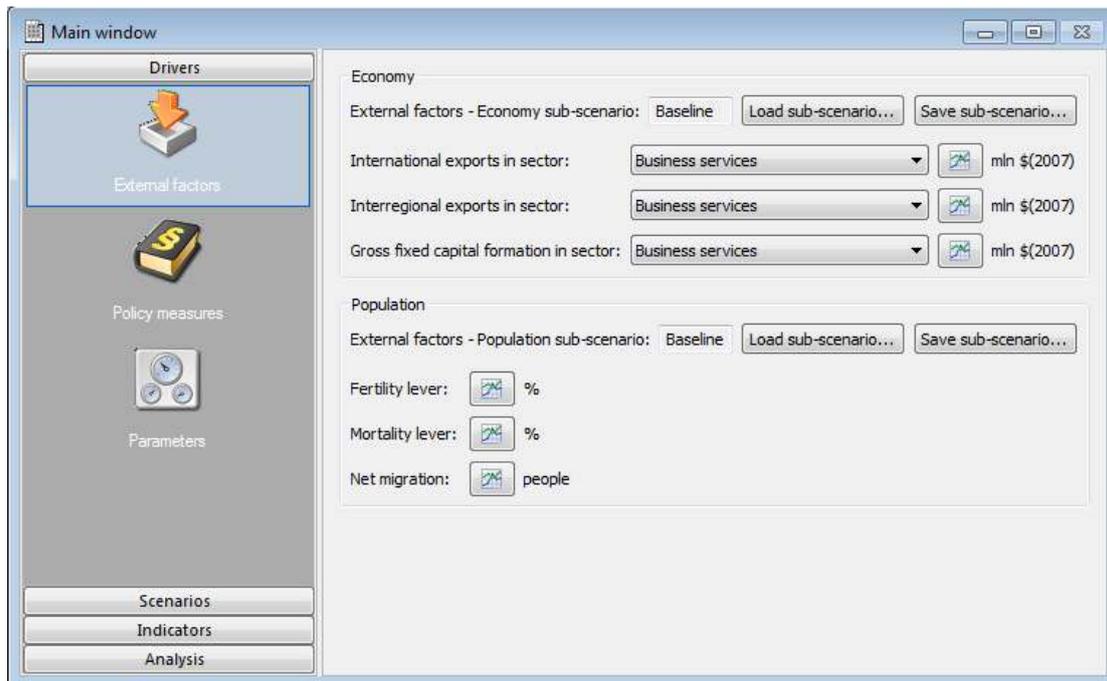
- Select from the layer manager the option Grid tools and select the Inspect button. Now inspect the dominant land uses of some of the cells in the Wellington.

## 1.4 Setting up the drivers

Unless you are running a scenario that has already been set up and saved, it is important to first set up the Drivers for the scenario you wish to explore before actually running a simulation.

The user interface of ISE provides access for two types of users: the *policy user* who carries out impact assessment studies related to the impact of certain policies under a range of external conditions and the *modeller*, who is responsible for the underlying (scientific) information of the system and needs to adapt underlying data and parameters when more knowledge becomes available over time. The Main menu provides access to both types of users. In this section we will explore how the policy user can use the system and next how the modeller can access the underlying models.

The *policy user* finds access to all information relevant to analysing the impact of policies and external factors on the left hand side of the Main window. Here, information is organised in such a way that the user can carry out a structured analysis. It has the tabs *Drivers*, *Scenarios*, *Indicators* and *Analysis*, each of which is explained in more detail below.

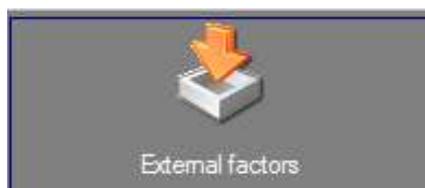


### 1.4.1 Main menu – external factors and policy measures interface

#### ***Set up external factors***

In the first part of the analysis the *drivers* can be entered and/or adapted. Drivers that are incorporated in the system are organised in two groups: *External factors* and *Policy measures*. When clicking on one of these groups, the user gets access to the underlying information. This is also the entry point for adapting drivers and entering new data.

- Click on the Main window to ensure that it is in front of the map window.
- Click on External factors



Drivers that can be changed in this part of this system are those drivers that typically cannot be influenced by regional or territorial local authority planners, policy and decision makers: these are external drivers for the economy and the population. (These are however key factors which determine the economic growth trajectory of the Wellington region and its constituent Territorial Local Authorities).

**What If: What are the implications of changing both the domestic and export trajectory of the Wellington Region economy?**

- In the Economy section select from the International exports in sector drop down box: Business Services.
- Next click on the graph button  beside International exports in sector.

A new window will open, showing you the assumptions for international exports in the Business services sector for the period 2007 – 2051. You are able to update these kinds of graphs in two ways. The first option is to double click on a figure in the table to the right of the graph and change the X and/or Y value in the window that pops up.

