BO3158 – The Business Proposition for Developing Custom Tools

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Class summary

In the era of 2D CAD, many firms invested in custom tools and development staff to write and maintain them. A firm's overall experience varied in terms of the success of this investment and just about everyone has a story to tell about being "burned" from spending money developing custom tools. However a number of market forces are coming into play that continue to drive the need to customize the Autodesk® Revit® software platform, and the question is, "Do you rely entirely on third-party software or go back down the road of customization?" This class explores the benefits of investing in the development of custom tools for your firm, and shows how Revit is really "different this time" for those who have a horror story to tell. This class looks at the tools Stantec has developed in the last year and the return on investment we have already seen. We also examine our overall strategy and approach to development.

Key learning objectives

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

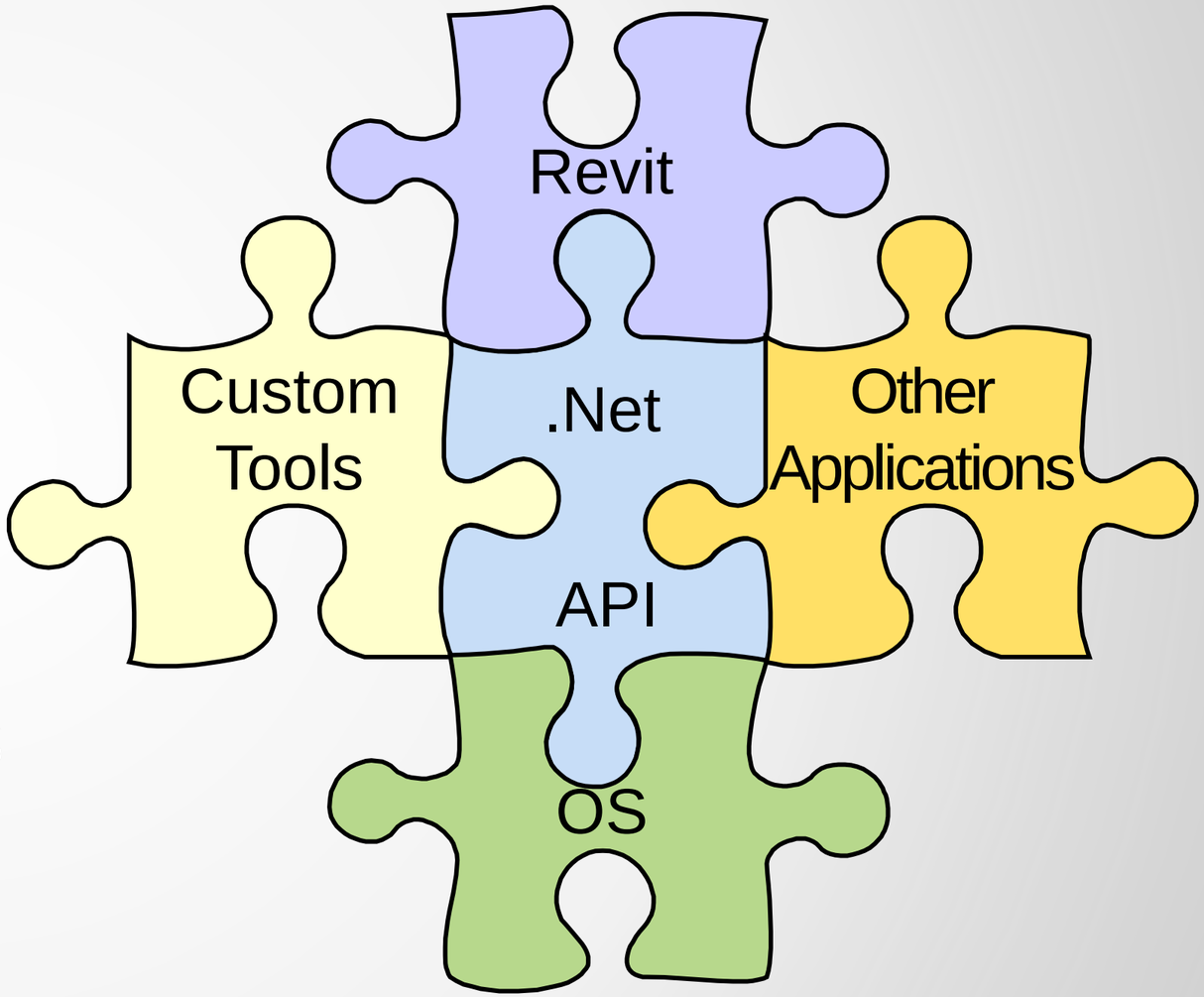
- Convey the value of custom tools for Revit
- Explain the difference between tools and utilities in Revit versus CAD
- Develop an internal strategy for development
- Review resumes of potential candidates who develop Revit tools

- We are not going to talk at all about how to program or what you can or cannot do.

