



# Developing .NET Applications for ArcGIS Engine

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## Schedule

- **75 minute session**
  - 60 - 65 minute lecture
  - 10 - 15 minutes Q & A
- **Tech Talk**
  - **Outside this room after this session**
- **Meet the Team**
  - **Wednesday 11:30am in Oasis 1**

**Please!**  
Turn **OFF** cell phones  
and paging devices



**Please complete the **session survey**  
we take your feedback very seriously!**

## Session Objectives

- **Raise awareness of the Engine .Net Software Developer Kit and the Resources available to all developers.**
- **Provide Best Practice guidance for building ArcGIS Engine applications, WPF design and Error Handling.**

# Developing .NET applications for ArcGIS Engine



# What do you need on your machine?

## 1. Install Visual Studio

- 2005 or 2008, all editions
- .NET Framework 2.0 or 3.5
- <http://msdn.microsoft.com/vstudio/express/>

## 2. Install ArcGIS Engine Runtime and Developer Kit for .NET

- Subscribe to EDN - <http://edn.esri.com/>
- Includes ArcGIS Engine developer copy of runtime and SDKs
- Authorize system for development

# What is included in the ArcGIS Engine .NET SDK?

1. The installed help system
2. Access to web help system through the Resource center: <http://resources.esri.com/arctgisengine>
3. Executable samples
4. Visual Studio IDE Integration
5. Snippets
6. 8 ArcGIS Engine Controls
7. Over 200 commands, tools, toolbars, and menus

