

# Integrating .NET Code with AutoCAD I/O to Add Design Intelligence to Your Website

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# Class summary

Over the last decade or so, software developers have amassed a significant amount of intellectual property harnessing AutoCAD's .NET API. AutoCAD I/O enables standard AutoCAD software commands, as well as those implemented in .NET, to be executed in the cloud, generating results that you can integrate into your own business-to-business or business-to-customer website.

This class will take a concrete example of a .NET application creating custom jigsaw puzzles inside AutoCAD software. During the class we will show how to move the core implementation to AutoCAD I/O via the Core Console, and then make use of this to power a new business-to-customer website. Potential customers will be able to specify custom designs for jigsaw puzzles and visualize the results before finalizing their orders.

# Key learning objectives

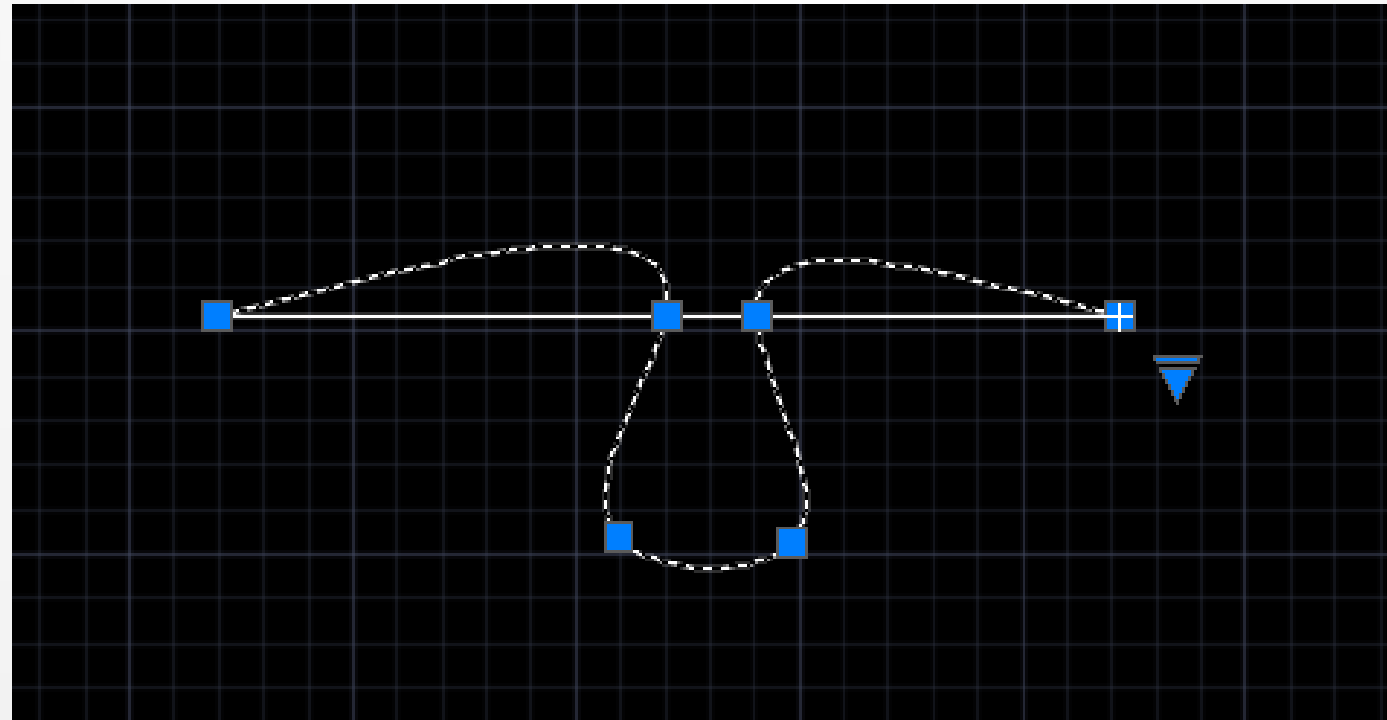
At the end of this class, you will be able to:

- Get started with the AutoCAD I/O service
- Learn how to take existing AutoCAD .NET applications and create "core" modules
- Learn how to drive AutoCAD I/O with custom .NET application from a website or web service
- Learn how to integrate the results from AutoCAD I/O, displaying them via the web