I want….

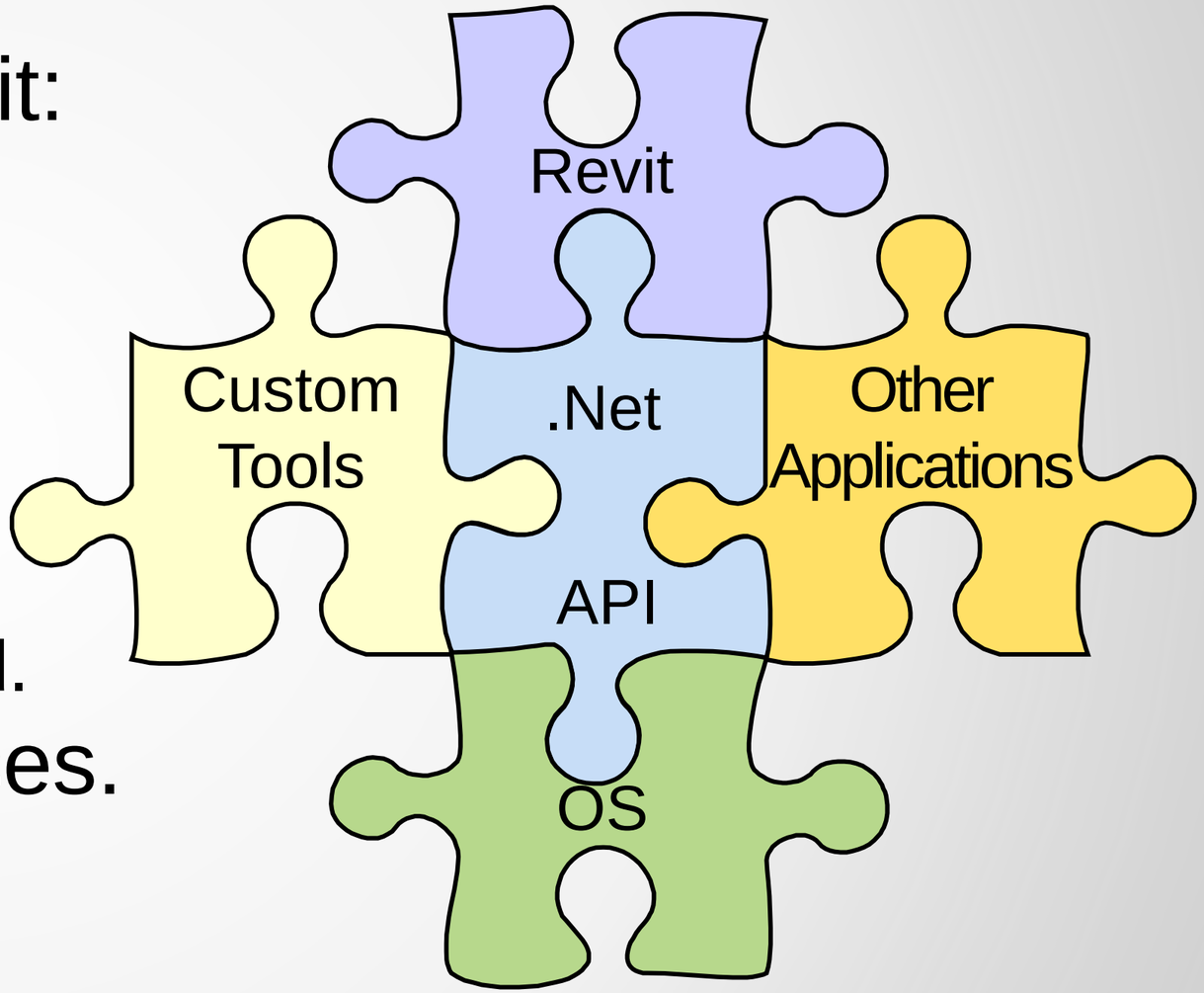
API What?

