# Use ArcPad Forms
## to Streamline Data Collection

*By Ty Fitzpatrick, Marketing Analyst*

ArcPad, the field solution for ArcGIS, is a lightweight application that runs on Windows 9.x, NT, 2000, XP, and Windows CE devices. This innovative software allows technicians in the field to input valuable spatial and tabular information into a database using a handheld device and provides an easy-to-use interface for streamlining workflow. Additionally, ArcPad captures input streaming from GPS devices, which enables real-time data collection accurate to the world.

When formulating strategies for collecting data, it is important to ensure that the process be completed efficiently but without compromising data integrity. Although using ArcPad without any customization is very easy, adding utilities that automate business processes can speed field data collection. If a technician is more productive in the field, more data can be collected in less time, which translates into dollar savings for a project. This article describes basic customizations that range from simple interface modifications that add a custom toolbar to creating a custom form that provides valid value choices in a drop-down box. A basic understanding of ArcPad and ArcView 3.*x* or ArcGIS and the operation of the handheld device being used is assumed.

### ArcPad Application Builder

ArcPad Studio, the development environment for ArcPad, is contained within ArcPad Application Builder and provides tools to create and edit default configuration files, customize layer properties, build forms, and reference VBScript source code files. Application Builder is a separate product from ArcPad. All customization is performed on the desktop in ArcPad Studio and deployed to ArcPad on the mobile device.

Modifications made using ArcPad Studio can be delivered to ArcPad and used without an Application Builder license. ArcPad Studio is also a platform for managing different configuration files and VBScript code from a central application. Although these files can be edited using any text editor, ArcPad Studio makes it easier to manage and edit these files within one application. With these new development tools, users can streamline and tailor applications to specific business needs, and enable ArcPad to read a wider variety of data formats and devices.

### Interface Management

ArcPad Studio supports several types of cus-
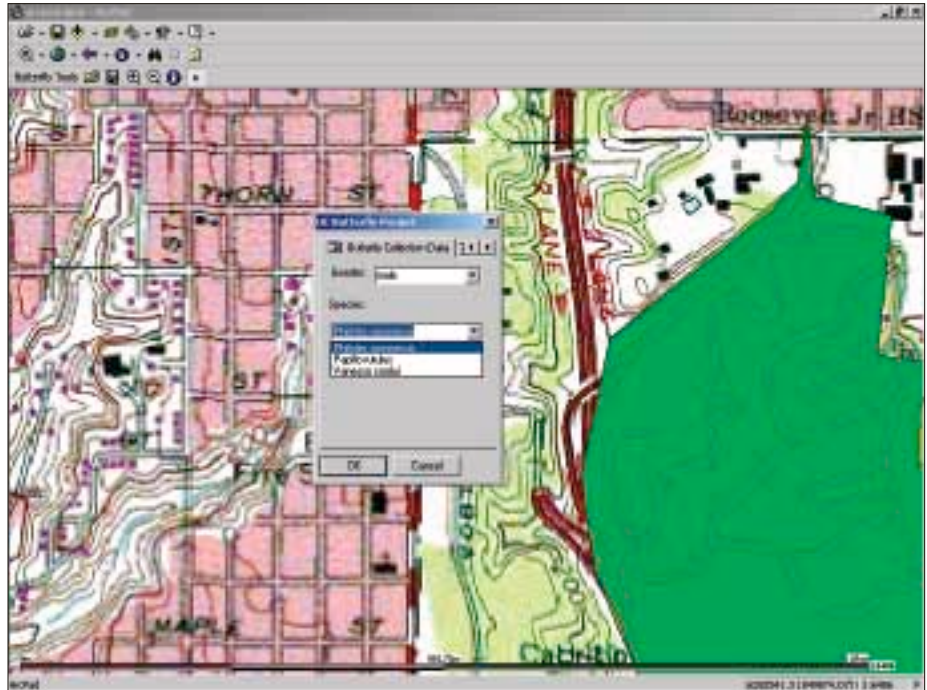


*The custom form provides only valid value choices in the drop-down boxes.*

tomizations. Creating a new applet or configuration file can change the interface to better meet a user's needs for a specific project.

