qNetica Manual

Version 1.81

Norsys Software Corp.

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Contents

1 Introduction

Netica-Web is a system to deploy your Bayes nets over the internet as a question-answer system. Such a system asks the user questions, or allows the user to enter relevant information, and presents the user with conclusions. At each stage of the process, the system chooses the best questions to ask based on the previous answers given. It may continuously provide conclusions, or wait until it reaches a certain level of confidence before presenting any information.

With Netica-Web, you can easily build an interactive website, also known as a HED system (Human-Electronic Dialog). You construct a Bayes net in the normal manner using Netica Application, and then with a single click of a button, a website is generated. Your HED system can be hosted by Norsys, or you can host it yourself. Either way, if you wish, it can become part of your existing website. Alternately, the "web page" can just be local to the machine it is running on, allowing you to distribute your solution as a desktop application that does not require the internet.

Netica-Web can be used to build diagnostic systems, such as troubleshooting for some machinery or plant, or to provide medical, environmental, corporate, etc. diagnostics. It can be used to build systems that identify some particular item(s) from a large set based on indirect criterion, such as a product to be purchased from an inventory, a movie or song selection, restaurant choice, person, etc. It can build classification systems to determine which group an item falls into, based on its characteristics, such as the personality type of a person, probable voting patterns, credit worthiness, whether a plant or product is poisonous, etc. Although these are typical applications, any Bayes net can be run on Netica-Web.

Netica-Web is superior to old tree-based methods because it is easier to build and maintain a Bayes net than a decision tree. Bayes nets represent their knowledge in a form which is easy to understand, and which can combine human expertise with learning from data. Furthermore, their modularity allows combining sub-models into a complete model. Any changes in probability distributions can drastically alter the structure of the optimum decision tree, whilst they produce a small change in a Bayes net. Bayes nets allow users to skip questions, answer "unknown", or provide likelihood answers, and still maintain optimal performance. And they can recover from incorrect answers, which often throw decision trees on the wrong track.

When constructing the Bayes net, its nodes are divided into (possibly overlapping) groups: observable, target and intermediate. Each observable node becomes a potential question in the system, and each target node will result in an answer, or have its probabilities displayed. Netica-Web determines which questions are the most relevant to determine the values of the target results. It then presents those questions first, either one at a time, or a few at a time in a scrolling list (depending on the configuration you set). The user may skip questions at any time, in which case the questions are moved to another part of the screen, to allow later answering if desired.

Since only the most relevant questions are asked, based on the previous answers, a HED session has the feel of an interactive dialog, rather than just filling out a form. Since the system is so judicious in choosing which question to ask from its pool of possible questions, it is okay to have a very large set of possible questions, further adding to its ability to reach good conclusions.

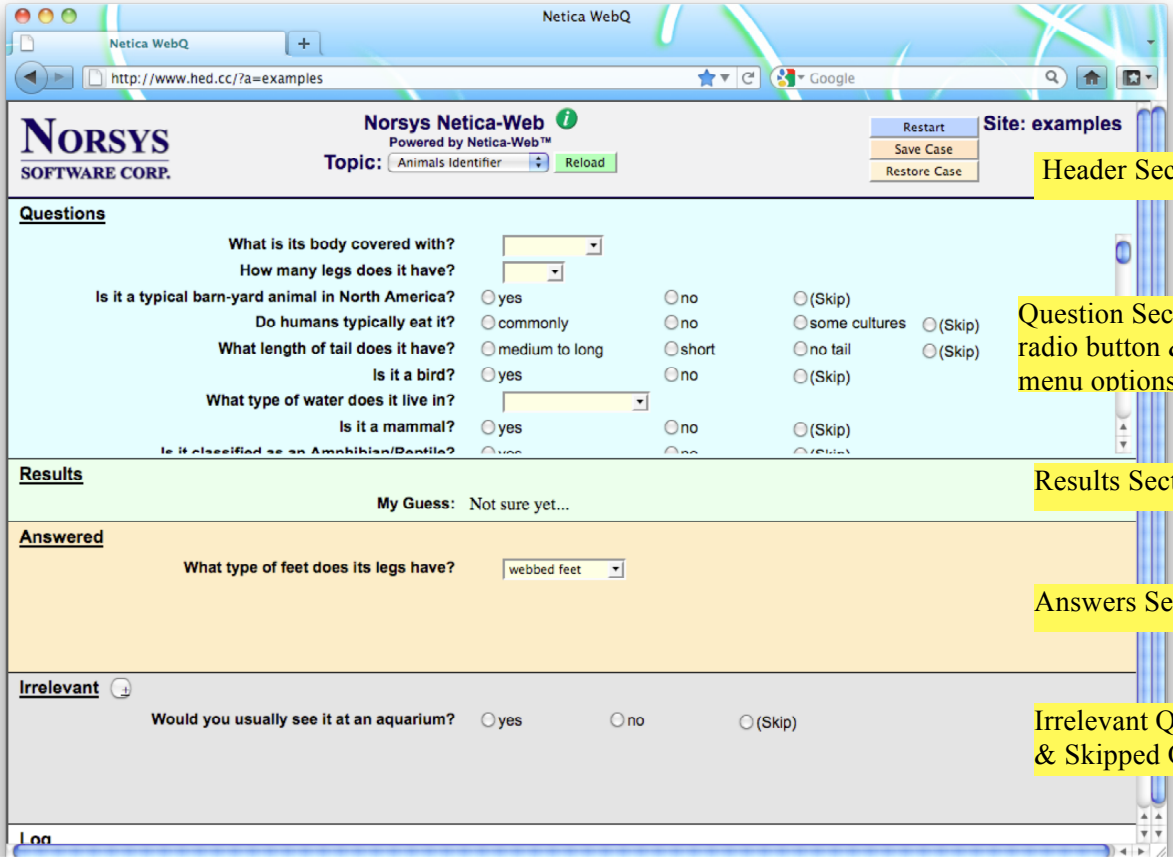
A working HED system can be built from a regular Bayes net with a single click, although if you want to you can highly customize it. Its visual appearance, dimensions, colors, behavior, etc. can all be easily changed, and graphics can be added so that it is seamlessly integrated with a larger website.

This manual describes how the HED System appears to the end-user, its behavior, and how to have Netica build one. It contains a great deal of detailed information, but it is only necessary to read the “HED System Behavior” and “Getting Started” sections to build your first HED system. Then to customize it as you wish, you can refer to the appropriate parts of the rest of this manual.

The last section, “Building Client-Hosted Systems”, is only relevant if you wish to host the HED system on your own computer, or if you wish to create a desktop-based HED system that does not require the internet.

2 HED System Behavior

HED systems are presented to the user entirely within a web browser. The figure below shows a typical HED system.



2.1 HED Display Sections

The browser display may contain six main sections. Depending on how you configure your HED system, and the user input so far, some of the sections or buttons described below may not appear.

1. **Header:** This section contains a "Topic" menu for the user to choose which model (i.e. Bayes net) to run, and the title of the model. It can also include a welcome message to the user (blurb), a help button to assist the user, buttons to generate reports and to save/restore the answers given so far, and your account name and company logo. See Chapter 5 on Generating Report buttons.
2. **Questions:** These are the unanswered questions ready to be answered. Netica's sensitivity analysis will determine which questions are most relevant and will display them accordingly.
3. **Results:** This area displays results of the HED system analysis, providing probabilities of various outcomes, best decisions, etc. These results are referred to as the Target node(s) in your BN.
4. **Answers:** All questions the user has already answered, together with their answer, and a button to retract the answer.
5. **Skipped:** Any questions that the user does not want to (or is unable to) answer will appear in this section.
6. **Irrelevant Questions:** This contains those questions determined by the HED system to no longer be relevant in determining the target results, based on previous answers, if there are any.

2.2 Answering Questions

You have extensive control over the visual design of your HED system. In particular, you can choose the formatting of your questions. The user will be presented with one or more questions, with the most important questions first.

Questions may be in the form of:

Multiple Choice: User clicks in a radio button: ○ true ○ false

or chooses from the pull-down menu:

Graphics: User clicks directly on the graphic:

Sliders: The user can enter an uncertain answer by clicking on the green indicator and sliding it to indicate the relative likelihood, or by entering a number in the text box:

or by clicking directly on the word choice: 

Data Entry: User enters a response in the text box: 

2.3 Question-Answering Process

Each time the user answers a question (or changes an answer), the following occurs:

1. The answered question moves from the Questions section to the Answers section, showing the answer that was given.
2. The Results section will change to reflect the new information. For example, new probabilities or values will be displayed, and graphic bars updated.
3. Any questions that have become irrelevant are moved to the Irrelevant section. For example, answering "Gender = male" may make "Are you pregnant?" irrelevant. Under some circumstances, questions that were irrelevant may become relevant, and are moved back to the Answers section.
4. If the question is answered with "Skip", then instead of going in the Answers section, it goes in the Skipped section (where it can be moved back by clicking "Re-enable", if desired). The Results are not affected.
5. The order of the questions in the Questions section will change to reflect the new information, so the most important questions are always first. If the system is configured to show only the N most important questions, then the questions which appear will change.

The user can retract an answer by choosing "Unknown" beside the appropriate question in the Answers section. The question will be moved back to the Questions section, and adjustments will automatically be made to all other sections. The **Restart** button will retract all the given answers.