- Application Programming Interface (API)
- Uses the Microsoft dot framework (.Net)
- Can write code in Visual Basic or C# (see-sharp)
- Access to other applications and the Operating System



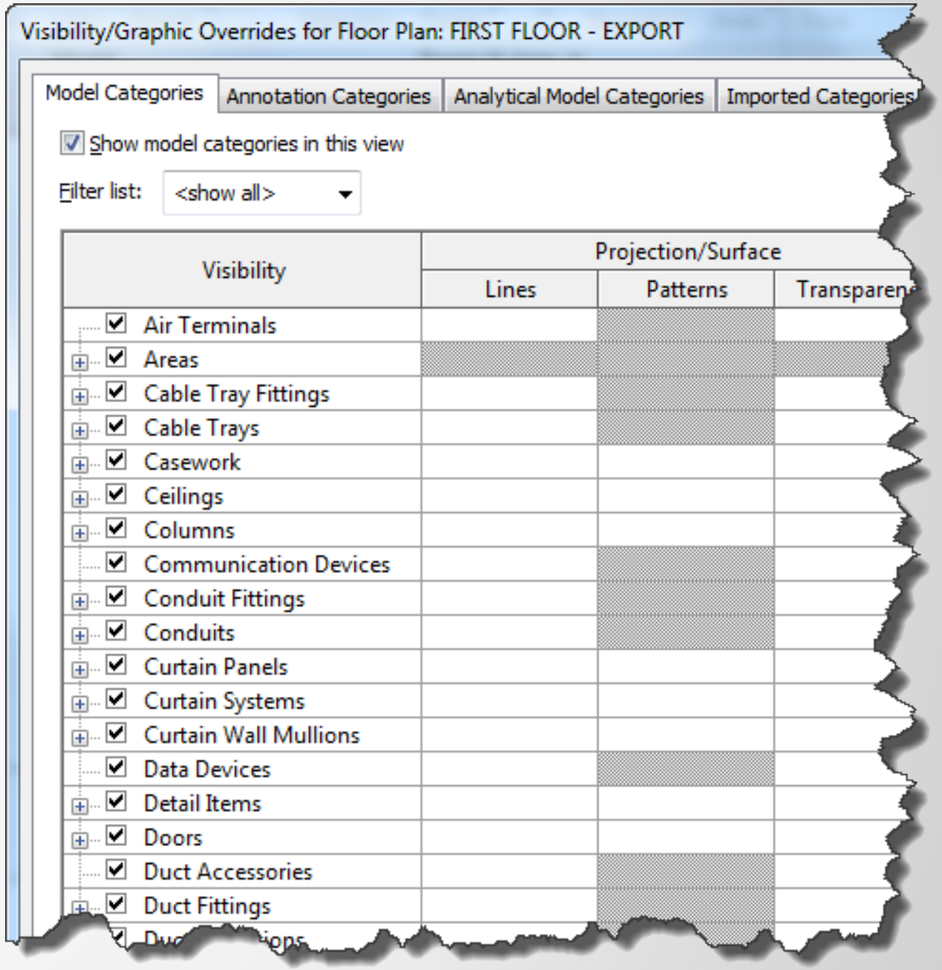
Why develop custom tools

- Autodesk is not going to do it:
  - Revit has become a platform, similar to AutoCAD or Office.
  - There is a lack of competition in the market.
  - Autodesk would/will never be able to address every need.
- You know your own processes.