# A puzzling problem

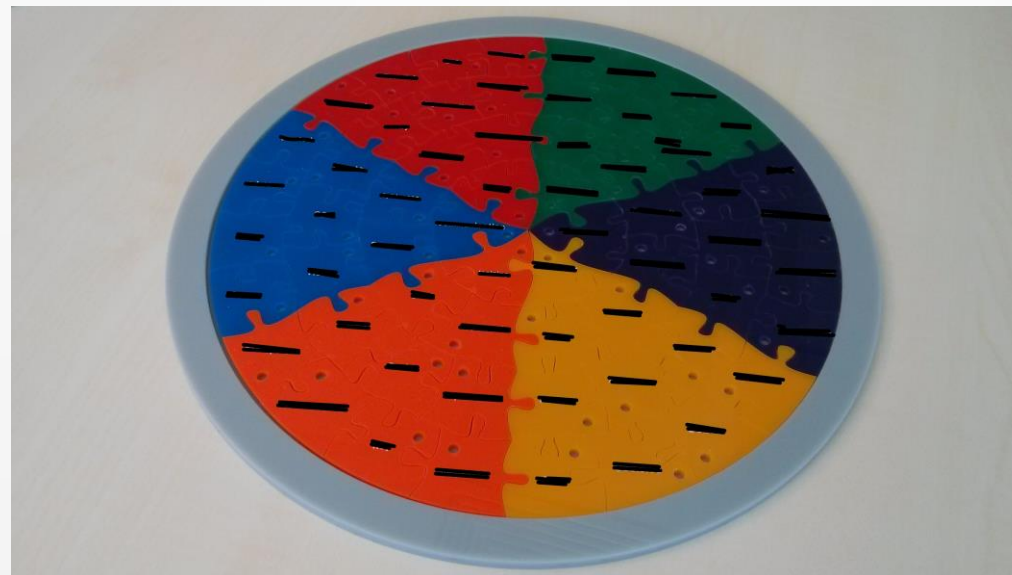
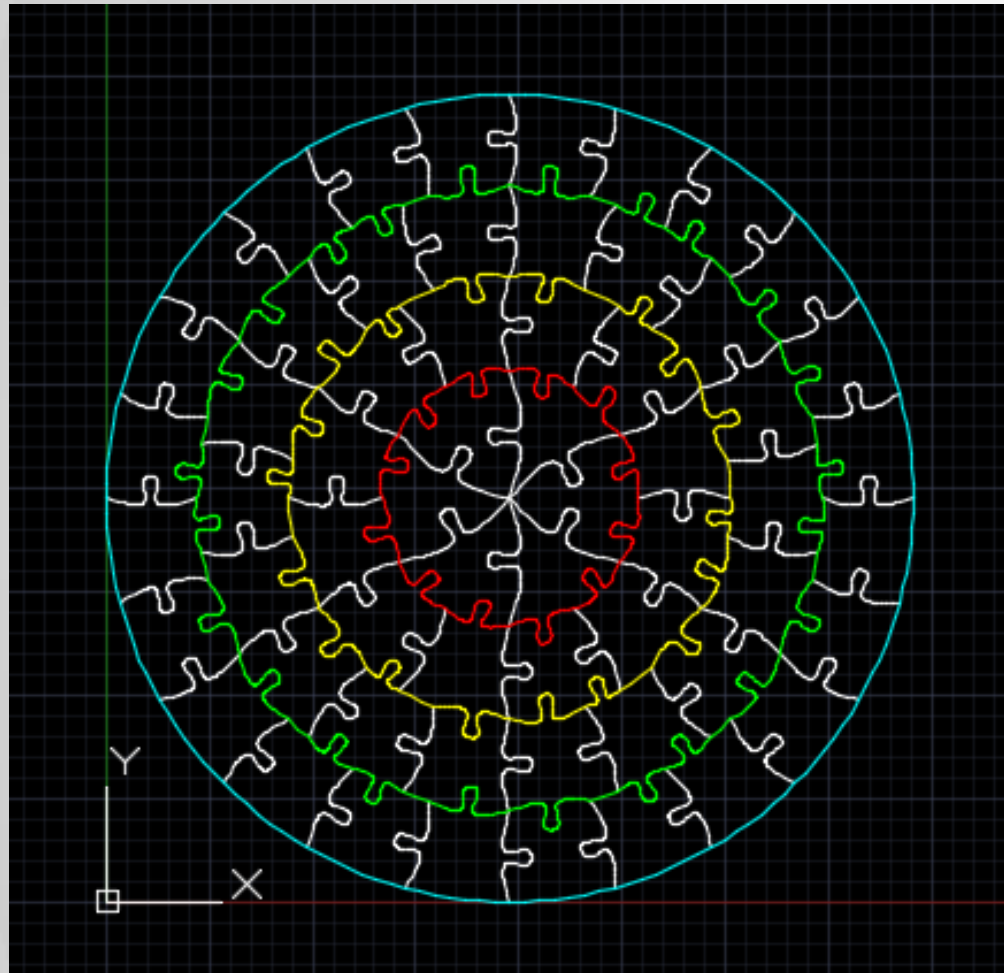
# Inspiration

- Our scenario was inspired by an internal project
  - A colleague was looking for a 60-piece, circular jigsaw puzzle
  - After searching the web in vain...
  - ... I wrote some code to convert curves to jigsaw patterns





# The project



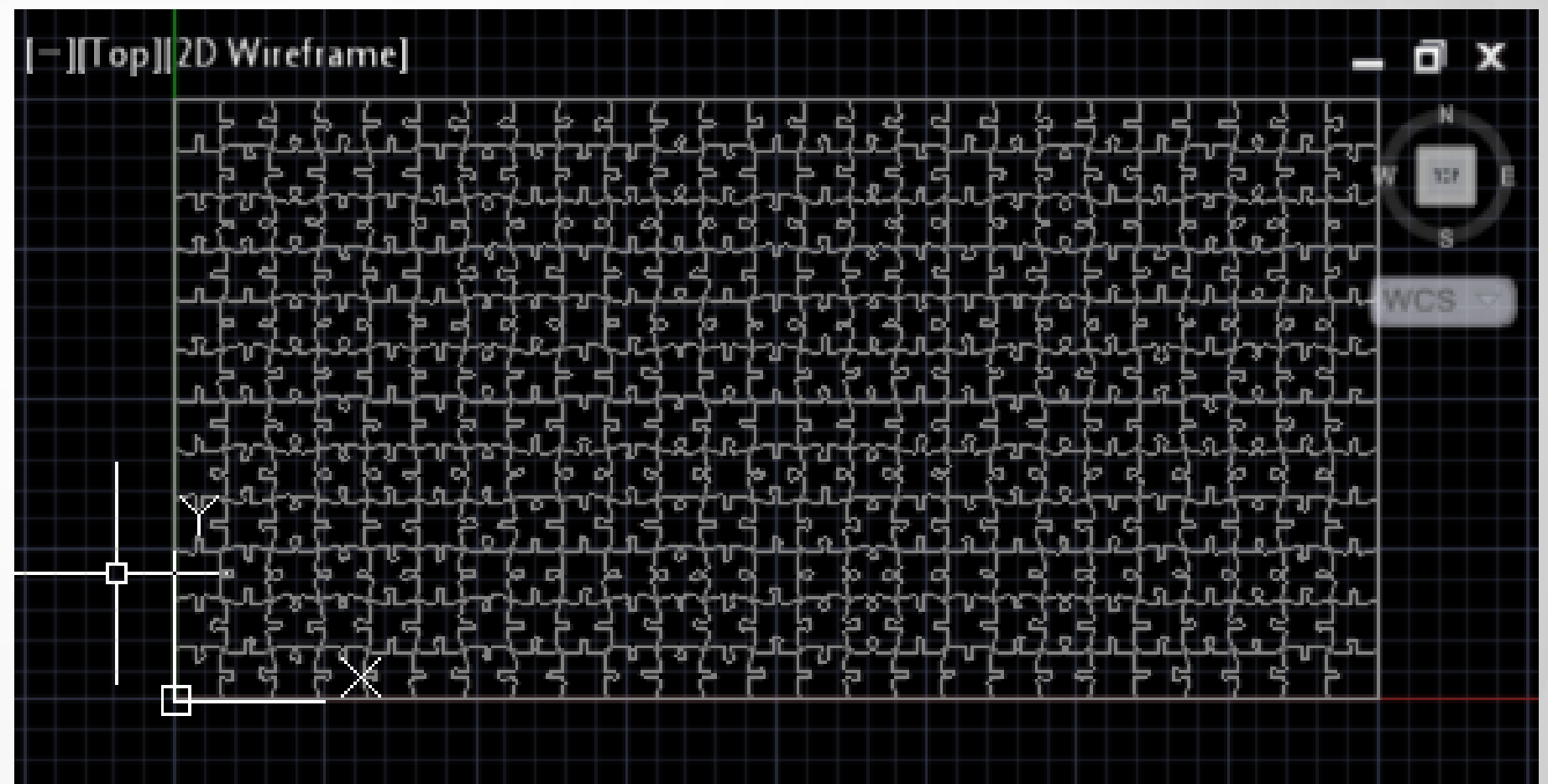
# A command to generate a rectangular puzzle

- The JIGG command takes...