These files contain XML tags that are stored in the ArcPad's root directory and control how toolbars or forms are displayed in ArcPad. This is particularly useful for field collection applications because the interface can be limited to the tools needed for the tasks needed for a project and eliminates unnecessary buttons and tools from the interface. Different interfaces, or applets, can be created that specifically meet the criteria for individual projects.

This article uses a hypothetical project to demonstrate the utility of several customizations. In this fictional example, the University of California has received a grant to collect information about local butterfly species in Southern California. A graduate student with extensive knowledge of butterfly species will collect information in the field. This graduate student is pressed for time and must collect data from many locations. This makes ArcPad a very useful tool for the project.

Although the university's resident entomologist, who is in charge of the project, has never used ArcPad, he feels confident it will be easy to learn. He also believes that data collection
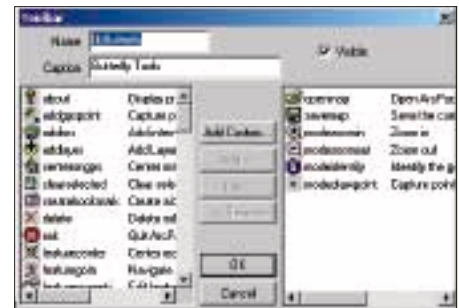


*An Applet will be used to customize the interface with a toolbar that contains just the six tools needed by the hypothetical graduate student.*

can be done more efficiently if ArcPad is customized. He wants custom forms for layers that contain valid value fields for the species because it seems unlikely his graduate student will be able to key in long Latin species names fast enough to keep pace with the butterflies being studied. Creating an applet with specific tools will be a time saver for the project.

Applets are data independent applications that can be added to ArcPad. This applet, called Butterfly Tools, will add six tools on a new toolbar designed just for the project's data collecting graduate student.

**1.** Start ArcPad Studio and click the New
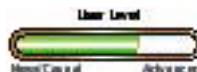
Applet button. This creates a file with two tags, <ArcPad> and <APPLET>.

**2.** Double-click on the <APPLET> tag. In the Applets Properties dialog box name the applet Butterflies. Click OK.

**3.** Click on the Toolbars button. In the Toolbars dialog box, click the Add button to create a new toolbar. Name it tblButterfly and type in Butterfly Tools for the caption. In the Toolbar dialog box, add the openmap, savemap, modezoomin, modezoomout, modeidentify, and modedrawpoint tools by selecting them from the left pane and clicking on the Add button to move them to the right pane.

**4.** Click OK to apply these changes. Save the applet file as Butterflies.apa in the /ArcPad/Applets/ subdirectory for the desktop copy of ArcPad.

**5.** Close ArcPad Studio and start ArcPad. Make sure the default storage location for Applets has been retained (i.e., \ArcPad\applet).

The Butterflies.apa file has a set of XML tags that identify which tools will be displayed when ArcPad is opened. The tools in the Butterflies.apa file will be displayed in the application as a new toolbar. After testing the toolbar in ArcPad on the desktop machine, copy Butterflies.apa to the /ArcPad/Applets/ subdirectory on the mobile device.