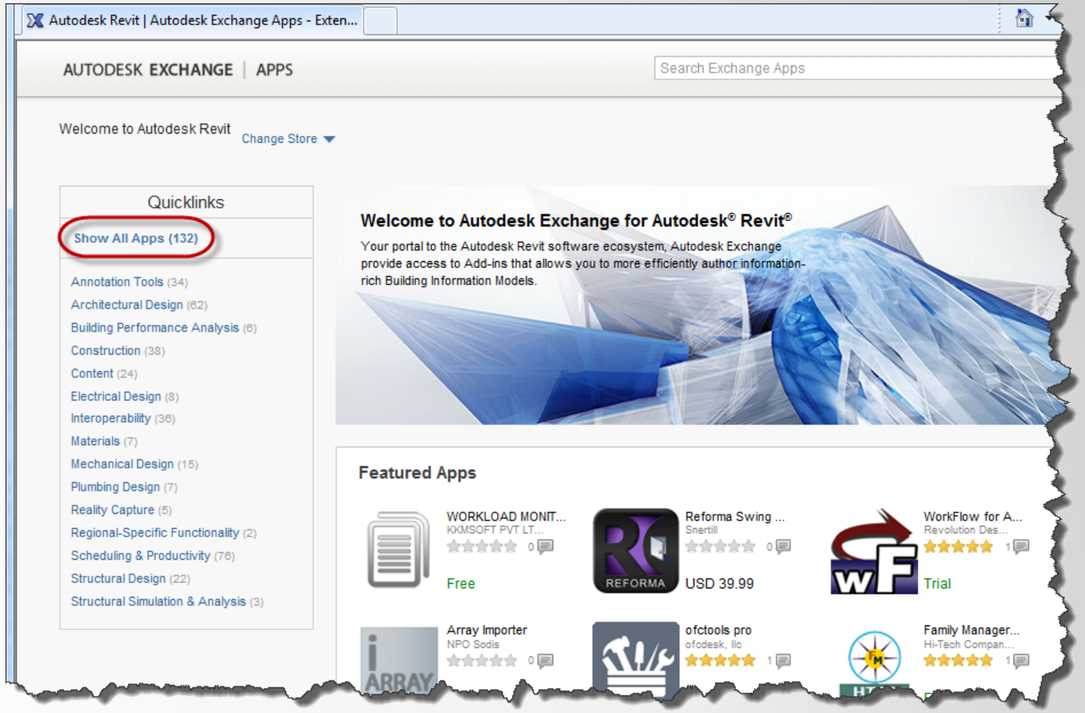
How is this different from CAD…?

- Revit provides a set infrastructure in the form of categories
  - Cannot create, alter or delete categories
- CAD was dependent on layers
  - Users easily deviate from layer standards
- Software is updated annually now, easier to “keep up”



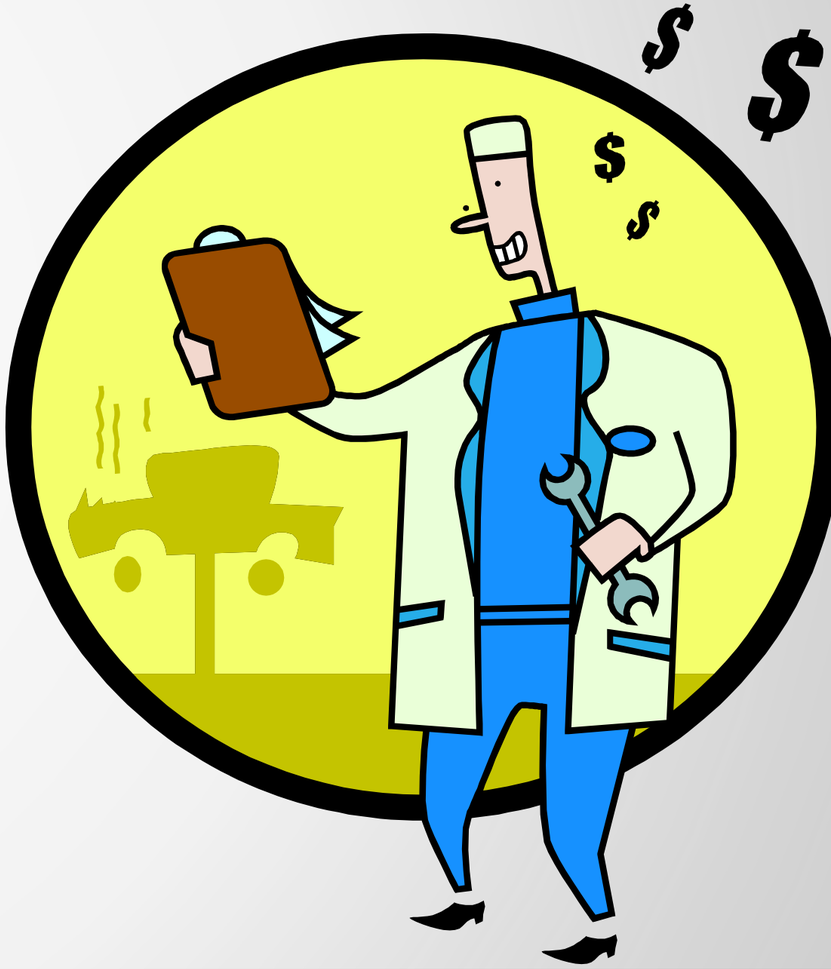
Know what is on the market

- Re-invent the wheel only when it makes financial sense.
- Know what features you need, and which ones you do not.
- Contact App developers (no one is getting rich on AEC apps)