- Width
- Height
- Number of pieces

- And generates...

- A random cut pattern



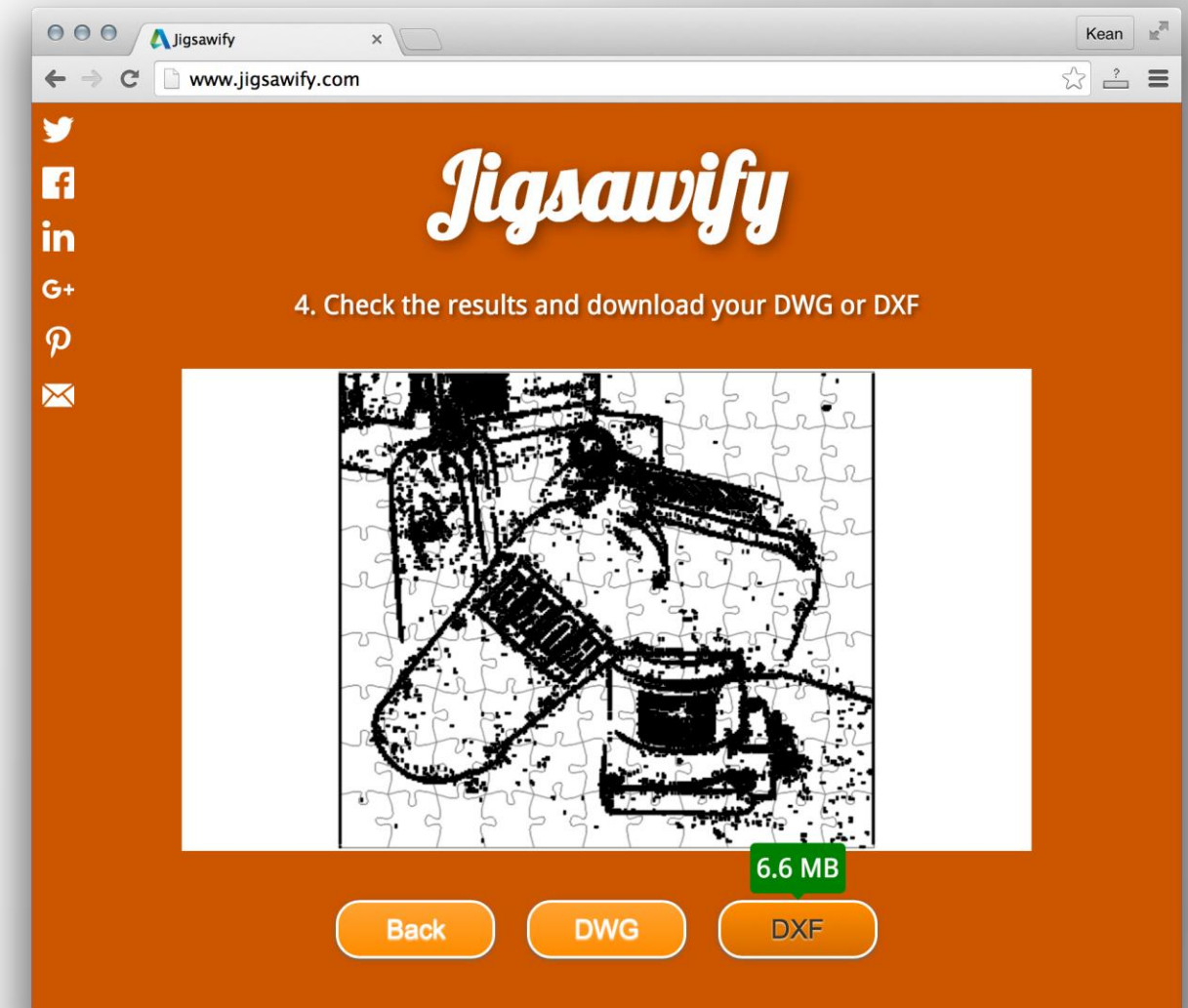
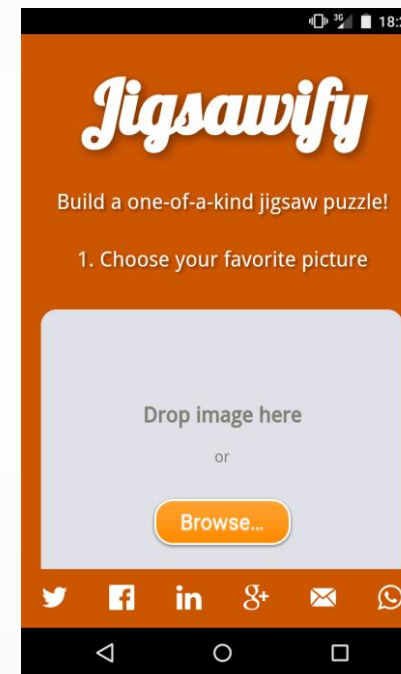
# Taking it to the next level

- Engraving with a laser cutter is slooooooow
  - There's also a manual step between phases
    - Engraving is directly from a bitmap, not from DWG/DXF data
- The approach
  - Replace simple engraving by extracting edges from the bitmap
  - Add these as 2D Solids into the DWG/DXF
    - It turned out this didn't work with our laser cutter
      - Diagonal lines across the square worked well
      - Can OVERKILL them to make them contiguous