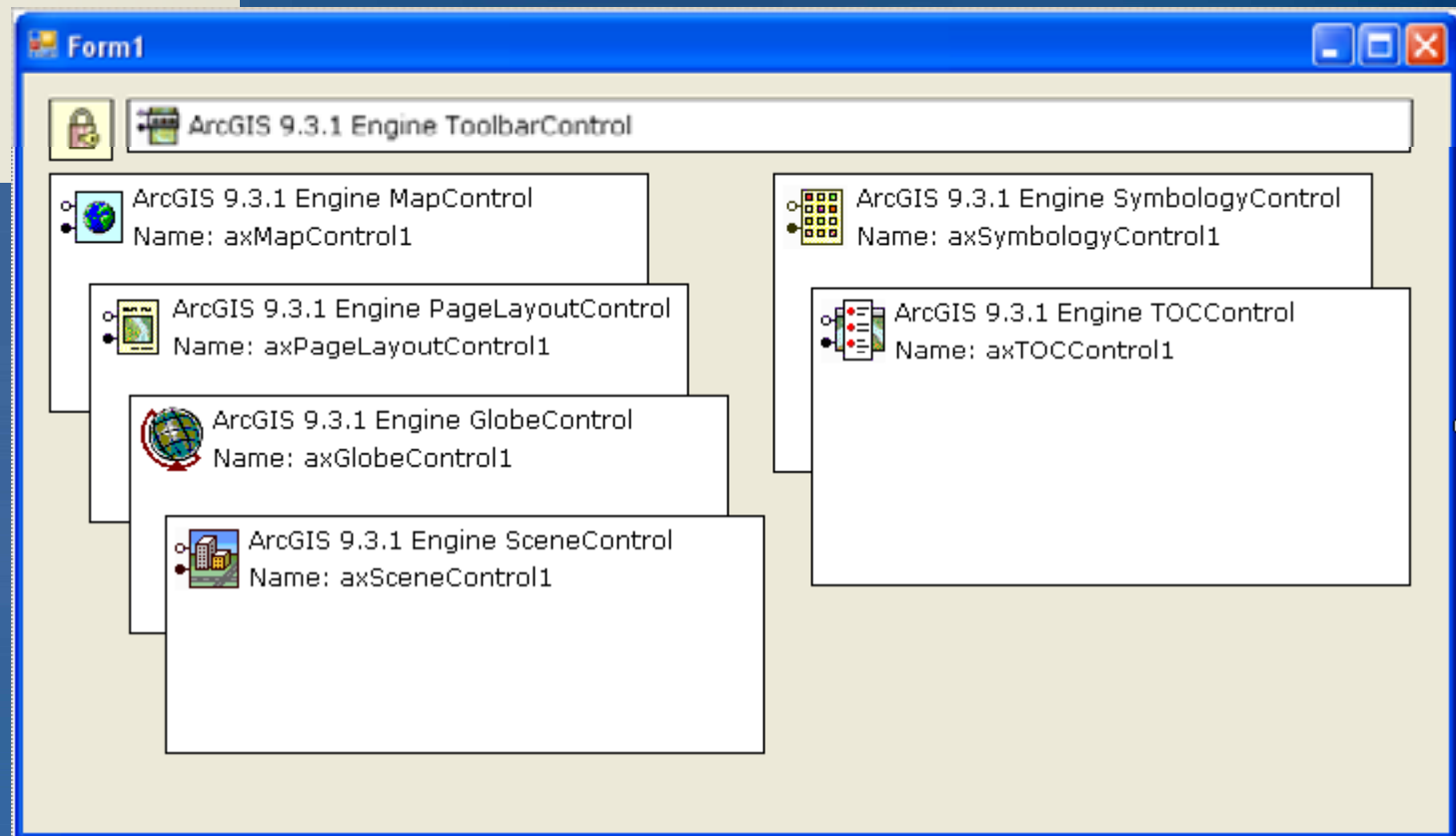


# ArcGIS Engine Controls at Design Time

## ArcGIS Windows Forms

- Pointer
- MapControl
- PageLayoutControl
- TOCControl
- ToolBarControl
- SceneControl
- GlobeControl
- LicenseControl
- SymbologyControl