**Creating Custom Forms
with Property Pages**
Creating custom forms linked to specific layers in a database can organize data input more effectively for a field collector. For the butterfly survey example, a property page containing several combo boxes or input text boxes referencing fields in the dataset will be created. To simplify this example, the data collector will create a point and enter the species and gender of each butterfly. He will choose the name and gender from a list of values rather than typing relatively long species names such as *Philotes sonorensis* (aka the Sonoran Blue). Data can be more quickly inputted from a drop-down list containing valid names. If the graduate student has to type in a species name for each butterfly, most of the butterflies will have flown away before he can enter data for more than one or two butterflies.
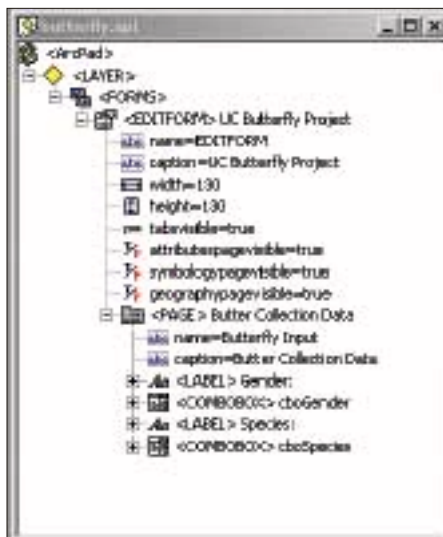


The following process will implement modifications that will speed the data collection process for the graduate student by adding a form with drop-down boxes with valid choices for gender and species.

**1.** Use ArcView 3.x or ArcCatalog to create a new empty point shapefile. Name it butterflies.shp and save it.

**2.** In ArcView 3.x or ArcMap, add the following fields to the attribute table: GENDER and SPECIES. Save the shapefile.

**3.** Start ArcPad Studio and click on the New Layer Definition button.

**4.** Navigate to the location of the butterflies shapefile and select it.

**5.** ArcPad Studio creates a layer definition (.apl) file called butterfly.apl which is linked to the butterfly shapefile. Every time butterfly.shp is loaded into ArcPad, it will be linked to this .apl file.

**6.** Click the Forms button. In the Forms dialog box, click the EDITFORM button. Choose Form > Form Properties and type in UC Butterfly Project for the caption. Click OK.

**7.** In the Form dialog box, choose Page > Page Properties. Type in ButterflyInput for the name and Butterfly Collection Data for the caption. Click OK.

*Layer definitions are a way to deliver customizations such as butterfly data collection form.*

**8.** Add controls to the form. Click and drag a Label control to the form. Releasing the control on the form brings up the Control Properties dialog box. Type slblGender for the name and Gender: for the caption. The X, Y, Width, and Height fields allow the control to be positioned precisely on the form. However, for this example, the controls will be positioned interactively.

**9.** Select a combobox from the tools palette and drag it onto the property page next to the Label Control. In the Control Properties dialog box, type cboGender for the name of this control and click the drop-down box next to Field to select the GENDER field in the butterfly shapefile.

**10.** Follow the same procedure to label and reference Species combobox. Adjust the locations of the controls on the form by dragging and resizing them. Click OK to close the form. Save the file.

**11.** In ArcView 3.x or ArcCatalog, create a dBASE (dbf) file called validvalues.dbf with two string fields—gender and species. In ArcView 3.x or ArcMap the GENDER column, enter male and female. In the species column, enter *Philotes sonorensis, Papilio rutulus,* and *Vanessa cardui,* the names of three butterfly species for which the project will gather data. These values could also be entered in and stored with the form rather than being read from a lookup table.

**12.** In the tree view in ArcPad Studio, double-click on the <EDITFORM> UC Butterfly Project tag to bring up the form. Double-click on the combobox control for Gender. In the Control Properties dialog box, click on the List Values tab, and click the Browse button to navigate to the validvalues.dbf table. For Values Field and Text Field, select the Gender field in the validvalues.dbf file. Click OK.

