

PLM integration with Adobe® LiveCycle® ES (Enterprise Suite)

Scenarios for integrating LiveCycle ES solution components with enterprise PLM systems for smooth collaboration workflows



Many manufacturing processes are centered around enterprise PLM systems. This technical guide can help developers and system administrators understand how LiveCycle ES software can be integrated into a PLM environment, providing document generation, assembly, security, or data capture services.

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This document provides a basic description of the integration between Adobe LiveCycle ES software and PTC's Windchill product lifecycle management (PLM) system, referencing sample integration code developed by Integrated Industrial Information, Inc. (I-Cubed). It is intended to help developers and administrators understand the options and potential for integrating LiveCycle ES with PLM and other enterprise systems in manufacturing.

Introduction

Throughout the product development and manufacturing process, manufacturing companies share large quantities of complex information. Effectively sharing and collaborating on this information can be a significant challenge. Product information may be spread across numerous systems (PLM and other enterprise systems) and may include a wide variety of documents and data types: CAD designs, drawings, engineering change orders, and part lists. Getting the right information and feedback to and from different groups means supporting collaboration with not only internal engineering and design groups, but also with production planning, marketing, and procurement groups, as well as external suppliers. Organizations interested in deploying cross-organizational solutions for processes like RFQ/RFP management, work instructions, supply chain management, and field service face the challenge of bringing together numerous systems, data sources, and file formats into a single, secure package.

Adobe LiveCycle ES

Adobe LiveCycle ES addresses the challenges of collaboration in manufacturing by providing companies with the ability to more securely extend the capabilities and content of their PLM systems to non-CAD users, multi-tier suppliers, shop floors, and customers. LiveCycle ES now supports automated conversion of CAD and other engineering data to PDF. With features such as dynamic document assembly and digital rights management, LiveCycle ES can complement and extend the boundaries and features of PLM systems, enabling communication and collaboration across all phases of the extended manufacturing ecosystem while managing and protecting product information and CAD data.

Solutions for manufacturing

With LiveCycle ES, manufacturing companies can more easily share product information with suppliers, shop floors, and customers. LiveCycle ES is an integrated J2EE server solution that blends document generation, electronic forms, document process management, and digital rights management. LiveCycle ES solution components can help manufacturing companies better manage processes such as design collaboration, RFQ/RFP management, work instructions, supply chain management, and field service.

LiveCycle ES solution components

The LiveCycle ES solution consists of the following components:

- **LiveCycle PDF Generator 3D ES**
Automate the creation and assembly of PDF documents from virtually any native file format, including 3D CAD formats.
- **LiveCycle Reader® Extensions ES**
Fill in, sign, and save Adobe PDF files using Adobe Reader software.
- **LiveCycle Forms ES**
Create and deploy interactive, XML-based forms as HTML, PDF, or SWF.
- **LiveCycle Rights Management ES**
Manage usage rights to protect sensitive documents.
- **LiveCycle Process Management ES**
Streamline human-centric business processes across your firewall.
- **LiveCycle Digital Signatures ES**
Automate the validation of digital signatures in PDF documents.
- **LiveCycle Output ES**
Dynamically generate personalized documents in print or electronic formats.
- **LiveCycle PDF Generator ES**
Automate the creation and assembly of PDF documents from virtually any native file format.
- **LiveCycle Barcoded Forms ES**
Automate the capture of form data using dynamic 2D barcodes.
- **LiveCycle Data Services ES**
Integrate rich Internet applications (RIAs) with LiveCycle services, J2EE applications, and business logic.

Universal clients

LiveCycle ES leverages Adobe Flash® Player and Reader software, which are currently installed on over 98% of Internet-connected PCs and devices worldwide. With LiveCycle ES, enterprises can engage users in business processes even when they cannot control the client environment. LiveCycle ES also supports new Adobe AIR™ technology, taking RIA-based engagement to an offline world.