If you wish, you can configure your HED system so that the user answers several questions at once, and then presses the Submit button, before the above actions take place (see **ManualSubmitMode**).

2.4 The Results Section

Each target node results in a display in the Results section. The type of display produced depends on your Results section configuration parameters (see Chapter 4), and whether the node can be displayed in a categorical way, a numerical way, or both (i.e. can produce both types of display next to each other). Discrete variables and discretized continuous variables can be displayed in a categorical way. Continuous

variables and discrete variables which have a numerical value assigned to each state can be displayed in a numerical way.

Categorical

The most common type of display is to show a single probability bar for a two-state node, or one bar for each outcome for multi-state nodes. These are like the belief-bars in Netica Application.

Unlike Netica Application, each state of the node can have multiple bars. This is useful for comparing the different probabilities given different scenarios. Depending on how it is configured, each state can have the following bars:

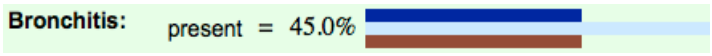
Current: Shows the probability of its outcome, considering all the answers that have been given thus far. (Represented by the dark blue bar in the diagram below)

Last: Shows the probability of its outcome, considering all the answers except the last one. (Represented by the light blue bar in the diagram below)

Initial: Shows the probability of its outcome before any questions were answered.

Snapshot: At any time, the user can take a 'snapshot' of the current bar positions by pressing the Snapshot button. A new bar will appear whose length is that of the current bar. The length of the bar will remain fixed until the Snapshot button is pressed again later (after some new answers). (Represented by the brown bar in the diagram below)

Snapshot 2: A second snapshot, which works like the first, but operates independently.

Example: 

Numerical

For nodes that are continuous or have real-value numbers assigned to each state, the display can be the mean (expected value) and standard deviation of that variable. These can be displayed textually as numbers, or graphically as a needle position on a bar (for the mean) and a darkened region on the bar (for the standard deviation).

2.5 Saving and Retrieving Cases

The set of answers that are currently entered in the system is known as a *case*.

If the user wishes to save her current case of the answers she has provided thus far (including slider positions), she can press the **Save Case** button. If she hasn't logged in yet, the system will ask for her account name and password. It will then ask for a file name to save the case. The case will be saved in the users sub-account, within your client account. The user will have access to any nets that are uploaded to your account (this can be restricted using **`NetsToInclude`** parameter in the .properties file).

To retrieve a case, the user presses the **Retrieve Case** button. She will be presented with a list of all saved cases in her account. After she chooses one, its answers will replace the answers currently entered in the system. You can set parameters to add a button to your HED site called **Add Case**. If she presses the **Add Case** button, the answers of the case will be added to those already entered in the system.

2.6 Generating Reports

You can configure your HED system to provide the user with highly customizable reports on a wide variety of things. For example, reports may contain helpful information for answering the questions, the answers given thus far, information on the model currently being run – including its conditional probability tables and structure, and current beliefs for any nodes, including target results.

Each report type will appear as a button (for reports applying to the whole net) or icon (for reports specific to a certain node/question) on your HED website. When pressed, the corresponding report will come up in a new browser window and may be saved to file or printed from there. For more information, see the entire Chapter 5 and the section on Report Display parameters in Chapter 4.

2.7 Grouping Questions into Domains

Below the "Topic" menu may appear another menu called "Domains". It breaks up the questions of a topic into (possibly overlapping) groups called *domains*. When you make a choice from this menu, only questions from that domain will be displayed (although the internal inference results will still reflect all the questions and answers). As a visual aid to increase awareness of the current domain, there is a bar across the top of the screen behind the "report" buttons that changes color to match the domain.

You can use domains to break up a large question set into smaller, more manageable sets. That can help end-users to conceptualize the question set, or help them to navigate to a desired question. Or, if there are multiple end-users answering the questions for a particular case, some questions may be appropriate for some end-users, and not for others.

3 Getting Started

If you haven't done so already, we recommend that you familiarize yourself with how Netica-Web works by exploring our examples site.

Go to: http://www.hed.cc/?a=examples

Tip: You just need to enter in your browser: hed.cc?a=examples

For instructions on how to use the system, click the green circle at the top with the "i" in it.

For the latest HED innovations, go to: www.hed.cc#NewStuff

3.1 Quick Start

The fastest way to get your system online is to use the Norsys hosting option. If you want to personally host your system, refer to Chapter 6 for getting started. Otherwise, follow these basic steps:

1. Using Netica Application, open your Bayes net file, or build a new one. (For help with building Bayes nets, see the onscreen help in Netica, by choosing **Help → Help**).
2. Select the target node(s). These are the node(s) the system will determine the value or probability of and will appear in the Results section of your HED site.
3. Right-click in the net background and choose **HED System → Add Net to Website** (or from the main menu, choose **Network → Build Website**), and answer the dialog box questions to create your first HED account. **Note:** your account name and password can be anything you choose. Keep this information recorded, as Norsys cannot retrieve it for you if you forget or misplace it.
4. Your web browser will open a new window with your complete running HED system. Test your new HED site to make sure it works the way you want. Your site is now live on the internet, so you can copy the url from the web browser (before answering any questions) and send it to anyone that you want to use your site.

3.2 Simple Changes

Your HED system can be highly customized and integrated into your company website, as described in later chapters. In the meantime, here are a few simple changes you can make to your Bayes net to improve the quality of your HED system. **Note:** Each time you make a change to your net, you have to re-upload it, as you did in step 3 above, to refresh the browser with your changes.

- **Choose Question Nodes:** In your Bayes net, create a node-set called "observable" and place within it all the nodes that you wish to form questions (otherwise, all nodes except the target one(s) will be considered observable).
- **Define the Question Text:** To set the text you wish to appear for a question, right-click on its node and choose **User Defined Field → Enter** and type "HED_Question" into the dialog box. Then enter the question text. Otherwise, the default "question" will be the node's label (i.e. the node's name or title as displayed in Netica Application).

  Tip: If you want to add this field to a lot of nodes, select them all, right-click on one, choose **User Defined Field → Enter**, type "HED_Question", then enter an empty field. (Choose 'No' when the dialog box asks if you want to remove the field due to an empty string). Next, for each node you can enter the customized question by choosing **User Defined Field → HED_Question**.
- **Add a Title and Description:** Your site will be immediately improved by adding a title and description. The description could also serve as a welcome message to the user of your HED system, or have brief instructions.

  Right-click on the net background and choose **User Defined → Enter**. Enter the name of the field as HED_NetTitle or HED_NetBlurb. Another dialog box will come up asking for the value of the field. You may use HTML tags to define the font style.

  For instance:

  HED_NetTitle: Chest Clinic

  HED_NetBlurb: This belief network is also known as "<u>Asia</u>".

  Note: you can also adjust the net title and description from the .properties file. See Chapter 4 for more info.
- **Set the Target Node(s):** Select the set of nodes you want as target nodes, right-click on one of them, choose **Set Nodeset → New**, and enter "target" (without quotes). You can also add or remove individual nodes from the target set by right-clicking them and choosing **Add to Nodeset → target** or **Remove from Nodeset → target**.

3.3 Sharing your HED nets

The best way to share web pages with others is to provide a link to the created webpage. We haven't instituted password logins to the webpages yet, as that could cause headaches for the users, though this could change in future versions of Netica-Web.

In the meantime, the best way to maintain privacy over your nets is to create multiple user accounts - say, one for yourself and all the nets you are developing and one for third-party users to view a particular net or set of nets. Make the user names unique, so that it would be difficult to guess your personal account url.

Second, if you would like remove certain nets from your hed website, you simply open that net in Netica, right-click on the net background and choose **HED System → Remove Website Net**. Netica will ask for your account name and password and then remove that net from the account that you log in to. So, in theory, you could keep that net on your development HED site and take it down from the HED site you are distributing to others.

3.4 Types of HED Systems

There are 3 different types of systems that can be built:

1. Norsys-hosted
2. Client-hosted
3. Desktop

Whichever you plan to deploy, it is easiest to start off with Norsys-hosted, so it is best to build that first. Later on, you can migrate it to your own server if you wish. With Norsys-hosted, you use Netica Application to build your model and then press a button to build the website, which will be hosted on the Norsys site: hed.cc. There are lots of options for customizing the appearance and operation of the site, so you may want to spend development effort to get the site customized to your liking. If you want, you can then integrate it into your own larger website while still leaving it Norsys-hosted. Or, you can actually move it to your own host machines to join the rest of your website as client-hosted.

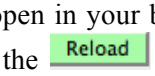
Client-hosted sites work and look the same as Norsys-hosted, but they are located on your own web server. This option requires a different type of licensing from Norsys.

Desktop systems are useful if you don’t want to run over the internet. They can be burned onto a CD and run off the end-user desktop. They use the same browser interface as the internet-hosted ones, so they look and operate in the same way, but they don’t require any internet activity.