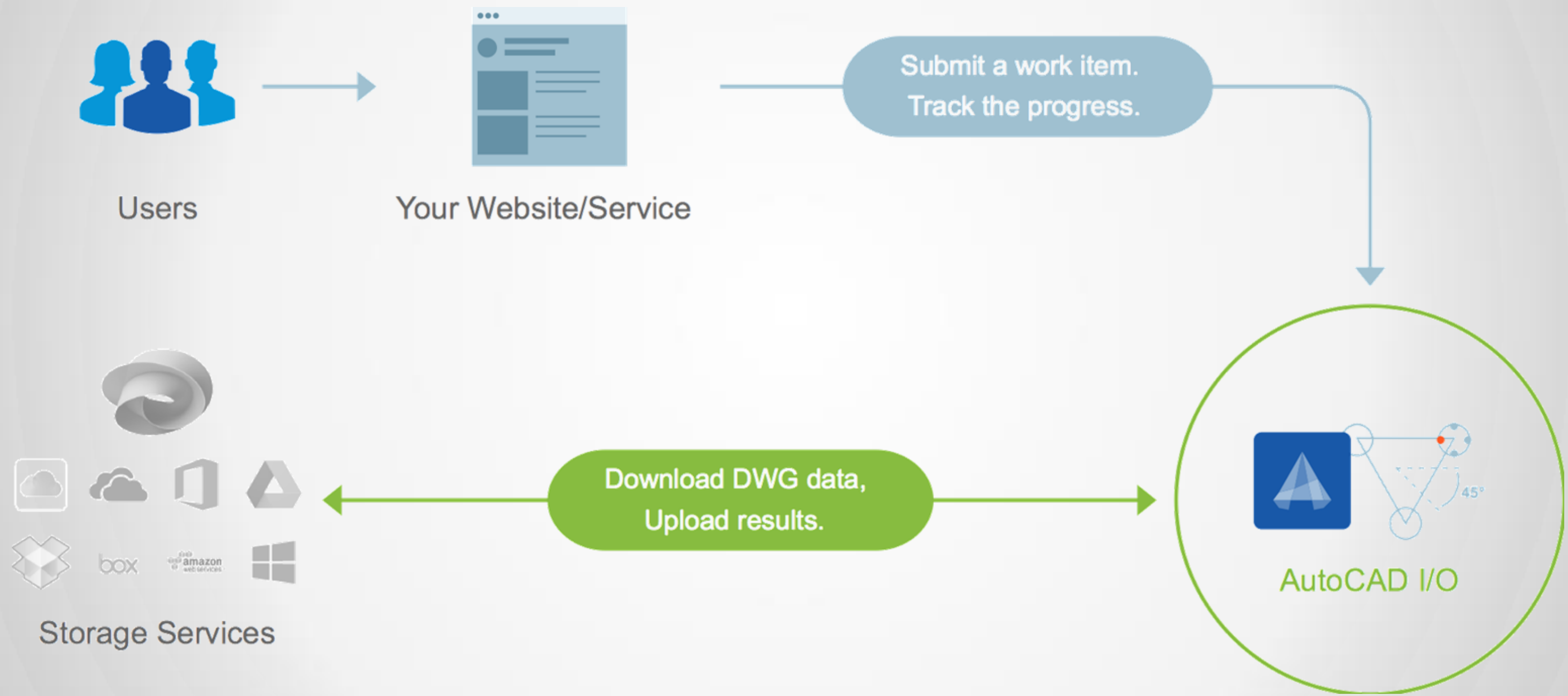
# And so Jigsawify was born

- Jigsawify.com
  - Jigsaw puzzles from photos
    - Adjustable edge detection
  - DWG & DXF output
    - Ready to drive a laser cutter



# Getting started with AutoCAD I/O

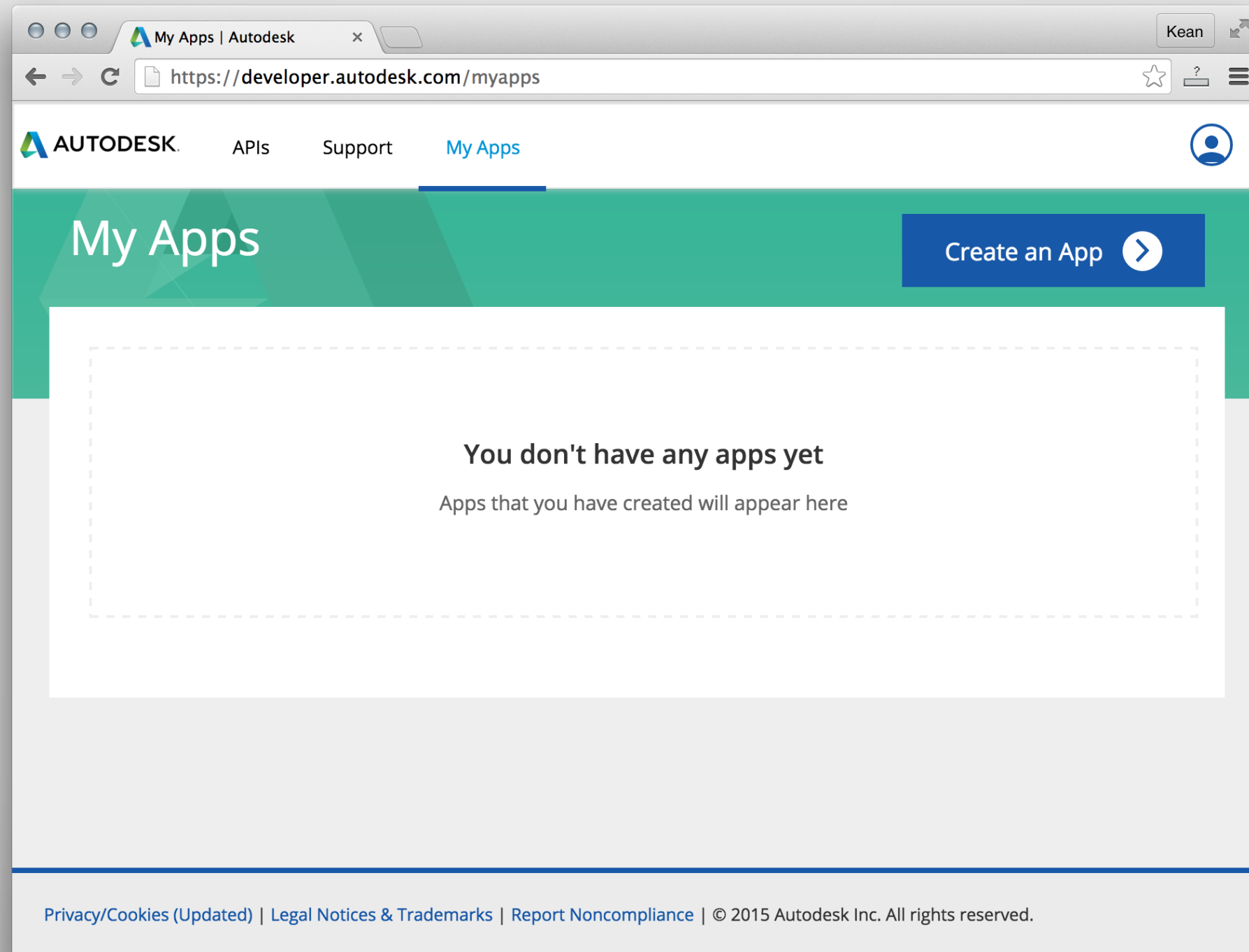
# What is AutoCAD I/O?