Development and infrastructure

An Eclipse-based IDE allows developers, designers, and business analysts to collaborate on, develop, and deploy customer engagement applications that fit the organization's architecture and avoid costly future maintenance. Standards-based frameworks for application development within the LiveCycle ES environment include PDF, XML, JavaScript, MXML, and ActionScript®. Developers can also create engaging LiveCycle front ends with Adobe Flex® software.

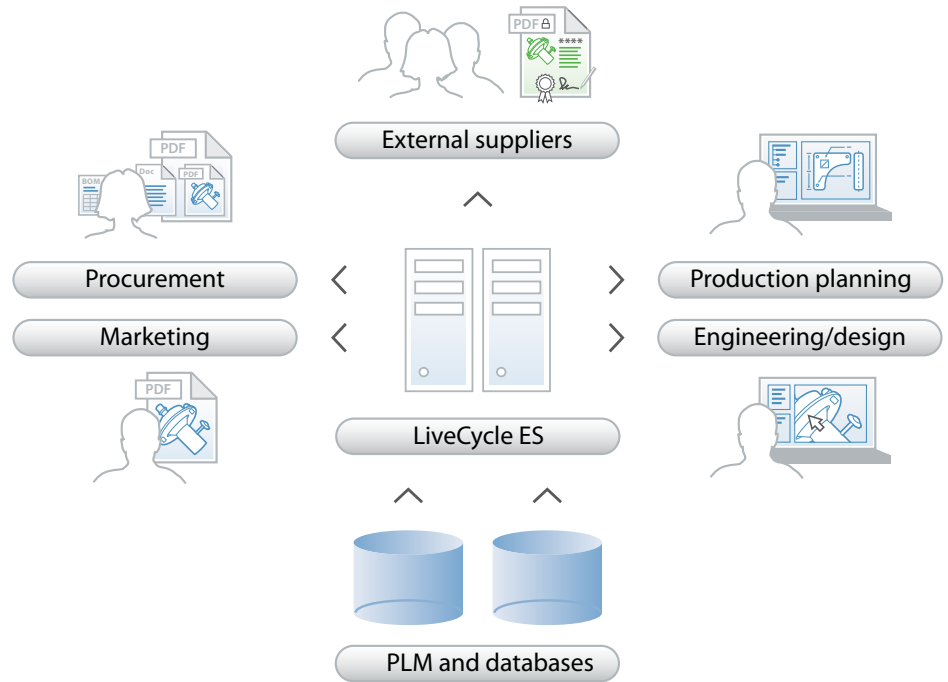
Two solution approaches

LiveCycle ES solution components may be used to develop enterprise applications, or they may be integrated as services with other enterprise applications. When integrated as services, LiveCycle ES components may be invoked through simple interfaces such as e-mail or Watched Folders mechanisms, or through direct, on-demand API calls using Java™ or Web Services. For example, Adobe LiveCycle PDF Generator 3D ES software may be invoked through the Watched Folder interface to automate the conversion of 3D formats to PDF. More advanced interactivity may also build upon other LiveCycle ES APIs to provide additional services, including the generation or verification of digital signatures, compound document assembly, or application of security and rights management. Exactly how an organization chooses to deploy LiveCycle ES depends on the nature of the organization's current systems, processes, and requirements. Both of the following approaches leverage a connector between LiveCycle and a PLM system. However, the user interaction for the first approach occurs within a LiveCycle application, and in the second approach, the user interacts with the PLM system, with LiveCycle invoked as a service in the background.

Solution approach 1—LiveCycle ES applications integrate PLM content

LiveCycle ES provides components for the development of user-centric applications that integrate services and content from other systems. In this capacity, organizations can develop applications based on LiveCycle ES that manage and extend processes that span their PLM, enterprise resource planning (ERP), customer relationship management (CRM), and other enterprise systems. LiveCycle ES enables the rapid development of rich user interfaces and process and service orchestration among its components. Using this solution approach, organizations can develop integrated enterprise applications such as RFQ delivery, work instructions, and field service management.