## Windows Form

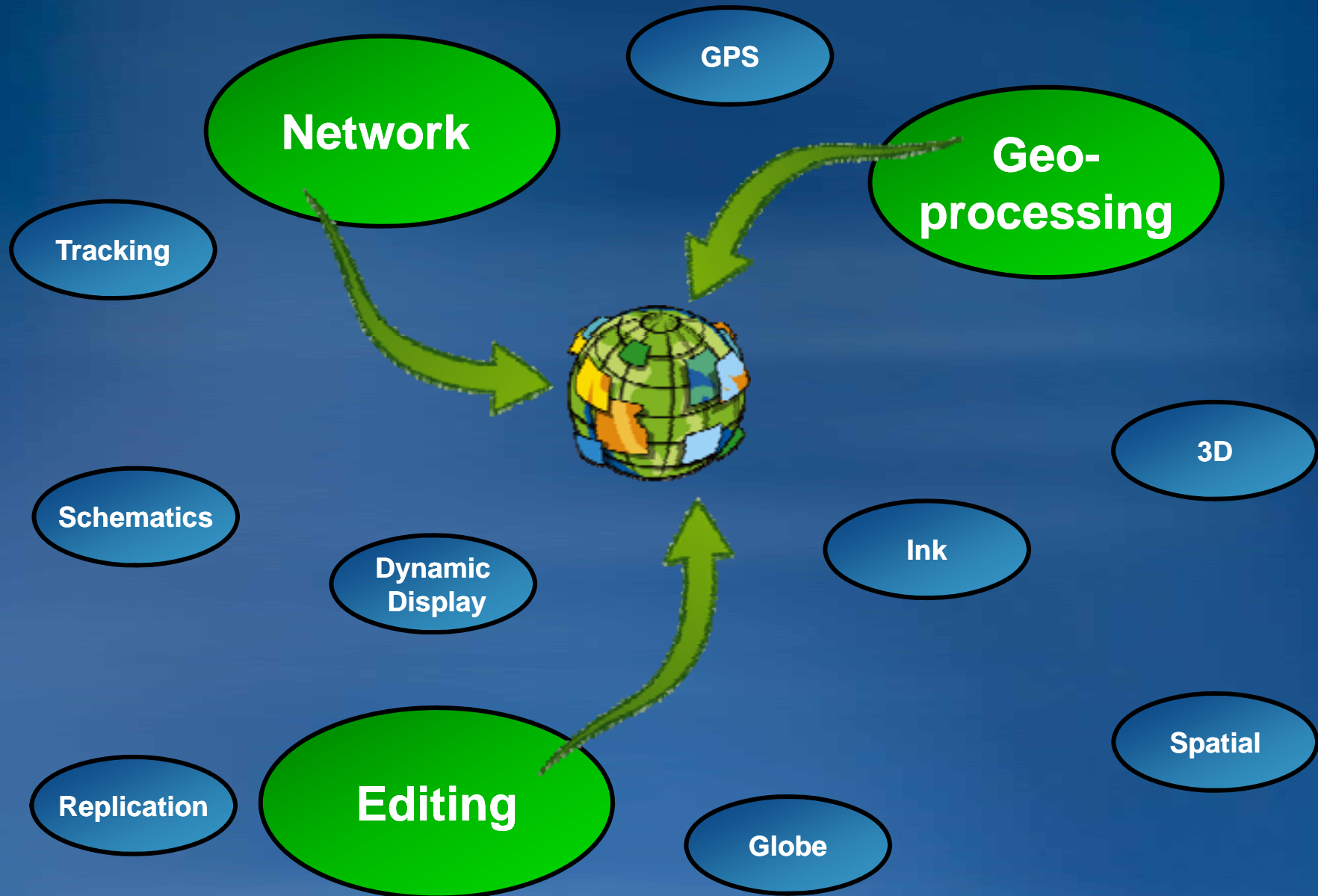


# Developing .NET applications for ArcGIS Engine





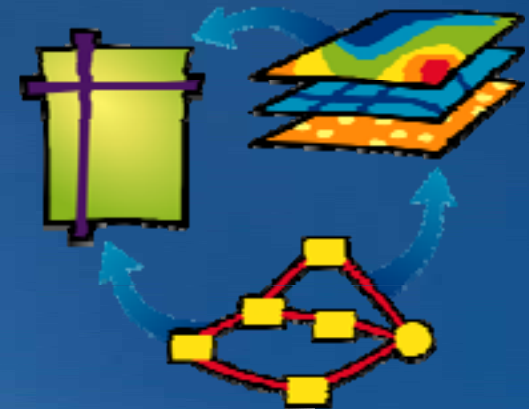
# ArcGIS Engine Applications



# Network Extension to ArcGIS Engine



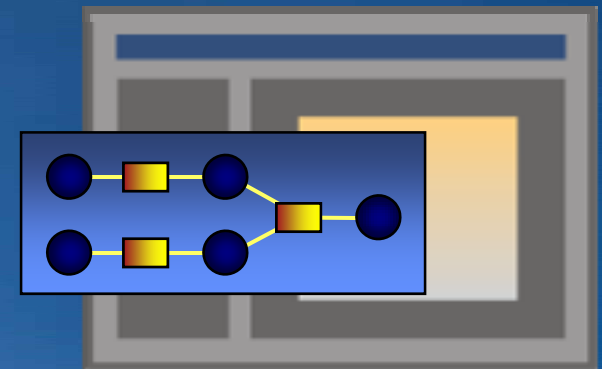
- **Best Practice**
  - **Network Analyst Extension**
  - **Network Analyst Toolset**
  - **License the extension**
  - **Incorporate your business logic into a focused application**



# Geoprocessing in Console Application



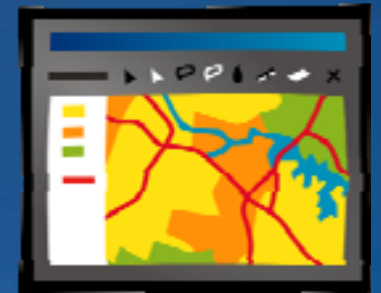
- **Best Practice**
  - **Build business specific Model**
  - **Model - Automate tasks, Document, Share**
  - **Rich set of tools available to ArcGIS Engine developers**
  - **Build your own tools**
  - **Build Console Application**