Alternatively you can make changes directly in the graph in two ways: either you can select a bubble and drag it to the desired position, or you can right click on one and enter the correct X and/or Y value manually. Additionally, you can introduce or remove any bubble by double-clicking somewhere in the graph area using the left mouse button. When you want to place a bubble outside the area of the graph you can click Options. A new window appears where you can introduce the minimum and maximum values for both axes.

Making changes to these graphs will impact on the demand for certain economic land uses (excluding residential) and therefore change the baseline sub-scenario for the driver External factors - economy you are currently working with. Alternatively you can save your changes in a new sub-scenario.

- Familiarise yourself with making changes in the graph.
- When you are finished press ‘OK’ to exit the graph window. This will store your results temporarily.
- To actually save your results in a new sub-scenario, press ‘Save sub-scenario...’ in the economy section you are currently working in.

A dialog window pops up in which you are able to overwrite the baseline sub-scenario for the driver External factors - economy or create a new sub-scenario for this driver.

- Select ‘Save in new sub-scenario’ and give the sub-scenario a name and a description.
- Press ‘OK’ to save the changes.
- In the ‘Population’ section, click the ‘Net migration [people]’ graph button.
- Change the value for 2016 and 2051 to -250. (NB: the current net migration figures are taken directory from SNZ’s sub-national population projections medium series. It is worth noting that your Council may not agree with these and hence these can be changed within ISE).

Making changes to this graph is how you can change the assumed demand for residential land use types from the baseline scenario (e.g. more or less people in the region for that year).

- Save your changes as a new sub-scenario for the external factor population, similarly to what you have done for the external factor economy.

### ***Set up policy measures***

Policy measures represent those drivers that can be actively influenced by regional and local planners and policy makers. Typically these are policies that can be set or adjusted regionally or locally, such as spatial planning, economic investments or infrastructure improvements. As these drivers can be influenced, they are of course an important input for scenario analysis.

- Select from the Drivers the Policy measures by clicking on this icon:



- Select the Driver drop-down list.

You will see that the policy measures are organised into three types of drivers: Socio-economic measures, Zoning and Infrastructure.

- Select the Socio-economic measures from the Driver drop-down list.

Socio-economic measures includes parameters relating to land use productivity, labour force productivity and population proportions for the residential land use types.

- In the population section, go to the section 'Proportion of people living in each land use category [%]' and change the proportion of people living within and outside the residential categories for the final year of the simulation by entering values in the table for the year 2051. Note that the total of these 4 values four should add up to 100%

ISE will interpolate between years, when information is not provided for intermediate years, like in the settings you have just entered. Alternatively you can enter information for several or all years.

- Save your changes as a new sub-scenario for the policy measure population, similarly to what you have done for the external factor population.

**What if: What are the economic and land use implications associated with a change in accessibility associated with the development of a major arterial road or highway?**

- Select 'Infrastructure' from the 'Driver' drop-down list.

Here you will see a 'Network' drop-down list with three types of infrastructure networks that are currently modelled and influence accessibility for functional land uses. This window is where you can import network changes directly from GIS data or edit or remove changes to a network. (NB: If you are entering a number of changes it is best to do this in a dedicated GIS such as ESRI ArcMap or MapInfo, as it reasonably slow to do this in ISE). You can also view networks in a map.

- Select 'Roads\_network' from the 'Network' drop-down list.
- Select the 'Show / Edit network at time...' button. A small window should appear requesting for which time do you want to view the map. Select '2012-Jan-01' from the drop-down list and click 'OK'.
- Use the 'Zoom tools' to zoom in to the Wellington area. You will see the different types of infrastructure that are mapped displayed in the legend on the left.

On the bottom of the 'Layer manager' pane on the right you will now also see a 'Network tools' menu. This allows you to add or delete network links or nodes.



- Select the 'Network tools' menu.
- Untick the check box next to 'Show nodes' and you will be able to see the network links more clearly.
- Close the map window by clicking on the small x at the top right of the window. It is okay to save changes