An integrated approach to sharing engineering data

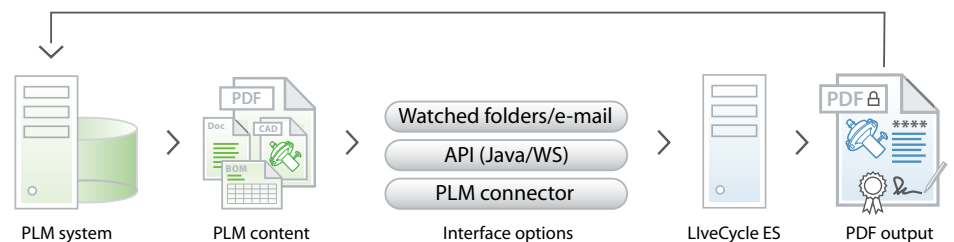


Integrate PLM systems with LiveCycle ES to enable two-way sharing of engineering data across an extended team.

Solution approach 2—PLM-centric solutions call LiveCycle ES services

Although the first solution approach allows the deployment of new applications across existing systems and services, it may not be the best approach for every solution. Some organizations may prefer to augment their existing applications and process with improvements by delivering LiveCycle ES solution components as services to existing applications and systems. For example, in this approach, LiveCycle ES can add value to a PLM system by providing integrated document generation and assembly, forms for data capture, digital signatures, and security and rights management.

LiveCycle ES in a PLM-centric role



Enable two-way data flow between PLM systems and LiveCycle ES with a variety of integration methods.

The remainder of this document describes an integration following solution approach 2. It demonstrates integration between LiveCycle ES and PTC's Windchill PLM system, with LiveCycle ES components used as a service by Windchill. It references sample integration code developed by I-Cubed. This example is intended to help developers and administrators better understand the options and potential for integrating LiveCycle with PLM and other enterprise systems in manufacturing.

Solution example: LiveCycle and PTC Windchill

This example describes the implementation of a connector between LiveCycle ES and PTC, Windchill PDMLink 9.0. This example uses I-Cubed's ECF Windchill Adapter to integrate and automate the application of LiveCycle ES services such as PDF file generation and document security to engineering information and documents stored in Windchill.

In this example, events in Windchill initiate LiveCycle processes. This integration scenario demonstrates one implementation and can be used as a guide to create LiveCycle/PLM integrations that meet specific requirements. In addition to LiveCycle ES and Windchill, this example leverages PDMLink software from PTC and ECF software from I-Cubed. PDMLink and ECF provide an integration service layer to the Windchill foundation.

Following are the solution implementation steps:

1. Listen for Windchill events

Throughout the course of a typical product lifecycle, parts and assemblies progress through their lifecycle within the Windchill environment. As they progress, Windchill identifies changes as particular events. Windchill events that are traceable include check-in and lifecycle state changes. The connector is registered with Windchill in such a way that the connector is notified when an event occurs. Windchill passes the object identifier and the type of event that occurred to the connector.

2. Filter specific events

The connector provides a simple mechanism for configuring which events in Windchill trigger connector activity. As a Windchill event occurs, the connector filters out only those events configured for processing. Events that pass the filter (triggering events) initiate connector actions. Events that do not pass the filter are ignored.

3. Retrieve native content

The connector retrieves the content and/or metadata for the triggering event objects from Windchill. This content may be native CAD files, office files, or other content types. Windchill supports many types of native content. The connector supports all file types supported by both Windchill and LiveCycle ES.