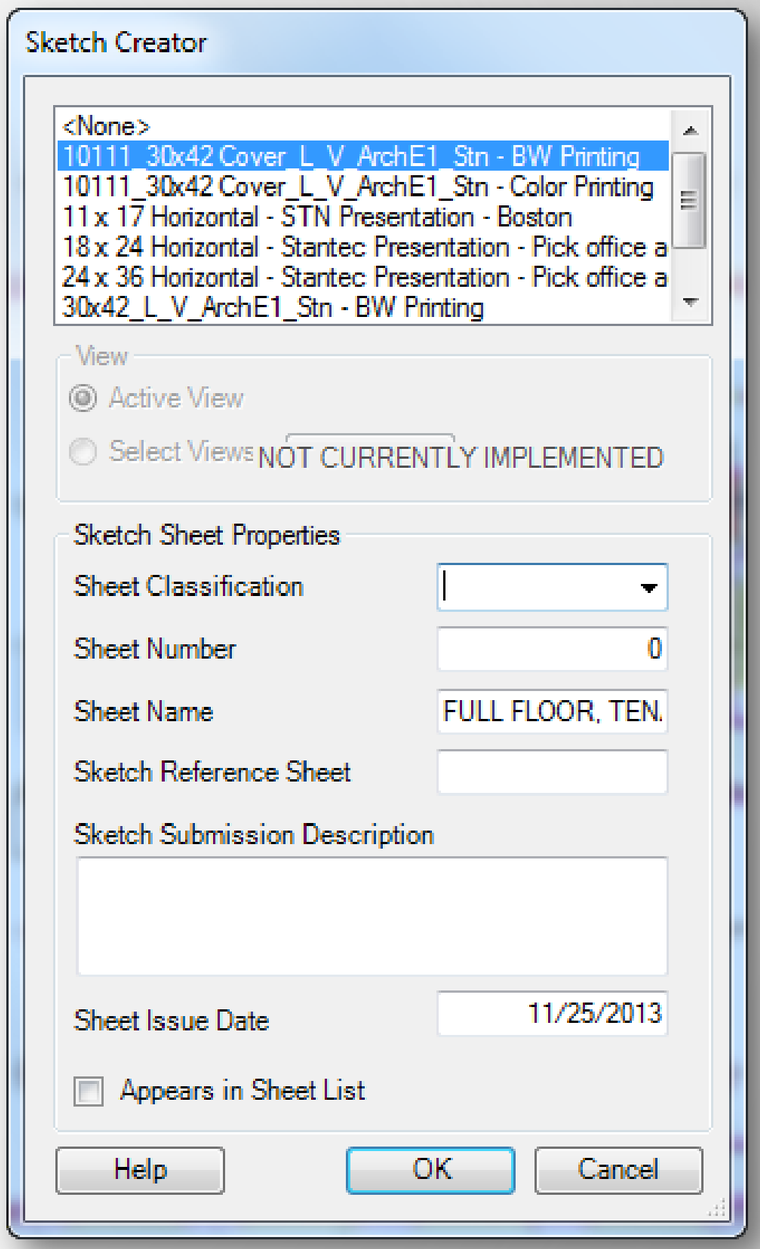
Estimating Development Cost

- “Simple” is easy
- More features increases risk;
  - Complexity of core code
  - More features equals more UI
- Fixed fees, even when conservative will always be wrong.
- Plan on a contingency
  - Bugs will always show up



