W.K. KELLOGG FOUNDATION
Grant No. P3002256

Agricultural & Life Skills Project

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Module: Soil and water conservation
I3dlo: Plough settings

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Localisation documentation

September 2008

VR in Africa – for Africa – by Africa

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- For general information on computer requirements, usage etc, refer to Annexure 3

1 Plough-settings i3dlo - background

Funding agency W K Kellogg Foundation (**Grant No. P3002256)**

Project partners This project has two main partners, **World Links** who focus on the testing of localisation procedures, translating the material into commonly used Zimbabwean languages as well as downstream implementation through their community centre network; and **the Naledi3d Factory,** responsible for the visual content development

This i3dlo forms part of a rural development and farming skills development project that addresses the following:

- Help rural communities better understand and, therefore, be better empowered to address local issues that impact on rural development – and in this case, focusing on agricultural and other life-skills development and in a way that **modernises** local practice, without necessarily **westernising** these practices
- Demonstrate the use of VR-based learning content and especially the use of Interactive3d Learning Objects (i3dlo's) as a new, innovative visually interactive communication / learning medium in the African context
- Implement agricultural capacity building, to be achieved through focused community-based training workshops
- Transfer of skills to further "localise" Interactive3d Learning Objects

Note: an associated interactive3d learning object is also available that addresses the setting up of a plough (plough parts).

1.1 Rural skills – Plough settings – main outcomes

- Understand the main settings that can be made on a standard single-furrow plough
- Understand how to adjust the plough-beam clearance and shape
- Furrow depth and width on a single-furrow plough
- Applicable life skill – how to get things done

1.2 Applicable life skills (general)

A principal project goal is to develop competence-based learning material that will help to empower rural people and to stimulate their minds in a way so that they can fill in the detail using their own local knowledge.

Thus, the learning material should (1) Inspire; (2) Stretch; (3) Develop self-confidence; in such a way that we can (4) **Modernise, without necessarily Westernising.**

1.3 Target audience & application

The i3dlo simulations developed as part of this project are directed at functionally (semi) illiterate people in rural communities who are (or plan to) working in small-holding farming activities.

The i3dlo's are suited for use as *part* of skills development workshops where they are embedded and used with other training material – where they can for example be embedded into PowerPoint presentations (see Annexure 2).

They will typically be used by farm extensions services, local community centre training staff, or as in the case of this project, directly by organisations such as World Links Zimbabwe, who are "training the trainers" as well as farmers in local, rural communities

1.4 Context -How to adjust the plough-settings

As for the plough parts i3dlo, the plough used in this demonstration is based on the **Mielie Brand** range of ploughs, manufactured by Zimplow Ltd (a Zimbabwean company, one of the largest manufacturers of animal drawn implements in Africa).

Setting a plough is arguably one of the most important aspects of ploughing. If the plough is set incorrectly the operator and the draught animals struggle and may even be injured. Productivity suffers and furrows are not prepared correctly with serious consequences for crop production.

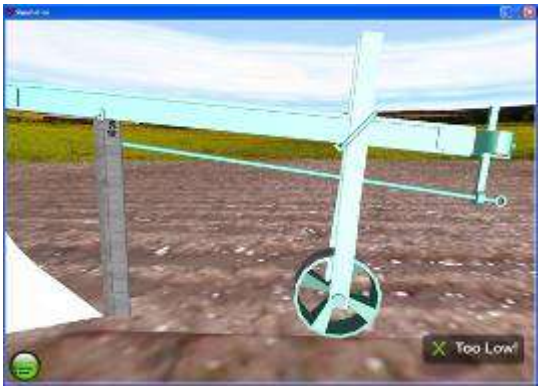
The three important adjustment concepts to demonstrate are (1) adjusting the depth of the furrow; (2) the width of the furrow and finally (3) the position of the wheel (and it is also important to emphasise that the wheel must never be used to adjust the height).

The setting for the i3dlo is an open field where the single-furrow (standard) plough is demonstrated.