4. Send to LiveCycle ES

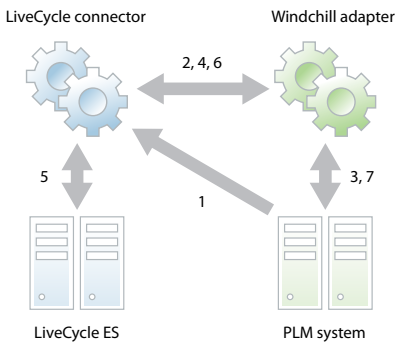
The connector sends the retrieved data to LiveCycle ES, along with parameters that specify what actions are to be taken. Those actions are predefined within Adobe LiveCycle Workbench ES software. The connector identifies which services apply to a given event. LiveCycle ES processes the documents and returns the result to the connector.

5. Store in Windchill

The returned file is stored in Windchill. For native files that are returned (for example, those with rights management applied), the connector replaces the old content with the new content. If the triggering event was an initial creation of the object, then no unsecured version of that content will be available in Windchill.

6. Log actions

The connector logs all triggering events, the actions taken upon objects, and the resulting success or failure of those actions.



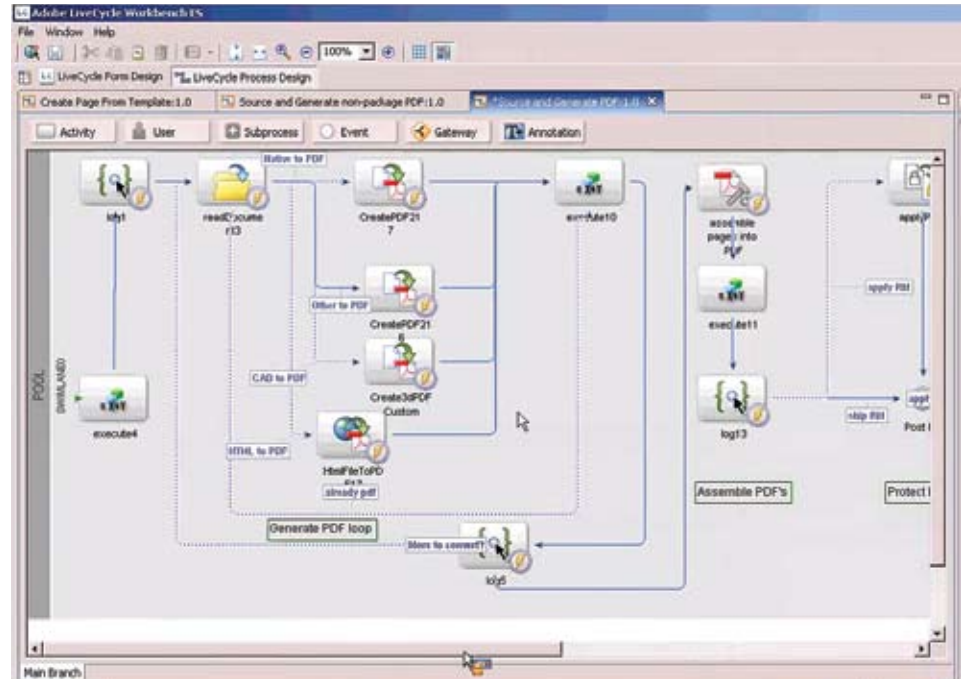
The LiveCycle connector and Windchill adapter manage transactions between LiveCycle ES and Windchill.

- 1 Windchill event is sent to LiveCycle connector
- 2 LiveCycle connector requests additional information from the Windchill adapter
- 3 Windchill adapter retrieves additional information from Windchill
- 4 Windchill adapter returns information to LiveCycle connector
- 5 LiveCycle connector requests services from LiveCycle ES
- 6 LiveCycle connector sends completed package to Windchill adapter
- 7 Adapter stores package in Windchill

Using the example

Here's a demonstration scenario using the connector for LiveCycle ES and Windchill example. In this scenario, an information package containing the product attributes, a bill of materials (BOM), an engineering change order (ECO) report, and 3D designs in PDF format are automatically generated for a product when its status changes to Released. The only interaction with the user takes place in the Windchill environment. All LiveCycle services are initiated through the connector and orchestrated in accordance with the parameters in the configuration file and the LiveCycle workflow.