Its easy to dream up “simple” yet complex tools

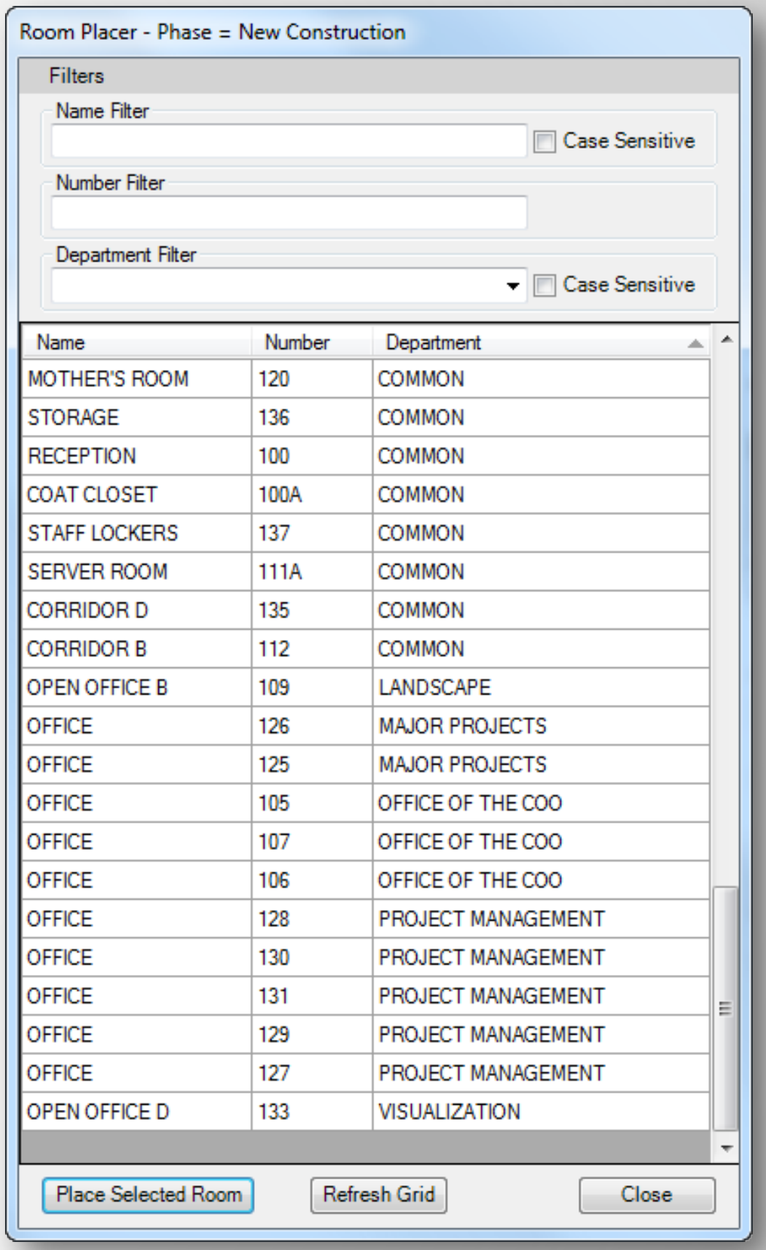
- I just want a tool that creates a “sketch”:
  - Can it also number the sheet for me?
  - Can we classify the sheet?
  - What about automatically cropping the view?
  - What if….



Dreaming

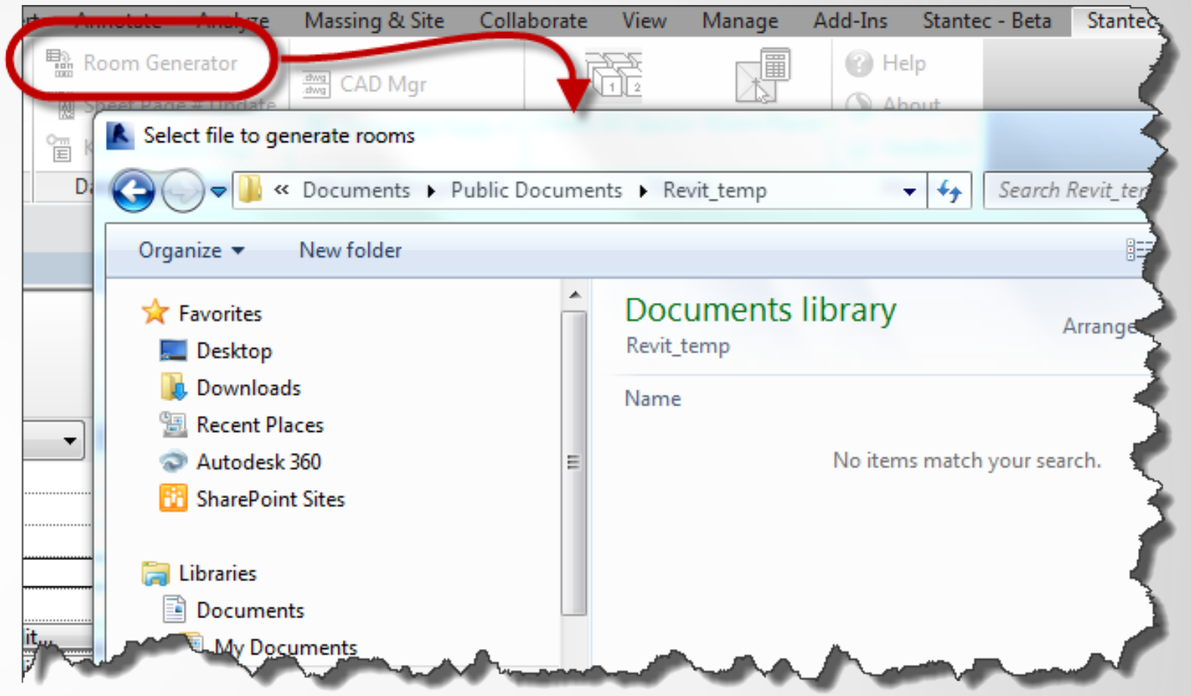
Minimum Viable Product (MVP)

- Goal is to keep it simple.
- What is the minimum you need?
- Plan to make it more complex through iterative development cycles.