4 Customizing Your HED System

Now that you have created a basic HED system, you may discover that you'd like to have greater control over its appearance or functionality. A great deal of control is available, as explained in this chapter. There are four main places available to do customization:

- Properties file – A text file with the same name as the Bayes net file, but with file extension ".properties", which provide values for many *configuration parameters*. You generate this file within Netica and it will be saved in the same directory as your Bayes net. See section 4.1, 4.2 and 4.4 for further details on this file. **Note:** if you ever move your BN file, be sure to also move the properties file with the corresponding name so the HED system can find it.
- User fields – Within the Bayes net, certain user-defined fields for nodes, or the net itself, which have the prefix "HED_". These values will over-ride those of the .properties file. See section 4.3 for further details.
- CSS file – Cascading style sheet for the HTML of the web page displayed, allows you to change colors, fonts and some dimensions. It has the same name as the Bayes net file, but with file extension ".css". See section 4.5 for more details.
- Report Templates – Template files in plain text or HTML, used to present the user with directions, information on the current answer set, results, internal operations, etc. Described in Chapter 5.

During the development phase of your HED system, you will normally progress through iterations of editing various files and content within your Bayes net or related files (i.e. Adding/Removing a question, editing the properties file, editing the .css file etc). To view the changes immediately in your browser, right-click on the Bayes net background and choose **HED System → Add Net to Website**. A new tab will open in your browser with your latest HED system. If you don't see the changes, you may need to click the 

button on the HED web page. If you get an Internet Explorer error, refresh your browser and your HED system will appear (if not, contact Norsys at: support@norsys.com).

If you are sharing your HED system with third parties (i.e sending them a link to your site), there may be times when you want to limit the nets on your site to only 1 or 2. In that case, you may want to create multiple HED accounts, as described in section 3.3, or you can simply remove nets from your site. There are two ways to remove a net from the HED topics menu (which appears in the top banner of your HED site). One method is, using Netica, open the net you wish to be removed. Right-click on the net background and choose **HED System → Remove Website Net** and then confirm the account from which the net will be removed. Alternatively, you can manage HED nets in the .properties file, with the **NetsToInclude** parameter, as described in section 4.2.

If you are working with many Bayes net files and you want them to have configurations parameters that are similar to each other, but different from the defaults, then it is often convenient to change the defaults by creating your own default property file. You create it exactly as you would the Bayes net properties file, but make sure that the only properties that are in it (and not commented out) are those whose default behavior you want to change. Name the file `default.properties` and upload it to your HED site by right-clicking on the background of any Bayes net and choosing **HED System → Upload File to Website** (it will ask you for the file location).

4.1 Configuration Parameters by Group

The majority of customization for your HED system will be done via the properties file of your net. To create a .properties file for the first time, right-click on the net background and choose **HED System → Properties**. A template will open and will automatically name itself to match the name of your net. Do not rename this file. The starting file contains all the possible parameters for customizing your HED. To activate any of the parameters, remove the # symbol and edit its value (the # makes it "commented-out"). If the parameter is not "activated", the default behavior will result. Defaults are described for each parameter below, and are usually the commented-out values that appear in the initial file.

Sometimes it is more convenient to set parameters by directly editing *user-fields* in your Bayes net using Netica Application. See the section "Setting Parameters within Your Bayes Net as User-Fields" below for more information.

Some of the parameters involve using images to further customize the look of your website. To upload images or other files to your HED server account, choose **HED System → Upload File to Website**.

Once your particular customizations have been made, you can use this .properties file as a template for other HED systems that you create. The name of the properties file must always be "<netname>.properties", where <netname> is the file name of your Bayes net without the .neta or .dne file extension, and the file must appear in the same directory as the Bayes net on your computer.

To see the changes to your HED system, save the file and return to your Bayes net window. Right-click on the net background and choose **HED System → Add Net to Website**. If the changes don't seem to be appearing, click the Reload button in the top panel of the browser window.

Below is a listing of available parameters and their default values, grouped by functionality:

Sections
```
ShowAnsweredSection = true
ShowIrrelevantSection = true
ShowSkippedSection = true
```

Development
```
Debug = true
ShowLogSection = true
ShowReloadButton = true
```

Operations
```
NetsToInclude = *All*
ManualSubmitMode = false
InDomainMenu = ""
NotInDomainMenu = ""
```

Questions Display
```
Question = <node label>
ShowRealValueSlider = true
ShowLikelihoodSliders = false
BothSlidersWhenTwoStates = false
CenterRealSlidersIfUnknown = false
UseMenuWhenMoreStatesThan = 4
HideEliminatedStates = false
HideLikelihoodNumber = false
HideRealValueNumber = false
ShowSliderTickMarks = true
WebQ_CalibrationSlider = false
```

Results Display
```
HideResultsByState = false
ShowBeliefBar_Current = true
ShowBeliefBar_Last = true
ShowBeliefBar_Initial = false
ShowBeliefBar_Snapshot1 = true
ShowBeliefBar_Snapshot2 = false
MaxDisplayStates = *All*
SortByBelief = false
HideResultUntilBeliefGT = 0
WhenInconclusiveMessage = "uncertain"
HideResultBeliefBars = false
HideResultNumbers = false
ShowGraphicalMean = true
ShowTextualMean = true
```

Question Layout
```
DisplayStatesVertically = false

MultipleChoiceFormatIndent = 4
AlignStateLayout = false
```

Answers Display
```
AnsweredSortOrder = 1
```

Overall Layout
```
HeightQuestionsSection = 200
HeightResultsSection = autosize
HeightAnsweredSection = 200
HeightSkippedSection = 100
HeightIrrelevantSection = 45
MaxQuestionsShown = 300
MaxResultsShown = 50
MaxAnsweredShown = *all*
MaxSkippedShown = *all*
MaxIrrelevantShown = 100
```

Reports
```
Report_x
NodeReport_x
NodeReportButtonPlacement = right
```

Heading
```
WindowTitle = "HED site powered by Netica-Web"
PageTitle = "Netica-Web"
NetTitle = ""
NetBlurb = ""
TopLeftCellHtml = ""
```

Case File Dialog
```
DateFormat = MMM dd, yyyy: hh:mm aa
ShowFileSizes = true
```

Images
```
SliderBackgroundImage = images/slider_scale_512x10.jpg
SliderHandleImage = images/slider_handle.gif
```

Colors
```
BeliefBarColors = navy, green, gray, etc
```

4.2 Configuration Parameter Descriptions

AlignStateLayout: value: true/false default: false node setting: no

Turning this on may improve the layout of the states in the questions section, especially if there are only a few states with short state names. If true, then each state is rendered into an HTML TABLE cell (HTML "TD" element). Ignored if DisplayStatesVertically is true.

AnsweredSortOrder: value: 1, 2, or 3 default: 1 node setting: no

This parameter sets the order in which answers will be displayed in the Answered section: 1 = last answered first, 2 = last answered last, 3 = alphabetic (any other number is ignored).

BeliefBarColors: value: html color default: navy etc node setting: no

To set the colors of the belief bars in the Results section. Its value must be a comma-delimited list, providing a color for each type of bar (whether it appears or not) in the order: current, last, initial, snapshot, snapshot2. The default colors are: `#0000A0, #D0E7FF, gray, #914E37, #30A030`.

BothSlidersWhenTwoStates: value: true/false default: false node setting: yes

It only applies to binary (2-state) nodes. If false, then only one likelihood slider is shown; the slider controls the likelihood for state 0; the likelihood of state 1 is one minus the likelihood for state 0. If true, then either no sliders or two sliders will be shown, depending on the value of ShowLikelihoodSliders.

CenterRealSlidersIfUnknown: value: true/false default: false node setting: yes

This is only for sliders of numeric variables (i.e. continuous or discrete with real values for each state) to enter the numeric value (i.e. not likelihood). Normally these sliders would start of at the position of the expected value before any value is entered. But if this parameter is true, then they start off in a centered position. See also ShowRealValueSlider to determine whether the sliders appear at all.

DateFormat: value: text default: MMM dd, yyyy: hh:mm aa node setting: no

This controls the format dates are displayed in, for example in the case dialog box. Lower case 'yyyy' or 'yy' is for the year. Use upper case 'MM' (indicates to use digits) or 'MMM' (letters) for the month. Use lower case 'mm' to indicate minutes, and 'hh' for hours. 'aa' can be used to put am/pm, or you can use uppercase 'HH' (instead of 'hh') to indicate a 24 hour clock. For more information, search the internet for "SimpleDateFormat".

Debug: value: true/false default: true node setting: no

You should develop your HED site with this turned on, but to deploy it you probably want to turn it off. The most important thing it does is display information messages in a section at the bottom (provided ShowLogSection is also set to true).

DisplayStatesVertically: value: true/false default: false node setting: no

If true, the states will be displayed one above the other, otherwise they are displayed horizontally. Note: if multiple-choice format is turned on, states will always display vertically regardless of this setting (see MultipleChoiceFormatIndent).

HeightAnsweredSection: value: pixels default: 200 node setting: no

Sets the number of vertical pixels to reserve for the Answered section, provided there are any questions to display. If the value is **autosize**, the system will choose a size so that all the questions fit (which may be very large if there are a lot of questions). See also MaxAnsweredShown.

HeightIrrelevantSection: value: pixels default: 45 node setting: no

Sets the number of vertical pixels to reserve for the Irrelevant section, provided there are any questions to display. If the value is **autosize**, the system will choose a size so that all the questions fit (which may be very large if there are a lot of questions). See also MaxIrrelevantShown, ShowIrrelevantSection.

HeightQuestionsSection: value: pixels default: 200 node setting: no

Sets the number of vertical pixels to reserve for the Questions section. If the value is **autosize**, the system will choose a size so that all the questions fit (which may be very large if there are a lot of questions). See also MaxQuestionsShown.