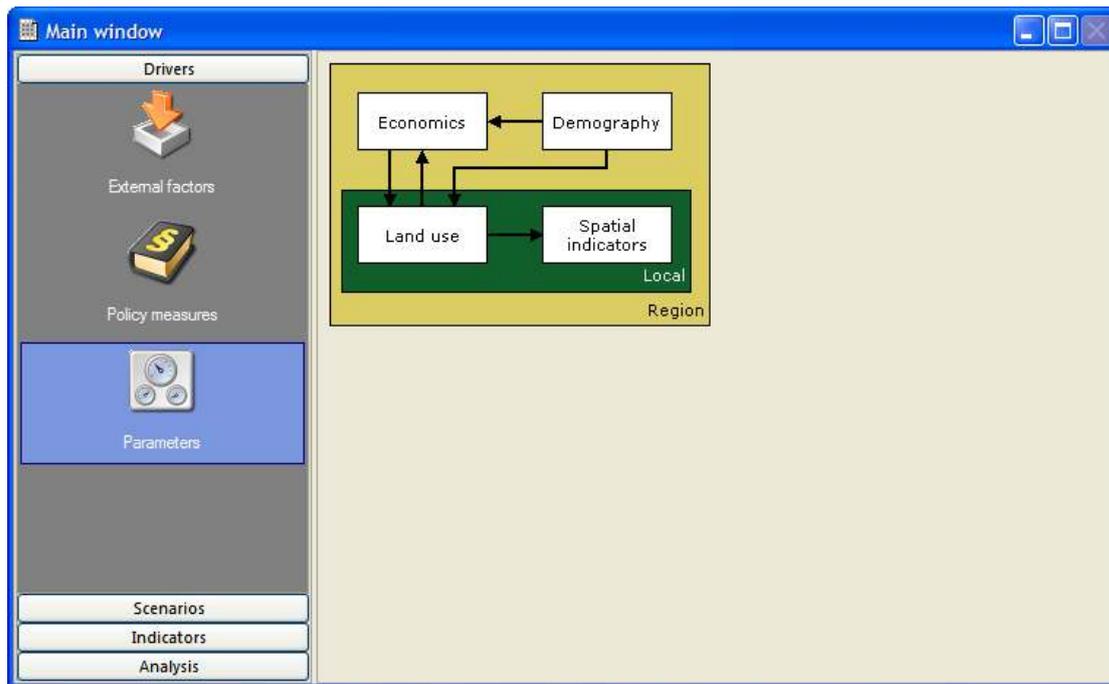
### ***Demonstration changing and adding roads***

You are welcome to follow me as I demonstrate changing the designation of a road and adding a new major road to ISE. We will demonstrate this using a crude interpretation of the Western Link Road between Paraparaumu and Waikanae. Alternatively, you could change or add roads within your own Territorial Local Authority.

## 1.4.2 Main menu - modeller interface

The *Modeller* finds their way through the user interface by going to the 'Parameters' part of the 'Main window' that can be found under 'Drivers'. When clicking on 'Parameters' the system diagram of the integrated model becomes visible on the right hand side of the 'Main window'.

- Click on the 'Drivers' button of the 'Main window' and subsequently select the 'Parameters' section to show the system diagram.



The system diagram shows all available sub-modules as well as their linkages. Sub-modules incorporated in ISE (so far) are:

- Economics
- Demography
- Land use
- Spatial indicators

The final version of ISE will also include the following sub-modules:

- Transport
- Stormwater

Other sub-modules are under development and may also be incorporated. This includes potentially sub-modules as developed within the earlier Mediated Modelling (Objective 1) workshops.

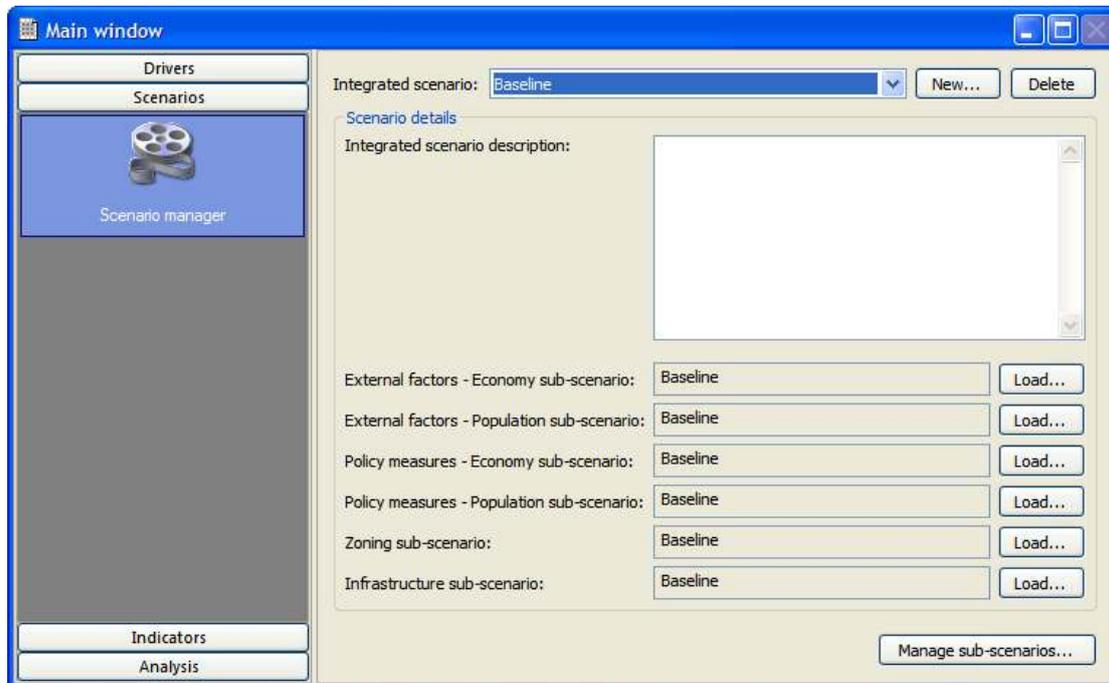
Information on all of the underlying models and their functioning, data and parameters can be found in the draft ISE technical specification document available on request. A user manual is also being developed a will be available in both hardcopy and under the help drop down menu within ISE.