# Editing in ArcGIS Engine



- **Best Practice**
  - New engine editing interfaces 9.3
  - IWorkspaceEdit or IEngineEditor
  - Utilize out of the box Commands
  - Customize to incorporate business logic



# Dynamic Display

- **Best Practice**
  - Carefully design the data for the business application
  - Data caching significantly improved performance
  - “Leverage Dynamic Display in ArcGIS Engine Applications” - Demo Theatre Workshop – 4pm Wednesday

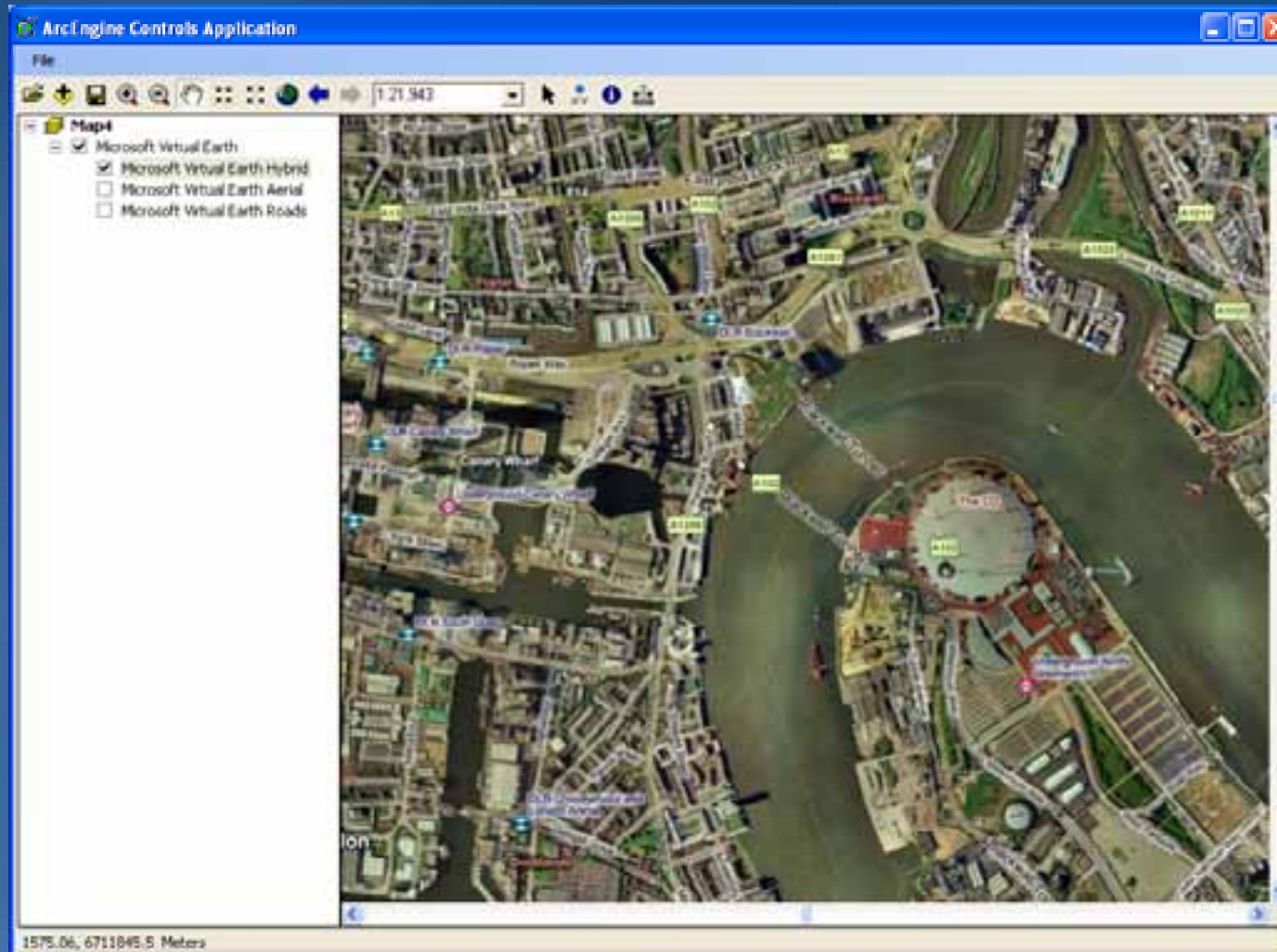


# Developing .NET applications for ArcGIS Engine



# Microsoft Virtual Earth Content in Engine

- High quality base maps



# Microsoft® Virtual Earth™ Content in Engine

- **How?**

- VE maps available with Engine Runtime license
- Available as an ArcGIS Online premium service
- Access VE maps through mxd, lyr or 3dd files
- Requires an internet connection

- **Why?**

- Content is fast, reliable, easy to use, and up-to-date
- Good International content
- Removes the extra hurdle of bundling data with the application