Other relevant information resources include:

1. ***Best practice guidelines for extension workers – Animal drawn ploughs*** – Zimbabwe Farmers Union / Agritex / Silsoe Research Institute (2002)

1.5 Plough Settings - plough beam clearance

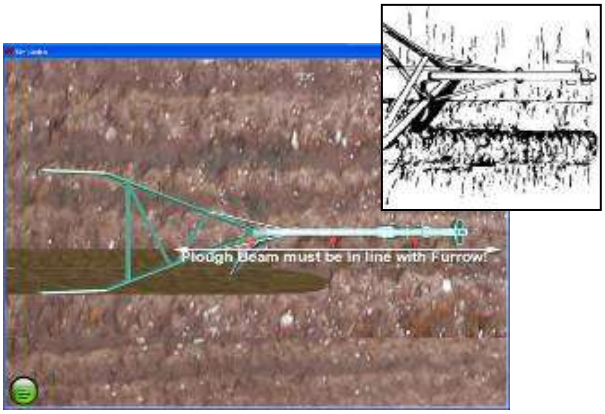


The important message to get across is that the vertical distance from the share tip to the lower surface of the plough beam should be 45 cm.

This is important because if the clearance is less than 40 cm, the plough is unlikely to penetrate the soil well. If it is greater than 50 cm, the plough is likely to dig too deep.

The plough is shown from a left static view on a surface. A ruler is shown measuring out 45cm from the surface to the underside of the plough beam.

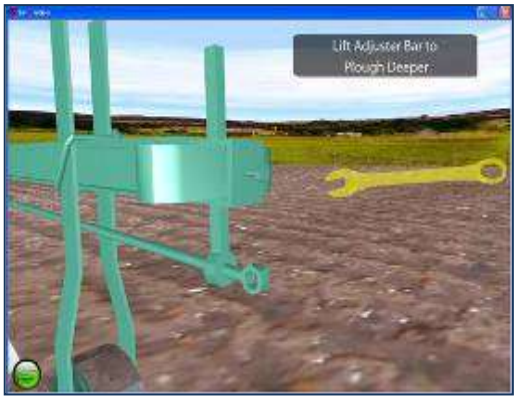
1.6 Plough settings - correct beam shape



The main aim of this section is to show the learner that the plough-beam must be straight by aligning the plough with a furrow.

The plough beam is shown from a top static view on a surface that is mapped with a texture of a ploughed land illustrating a furrow. The beam is shown parallel to the furrow.

1.7 Plough settings - setting the ploughing depth



Adjusting upwards for a deeper furrow

A standard plough appears in the field. The steps required to set the plough depth correctly are listed along the right hand side of the screen and the process shown step-wise, with the effect on the plough being shown in the simulation itself:

1. The wheel lifts up from the field surface
2. **A. Adjusting for a deeper furrow:** The locking screw turns anti-clockwise to loosen the adjuster bar; the adjuster bar moves upwards, along with the draw bar. Finally, the locking screw turns clockwise to tighten.
2. **B. Adjusting for a shallower furrow:** the locking screw turns anti-clockwise to loosen the adjuster bar; the adjuster bar moves downwards, as does the draw bar. Finally, the locking screw turns clockwise to tighten.

3. The plough is shown moving forward and creating a furrow in the field. If step 2(a) is selected a deeper furrow is shown and conversely, if step 2(b) is selected the furrow is shallower. To show the depth, the field surface is shown as transparent and the camera zooms in on the furrow where an arrow indicates the deeper or shallower depth.

4. : The plough stops and the wheel lowers back onto the field surface.

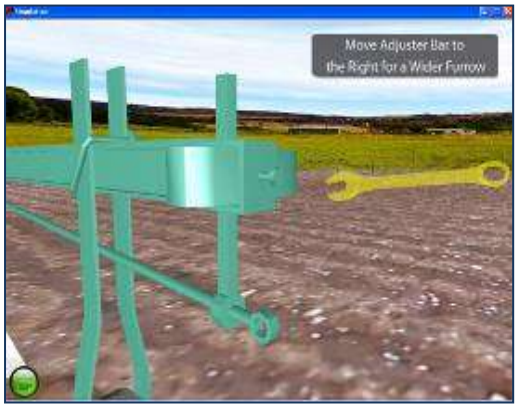
Adjusting down for a shallower furrow

1.8 Plough settings - setting the ploughing width

Different crops require different planting widths. In other words, the distance between the furrows needs to be based on the particular crop one is planting. This i3dlo has functionality to show how the width can be set according to the crop that is being planted (this functionality can be used in other crop specific settings to show how the plough should be set for that specific planting. The following 3 actions are demonstrated:

- **"Widen the cut":** Locking screw turns anti-clockwise; adjuster bar moves to **right** (from behind) on the hake regulator (i.e. towards ploughed land) and the chain moves to the right; Locking screw turns clockwise to re-tighten

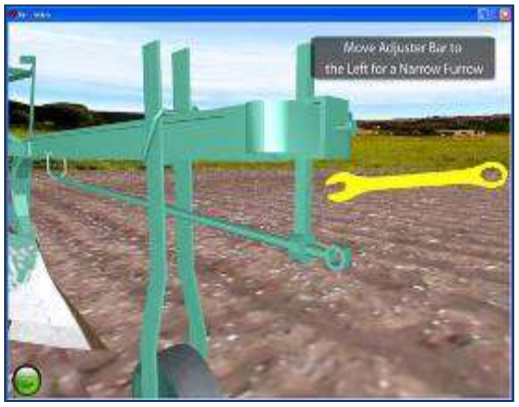
  "Test Plough" - the camera looks at the furrow from above. The plough is shown moving forward - and creating a wider furrow



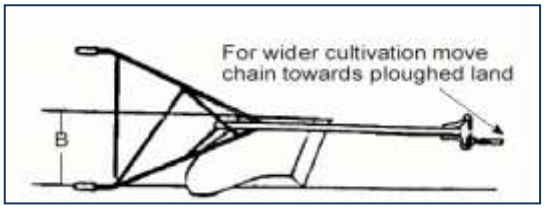
Adjusting for a wider furrow

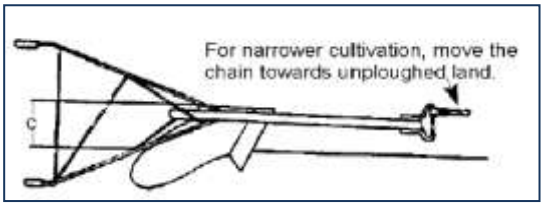
- **"Narrow the cut":** Locking screw turns anti-clockwise; adjuster bar moves to **left** (from behind) on the hake regulator (i.e. away from ploughed land & chain moves to left); Locking screw turns clockwise to tighten

  "Test Plough" - the camera again looks at the furrow from above. The plough is shown moving forward - and creating a narrower furrow



Adjusting for a narrower furrow





2 Text to translate

In this section, we look at the text that has been included in the i3dlo, either on buttons, used in pop-up boxes etc.

For each piece of included English text, the PSD filename, the actual filename as well as the font used is given.

For each text element described, a second language cell has also been included to help you to work on the new language text. *We suggest you copy this table into a separate file to work on.*

English text	New text	filename	PSD filename	Font
Animal-drawn ploughs – simple settings		plough-SetS.jpg	splash_Screen_NR.psd	Arial , Bold, 12.7mm, RGB Colour Code: 0,0,0
***Note**: This is a screen that contains credits and licensing information. Because most of this information consists of names of individuals and their contact details you may not wish to translate the text. Should you prefer, however, to localise this information please see the Credits & License.psd file for details*		Credits & License.jpg	Credits & License.psd	Arial, Colour Code: 0,0,0
Click to check clearance		Button_1_Text.png	ButtonText.psd	Arial, Bold, 1.76mm, RGB Colour Code: 255,255,255
Click to check beam shape		Button_2_Text.png	ButtonText.psd	As above