## 1.5 Creating scenarios based on 'what ifs'

Next we will learn how *integrated scenarios* can be constructed. Integrated scenarios consist of a combination of sub-scenarios from each driver. For each of the drivers the user can select from any available sub-scenarios or create their own sub-scenarios and save this combination as their own integrated scenario. Drivers that are incorporated in the current version of ISE are:

- External factors - economy
- External factors - population

- Policy measures - economy
  - Policy measures - population
  - Zoning
  - Infrastructure
- Click on the ‘Scenario manager’ button on the left side of the Main window.
  - Make sure the Baseline scenario is selected from the drop down list after Integrated Scenario (as shown in the figure below).

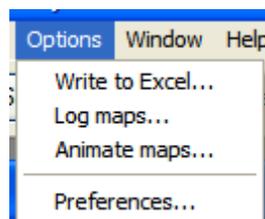


On the top right hand side you can create new or delete integrated scenarios based on sub-scenarios of the different drivers. In the Scenario detail pane you can see where you can record details about the integrated scenario and also where you can select different combinations of sub-scenarios and edit the details for those sub-scenarios.

NB: Integrated and sub-scenarios will not be saved until you save your geoproject. So if you have created some scenarios you want to keep it pays to promptly save your geoproject. We will explore and use the Scenario manager further in later parts of this workshop.

## 1.6 Running a simulation and recording results

When running a simulation there are indicators that can be explored within ISE of which some data can be exported, however, before running a simulation it is important that you decide which results you would like to have saved to disk while the simulation is running. ISE has three ways of saving results:



- Write to Excel (for all numerical results): When this option is enabled all selected model outputs will be directly written to Excel and can be used for analyses and post-processing after the simulation is finished.
- Log (for all map results): When this option is enabled all selected model outputs will be saved as .rst or .asc maps that can be opened in the Map Comparison Kit (part of the ISE package) or most common GIS packages, for further analysis after the simulation has run.
- Animations (for all map results): When this option is enabled all selected model outputs will be saved as little movies in animated GIF format that can be opened in a viewer, but can also be readily incorporated in presentations.

You will use all three options as part of this exercise.

After choosing the options for saving simulation results, the simulation can be controlled using the following buttons:

Use this button	To:
 Step	Take a step and bring the simulation one year forward.
 Run	Run the simulation until the end-year 2050
 Stop	Stop the simulation after the current step is finished.
 Reset	Reset the simulation to its initial year 2006.

You will now run the baseline scenario that is incorporated in the system, while saving some results to Excel, logging land use maps for 2007 and 2051 and creating an animation of the land use map:

### ***Write to Excel***

- Choose ‘Write to Excel’ from the ‘Options’ menu in the menu bar.

Here you can choose which results you want to write to Excel and for which year. First, as we are interested in the developments over time, you need to generate additional dates for which to write data.