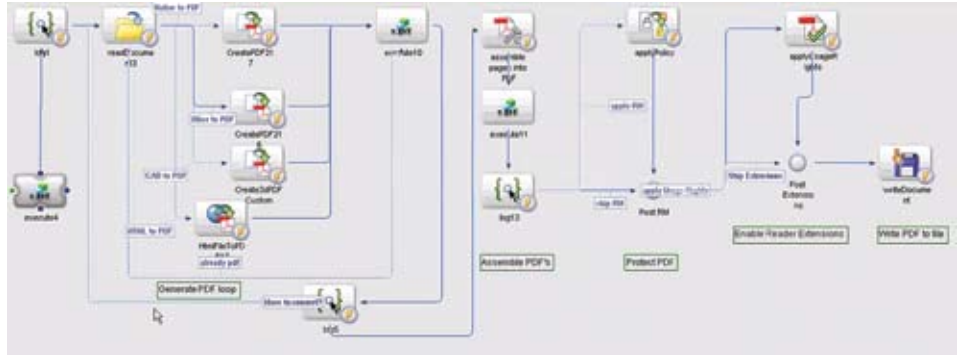
Once the sample connector files have been installed in LiveCycle through the administration console (the connector sample and detailed documentation can be obtained at www.i-cubed.com), the processes may be accessed in LiveCycle Workbench ES. Open and view the processes to examine the steps and process flow. The LiveCycle processes for the example reflect the steps within LiveCycle that occur once the connector passes the content to LiveCycle ES. These processes generate PDF files, create the PDF package, and apply the security policies before passing the result back to the connector to be placed back into Windchill.



The LiveCycle process designer.

Retrieve native content and send to LiveCycle ES

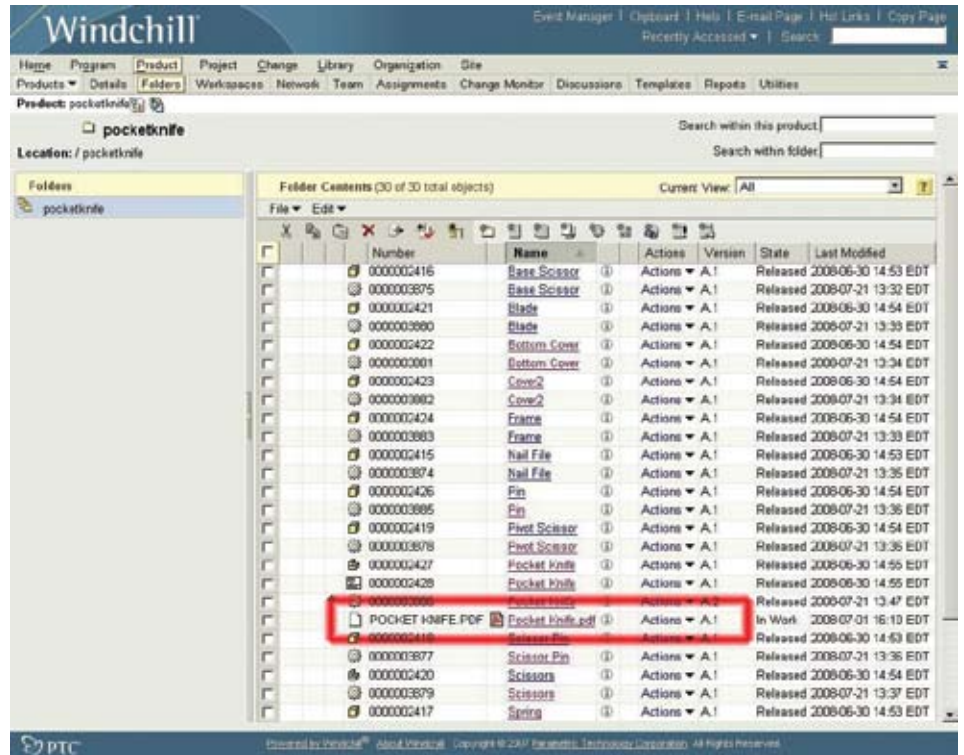
The connector retrieves the native content from Windchill and places it in a temporary location that LiveCycle can access. This content may be native (3D) CAD files, office files, XML data, or other content types. The connector invokes LiveCycle ES, passing it parameters that specify what actions to take on the content. Those actions are predefined within the LiveCycle workflow and the connector.properties file.