# OK, but what is it, really?

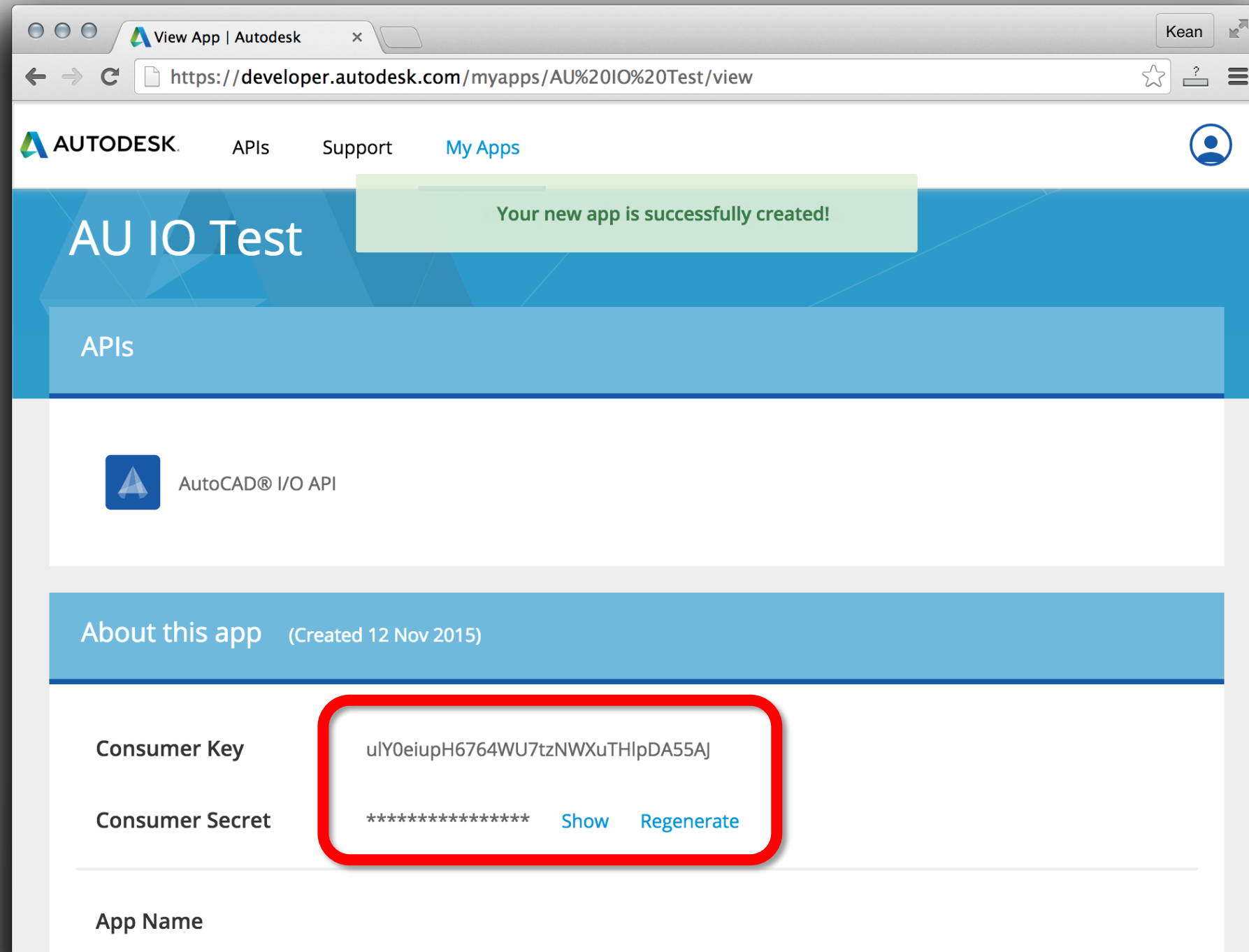
- A web service...
- Allowing you to batch process DWGs in the cloud...
- Running standard or custom AutoCAD commands...
- Inside the Core Console, but with additional security...
- Generating DWG, DXF or other output formats.

# Getting started: credentials!





# Creating an app



**Never share these!**

**Includes embedding  
directly in a DLL**

**Hide them behind  
a web-service**

# Start small with a simple sample

- AutoCAD I/O samples
  - [github.com/Developer-Autodesk/AutoCAD.io](https://github.com/Developer-Autodesk/AutoCAD.io)
- Simplest sample to get started
  - [github.com/Developer-Autodesk/autocad.io-simplest-Csharp](https://github.com/Developer-Autodesk/autocad.io-simplest-Csharp)
- Clone it locally and insert your credentials
  - Running it will create a WorkItem for an existing Activity
    - PlotToPDF: generates a PDF file for a given DWG