Keep It Simple Stupid (KISS)

- Most of our tools are simple, limited UI
  - Click button, pick source file



Keep It Simple Stupid (KISS)

- Most of our tools are simple, limited UI
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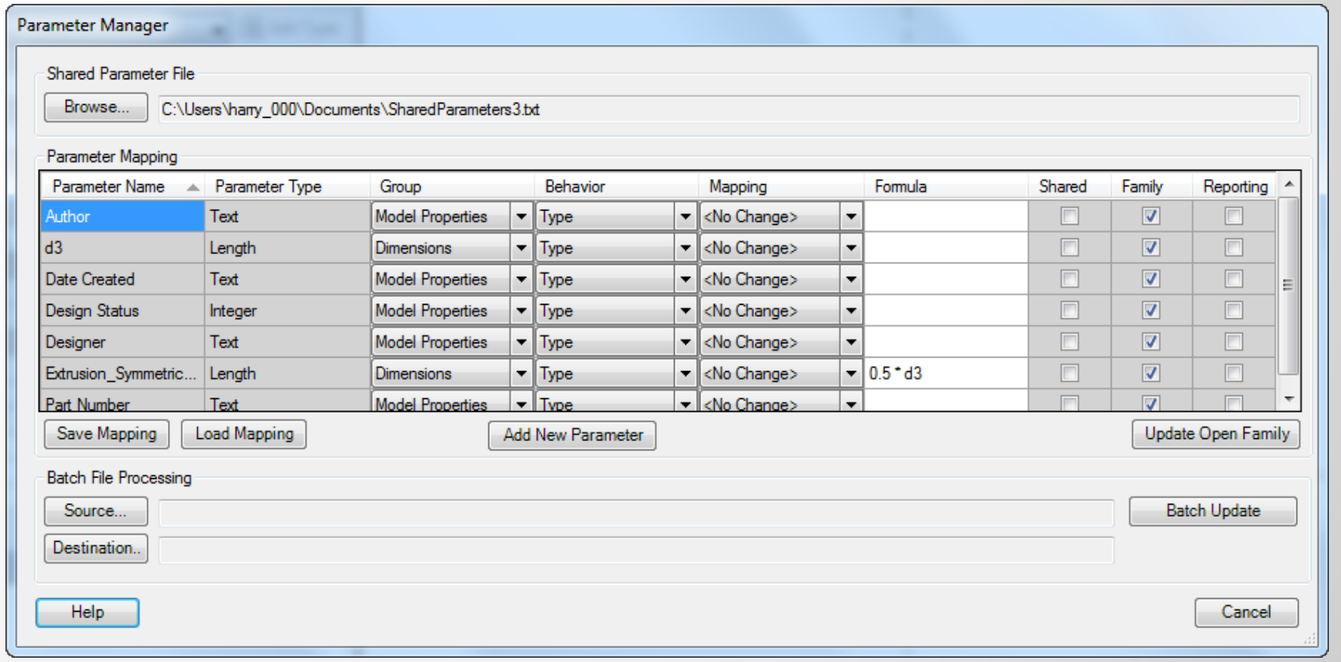
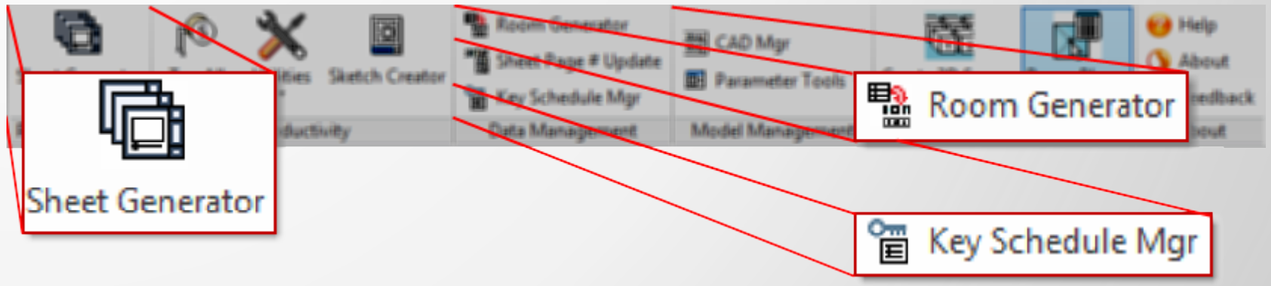
- Some are more complex
  - Multiple options
  - Multiple dialogs