The LiveCycle ES process.

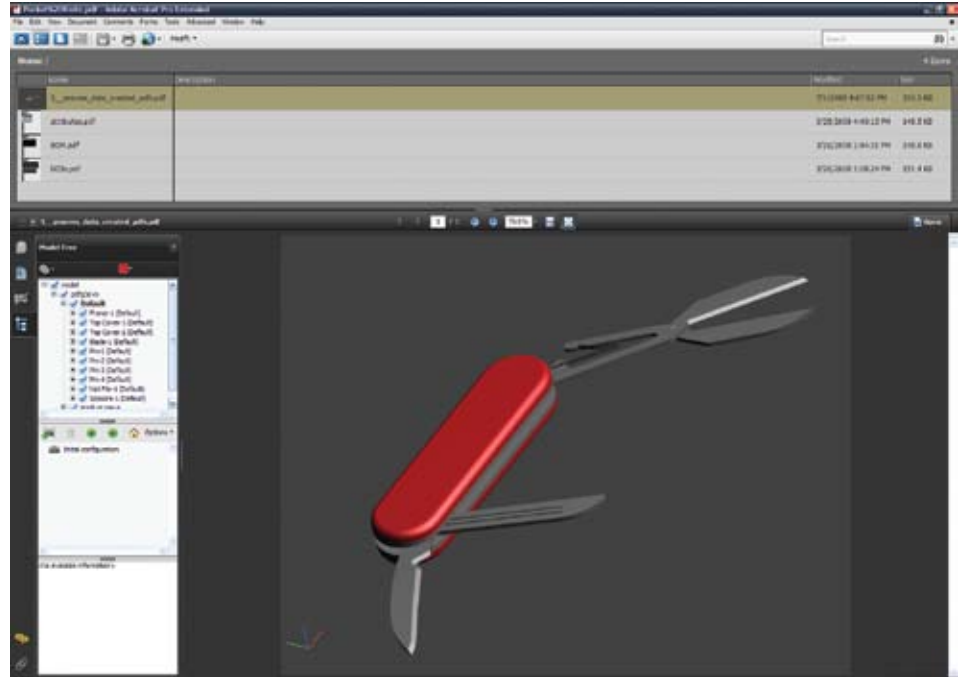
Process content in LiveCycle and return to Windchill

The LiveCycle process determines the type of content (CAD/3D, office files, and so on) and selects the appropriate method of generating a PDF file. LiveCycle ES then assembles the multiple PDF files into a single PDF package. Finally, LiveCycle ES applies a security policy to the package, requiring authentication to open the document and limiting what users can do with it. When complete, LiveCycle then places the package into the temporary directory and notifies the connector that the process is complete. The connector then returns the PDF package to the originating location of the content in Windchill.



The PDF package is returned to Windchill.

Opening the PDF package requires authentication in accordance with the security policy placed on the document. Once opened, the contents of the package may be viewed, including product attributes, BOM, associated ECOs, as well as interactive 3D models of the product.



Opening the PDF package.

About I-Cubed

Since 1984, Integrated Industrial Information, Inc. (I-Cubed) has been developing solutions that maximize the tremendous potential of engineering assets across the enterprise. In 2005, Adobe acquired Navisware and rights management technology from I-Cubed. I-Cubed is a PTC Platinum Partner, Adobe Enterprise Development Partner, and Adobe Solutions Partner. For more information, please visit www.i-cubed.com.



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