# Creating core modules for your .NET apps

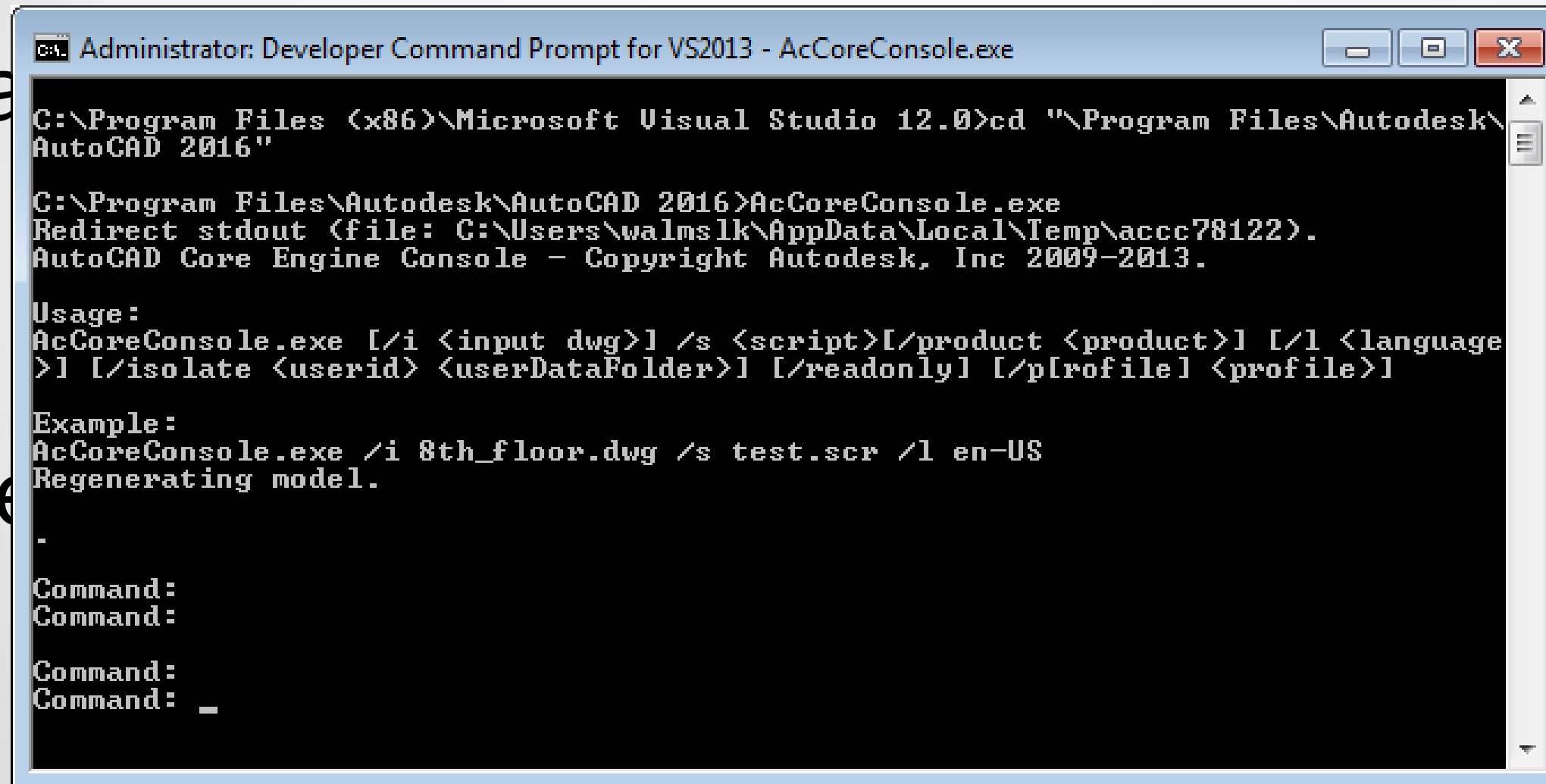
# The Core Console

- Headless AutoCAD, running inside a Command Prompt

- Create

- Can

- A gre



```
Administrator: Developer Command Prompt for VS2013 - AcCoreConsole.exe

C:\Program Files (x86)\Microsoft Visual Studio 12.0>cd "%Program Files\Autodesk\AutoCAD 2016"

C:\Program Files\Autodesk\AutoCAD 2016>AcCoreConsole.exe
Redirect stdout (file: C:\Users\walmslk\AppData\Local\Temp\accc78122).
AutoCAD Core Engine Console - Copyright Autodesk, Inc 2009-2013.

Usage:
AcCoreConsole.exe [/i <input dwg>] /s <script>[/product <product>] [/l <language>] [/isolate <userid> <userDataFolder>] [/readonly] [/p[rofile] <profile>]

Example:
AcCoreConsole.exe /i 8th_floor.dwg /s test.scr /l en-US
Regenerating model.
.

Command:
Command:

Command:
Command: _
```

# Running custom AutoCAD code in AutoCAD I/O

- Start by making it work with the Core Console
  - Target *AcDbMgd.dll* and *AcCoreMgd.dll* but not *AcMgd.dll*
  - Command-line/canvas selection UI only
    - `Editor.GetXxx()` functions
- A few changes needed for AutoCAD I/O...
  - Runs with limited local privileges: no direct network access
    - The CoreRunner process downloads any remote content needed
  - Command parameters encoded as (e.g.) JSON
    - Use `Editor.GetString()` to get the location of the JSON file



# Creating a custom Activity with a .NET AppPackage

# Administering AppPackages and Activities

- Typically use a console app for administration
  - Embeds your credentials locally
  - Never gets distributed to customers
- Simplest approach: clone and modify another sample
  - [github.com/Developer-Autodesk/autocad.io-custom-activity-apppackage-Csharp](https://github.com/Developer-Autodesk/autocad.io-custom-activity-apppackage-Csharp)
  - Builds your “CRX app” and uploads it as a Zipped AppPackage
    - Creates a corresponding Activity that makes use of it

# Calling a custom Activity from your web-site

# You're going to need a web-service

- Your web-page cannot call directly into AutoCAD I/O
  - Embedding of credentials being the primary reason
- Can use lots of server-side technologies for this
  - ASP.NET is a popular choice for existing .NET developers
- Your web-service will need an authorization token
  - Requests it from the authentication API using your credentials
  - Uses it to sign the various AutoCAD I/O requests

# Web-service manages WorkItems via HTTP

- Jigsawify.com uses Node.js for server-side JavaScript
  - Same edge detection code as the browser
- Web-service uses POST to create WorkItems
  - <https://developer.autodesk.com/autocad.io/us-east/v2/WorkItems>
  - Authorization headers
  - OData 4.0 payload for parameters
- Checks status using GET
  - Same URL + "(Id=12345678)"



# Browser

# Node.js

# AutoCAD I/O



edgedetector.js



/api/submit?pieces=10&width=12&height=18&units=inch&threshold=10&pixels=...



Too much data to  
encode as URL  
parameters

Browser

Node.js

AutoCAD I/O

Scaled down image



edgedetector.js

blob1438009040488

/api/submit?pieces=100&width=12&height=18&units=inches&threshold=70&upload=blob1438009040488

Stores image in folder

edgedetector.js

Extracts contents of ZIP

Larger images caused a server-side problem (with logging)