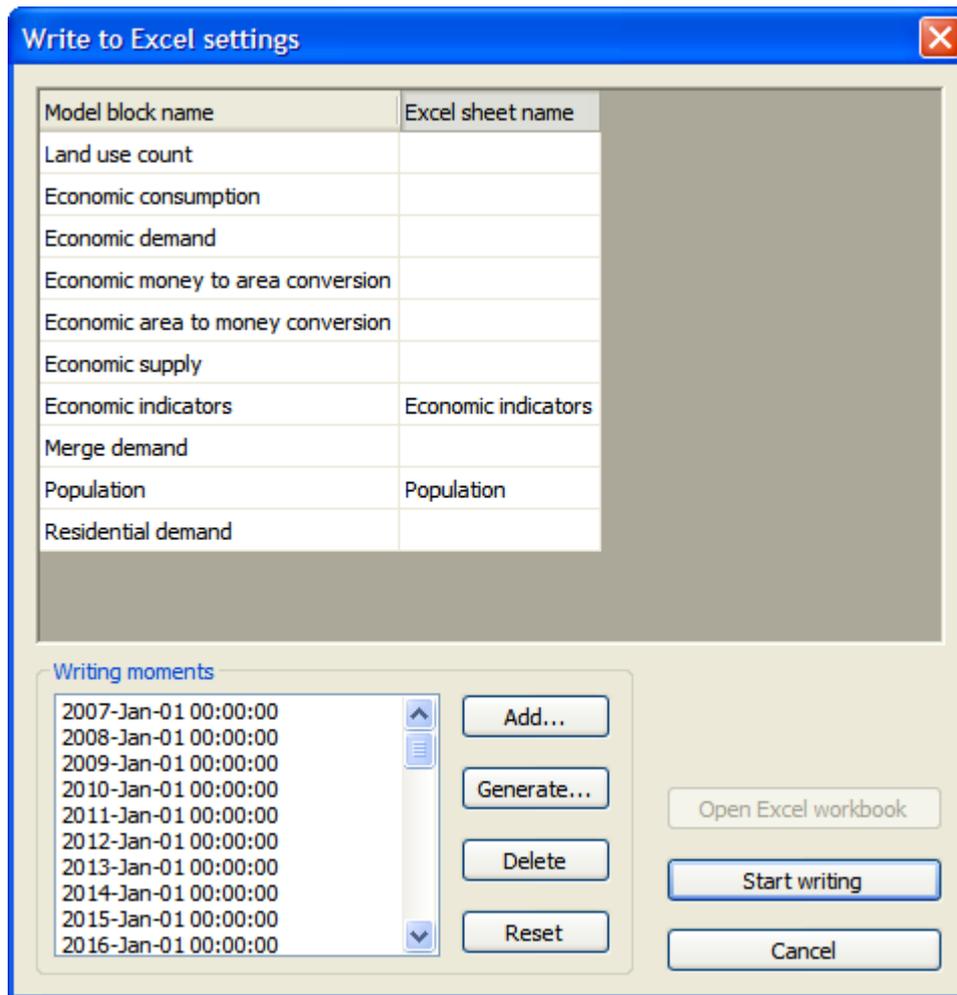
- Click ‘Generate’ in the ‘Writing moments’ pane on the lower left of this window.

The ‘Generate moments’ window pops up. Automatically, the dates that are entered are the start and end year of the simulation, while the interval steps are set to one year. You can change these dates if you want, but for this workshop we will use these settings.

- Click ‘OK’ to close this window and the yearly moments to write data are generated. As you see a whole list of dates appears.

For each model block you can indicate whether you want ISE to write pre-selected results to Excel. To do so, you need to fill a proper name in the ‘Excel sheet name’ fields. The easiest way to do this is to copy and paste the Model block name.

- Copy and paste the Model block name to the Excel sheet name for the results from the model blocks Population and Economic indicators.



- To finalize, click the 'Start writing' button. It may take a few moments to do this.

### ***Logging maps***

Next we will log land use maps as at 2007 and 2051.

- Choose 'Log maps...' from the 'Options' menu in the menu bar.
- Scroll down the list in the top pane till you see 'Land use map'. Select the check box to the left of it.

Next you will see under in the 'File names' pane where the MCK log file is stored by default.

- Make sure the MCK log file path is My Documents \ Geonamica \ ISE \ Wellington \ Log \ Wellington.log .
- Next, type in the name you would like to give to the simulation in the Simulation name: form, e.g. *workshop\_YourName*.
- Next we need to add another Log moment for 2051. In the 'Log moments' pane at the bottom left click 'Add....'.
- In the empty Time: form that appears in the 'Add log moment' window type in *2051-Jan-01* and click 'OK'.
- Leave all other default settings as is. Now we are ready to turn logging on.
- Click on the 'Turn logging on' button and wait while the 2007 map is logged.

### ***Create animations***

Next to the numerical results, we will make an animation of the land use map to rapidly see how it changes over the course of our simulation:

- Choose ‘Animate maps...’ from the ‘Options’ menu in the menu bar. The ‘Animation settings’ window appears.
- Scroll down the top pane and tick the check box in front of Land use map.
- Ensure the pathway to the Animation folder is My Documents \ Geonamica \ ISE \ Wellington \ Animation.
- Leave the ‘Animation size’ setting as is.
- Press ‘OK’

### ***Running ISE***

Now you are ready to run your simulation!

- Press the ‘Run’ button in the top toolbar. If you want, go to the land use map window and take the time to watch it work, however, the simulation will take several minutes to run.

When your simulation reaches 2051, it will stop and we can start exploring the indicators reported internally in WISE.