HeightResultsSection: value: pixels default: autosize node setting: no

Sets the number of vertical pixels to reserve for the Results section, provided there are any questions to display. If the value is **autosize**, the system will choose a size so that all the results fit. See also MaxResultsShown.

HeightSkippedSection: value: pixels default: 100 node setting: no

Sets the number of vertical pixels to reserve for the Skipped section, provided there are any questions to display. If the value is **autosize**, the system will choose a size so that all the questions fit. Keep in mind that this section has a show/hide button so the user can control whether any are displayed. See also MaxSkippedShown, See also ShowSkippedSection.

HideEliminatedStates: value: true/false default: false node setting: yes

You can apply this parameter to any node in your net where you do not want HED to display states that are impossible according to previous answers (and the Bayes net model). Otherwise, impossible states are displayed, but grayed out and inactivated.

HideLikelihoodNumber: value: true/false default: false node setting: yes

If you prefer that the user just has the slider to set likelihoods, and that no box appears beside it for entering numbers as text, set this parameter to true. Note that if ShowLikelihoodSliders is false, then no sliders or text boxes will appear.

HideRealValueNumber: value: true/false default: false node setting: yes

Applies to continuous nodes only, and is ignored for other types. If this is true, then the HED will not display a text-box for entering a real-value. If false, or not set, then it displays a text-box for entering the real-value. Note: If this is true, and the node has not been discretized, then there will be no way to view or change the value of this node. See also ShowRealValueSlider.

HideResultBeliefBars: value: true/false default: false node setting: yes

Set this parameter to true to hide all the belief-bars in the Results section. Instead, a number for each state will be shown. Note that no belief-bars will be displayed if HideResultsByState is true. See also HideResultNumbers, HideResultUntilBeliefGT.

HideResultNumbers: value: true/false default: false node setting: yes

If true, it won't put any probability number by the belief-bars in the Results section. Note that no belief-bars or probability numbers will be displayed if HideResultsByState is true. See also HideResultBeliefBars, HideResultUntilBeliefGT.

HideResultsByState: value: true/false default: false node setting: yes

Set this parameter to true to hide all the state information in the Results section. It is only useful if you are displaying the output some other way (e.g. graphical mean or textual mean). See also

ShowGraphicalMean, ShowTextualMean, HideResultNumbers, HideResultBeliefBars, HideResultUntilBeliefGT.

HideResultUntilBeliefGT: value: number default: 0.0 node setting: yes

If nonzero, HED will not display any result for a variable in the Results section until the belief in one of the variable's states is greater than x % (e.g. 0.25 for 25%). If you enable this parameter, you may want to also set the parameter WhenInconclusiveMessage.

InDomainMenu: value: text list default: empty node setting: no

This parameter controls which node-sets appear on the "Domain" menu, to allow the user to work with different subsets of the questions at a time. First, use Netica Application to create the desired (possibly overlapping) node-sets. Then set this parameter to a comma-delimited list of those node-sets you wish to appear on the Domain menu. The menu will also contain all node-sets whose name begins with 'HED_Domain_', unless explicitly eliminated by using the NotInDomainMenu parameter. For more information, see sections 2.7 and 4.4 "Grouping Questions into Domains".

ManualSubmitMode: value: true/false default: false node setting: no

If true, a Submit button will be shown and the answers to questions will not be processed until the Submit button is manually pressed. By default this is false, so then every response is automatically submitted. See also ShowReloadButton.

MaxAnsweredShown: value: number default: all node setting: no

Use this parameter to set the maximum number of questions to be displayed in the Answered section. Overflow questions will be handled in a normal way internally, but just won't be displayed. By default, all answers are displayed. See also HeightAnsweredSection and Max…Shown (to set the max number for other sections).

MaxDisplayStates: value: number default: *all* node setting: yes

This limits the number of states displayed for a variable in the Results section (i.e., the number of states of the target node), so that only the N most probable are shown. The probability of each state usually changes after each question is answered, so which states are displayed often changes. Note: If you limit the states of a target node, you normally also set SortByBelief to true. By default, all states of the target node are displayed.

MaxIrrelevantShown: value: number default: *all* node setting: no

Use this parameter to set the maximum number of questions to display in the Irrelevant section. Overflow questions will be handled in a normal way internally, but just won't be displayed. By default, all irrelevant questions are displayed. Keep in mind that the Irrelevant section contains a [+] button to hide/show all its questions. See also HeightIrrelevantSection and Max…Shown (to set the max number for other sections).

MaxQuestionsShown: value: number default: 300 node setting: no

Use this parameter to set the maximum number of questions to display in the Questions section. Overflow questions will be handled in a normal way internally, but just won't be displayed. See also HeightQuestionsSection and Max…Shown (to set the max number for other sections).

MaxResultsShown: value: number default: 50 node setting: no

Use this parameter to set the maximum number of target variables to display in the Results section. Overflow target variables will be handled in a normal way internally, but just won't be displayed. See also HeightResultsSection and Max…Shown (to set the max number for other sections).

MaxSkippedShown: value: number default: *all* node setting: no

Use this parameter to set the maximum number of questions to display in the Skipped section. Overflow questions will be handled in a normal way internally, but just won't be displayed. See also HeightSkippedSection and Max…Shown (to set the max number for other sections).

MultipleChoiceFormatIndent: value: number default: 0 node setting: no

When non-zero, this parameter turns on multiple-choice format, which displays the question on one line, and then each possible answer on the following lines, each indented and with a radio button, much the way a multiple-choice exam often appears. This parameter sets the number of characters of indent from the edge of page (left margin) to the radio button. Set it to 0 if you don't want multiple-choice format, otherwise a value around 4 is usually good. See also DisplayStatesVertically.

NetBlurb: value: html text default: empty string net setting: yes

This determines the text to display in the area just below the top HED panel, which could include introducing the purpose of the model to the user, or directions for its use. If not supplied, that section of the HED page will be blank. This parameter is usually set within the Bayes net, as net user-defined field HED_NetBlurb. See also NetTitle.

NetsToInclude: value: text default: *all* node setting: no

The value is a comma-delimited list of the net files to appear in the "Topic" drop-down menu in the top panel. If this property is not defined, then all the files uploaded to your account with the suffix .dne, .dnet, or .neta will be listed. The best place to set this parameter is in the `default.properties` file of your account so that it doesn't change when the user chooses a new topic.

NetTitle: value: html text default: empty string net setting: yes

The title to display in the description panel of your HED page, when this net is loaded. If no value is supplied, then no title is shown. For the value of this field, you may want something like: `<center> Title </center>` This parameter is usually set within the Bayes net, as net user-defined field HED_NetTitle. See also PageTitle, WindowTitle and NetBlurb.

NodeReport_x: value: <icon file name> ^^ <css style> ^^ <template file name> ^^ <hover text> default: empty node setting: no

There can be multiple NodeReport_x entries, containing information specific to each node within your net. For each, the "x" is replaced with a digit, starting at 1 for the first report, and numbered consecutively onwards. If <icon file name> is empty, then a default image will be used. <css style> is usually empty, but may contain something like `margin-left:10px` to leave extra space between buttons. <hover text>, if non-empty, provides text for the little yellow tool tip that comes up when the cursor is held over the icon. For a full explanation of <template file name> and how this property works, see the "Generating User Reports" chapter. For Example: `NodeReport_1 = images/question_balloon_green16.png ^^ margin-left:10px ^^ Generic/Report Templates/Node Description.nsp.htm ^^ View Description explanation.` See also NodeReportButtonPlacement and Report_x (for whole net).

NodeReportButtonPlacement: value: left/right default: right node setting: no

Use this parameter to set the placement of the report icons in the Questions section. Report buttons can be inserted next to each question and can either appear to the left or right of the question (use values **left** or **right**). Left is generally more aesthetically pleasing for longer questions. See also NodeReport_x and AlignStateLayout.

NotInDomainMenu: value: text list default: empty node setting: no

When node-sets are created in your net, you can force them to appear or not appear in the HED Domain menu. This parameter is a comma-delimited list of domains you would like to have removed from the Domain menu. For more information, see InDomainMenu.

PageTitle: value: html text default: New HED Site node setting: no

This title appears at the very top of the browser page, above "powered by Netica". It is often set to display a company or project name as the page's title. If you want the same window title no matter which model is being run from the Domain menu, you may want to set this parameter in the `default.properties` file. See also TopLeftCellHtml for customizing your HED page to match your company name and logo. See also NetTitle and WindowTitle.

Question: value: text default: node label node setting: yes

For each node, this provides the question text to be displayed on the HED page. If not supplied, then the node's "label" will be used, which is its name, title or combination, as displayed in Netica Application. This parameter is normally set for each node individually, within the Bayes net, as node user-defined field **HED_Question**.

Report_x: value: <button text> ^^ <css style> ^^ <template file name> ^^ <hover text> default: empty node setting: no

There can be multiple Report_x entries, which will contain information pertaining to the entire net. For each, the "x" is replaced with a digit, starting at 1 for the first report, and numbered consecutively onwards. Each report will be represented as a button on your website, with the 1st report appearing in the far-left position in the header of the browser. <css style> is usually used to color the button, by making it something like `background:yellow`. <hover text>, if non-empty, provides text for the little yellow tool tip that comes up when the cursor is held over the button. For a full explanation of <template file name> and how this property works, see the "Generating User Reports" chapter. For Example: `Report_1 = Description ^^ background:#FFFFCF ^^ Generic/Report Templates/Net Comment.nsp.htm ^^ tooltip.` See also NodeReport_x (for node-specific information).