Zipped DWG & PNG

JigsawActivity  
Generates puzzle geometry, plots image

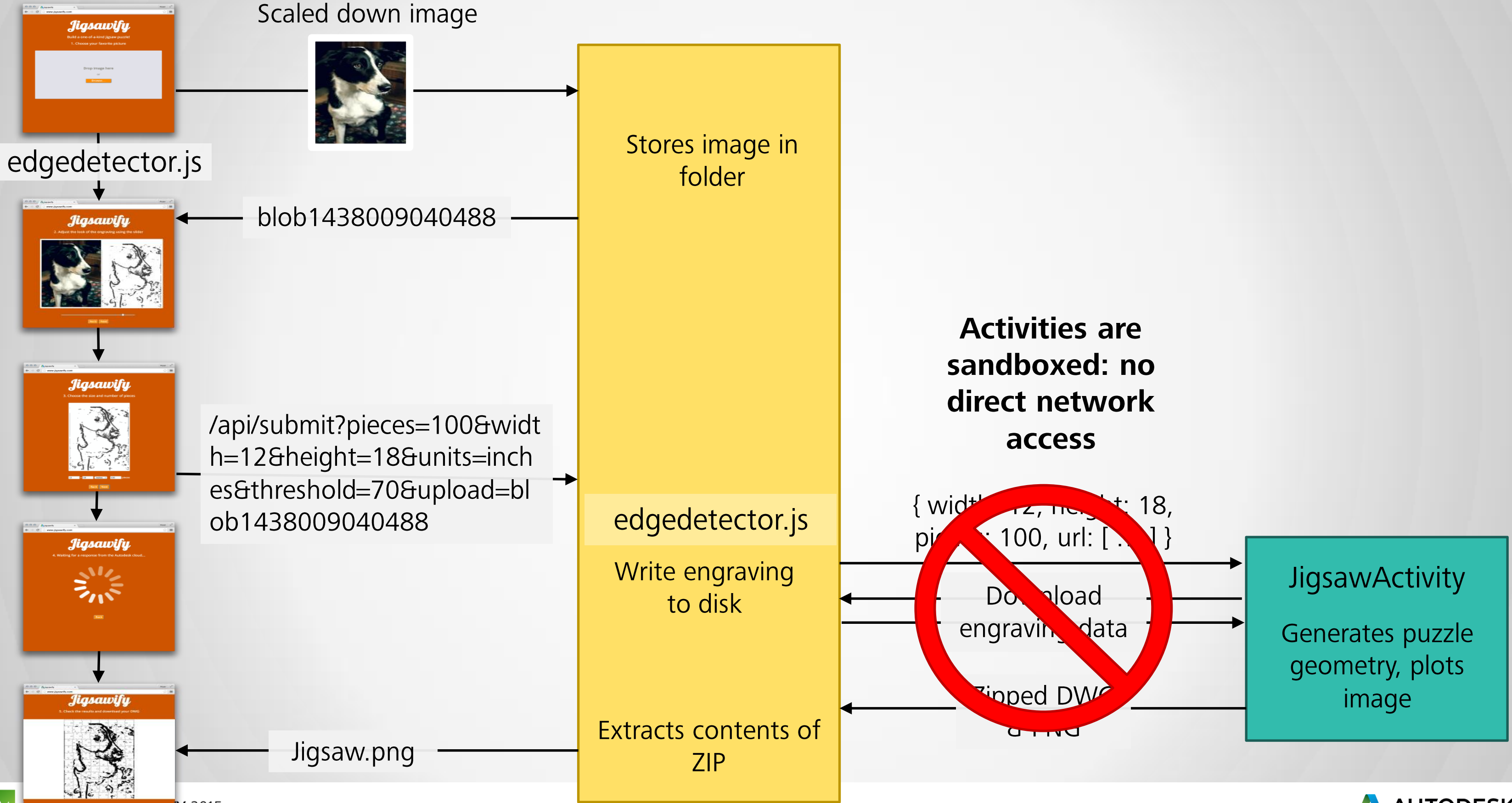
Jigsaw.png



Browser

Node.js

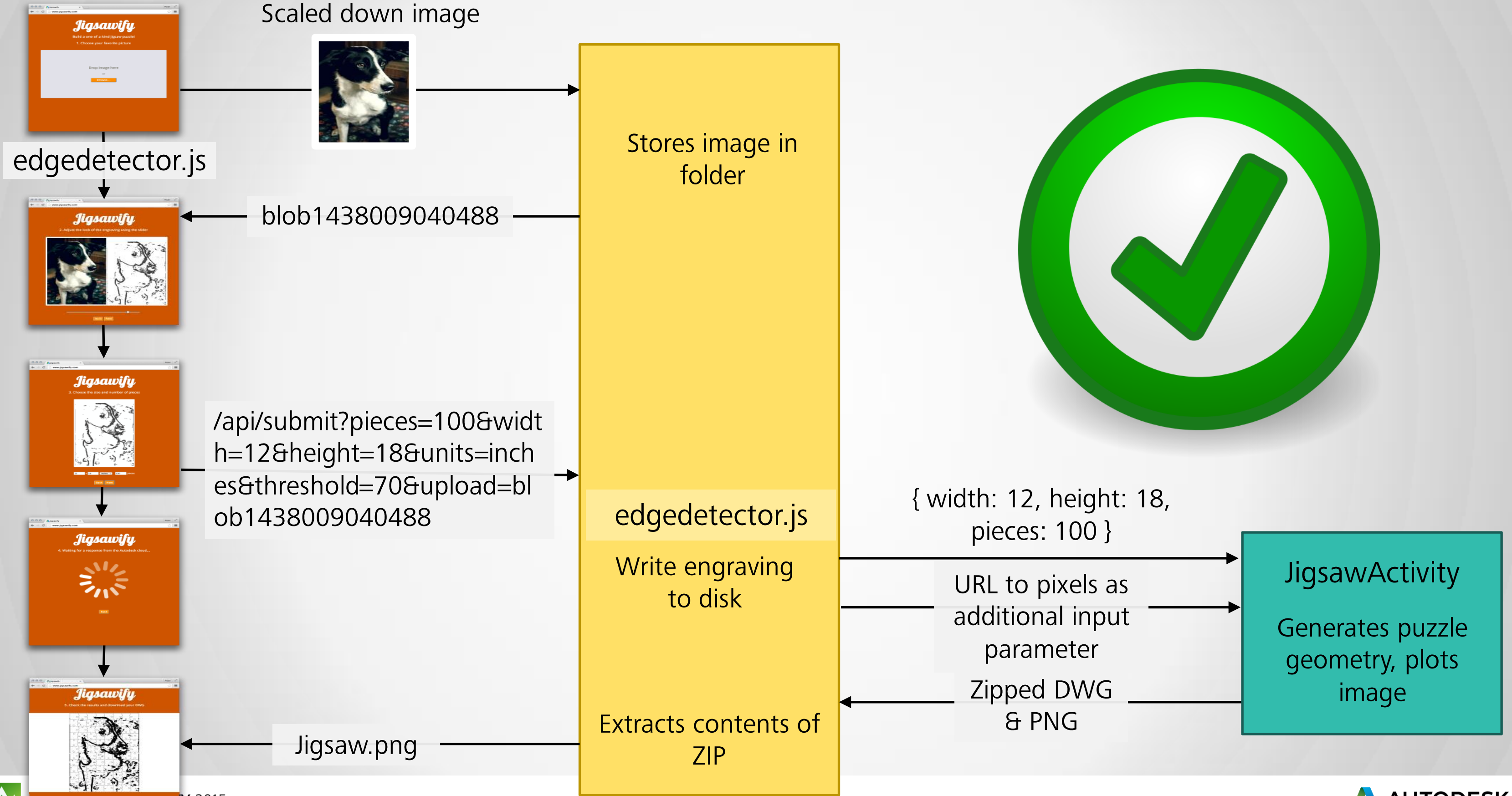
AutoCAD I/O



Browser

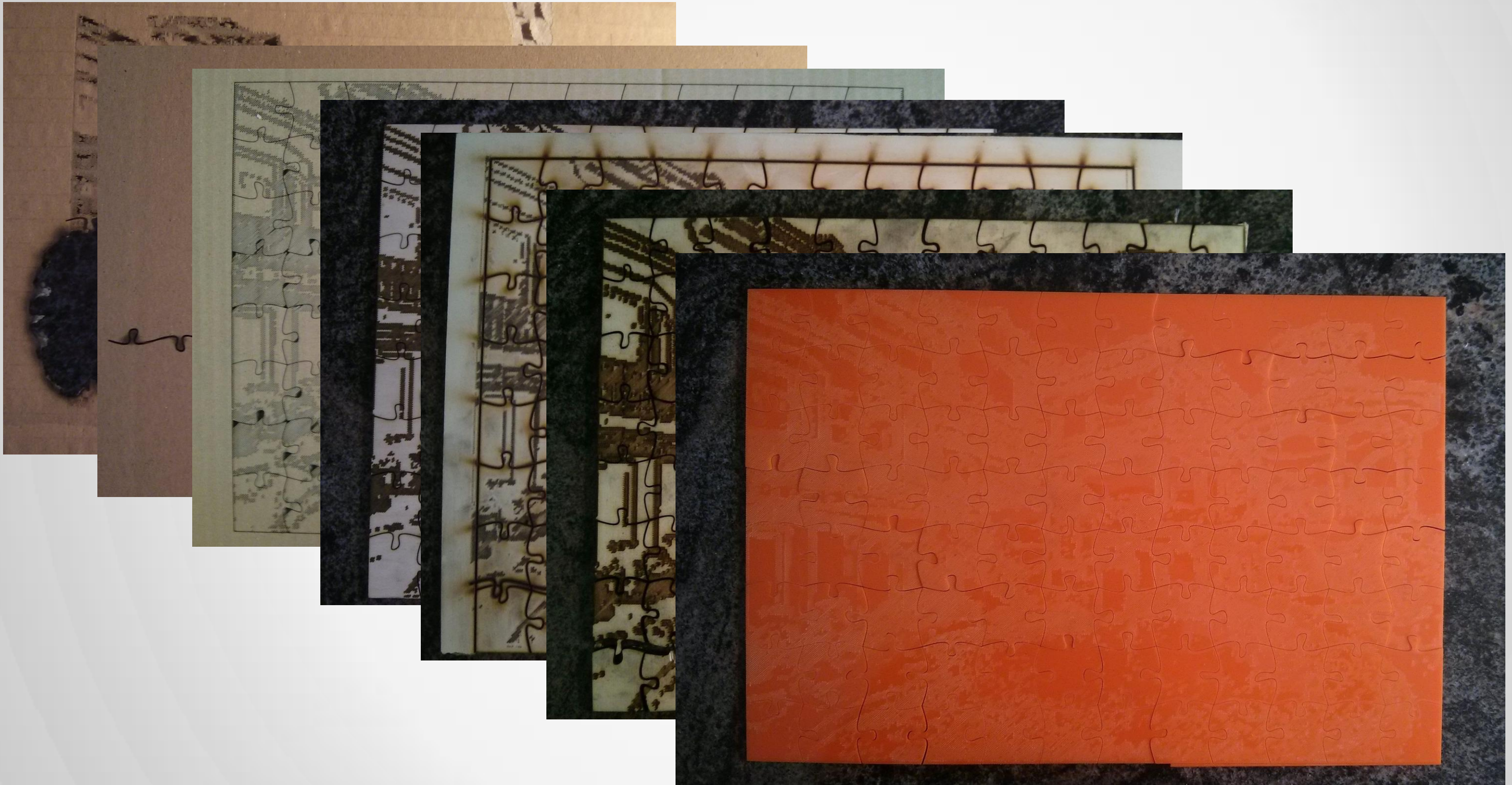
Node.js

AutoCAD I/O





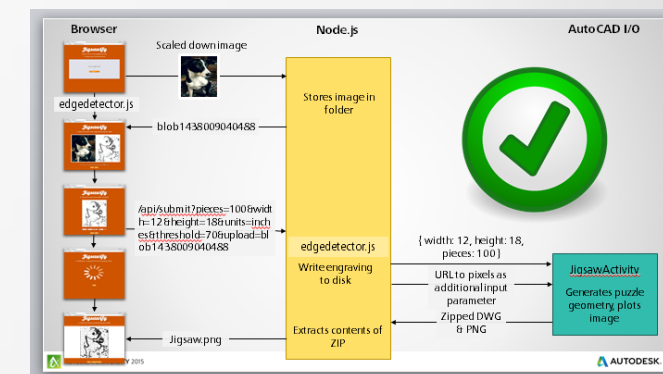