Click to set plough width		Button_3_Text.png	ButtonText.psd	As above
Click to set plough depth		Button_4_Text.png	ButtonText.psd	As above
Plough Beam Settings Simulation		Popup Heading.png	Popup Heading.psd	Arial, Bold, 1.76mm, RGB Colour Code: 0,0,0
Move Adjuster Bar to the Left for a Narrow Furrow		Adjuster_Narrow.png	On_Screen.psd	Myriad Pro, Regular, 34.93mm, RGB Colour Code: 255,255,255
Move Adjuster Bar to the Right for a Wider Furrow		Adjuster_Wide[1].png	On_Screen.psd	As above
Lower Adjuster Bar for Shallower Ploughing		Plough_Shallower.png	On_Screen.psd	As above
Plough makes Furrow Deeper		Furrow_Deeper.png	On_Screen.psd	As above
Position Plough in Furrow		Position_Plough.png	On_Screen.psd	As above
Plough a Test Furrow to Make Sure Furrow is Correct		Plough_Test.png	On_Screen.psd	As above
Plough makes Furrow Shallower		Furrow_Shallower.png	On_Screen.psd	As above
Lift Wheel		Lift_Wheel.png	On_Screen.psd	As above
Lower Wheel		Lower_Wheel.png	On_Screen.psd	As above
Lift Adjuster Bar to Plough Deeper		Plough_Deeper.png	On_Screen.psd	As above

Correct!		Correct[1].png	Clearance.psd	Arial, Bold, 10mm, RGB Colour Code: 255,255,255
Too Low!		Too Low[1].png	Clearance.psd	As above
Too High!		Too High[1].png	Clearance.psd	As above
Plough Beam must be parallel to furrow		Parallel.png	Parallel.psd	As above
Welcome to the Plough Beam settings simulation. In this simulation you will learn about four important plough beam settings. These settings are: 1. The plough beam clearance 2. The plough beam shape 3. Setting the plough depth 4. Setting the plough width Click here to continue...		Welcome_2.png	Welcome_2.psd	Arial, Bold, 1.76mm, RGB Colour Code: 255,255,255

3 Audio to translate

3.1 Narration

The narrations act as an aid to the learning process and to reinforce specific messages.

3.2 Compression data

File type : Wave (Microsoft)
Audio Format : MPEG Layer-3
Audio Attributes : 24,000 Hz, 56kBit, Stereo

3.3 Audio file content

Filename	Text
Clearance.wav	*Check the vertical distance from the share tip to the lower surface of the plough beam. It should be 45 cm. This is important because if the clearance is less than 40 cm, the plough will not penetrate the soil well. If it is greater than 50 cm, the plough will dig too deep.* *Cutting too deep will put a lot of strain on your draught animal, create large clods which take too long to break down and mix your precious top soil with your sub soil. Cutting too shallow doesn't leave enough space for water to accumulate in the furrows.* *As a general rule of thumb, when a man of average height puts his elbow next to the tip of the share his fist should touch the underside of the plough beam.*
Beam_Shape.wav	*If the plough beam is bent or twisted you will struggle to plough in a straight line. Straighten it if you can or get your local blacksmith to do it for you.*
Plough_Width_1.wav	*Different types of crops require varying row sizes. This means that you will need to plough wider or narrower furrows to suit a particular crop.*

Plough_Width_2.wav	*To widen the cut you must move the adjuster bar to the right. This will move the front of the plough beam towards ploughed land causing the share to make a wider cut.*
Plough_Width_3.wav	*Plough for at least ten metres or so after every adjustment and keep on adjusting the bar until you are happy with the width of the furrow.*
Plough_Width_4.wav	*To make a narrower furrow you must move the adjuster bar to the left, in other words away from ploughed land. This will move the front of the plough beam away causing the share to make a narrower cut.*
Plough_Depth_1.wav	*This is one of the most important aspects of ploughing. If the plough is set incorrectly you and your animals may struggle or even be injured. Productivity suffers and furrows are not prepared correctly with serious consequences for crop production. Remember, you don't want to plough too deep because this will damage your soil by mixing the subsoil with the topsoil.*
Plough_Depth_2.wav	*The process is straight forward. Lift the wheel so that it does not touch the ground.*
Plough_Depth_3.wav	*Lift the adjuster to plough deeper or lower the adjuster for shallower ploughing. Always test the plough depth to make sure it is correct before finally lowering the wheel onto the ground again.*

Annexure 1: How to localise i3dLO's – a summary

Arguably, the most powerful feature of *Interactive3d Learning Objects* is their translatability into many other languages. This feature means that the knowledge encapsulated within each I3dLO can cross language barriers and be shared with a global community at the click of a button. Audio and text components can easily be translated into other languages by exploiting the so-called "ZIP" compression functionality built into .EOZ files. This is how it's done.