ShowAnsweredSection: value: true/false default: true node setting: no

If true, then the Answered section will be displayed. If false, then internally the HED system works the same, but the answered questions are not displayed.

ShowBeliefBar_Current: value: true/false default: true node setting: no

If true, then each state entry in the Results section will contain a belief-bar expressing its current probability. Note that for state entries to appear, the node must be discrete or discretized, and both HideResultsByState and HideResultBeliefBars must be false.

ShowBeliefBar_Initial: value: true/false default: true node setting: no

If true, then each state entry in the Results section will contain a belief-bar expressing its initial probability before any questions were answered. Note that for state entries to appear, the node must be discrete or discretized, and both HideResultsByState and HideResultBeliefBars must be false.

ShowBeliefBar_Last: value: true/false default: true node setting: no

If true, then each state entry in the Results section will contain a belief-bar expressing the probability it had after all questions have been answered except the last one. Note that for state entries to appear, the node must be discrete or discretized, and both HideResultsByState and HideResultBeliefBars must be false.

ShowBeliefBar_Snapshot1: value: true/false default: true node setting: no

If true, then each state entry in the Results section will contain a belief-bar expressing the probability it had when the "Snapshot" button was last pressed. Note that for state entries to appear, the node must be discrete or discretized, and both HideResultsByState and HideResultBeliefBars must be false.

ShowBeliefBar_Snapshot2: value: true/false default: false node setting: no

If true, then each state entry in the Results section will contain a belief-bar expressing the probability it had when the "Snapshot 2" button was last pressed. Note that for state entries to appear, the node must be discrete or discretized, and both HideResultsByState and HideResultBeliefBars must be false.

ShowFileSizes: value: true/false default: true node setting: no

When listing file names (e.g. in the Case dialog box), the sizes of the files will be displayed only if the value of this parameter is true (which is its default value).

ShowGraphicalMean: value: true/false default: true node setting: no

For target nodes in the Results section which are continuous (or discrete with real numeric values attached to each state), this parameter will determine whether their "mean-bar" is displayed. The mean-bar extends from the minimum possible value to the maximum possible value, with an indicator mark at the expected value and a grayed region showing standard deviation. The expected value and standard deviation are based on their current probability distribution. See also ShowTextualMean and HideResultsByState.

ShowIrrelevantSection: value: true/false default: true node setting: no

If true, then the Irrelevant questions section will be displayed. If false, then internally the HED system works the same, but the irrelevant questions are not displayed. See also HeightIrrelevantSection, ShowSkippedSection.

ShowLikelihoodSliders: value: true/false default: false node setting: yes

If you want to allow the user to enter uncertain answers to some questions (i.e. "likelihood findings"), you can have the HED system display sliders (and a text box) that allow probabilistic entry. This parameter determines whether the sliders appear. If you want them for some nodes and not for others, you can set your default value in the .properties file, and for those nodes different from the default, you can adjust their node user-defined field HED_ShowLikelihoodSliders in the Bayes net using Netica Application. See also BothSlidersWhenTwoStates, ShowRealValueSlider and HideLikelihoodNumber.

ShowLogSection: value: true/false default: true node setting: no

If true, then the Log section is displayed, where error messages and other diagnostic information is printed. The Log section is primarily useful for developers, but can be helpful to users if anything goes wrong. See also Debug.

ShowRealValueSlider: value: true/false default: true node setting: yes

Questions whose answers can be a numeric real value (e.g. for continuous nodes), can be represented by a slider with a text box, where the user can either slide the graphical handle or enter a number to input their answer. See also ShowLikelihoodSliders and HideRealValueNumber.

ShowReloadButton: value: true/false default: true node setting: no

Set this parameter to false if you do not want your HED to display a Reload button. Reloading is generally used by developers, in order to reload the net and all associated files (such as .properties and .css) that they may have changed. If you are just looking for a way for users to clear away the findings they have entered, use the Restart button instead. See also ManualSubmitMode.

ShowSkippedSection: value: true/false default: true node setting: no

If true, then the Skipped questions section will be displayed. If false, then internally the HED system works the same, but skipped questions are not displayed. See also HeightSkippedSection, ShowIrrelevantSection.

ShowSliderTickMarks: value: text default: true node setting: no

If true, then "tick marks" are drawn at 1/2, 1/4, and 1/8 intervals along the slider. See also SliderBackgroundImage and SliderHandleImage.

ShowTextualMean: value: true/false default: true node setting: no

For target nodes in the Results section which are continuous (or discrete with real numeric values attached to each state), this parameter will determine whether their expected value and standard deviation numbers are displayed. The expected value and standard deviation are based on their current probability distribution. See also ShowGraphicalMean and HideResultsByState.

SliderBackgroundImage: value: images/x.jpg default: images/slider.jpg node setting: no

To insert your own tick-mark image for sliders, activate this parameter by indicating the location and file name of your image. Images may be in .gif or .jpg format. See also SliderHandleImage and ShowSliderTickMarks.

SliderHandleImage: value: images/x.gif default: images/slider.gif node setting: no

Use this parameter to change the image of the handle ("thumb") used on slider controls. See also SliderBackgroundImage and ShowSliderTickMarks.

SortByBelief: value: true/false default: false node setting: yes

This controls whether the states of a target node appear in order sorted by their posterior probabilities (most likely first), or just the fixed order of Netica Application. If they are sorted, then their order, and even which states appear, will normally change each time a question is answered. Its default value is 'true' when the maximum number of states to display (see MaxDisplayStates) is less than the number of states, otherwise 'false'. This parameter is normally set at the node level, as user-defined field HED_SortByBelief. See also MaxDisplayStates.

TopLeftCellHtml: value: html file name default: NorsysSoftware.gif node setting: no

Use this property to define the HTML that will go in the top-left corner of your HED system. The default value is: `<a href = 'http://www.norsys.com/' target = '_NorsysWeb'><img src = 'images/ norsys_corp_transp.gif' height = '60' border = 0></a>`. This section is commonly used for displaying a company logo or other graphic related to the HED topic. Images may be .png, .jpg or .gif. You may want to set this parameter in the `default.properties` file of your account, so it will be the same for all nets you upload to your page. See also PageTitle.

UseMenuWhenMoreStatesThan: value: number default: 4 node setting: no

If a node has a number of states greater than this number, then a drop-down menu will be shown, rather than radio-buttons or state-name links. This is typically used for a node with many states, as it presents a much more compact display.

WebQ_CalibrationSlide: value: true/false default: false node setting: no

WhenInconclusiveMessage: value: text default: uncertain node setting: no

Sets the message to display in the Results section, when all probabilities are below threshold. The default is the message: "uncertain". See also HideResultUntilBeliefGT.

WindowTitle: value: text default: …Netica-Web node setting: no

Use this parameter to set the title of the window browser. This title will also appear on the browser tab if more than one window is open. If you want the same window title no matter which model is being run from the Domain menu, you may want to set this parameter in the `default.properties` file. See also PageTitle and NetTitle.

4.3 Setting Parameters within Your Bayes Net as User-Fields

Sometimes it is more convenient to set parameters by directly editing "user-fields" in your Bayes net using Netica Application. **The values set there will override those of the properties file.** The parameters that are available for setting as user-fields are those that say "node setting: yes" or "net setting: yes" in the reference section above (and are in the list below). The name of the user-field is the same as the name in the properties file, except their name is prefixed with "HED_". They have exactly the same effect as those appearing in the properties file.

To set these fields from within Netica Application, right-click on either the net background (for net fields) or the desired node (for node fields) and choose **User Defined → Enter**. You can set them for a number of nodes at a time by selecting the nodes and then right-clicking on one of them. See the onscreen help of Netica Application for more information on user-fields. Below is the list of **node** user-fields that can be set in your Bayes net:

```
HED_BothSlidersWhenTwoStates
HED_CenterRealSlidersIfUnknown
HED_HideEliminatedStates
HED_HideLikelihoodNumber
HED_HideRealValueNumber
HED_HideResultBeliefBars
HED_HideResultsByState
HED_HideResultNumbers
HED_HideResultUntilBeliefGT
HED_MaxDisplayStates
HED_Question
HED_ShowLikelihoodSliders
HED_ShowRealValueSlider
HED_SortByBelief
```

Here is the list of **net** user fields:

```
HED_NetBlurb
HED_NetTitle
```

Removing User-Defined fields: to remove a user-field after a value has been entered, right-click on the appropriate node(s) or net and choose **User-Defined**. Select the field you wish to delete by highlighting it with your cursor. A dialog box will open showing the current value of the field. Delete the text and choose **Okay**. You will then be prompted whether you want to remove the field. Click Yes. If you leave a user-defined field empty, it will show up as a blank in the browser and will still override the .properties file for that particular node/function.

4.4 Grouping Questions into Domains

When working with a net, you may wish to divide its nodes into groups, according to subject or content matter. To do this, in Netica create a node-set for each group (highlight the group of nodes, right-click and choose **Add to Nodeset → New…**). However, you may not want all the groups to show up in your HED at the same time, as some groups of questions may or may not be relevant for particular groups of users. For example, the questions you would ask an incoming patient would be different from the group of questions you'd ask about their x-ray results. In the HED, a node-set group is called a domain. Domains can be enabled or disabled, according to which group of questions you want the user to answer.