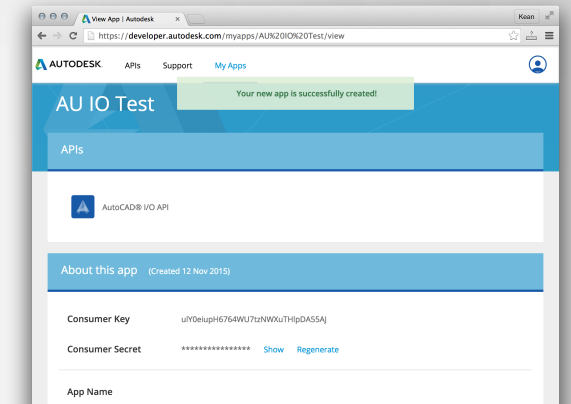
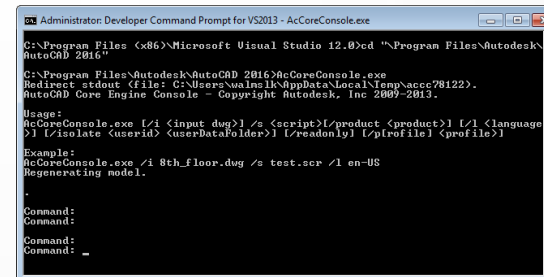
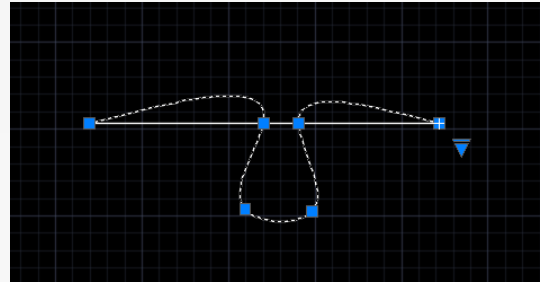
# The output





# Summary

- The scenario
- Getting started with AutoCAD I/O
- Creating core modules
- Creating & calling custom Activities



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