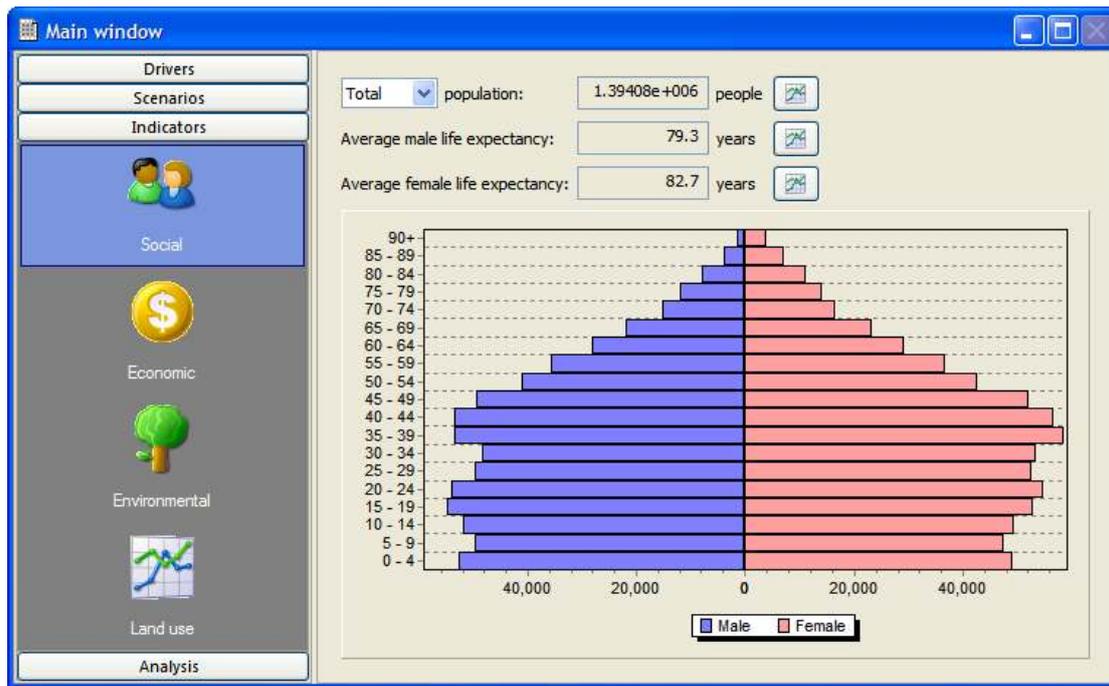
## **1.7 Exploring indicators**

After running the simulation, ISE offers several options to analyse results. The first option is to explore the indicators within ISE itself. The indicators are organised into four groups:

- Social indicators
- Economic indicators
- Environmental indicators
- Land use indicators

When you run a simulation each of these indicators is calculated on an annual basis. Depending on the type of indicator, it is calculated and reported at one of the spatial levels (Regional or Local) or at several spatial levels.

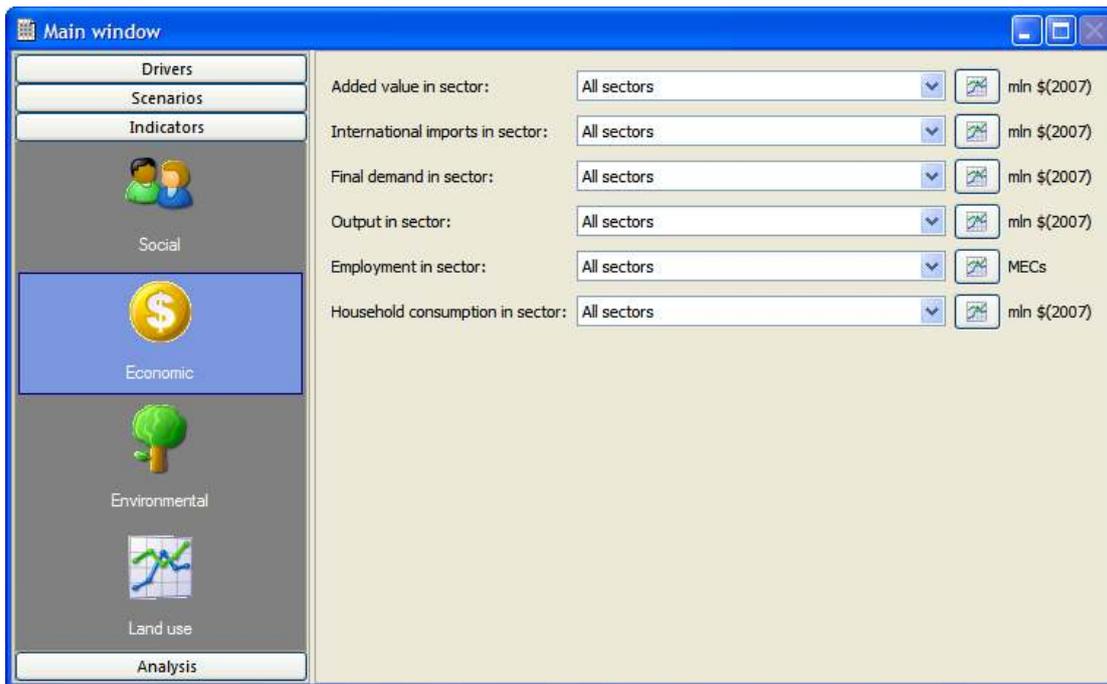
- Click on the Indicators button of the Main window. Below this button you will see four buttons with which you can open the indicator groups.



- Select from the Indicators the social indicators by clicking on the Social button.