The Basics:

All the information needed to run an i3dLO such as text files, audio files, etc, can be found inside the compressed .EOZ file. In principal, you need to replace the graphic and audio files in the EOZ in order to change the text and audio components of the I3dLO to a new language.

This is actually very easy to do if you follow these steps:

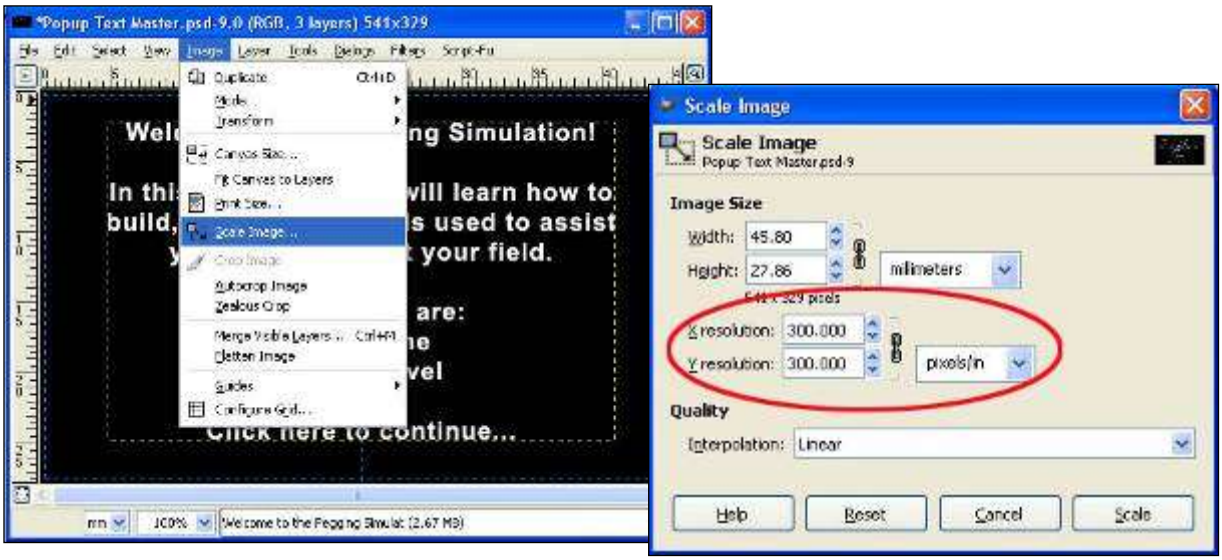
1. You've probably worked with compressed .ZIP files before. Well, an EOZ file is basically the same – you just need to unzip it! We recommend that you use WinRAR to do this as it is NOT case sensitive, unlike WinZIP which IS Case-sensitive (trust us on this one, you'll thank us later!). WinRAR is a shareware program that can be downloaded at http://www.win-rar.com so go get it if you haven't already.
2. Right, now you have got WinRAR at the ready, you're raring to go. Not so fast. First you need to something very important. Save a backup copy to work on (we never work on original files!). Now open the file with WinRAR by right-clicking on the file, choose "Open With" and select WinRAR. You may have to click on "Choose Program …" and then select WinRAR from the list or browse to its location to get it to open your file if it's not already associated with .EOZ files. Hey presto, the inner secrets of your I3dLO are revealed!