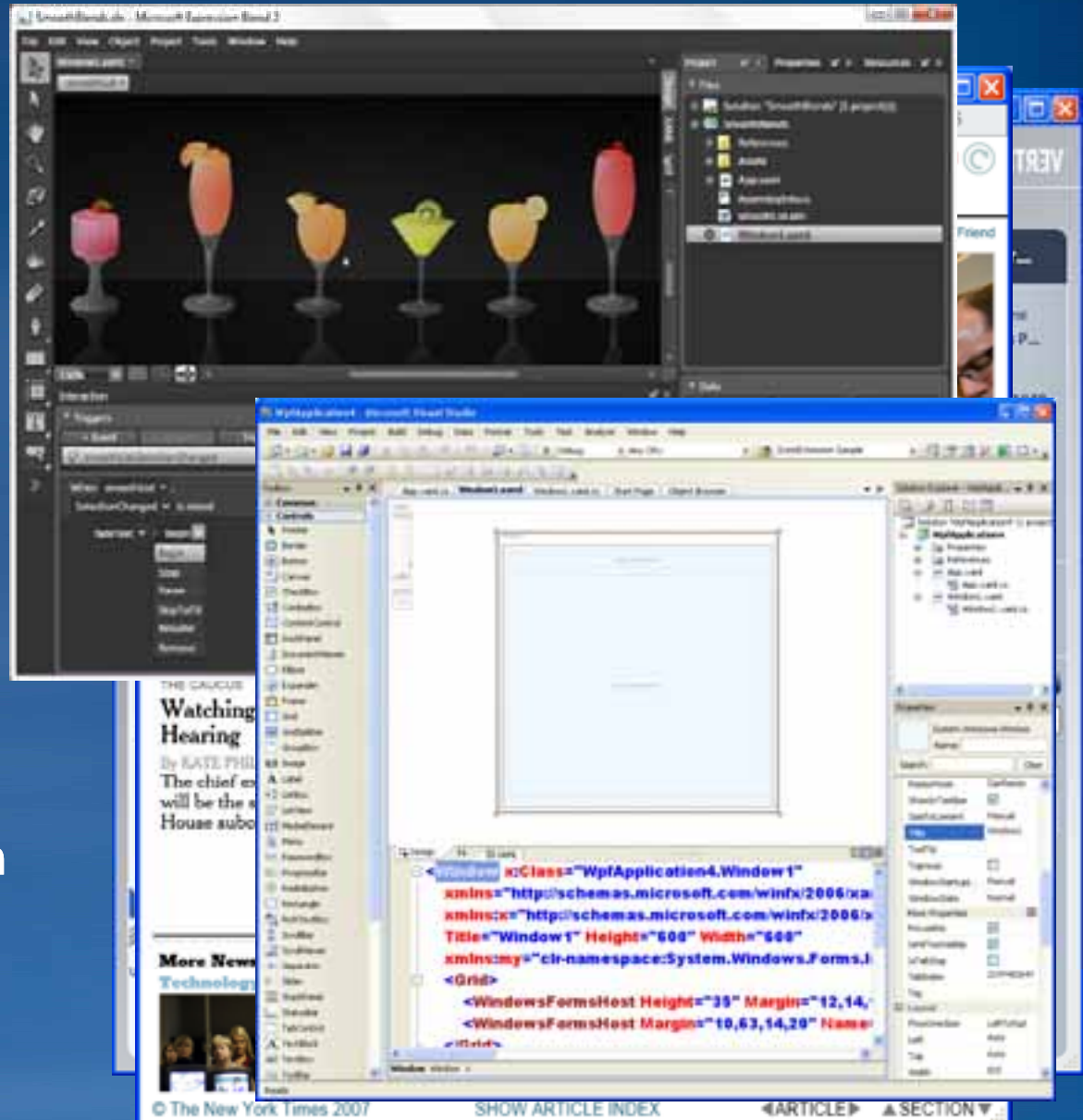


# Developing .NET applications for ArcGIS Engine



# Windows Presentation Foundation (WPF)

- What is WPF?
  - Presentation technology
  - Visually stunning user experiences
  - User focused
  - Design philosophy “Separate content from presentation”



# Why Use WPF?

- Spatially enable WPF app.
- Place a WPF UserControl into Engine app.
- Place Engine Control into WPF app.



# WPF – Checklist to embed ArcGIS Engine Controls ?

1. Create a WPF Application in VS2008
2. Set up References
3. Host Control in WindowsFormsHost
4. Initialize License
5. Wire WPF commands to Engine commands
6. Garbage collection



## WPF – Best Practice

1. Initialize ArcGIS Engine license programmatically
2. Creating Controls within the Window Loaded event (not in Windows constructor)
3. Control Properties and Events managed programmatically
4. Call Garbage Collector
5. SP1 for .NET Framework 3.5

# Developing .NET applications for ArcGIS Engine



# Error Handling for .Net ArcGIS Engine Applications

## Microsoft .Net Framework errors

- Structured Exception Handling
- try – catch – finally statements



## ArcObjects errors

- COM errors (HRESULT)  
0x8004005 (hex)  
-2147467269 (dec)
- Use COMException filter in .NET