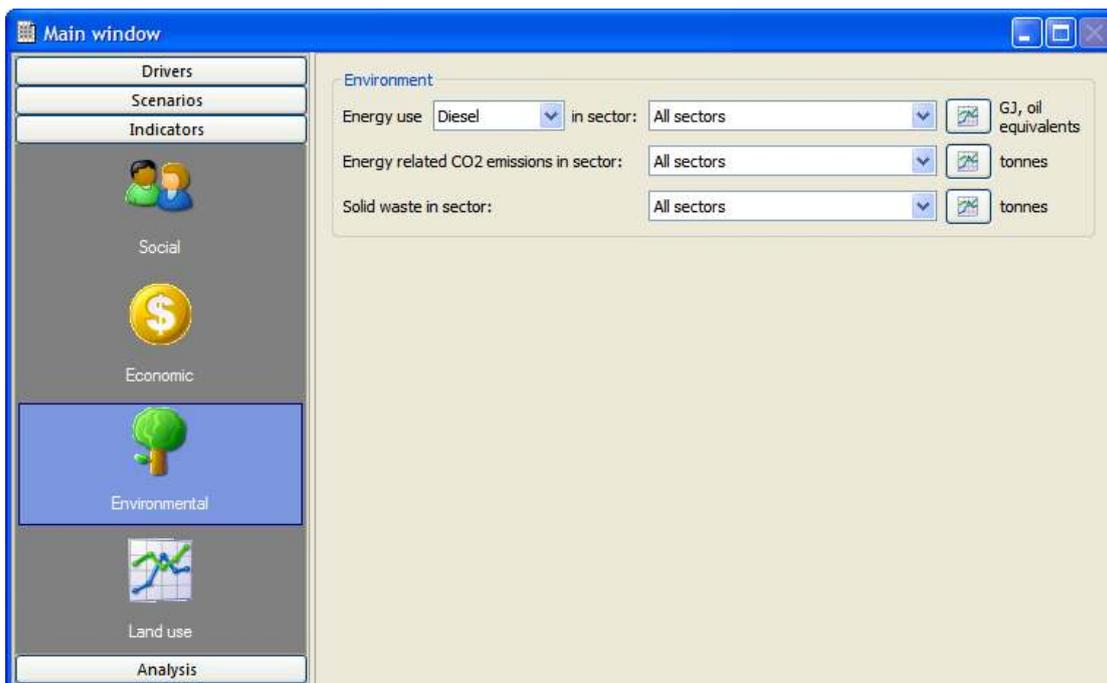
On the right hand side of the Main window you will see the age-cohort pyramid showing the men and women living in the Wellington region in 2051 (NB: If the Main window was open at this location while ISE was running the simulation you would have seen the age-cohort pyramid update dynamically). You can select an age-cohort pyramid for any district by selecting the name of the district in the drop down list beside Population for district. Furthermore you can investigate how population has changed over time by selecting the graph buttons , and you can explore the population densities for the three residential land uses by going to the Density tab.

- Select from the Indicators the economic indicators by clicking on the Economic button.



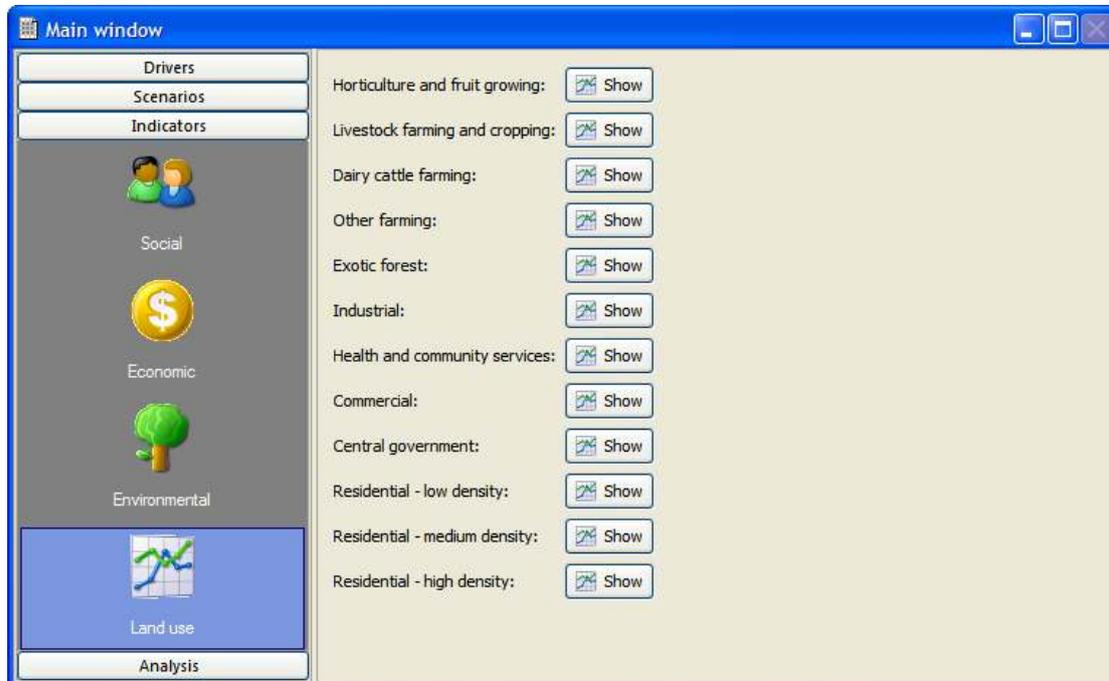
On the right hand side of the Main window you will see a number of key economic indicators. For each indicator you can select either 'All sectors' or any single economic sector from the drop down list. You can then explore how that indicator has changed over time by selecting the graph buttons . Perhaps Added value in sector for All sectors and Employment in sector for 'All sectors' are the two most important economic indicators. Added value in sector for all sectors is the same as Gross Regional Product (GRP) and Employment in sector for all sectors shows the number of people employed across the whole region.