Replacing Text Textures:

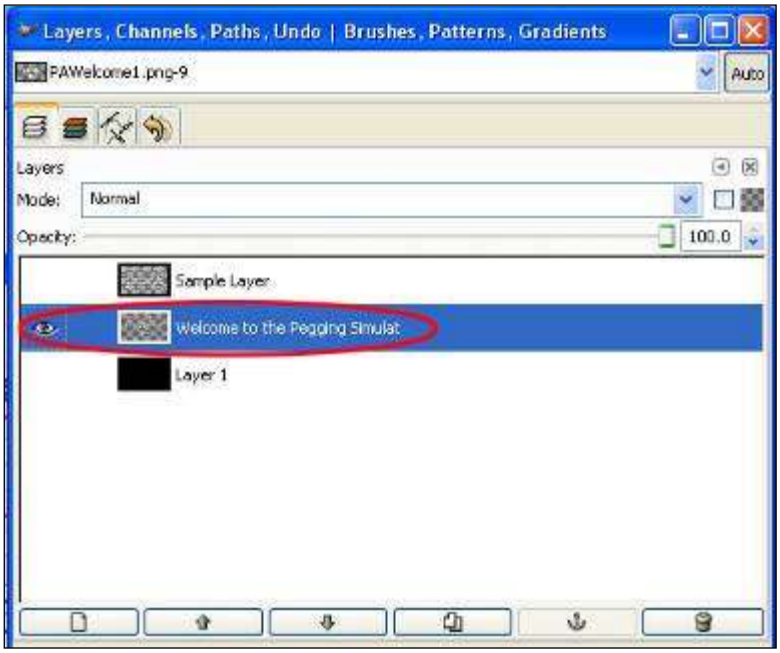
OK. Now that you've opened the .ZIP file with WinRAR you're probably thinking, wow, there's a lot of stuff in here. You'll probably see about half a dozen types of files. Don't panic. We're only interested in a couple. We'll take it step by step - starting with text replacement.

1. You'll see that there are a number of .PNG files inside the file. These contain the actual text that is used in the i3dLO. These are the files that you need to replace with your new, translated versions. But please don't edit the .PNG files directly. You can download a set of Adobe Photoshop files from the website (see the Photoshop resource folder) that can be used as templates to generate your own translated content. They are precisely sized to ensure that the text fits the way it should. These Photoshop "templates" are listed next to the relevant .PNG files in tables below together with the fonts, font sizes and font colours you'll be using.
2. Go ahead and open the .PSD file and type your own translated text in. If you have Photoshop then the process of editing the text layer contained within a .PSD file is a simple process. You can purchase a simpler and cheaper download version called "Photoshop Elements" from Adobe.com for approximately USD 100.
3. What? Do I hear screams and a gnashing of teeth: "How do I open .PSD files if I don't have Adobe Photoshop™?" Relax, take a deep breath and then download a secret weapon from the Web called "GIMP" from http://www.gimp.org/. With GIMP you can do photo retouching, image composition, image authoring, open .PSD files and, what's more, it is open source and therefore, free!

4. OK, that was the good news. Now for some bad news. GIMP won't actually allow you to edit the .PSD file's text layer itself because it turns it into a raster image as opposed to editable vector-based text. This means that you can only use the text layer as a guide for the correct placement of your new text. The table below gives you all the font information that you need. However, before you start, you must make sure that GIMP is using the correct resolution otherwise you'll never get the font size right. The settings will obviously vary from project to project. For Pegging out with the A-Frame you must set GIMP's resolution to 300 pixels per inch. Click on "Image" then "Scale Image" to get to the right window. Make sure that the X and Y resolutions are set to 300! Check out the screen shots below.



5. **There is one important thing to keep in mind when you are editing the layers.** You only want your new text layer to be visible. Make sure, therefore, that only this layer is visible in your layers palette. Look for the "eye" icon next to the text layer. See the screenshot below.



6. When you're done, save the new file as a .PNG file. Now, this next bit is very important: You must save your new .PNG file using EXACTLY the same file name as the original file otherwise the .EOZ file won't recognise it and it simply won't load into the simulation – don't use the .PSD file name and don't say we didn't warn you!
7. When you're ready simply drag the new file from Windows Explorer into the open WinRAR window to replace the old file. That's that! Or is it? Nope, not quite but almost. Your .ZIP file will, to be frank, do just that. Zip, nada, nothing.

You have to rename the simulation file extension back to .EOZ again to be able to run your i3dLO in the EON Viewer. Now you're done.