  - ErrorCode property



Avoid a crash!

# VB.NET: Try – Catch – Finally

Try

```
Dim env As IEnvelope = New EnvelopeClass()  
env.PutCoords(0D, 0D, 10D, 10D)
```

```
Dim trans As ITransform2D = CType(env, ITransform2D)  
trans.Rotate(env.LowerLeft, 1D)
```

Catch COMex As COMException

```
If (COMex.ErrorCode = -2147220984) Then
```

```
    MessageBox.Show("You cannot rotate an Envelope")
```

```
Else
```

```
    MessageBox.Show(COMex.ErrorCode.ToString() + ": " + COMex.Message)
```

```
End If
```

Catch ex As System.Exception

```
    MessageBox.Show("Error: " + ex.Message)
```

Finally

```
    ' Steps taken whether or not an error is caught
```

```
End Try
```



# C#: try – catch – finally

```
try
{
    IEnvelope env = new EnvelopeClass();
    env.PutCoords(0D, 0D, 10D, 10D);

    ITransform2D trans = (ITransform2D)env;
    trans.Rotate(env.LowerLeft, 1D);
}

catch (COMException COMex)
{
    if (COMex.ErrorCode == - 2147220984)
        MessageBox.Show("You cannot rotate an Envelope");
    else
        MessageBox.Show(COMex.ErrorCode.ToString() + ": " + COMex.Message);
}

catch (System.Exception ex)
{
    MessageBox.Show("Error: " + ex.Message);
}

finally
{
    // steps taken whether or not an error is caught
}
```

