study black holes and a doctor might apply to the National Institute of Health (NIH) for a grant to study vaccines for AIDS. All of these grant programs have similar requirements. Consequently, the goal of the eGrants initiative is to develop systems for managing the grant process that could be shared among all of the agencies that give grants. As a result, the government would achieve cost savings and efficiency by reducing unnecessary duplication of systems. The FEA invited vendors to participate in demonstration program to show how their technology meets the requirements for eForms and web services for eGrants. In a traditional grant application, a principal investigator would fill out a paper grant application which would then be submitted to the appropriate agency which would then route the application to employees and other reviewers for assessment, consideration, and approval or rejection. This process would require that data from the form would have to be entered into internal agency systems so that the grant process can be managed and administered. In order to help automate this process, the government contracted with a consulting firm to create and XML schema that captures the business data involved in the grant process. Sample documents 6 and 7 show the eGrants XML schemas that were developed. The government then invited vendors to show how their technology could leverage the eGrants schemas for eForms and web services to automate the grant business process. Using the new Adobe design tools, Adobe generated the GrantApplication.pdf sample file which combines the pdf files of the paper grant application with the eGrants schema. As a result, a person applying for a grant can fill in the pdf GrantApplication and send it to the agency to which they are applying for a grant. Once the agency receives the completed pdf grant application, they can automatically extract the XML data for integration with their enterprise systems. To see how the xml data can be exported from the sample document, follow the directly below:

1. Open GrantApplication.pdf in Acrobat 6.

2. Fill in some data on the form.

3. Select **Advanced** > **Forms** > **Export Forms Data**. In the Export Forms Data As dialog box, select **XML files (.xml)** in the *Save as type:* pull-down menu.

This PDF also shows how PDF/XML forms can be integrated with web services technologies to further automate forms based processes. GrantApplication.pdf includes a call to a web service using SOAP 1.1 for the validation of DUNS numbers.

To view the JavaScript code for the web service:

Select Advanced > Edit All JavaScripts. This will open the JavaScript Editor window displaying the code for the web service invocation. For your convenience, DUNSValidation.txt is an example of this code.

During the demonstration for the eGrants project, the DUNS validation web service was running on a local machine, but the web service could just as easily be invoked anywhere on the Internet.

The ability to include web services in Adobe PDF/XML forms is another example of the ability to embed sophisticated business logic in pdf documents.