Replacing Audio files:

1. Now you'll have noticed a several other files inside the .EOZ file that have a .WAV extension. At this point all the experts among you will, no doubt, stretch and yawn with a "been there, done that expression" on your faces. Just bear with me as we run through some more basics. All the I3dLO's that you download from the website contain WAV files recorded at 44kHz, in 16 bit and stereo, with MPEG layer 3 compression. This gives good quality audio with a low file size and is our audio standard for I3dLO's. For a more detailed discussion about audio files take a look at the August 2006 "*News and Views" which* contains a great article about recording audio clips.
2. By now you should be familiar with the procedure for "un-zipping" .EOZ files. If you're still not comfortable with this have another look at the steps outlined above again and try it out a few times. Practice makes perfect, after all.
3. Once you've finished recording your audio clip you have to save it back to the original file in WinRAR. We must stress again at this point how important this step is. Save your new .WAV file using EXACTLY the same file name as the original file otherwise the .EOZ file will not be able to pick it up when the simulation is run, *capiche?*

Annexure 2: Linking i3lo's to PowerPoint

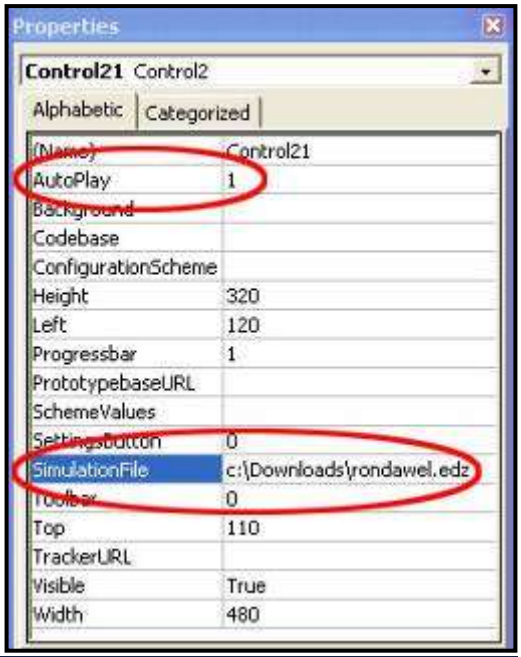
You can also use your simulations in PowerPoint presentations. It's easy to set up and all you have to do is the following:

1. Open PowerPoint, move to the slide where you want to inset the simulation
2. Click on *Insert* / *Object*.
3. Select *Create New* and *EonX 4.0.1* (note, the version number is likely to be higher) & click *OK*.

4. An empty selection dialogue box will now appear on your screen. Right-click on the selection. Click on *Properties* and complete the following fields:

Autoplay: **1**

Simulation File: The **path** to your simulation file (NB: Check your file extensions – If you're using *EON Distribution Files* the file extension will be.*edz* & *if* you're using *EON Studio Documents* the extension will be.*eoz*.



5. When you now view your slide show, the EON simulation will automatically run when you move to the PowerPoint slide that you have linked to the simulation.

Annexure 3: General information

Simulation Viewer - installation

I3dlo's have been developed and are normally distributed as separate files (they will have either an .EOZ or .EDZ file extension). You will need to install the EON Viewer to run these simulations. If you haven't already installed the latest viewer, or don't have a latest copy, it can be found at **www.naledi3d.com** **(select the "i3dlo home" button / downloads**, the link is at the top of the page). The latest version (September 2008 is 6.0.0).

There is no installation process for i3dlo files. Once they have been copied to your hard drive, they can be run by simply double-clicking on the file name; or you could consider placing a short-cut on your Windows desktop, or for example, embed relevant i3dlo's into your PowerPoint presentations (see Annexure 2 for more on this).