- Select from the Indicators the environmental indicators by clicking on the Environmental button.



On the right hand side of the Main window you will see graph buttons (  ) that show the change over time of the energy use, CO<sub>2</sub> emissions and solid waste generation indicators, up until 2051.

- Select from the 'Indicators' the land use indicators by clicking on the 'Land use' button.



On the right hand side of the Main window you can see graph buttons that allow you to show how land use area (ha) has changed over time for the functional land uses. A red line represents the simulated unconstrained demand. A green line represents the simulated allocation. Allocation usually does not meet unconstrained demand as there simply is not enough suitable land in the Wellington region to meet economic demand and functional land uses have to “compete” for the optimal land.

- Feel free to spend some time to explore the indicators here. Everything here is read-only so you can't break it. Just don't press the Reset or Save button.
- Open some of the maps and graphs and right click on them. Note the functions available to you.
- When you have finished close all the indicator windows you have opened and let your facilitator know.

Some indicators can be saved as animations if you had set this up before running the simulation. You can view these animations by opening Windows Explorer and navigating to where they were saved, then opening these gif files in Internet Explorer or any other program which can read gif files.

- Close the Internet explorer windows with these gifs in them when done.
- Go to Options Write to Excel, select Open the Excel workbook and save it somewhere on your computer where you can find it later.

## 1.8 Creating an alternative scenario

You have now run a scenario using the baseline settings currently included in the Wellington application of ISE. Now you will create an alternative scenario using some of the driver changes you have made previously in these exercises.

- Reset the simulation.
- Go to Scenarios in the Main window.
- Select New... from the right side of the window and a new window pops up.

In this window you need to give a name to the integrated scenario you are now creating and select a sub-scenario for each driver.

- Select for the drivers Policy measures - population and Policy measures – transport sub-scenarios you have just created and select the baseline sub-scenario for all other drivers.
- Give your integrated scenario a name and a description and press ‘OK’ to save your integrated scenario settings and bring you back to the scenario manager in the Main Window.
- Select the integrated scenario you have just created from the drop down list on top of the scenario manager.
- Run the simulation while saving your results in a log file and an Excel file as you have done for the baseline run.

## 1.9 Analysing results

Now we have run a simulation in ISE and explored some of the indicators resulting from the scenario. But what do we do if we want to compare some results from two different scenarios or measure how your indicators have changed over time?

The last step of the exercise is to analyse results within a single scenario (e.g. the temporal change of a scenario) or between two differing scenarios at the same time. Before you ran the baseline simulation you will have selected what type of information you would like to analyse, in this step you carry out the analysis. The Excel files that have been created can be analysed with Excel:

- Open the ‘Options’ menu again. As you can see there are tick marks in front of ‘Write to Excel’ and ‘Animate maps’ to indicate that both are still activated.
- Open the ‘Write to Excel’ option from the ‘Options’ menu.
- To view the numerical results, click the ‘Open Excel workbook’ button. ISE will ask if you are sure you want to stop the application from writing to Excel, and Excel will automatically start after you click ‘OK’.

The sheet that opens contains the results for the population model and the economic indicators for all years for which the simulation was run.

- Explore the excel workbook you have saved. Note how much data is in there that you could possibly break down and analyse – and this is only two of the excel table outputs.
- Close the excel workbook without saving changes when done and go back to ISE.

## 1.10 Summary

In this workshop you briefly went over most of the components of ISE and covered the following processes for policy analysis:

1. Software and file structure
2. Opening a simulation
3. Exploring the land use map
4. Setting up the 'what ifs' using the ISE drivers
5. Creating sub-scenarios and integrated scenarios
6. Running a simulation and record results as maps, animations and as Excel files
7. Exploring indicators

Feel free to discuss scenarios you would like to explore – and if you have time give it a go!