Enabling & Disabling Domains:

1. If you want a node-set to be automatically included in the Domain menu of your HED, prefix the name of the node-set with "HED_Domain_", for example: HED_Domain_Expert.
2. If you want to be more selective between node-sets, use the .properties file to set the value for **`InDomainMenu`**. Activate the parameter by removing the #sign and adding the name(s) of the node-sets you wish to appear in the HED Domain menu. These node-sets do not require their name to have any special prefix.
3. You can exclude any node-set from the HED Domain menu using the .properties file. Activate the **`NotInDomainMenu`** parameter by removing the #sign and adding the name(s) of any node-set you wish to be excluded from the HED Domain menu.

4.5 Style Sheets

You have extensive control over the colors, fonts and general display of your HED site by editing the .css file. For cascading style sheets, values of net.css override those of default.css.

```
/* ---- The default font
*/
.body{  font-family: Arial, Helvetica, sans-serif;
      font-size: 12px;
      color:#000040;
      font-weight: normal; }


/* ---- The style of each of the five table sections
*/
.tableQ1_Unanswered  { background:#ddFFFF; margin-left:5; }
.tableQ2_Target      { background:#e7FFe7; margin-left:5; }
.tableQ3_Answered    { background:#e7e7FF; margin-left:5; }
.tableQ4_Skipped     { background:#FFFFdd; margin-left:5; }
.tableQ5_Irrelevant  { background:#DDDDDD; margin-left:5; }
```

```
/* ---- The style of each of the four div sections.   This is for managing
the scrollbars.
        Scrollbars aren't typically wanted for the Target section.
*/
.divQ1_Unanswered    { overflow-y: auto; height: 200px; }
.divQ2_Target        { overflow-y: auto; }
.divQ3_Answered      { overflow-y: auto; height: 200px; }
.divQ4_Skipped       { overflow-y: auto; height: 100px; }
.divQ5_Irrelevant    { overflow-y: auto; height: 100px; }


/* ---- The style of the NetBlurb section
*/
.tableNetBlurb   { background:#FFFFFF; margin:5; overflow-y: auto;
                font-size: 16px; font-weight: normal; }


/* ---- The style of the Question section
*/
.questionText { font-size: 16px;
                font-weight: bold;
            background:#FFFFFF; }


/* ---- The style of the NetTitle section
*/
.titleText    { font-size: 18px;
                font-weight: bold;
            background:#FFFFFF; }


/* ---- The style of the TD element within which belief bars are drawn
*/
.bbarTD     { width:200px; }


/* ---- The style of the IMG element used to draw belief-bars
*/
.bbarIMG    { height: 10px; background: navy; }


/* ---- The style of the section left of the belief bars
*/
.leftColQ   { text-align: right;
              width: 400px;
            white-space: wrap; }


/* ---- The style of each radio button; useful for spreading them out.
*/
.stateRadio { margin-left: 20px; }


/* ---- The style of the irrelevant Button
*/
.irrelevantButton { margin:0; padding:0;
                    line-height: 8px;
```

```
                    height: 17px;
                    width: 17px; }


.tableQuestionsAnswered   { background:#ddFFee; margin:5; }
.tableQuestionsUnanswered { background:#e7FFe7; margin:5; }
.tableQuestionsSkipped    { background:#e7e7FF; margin:5; }
.tableQuestionsTarget     { background:#FFFFdd; margin:5; }
```

5 Generating User Reports

Your HED site can be customized to contain a selection of special buttons and icons, which the end-user can click at any time to bring up information or report windows. The purpose is mainly to provide the user with extra information, assistance or directions. Or perhaps to create a report for the user on the current case or inferred results, which can be printed out or saved to file. But, as a developer, you may also use reports to make some information about the inner workings of your HED system available to yourself, for use while developing it.

The Netica mechanism to support this is called *custom reports*. You create a *template file* (usually in HTML with special notations for report elements to be inserted) which defines what you want to have displayed. You upload that template file to your HED site along with your Bayes net. There are a number of example templates in the Report Templates folder that came with your Netica download. You can open and edit an .htm file directly in Netica. Then, in the properties file of the Bayes net, you use a special instruction, which creates colored buttons or icons, and associates with each one a template file. When the user clicks the button, the HED site uses the template file to generate the desired "report", and then displays it.

The "report" could be as simple as a text message giving a more detailed description of what a question means. Or it could be more complex, such as the current belief probabilities of the questions, or a sensitivity analysis of questions with respect to the target node.

A template file can be used to generate a report on the overall model (i.e. Bayes net), or it can apply to individual questions (i.e. nodes). In the first case, it is called a "net template file", and the tags within it start with "Net.", and in the second case it is called a "node template file", with tags that start with "Node.".

5.1 Adding a Report

To add a report capability, here are the required steps: (described in detail further below)

1. Create a report template file.
2. Test it using Netica Application, if desired.
3. Upload it to your HED site.
4. Create a button for it on your HED site.
5. Test it on your HED site.

The first step is to create the report template file. The easiest way is to use an existing report template file, or modify one that is similar to what you want. To find existing template files, look in the "Report Templates" folder, which is in the same folder as the Netica executable: Netica.exe (the path to this folder is printed out in the Messages window of Netica Application when it first starts up).

You can edit the template file using Netica Application, by choosing **File → Open as Text**. However, it is mostly an HTML file, so you will probably want to use a text editor that has special facilities for HTML (such as Visual Studio).

You construct the template file out of normal HTML code, but you put special tags where you want your HED site to insert information. The tags consist of double opening square brackets [[followed by one of the tag names listed later in this chapter, possibly followed by some extra directions in parenthesis, and ending with two closing square brackets]].

Then you save your template file wherever you wish, with a file extension of ".nsp.htm". It is probably best not to save it in the same folder as the ones that come with Netica Application, just so they don't get mixed up.

The next step is to test your report with Netica Application. You can skip this step if you are confident, and want to go directly to testing under HED. If the template file is for a net report, then right-click on the net background, and choose from the menu "Custom Report". From the file dialog which appears, pick the template file you have just created. In a moment your browser should display the results of your report. If the template file is for a node report, follow the same procedure, but right-click on a node instead.

Now that you know that your template file works as desired, right click on the net background, choose **HED System → Upload File to Website**, and follow the directions.

To put the button on your HED site, edit the net's property file (for example, by right-clicking on the net background and choosing **HED System → Properties**). For a net report, add something like the following line:

```
Report_1 = Comment ^^ background:#FFFFCF ^^ Net Comment.nsp.htm
```

```
The format is:   Report_x = <button text> ^^ <css style> ^^ <template file
name> ^^ <hover text>
```

For each net report button, you add a line, the first being Report_1, then Report_2, and so on. You replace "ButtonText" with the text you want to appear on the button, and #FFDDDD with the hex code of the color you wish the button to be. At the end of the line is the file name of the template file you created above.

To create node buttons, you follow the same procedure, except the lines should be in the form:

```
NodeReport_1 = images/question_balloon_green16.png ^^ margin-left:10px ^^
Node Description.nsp.htm ^^ Comment
NodeReport_x = <icon file name> ^^ <css style> ^^ <template file name> ^^
<hover text>
```

Finally, upload your net, along with its newly changed properties file, by right-clicking on the net background, choosing **HED System → Add Net to Website**, and following the directions. Soon your browser will display your HED site, including your newly added buttons. If you added a net report, the button should appear at the top of the section directly below the overall page title. If you added a node report, it should result in an icon placed after each question. If you want the icons to appear before the question instead, then you should put "`NodeReportButtonPlacement = left`" in the net's properties file.

5.2 Built-In Generic Report Template Files

Netica comes with a number of pre-made template files for common types of reports, and they might be just what you need, so you don't need to create your own template file. Even if you do create your own template file, you may want to use one of the generic ones as a starting point, or examine it for ideas on how to make your own. The generic files "Net All.nsp.htm" and "Node All.nsp.htm" are especially useful, since they contain many possible ways of doing things.

If you want to access a generic template file, in your properties file you refer to it as being in directory "`Generic/Report Templates/`". For example, for a report on the table of a node, you could put: `Generic/Report Templates/Node Table.nsp.htm`

Here is a list of the generic reports available:

Net All.nsp.htm: this will generate a report on all the elements of the net

Net Beliefs.nsp.htm: report on the net

Net Findings.nsp.htm

Net Case.nsp.htm

Net Comment.nsp.htm

Net Comment Unformatted.nsp.htm

Net Developer.nsp.htm

Net Equations.nsp.htm

Net Sensitivity.nsp.htm

Net User.nsp.htm: reports the name of the account user

Node All.nsp.htm

Node Description.nsp.htm: reports the descriptions of either all nodes, or of those selected.

Node Developer.nsp.htm

Node Equation.nsp.htm: reports either all the equations in the net, or only those selected

Node Parents.nsp.htm

Node Sensitivity.nsp.htm

Node Table.nsp.htm

Node User.nsp.htm

Node Web_Description.nsp.htm

5.3 Example: Providing a Description for Each Question

Suppose you simply want to have a small button by each question, which when pressed provides more information on that question. Since the report is particular to each question, you will make a node template file. From Netica Application, choose **New → Text Edit**. In the window which appears, put [[Node.Description]]

Then save the file as "Question Description.nsp.htm". Now open your Bayes net, right-click on the background and choose **HED System → Upload to Website**. When asked for the file, pick "Question Description.nsp.htm" that you just saved.