Computer specifications

It is important to keep in mind that VR simulations require PC's with a "good" graphics card and sizeable memory. The terms "good" and "sizable" can be defined along the lines of the following hardware configuration, which would be our PC of choice:

Intel Pentium IV or AMD Athlon CPU (2GHz or better)
256 MB RAM (512 MB RAM preferred)
At least 250 MB spare hard drive disk space for installation – some of the i3dlo's can be as big as 20Mb (or more) each
Sound card and stereo speakers, CDROM
Monitor capable of 1024 x 768 or better
AGP or PCI-E Graphics card with at least 128Mb of dedicated memory onboard (256Mb preferred) (NVidia GeForce cards are recommended.)
3-button mouse and Windows XP

I3dlo simulations have been known to run on smaller computers, such as notebooks with the Intel graphics chipset (for example, with 128Mb shared memory); and World Links in Harare have even run some smaller simulations on older Pentium III computers. However, it is the nature of "real-time" interactive graphics programmes that the better the graphics card / chipset combination, the more dedicated graphics memory and PC memory available, the better the simulation will run.

Typical symptoms of using a computer that is "low" on specifications is that the simulation take longer to load; are "jerky" when moving around; or some of the textures may not render properly.

Mouse usage

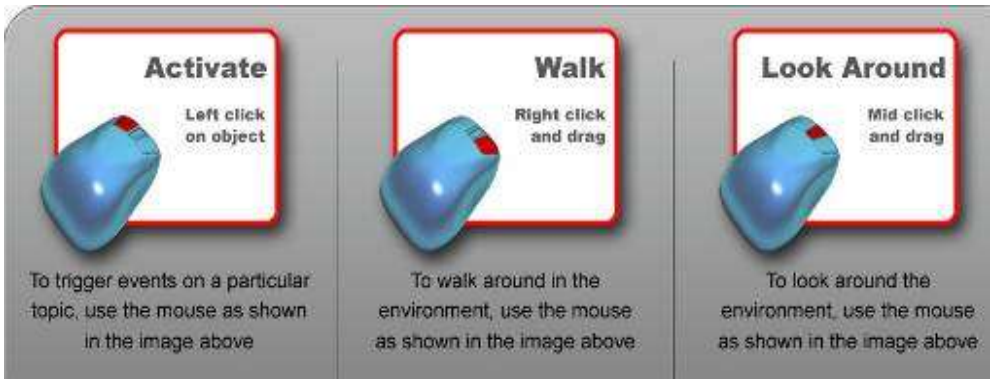
Depending on which i3dlo is being used, a computer mouse can be used in varying ways to control movement around the simulation. Firstly, as in most software applications, the user uses the mouse to move the cursor and mouse clicks to make selections from displayed menu items, or to click to move the i3dlo forward when dialog boxes are displayed.

However, because the i3dlo is based on Virtual Reality (VR) and interactive 3D worlds, the mouse can also be used (sometimes this option is intentionally "turned off') to move around the 3D world.

This is usually achieved by holding the left –button in and sliding the mouse slowly forward to move forward, or left / right to turn (depending on which direction you want to go). This navigation control is quite intuitive and normally only take a few seconds of practice to get used to the idea, and to also get used to co-ordinating the speed of the mouse movement with the actual speed of movement within the simulation.

Similarly, the right mouse button can often be used to move vertically (up or down) in the simulation; and a combination of the left button and the keyboard key to change the angle of view (again these options may have been intentionally turned off).

The middle mouse button may also be used change the angle of view.



Finally, there may be some cases where the left / right buttons may have been intentionally swapped. A little trial and error will help you to determine what mouse controls result in which movements in a particular i3dlo.

Troubleshooting

In this section, we look at some common problems that may arise when working with interactive simulations.

1. Simulations don't run smoothly

By their nature, VR allow you to move around the 3D simulation in real time. While this is one of the more powerful features of Virtual Reality, it also means that the quality of the "screen re-rendering" is dependent on the amount of memory (both dedicated graphics and computer memory) and the system CPU that is available. If the simulation is not running smoothly it is likely that your computer is below specification (for that particular i3dlo). In marginal cases, you could try to reduce the load on the PC by closing as many other applications as possible.

2. Audio

On rare occasions, the sound option may become disabled. To check this click on *Tools* on the **EON Viewer Menu Bar** (right). Select *EON Configuration* from the drop-down menu and click on *Wave Sound*. The Wave Sound Properties menu will appear. Make sure that the *Sound Off* box is **unchecked**!