## Error Handling – Best Practices

- Use exception handling when the event is truly exceptional and is an error
  - Running out of memory
  - File/Directory locks
- First use **If/Then** or other conditional programming
  - For example, to check file exists before reading
- Next use **Try/Catch/Finally** statements in applications
  - Use specific exception types not just `System.Exception`
  - Catch specific exceptions before generic exceptions
- **ArcObjects** errors are listed by **Assembly**

## Error Handling – Additional information in the SDK

- How to implement error handling

[http://resources.esri.com/help/9.3/arcgisengine/arcobjects/ao\\_start.htm#3bb024fa-ed32-4773-b2dd-f5d49c563f41.htm](http://resources.esri.com/help/9.3/arcgisengine/arcobjects/ao_start.htm#3bb024fa-ed32-4773-b2dd-f5d49c563f41.htm)

- ArcObjects error codes

[http://resources.esri.com/help/9.3/ArcGISEngine/dotnet/concepts\\_start.htm#a3bd05c8-64a6-4dd4-acb3-0d10b021f2f8.htm](http://resources.esri.com/help/9.3/ArcGISEngine/dotnet/concepts_start.htm#a3bd05c8-64a6-4dd4-acb3-0d10b021f2f8.htm)

# Developing .NET applications for ArcGIS Engine



## **Future: Migrating from ArcWebServices to ArcGIS Online**

- **Timescale = end of June 2009**
- **Migrate from ArcWebServices to ArcGIS Online**
- **What is the migration path..... ?**

## **Future: 9.3.1**

- **Timescale = Start shipping June 2009**
- **Focus on creating maps for the web**
- **Optimized Map Document – faster engine**
- **Quality improvements**
- **Migration from ArcWebServices to ArcGIS Online Services**

## Future: 9.4

- **Timescale = Beta around the User Conference**
- **Concurrent use Engine Runtime**
- **Asynchronous GeoProcessing**
- **Deploy Engine Runtimes Side by Side**
- **No VB6 Software Developer Kit**
- **Visual Studio 2008 supported**
  - VS2005 – not supported
  - VS10 – under investigation

# Developing .NET applications for ArcGIS Engine





## Questions, answers and information?

- ***Tech Talk***
  - ***Now - Outside this room after this session***
- ***Meet the Team***
  - ***Wednesday 11:30 in Oasis 1***
- ***Showcase***
  - ***Tuesday and Wednesday Desktop***

# Where now?

## Technical Sessions

Tuesday	2:45	Enhancing Your Applications with ArcGIS Online
Tuesday	4:30	Extending the ArcGIS Desktop Applications
Wednesday	2:45	Distributed Geodatabase Development
Thursday	8:30	ESRI Product Licensing
Thursday	10:15	ArcGIS 9.4: The Road Ahead for Developers

## Demo Theatres

Tuesday	3:00	Tracking Analyst and TrackingServer
Wednesday	12:00	Geometric Networks
Wednesday	1:00	Performing Network Analysis with Geoprocessing
Wednesday	4:00	Leverage Dynamic Display

# Resources

- Using premium Microsoft Virtual Earth Maps with ArcGIS 9.3
  - [http://resources.esri.com/help/9.3/arcgisonline/about/start.htm#premium\\_virtual\\_earth.htm#](http://resources.esri.com/help/9.3/arcgisonline/about/start.htm#premium_virtual_earth.htm#)
  - [http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?TopicName=Using\\_Microsoft\\_Virtual\\_Earth\\_in\\_ArcGIS\\_Desktop](http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?TopicName=Using_Microsoft_Virtual_Earth_in_ArcGIS_Desktop)
- WPF Training Videos
  - [http://windowsclient.net/learn/videos\\_wpf.aspx](http://windowsclient.net/learn/videos_wpf.aspx)