Next, for each node, double-click the node to open the node properties dialog box. Enter a description for each node in the Description box at the bottom, as you would like it to appear on your website.

Finally, right-click on the net background and choose **HED System → Properties**. In the Node Reports section, remove the # sign from Report_1 to enable the descriptions you just entered in your Bayes net. You can additionally add text, at the end of the parameter line, for the tooltip.

The resultant text in the properties file should appear somewhat as follows:

```
NodeReport_1 = images/i_circle_green16.png ^^^^ Question Description.nsp.htm
^^^^ Further details
```

To initiate these changes, right-click on the net background and choose **HED System → Upload to Website**. After following the directions, your browser should open, showing your HED site with your model. Beside each question should be an icon, which when pressed displays the node's description. If the description window pops up but is empty, perhaps you haven't given the node a description (using the node property dialog).

Actually, we advise that you save the "Description" of a node to use for developer documentation. In that case, you could put your HED System descriptions in a user-field, say "Web_Description", of each node. In that case you would put [[Node.User(Field=Web_Description)]] in your "Question Description.nsp.htm" file, and it will produce the same results for your HED System.

Easier Way

To add the description ability described above, there is an easier way, by just using a built-in generic template file. If you are putting your information on each question into the "Description" field of each node, then you only need to add this line to your .properties file:

```
NodeReport_1 = images/i_circle_green16.png ^^^^ Generic/Report
Templates/Node Description.nsp.htm
```

And if you are putting the information in the Web_Description user field of each node, you add the line:

```
NodeReport_1 = images/i_circle_green16.png ^^^^ Generic/Report
Templates/Node Web_Description.nsp.htm
```

5.4 Net Report Tags Available

The following tags may appear in any report template file, in double square brackets. They will be replaced with a report according to their description. For an example of their use, see the file "Report Templates\Net All.nsp.htm".

Net.**BeliefsTable** Report on all the beliefs in the net. Can be displayed in text or html respectively, as Net.BeliefsTable(TextFormat) and Net.BeliefsTable.

Net.**CaseID** The ID number of the case currently read into the findings.

Net.**CaseProbability** The joint probability of the findings currently entered, as predicted by the net.

Net.**CaseExpectedUtility** The expected utility of the findings currently entered.

Net.**Comment** Comments made within the net or the net description.

Net.**EliminationOrderList** (Seperator=", ") The elimination order used to construct the junction tree.

Net.**Equations** (Compiled) Report on all the equations within the net. If the "Compiled" tag is left out, then the equations will appear in text as entered. With the Compiled tag, the equation appears in an internal (text) format, which is sometimes illuminating (see Netica Application's onscreen help).

Net.**FileName** File name should end in .neta

Net.**FindingsList** (Equals=" = ",Seperator=", ") Report on all the findings within the net in list format.

Net.**FindingsTable** Report on all the findings within the net in table format. Can be displayed in text or html respectively, as Net.FindingsTable(TextFormat) and Net.FindingsTable. If you want the questions listed vertically, you can use: Net.FindingsTable(VerticalFormat)

Net.**Graphic** Report on net graphics. Not available on most systems.

Net.**JunctionTreeTable** (TextFormat) Report on the net's junction tree.

Net.**ModifyDate** Date Bayes net file was last modified

Net.**Name** Name of the net

Net.**NodesetTable** Report on the node-sets within the net. Can be displayed in text or html, as Net.NodesetTable (TextFormat) or Net.NodesetTable respectively

Net.**OverallTable** Report on the overall net. Can be displayed in text or html, as Net.OverallTable (TextFormat) or Net.OverallTable (StyleHtml=tableOverall). This report contains general numeric measurements on the number of nodes of each type, number of links, number of findings, number of loops, and number of CPTs etc.

Net.**Title** Title of the net

Net.**User** (Field="..") The value of the named user field. Sometimes it is useful during development to display the HED_.. fields in this way.

5.5 Node Report Tags Available

The following tags may appear, in double square brackets, in a report template file meant for a node. They will be replaced with a report according to their description. For an example of their use, see the file "Report Templates/Node All.nsp.htm".

Node.**BeliefsList** (Seperator="</td><td>")

Node.**Comment**

Node.**CPTable**

Node.**CPTable** (Experience)

Node.**CPTable** (TextFormat)

Node.**Equation** (Compiled) This nodes equation, if it has one. If the "Compiled" tag is left out, then the equation will appear in text as entered. With the Compiled tag, the equation appears in an internal (text) format, which is sometimes illuminating (see Netica Application's onscreen help).

Node.**Finding**

Node.**HoverComment**

Node.**InputName** (Parent=0)

Node.**IsDeterministic**

Node.**Kind**

Node.**Label**

Node.**MutualInfo** (Node="TargetNode(0)")

Node.**MutualInfo** (Node="TargetNode(0)",Fraction=Percent)

Node.**MutualInfo** (Node=0)

Node.**MutualInfo** (Node=0,Fraction=Percent)

Node.**Name**

Node.**NumberStates**

Node.**Real** (State=0)

Node.**RelativesList** (Generation=-3, Seperator=", ")

Node.**RelativesTable** (StartGeneration=-4, EndGeneration=2, StyleHtml=table)

Node.**SensitivityTable** (MutualInfo)

Node.**SensitivityTable** (TextFormat,MutualInfo)

Node.**StateComment** (State=0)

Node.**StateLabelsList** (Seperator="</td><td>")

Node.**StateName** (State=0)

Node.**StateTitle** (State=0)

Node.**ThresholdLower** (State=0)

Node.**ThresholdUpper** (State=0)

Node.**Title**

Node.**Type**

Node.**User** (Field=HED_Question)

Node.**VarianceReal** (Node=0,IndicatesUnknown="unknown")

Node.**VisualPosition**

Node.**VisualStyle**

6 Building Client-Hosted Systems

Most finished Netica-Web projects just use the Norsys-hosted HED.CC site (as described in the preceding chapters), in which case this chapter is not required. However, if you want to host Netica-Web on your own web server machine, or you want to create a standalone Netica-Web application that doesn't require the internet, then:

1. Get your system working to your satisfaction using the regular Norsys-hosted HED.CC.
2. Obtain the appropriate licenses from Norsys.
3. Follow the directions of this chapter.

6.1 Installation

Unzip the file provided (e.g. NeticaWeb_124.zip), and put the resulting folder anywhere you wish on your hard disk. Netica-Web requires Java and Tomcat to be installed and the appropriate environment variables to be set, as described below.

Step 1a: Installing Java

You must have a JDK for java (SE) 1.6 or higher installed. It must be a "JDK"; a "JRE" is not sufficient. If you want to check whether a suitable version of Java is already installed on your machine, check the names of the directories in C:\Program Files\Java (which have the version numbers, and "jdk" or "jre").

- If necessary, get it at: http://java.sun.com/javase/downloads/

Step 1b: Installing Tomcat

Tomcat 6.0.18 or higher must be installed (some lower versions may work, but definitely not as low as 5). If you want to check whether your machine already has Tomcat installed, look to see if Environment

variable "CATALINA_HOME" is defined. If it is, then its value should be the name of Tomcat's directory, which will contain the version number of Tomcat.

- Get the latest version at: http://tomcat.apache.org/download-60.cgi
- You will be given a choice between "Core" and "Deployer". Choose the .zip version of the Core download.

Step 2: Environment Variable Setup

You MUST have these three environment variables defined:

1. JAVA_HOME - path to the JDK (not JRE) installed above
   e.g.: `C:\Program Files (x86)\Java\jdk1.6.0_20`

   e.g.: `C:\Program Files\Java\jdk1.6.0_12`

2. CATALINA_HOME - path to Tomcat installed above (top directory of Tomcat)
   `C:\NeticaWeb\LocalHost-1.24\apache-tomcat-6.0.26`

3. NETICA_WEBQ_HOME - path to the "Netica WebQ" directory
   e.g.: `C:\NeticaWeb\LocalHost-1.24\Netica WebQ`

   e.g.: `C:\Netica\NeticaWeb\v124\Netica WebQ`

You can set them via:

Control Panel → System → Advanced system settings → Environment Variables → System Variables

Control Panel → System → Advanced tab → Environment Variables → System Variables

Step 3: Setting License Password

When you obtain licensing from Norsys to construct your own Netica-Web site you will be provided with a license password. You must edit the text file "" to put in your password. Add the following line: `NeticaKey = <license password>`

Now your system is set up.

6.2 Running Netica Web

Starting up Tomcat/Netica Web

Double-click the batch file: `NETICA_WEBQ_HOME\website_examples\startup.bat`

A command-line window titled "Tomcat" will appear with a message, such as:

```
Mar 1, 2009 8:34:46 PM org.apache.tomcat...
...
INFO: Server startup in 786 ms
```

Now you are ready to use the website consisting of example nets provided by Norsys.

Viewing Netica Web

Bring up your favorite web-browser and go to:

http://localhost:7000/

Netica Web will come up with the nets in the "`website_examples\content`" directory, and will load the first net in the directory.

To stop a Tomcat session, close its command-line window (e.g., by clicking the X button at the top).