**13.** Double-click on the combobox control for Species, click the List Values tab, and

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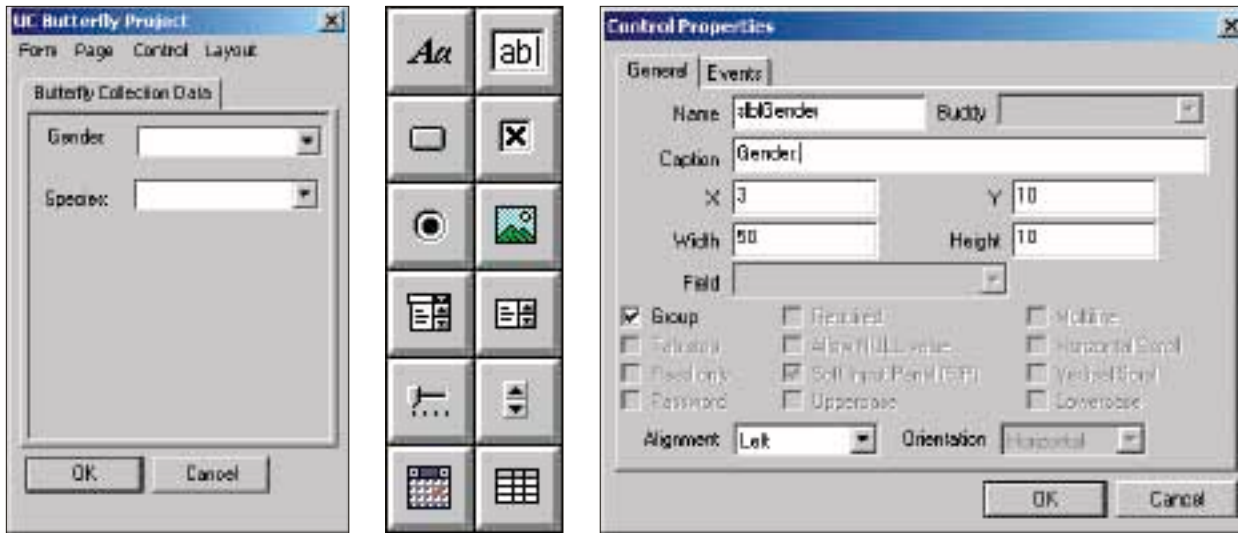
*Controls are dragged from the control palette to the form and resized and arranged. The properties for each control are set in the Control Properties dialog box.*

click the Browse button to navigate to the validvalues.dbf table. For Values Field and Text Field, select the Species field in the validvalues.dbf file.

**14.** Click OK and save butterfly.apl. Close ArcPad Studio and start ArcPad. Load the sample ArcPad map for San Diego (\Program Files\ArcPad\Samples\San Diego\arcpad.apm) and add the butterfly shapefile and make it editable. After testing the custom form on the desktop version of ArcPad, copy butterfly.apl, validvalues.dbf, and all the files associated butterfly shapefile to the mobile device.

Now the graduate student can start collecting information about butterflies. Adding a point feature invokes the new form that contains just the comboboxes for gender and species. Filling out the form for each new point feature populates the gender and species fields in the attribute table for the butterfly shapefile.

**Validating Data**

VBScript is a subset of Microsoft Visual Basic for Applications and Microsoft Visual Basic. With VBScript, developers can leverage the ArcPad object model to create macros that can link controls on a form to specific layers in a database. Further form enhancements could include adding a validation script that would verify that all the fields on the form have been populated or controls the type of data entered in text fields. Using a validation routine written in VBScript, complex business logic associated to data entry can be used in conjunction with custom forms to protect information as it is entered into a GIS. This is another method for standardizing data collection and eliminating the need to clean up data.

**ArcPad Extensions**

ArcPad extensions let developers support the use of new devices and data formats and add new functionality to ArcPad. Extensions are written in C++ and are a more ambitious undertaking than the simple customizations described in this article.



**Conclusion**

As the hypothetical butterfly project has demonstrated, several useful customizations can be made to ArcPad that require relatively little work and address an organization's specific business needs. Creating data is probably the most expensive part of building a GIS. With a little customization, ArcPad can speed the data collection and verification process for field technicians, who often battle bugs, boulders, and inclement weather, and make their hours in the field more productive. For more information on ArcPad, visit the ArcPad section of ArcOnline (**arconline.esri.com**) or the ArcPad product pages at **www.esri.com/arcpad**.