Other Websites

To start up another Netica Web website, you first run its `startup.bat` file. For example, you can double-click `NETICA_WEBQ_HOME\website1\startup.bat` to start the website in folder "website1". That is the place it is recommended you put the nets that you built, so it is your website. Then point your browser to http://localhost:7001 to interact with nets. Notice that the port number 7001 identifies website1. The section "Creating Multiple Websites" below explains how you can create more separate "websites". You can have as many websites as you wish running at a time; each will be a separate Tomcat session.

Troubleshooting

- If starting Tomcat fails, look at the error logs in: NETICA_WEBQ_HOME\website_examples\TomCat6.0.18\logs
- Try using the command prompt program to run `startup.bat` instead of just double-clicking the file icon to run it. It is usually available from: **Start → All Programs → Accessories → Command Prompt**

- If opening the website in your browser fails, read the error message displayed on the web-page and contact Norsys. Also check the logs (see first point above).

6.3 Files and Directory Structure

If your website is online, the files that will be accessible to the general public are the ones in the www\ directory. Files in the content\ directory and the tomcat\ directory will be used to display public pages, but they won't be directly accessible to the public.

The files that you edit to create your website are all in the content\ directory. You can also change overall properties and dimensions. These files are contained in the default

```
website1\
      startup.bat                   do not edit this file, except to put the port# when first created
      content\                      contains your nets
            default.properties
            net1.neta
            net1.properties
            net2.dne
            ...

      www\
            webQ.jsp
            default.js
            default.css
            css\
                  net1.css
                  net2.css
                  ...
            WEB-INF\
      tomcat6.01.8\
            bin\
            conf\
            logs\
            ...

website2\
      startup.bat
      etc. (as website1 above)
```

6.4 Putting Your Website Online

Right-click on the Bayes net background, choose **HED System → Add Net to Local System**.

Please note that NETICA_WEBQ_HOME\websiteXYZ\www\ is a public directory. It is the root of your website. In general, any files you place within it could be seen by users of your website. This is not true of the NETICA_WEBQ_HOME\websiteXYZ\content\ directory, or the Tomcat directory, which are not made public by WebQ/Tomcat.

6.5 Creating Multiple Websites

You can add as many new nets as you wish to the "website1" folder, and the user will be able to run them as described earlier, by choosing each from the Topic menu at the top of the Netica-Web web page. However, if you want to have different web pages, each with its own net or nets, you can create new "websites" as described here.

If you want to add a new website (called XYZ), follow these steps:

1. Create a new website directory called websiteXYZ in NETICA_WEBQ_HOME
   The name "websiteXYZ" must not contain blanks or special characters other than underbar '_'.
   The recommended naming is for XYZ to just be an integer, resulting in "website1", "website2", etc., but that is not necessary.
2. Copy all contents of NETICA_WEBQ_HOME\website1 to
   NETICA_WEBQ_HOME\websiteXYZ
3. Empty the folder: NETICA_WEBQ_HOME\websiteXYZ\content
   Put in this folder the specific .dne, .neta and .properties files for this website. For instance, in this file could appear net1.dne, net2.neta and net2.properties (the .properties files are optional).
4. Empty the folder: NETICA_WEBQ_HOME\websiteXYZ\www\css
   Put in this folder the specific .css files for this website. For instance, in this file could appear net1.css, and net2.css (.css files are optional).
5. Using any text editor (e.g., Wordpad), edit
   NETICA_WEBQ_HOME\websiteXYZ\TomCat6.0.18\conf\server.xml

   - Choose new unique port numbers for startup and shutdown.
   For instance, where it says: <Server port="8001" shutdown="SHUTDOWN">
   you could change the 8001 to 8002.
   Where it says: <Connector port="7001" protocol="HTTP/1.1" ...
   you could change the 7001 to 7002.

   - The startup number will form part of the URL to address the site, as seen in step 8

- If you are naming the directory websiteX, where X is a digit, the recommended number for the startup port is 700X and for shutdown 800X.

6. Edit NETICA_WEBQ_HOME\websiteXYZ\startup.bat

   (right-click and choose Edit)

   - replace "website1" with "websiteXYZ"

7. The setup is now complete. You can now startup Tomcat/WebQ by clicking the batch file from the previous step.

   A command-line window titled “Tomcat” will appear with a message, such as:

   ```
   Mar 1, 2009 8:34:46 PM org.apache.tomcat...
   ...
   INFO: Server startup in 786 ms
   ```

8. The new website is now available. Bring up your favorite web-browser and go to:

   http://localhost:7002/ (notice the 7002 port identifies the new website, as chosen in step 5)

   HED will come up with all nets appearing in the “websiteXYZ\content” directory, and will load the first one.

6.6 Maintenance

Upgrading Netica-J

If you should ever wish to run a specific website with a newer version of Netica-J, simply replace the four files in NETICA_WEBQ_HOME\websiteXYZ\www\WEB-INF\lib with the newer versions from NETICAJ_HOME\bin. Generally speaking, it is recommended to upgrade all of HED at once, rather than just the Netica-J component of it.

Upgrading Tomcat

Install your newer version of Tomcat and then set the Environment variable CATALINA_HOME to its directory, as described in the “Getting Started” chapter. You might also need to refresh the NETICA_WEBQ_HOME\websiteXYZ\TomCat6.0.18 with the newer versions.

7 Troubleshooting

While Netica-Web is in its development stages, there are a number of glitches in its operation. Some of the problems you may encounter have simple solutions- others may require more effort to resolve. If any of your problems are either a) not listed here or b) not resolved after trying the solution(s), please contact us immediately.

7.1 General Troubleshooting

Account Information Problem 1:

When I enter my account name and password, I get a message that says, "Cannot retrieve account information".

Solution(s):

1. make sure you are entering the correct account name and password. Double-check the spelling. Passwords are case sensitive.

2. Make sure that your nets are within the root directory of your netica.exe file (which should be named "Netica verX".

3. Re-install Netica. Go to: http://www.norsys.com/downloads/ for the latest versions.

Account Information Problem 2:

When I enter my account name and password, I get an error message: "Couldn't create or update account information for xAccount. Request has timed out."

Solution(s):

1. Check your firewall settings. Interacting with HED requires using several traditional ports: port 80 (HTTP), port 443(HTTPS), and ports 21 and 22(FTP). If for some reason your firewall blocks those ports, you will not be able to create an account. You can either adjust those settings, or turn off the firewall completely. Just remember to turn it back on when you are finished using Netica, if you are concerned about worms or hackers.

2. If you are unable to adjust or turn off your own firewall settings (due to company network restrictions), you can download Netica onto your own personal machine and try uploading nets from your personal network (e.g. at home).

Password Problem:

I can't remember my password. Or, Error: my password doesn't match my account name.

Solution(s):

1. Netica will remember your HED password for each active session if you click "Always Yes" when prompted whether you want your information sent over medium security. However, it cannot retrieve your password if you forget it. There are no limits on how many times you can try your password, so keep trying your usual ones.

2. If you really cannot remember it, you will need to create a new account name and password, which you can make up the same way you created your first account. You will need to resend/reload all the nets you had in your first account to your new account, if you want to have access to them. If there is an account you are no longer using, you should notify Norsys so that they can delete the account from the server: support@norsys.com

Blank Browser Problem:

I am getting a blank browser window after performing HED System → Add Net to Website.

Solution:

Click the refresh button on your browser. If that doesn't work, there may be an error in your properties file. This file is as sensitive as any html page and will fail to be read correctly if it is missing any elements of a <tag>. See the No Changes Problem for further help with .properties.

No Changes Problem:

The changes I made to the .properties file are not showing up.

Solution(s):

1. Click the Reload button in the top banner of your HED website (next to the Topic list).
2. Click the Refresh button in your Internet browser after you have done "Add Net to Website".
3. Make sure the name of your .properties file exactly matches the name of your BN.
4. Locate the line(s) in the .properties file that you are adjusting. Make sure the # sign is deleted from the beginning of the line. Click the Reload button in your browser.
5. The values in the .properties file may be overridden by values of user-fields set in your Bayes net or its individual nodes. Check your BN for user fields which are conflicting with the parameters in your .properties file (the name(s) of user fields will have the prefix "HED_x"). See Section 4.3 for more information.
6. Use the qNetica manual to verify the definitions of the parameters to make sure you are editing the correct parameter for your desired result.

One Target Problem:

Only one state is showing for the Target nodes, but I want multiple states to show.

Solution:

In the .properties file, go to the Results section. Find the parameter MaxDisplayStates and set the value to the number of states you want to have displayed.

7.2 Mac-Specific Trouble-Shooting

External Monitor Problem:

Opening Netica.exe using Crossover fails if an external monitor is plugged into my machine.

Solution:

This bug has not yet been fixed. As a work-around: unplug the external monitor. Run Crossover and open Netica. Once the programs are running, you can plug the external monitor back in and everything should work fine.

Learning from Excel Problem:

I get an error message when I use the **Cases → Learn from Cases → Add Case File Nodes** function, when learning from an Excel file.

Solution:

Unfortunately, learning from and Excel case is currently not possible through Crossover or other Windows emulators. As a work-around, you can:

1. Convert your Excel file(s) into a text file(s) and perform the function again. Learning from text files works perfectly in the Mac/Crossover environment.

2. In theory, it may be possible to learn from Excel cases by installing an ODBC driver on your Mac. This solution has not yet been successfully replicated.