Keep It Simple Stupid (KISS)

- Most of our tools are simple, limited UI
  - Click button, pick source file
- Some are more complex
  - Multiple options
  - Multiple dialogs
- Look for common behavior
  - Importing data from Excel



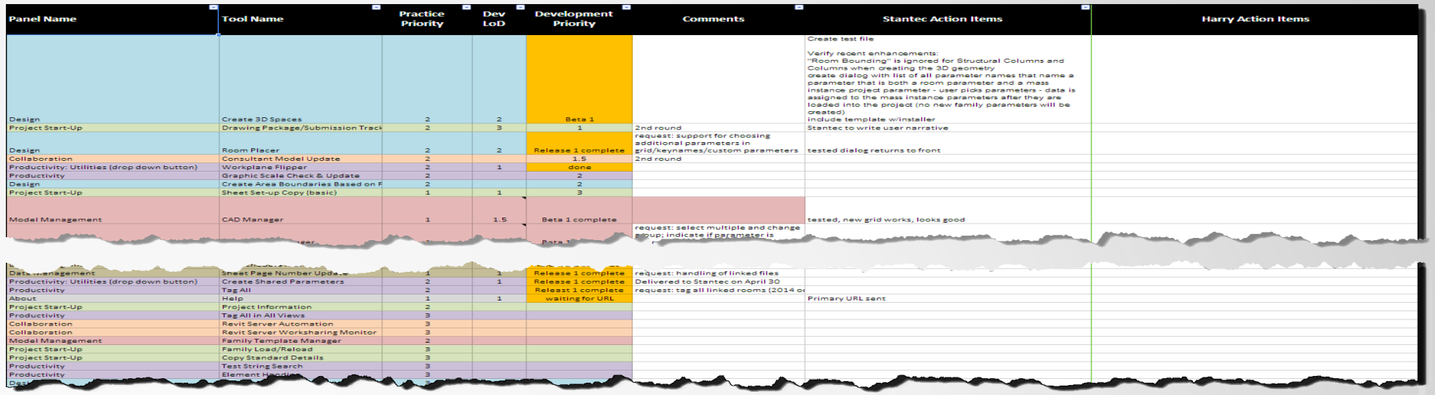
Planning

What to develop?

- Create a plan (roadmap)
  - Often necessary to justify the investment

Panel Name	Tool Name	Practice Priority	Dev LoD	Development Priority	Comments	Stantec Action Items	Harry Action Items
Design	Create 3D Spaces	2	2	Beta 1		Create test file Verify recent enhancements: "Room Bounding" is ignored for Structural Columns and Columns when creating the 3D geometry create dialog with list of all parameter names that name a parameter that is both a room parameter and a mass instance project parameter - user picks parameters - data is assigned to the mass instance parameters after they are loaded into the project (no new family parameters will be created) include template w/installer	
Project Start-Up	Drawing Package/Submission Track	2	3	1	2nd round	Stantec to write user narrative	
Design	Room Placer	2	2	Release 1 complete	request: support for choosing additional parameters in grid/keynames/custom parameters	tested dialog returns to front	
Collaboration	Consultant Model Update	2		1.5	2nd round		
Productivity: Utilities (drop down button)	Workplane Flipper	2	1	done			
Productivity	Graphic Scale Check & Update	2		2			
Design	Create Area Boundaries Based on F	2		2			
Project Start-Up	Sheet Set-up Copy (basic)	1	1	3			
Model Management	CAD Manager	1	1.5	Beta 1 complete		tested, new grid works, looks good	
				Beta 1	request: select multiple and change group; indicate if parameter is		
Data Management	Sheet Page Number Upda	1	1	Release 1 complete	request: handling of linked files		
Productivity: Utilities (drop down button)	Create Shared Parameters	2	1	Release 1 complete	Delivered to Stantec on April 30		
Productivity	Tag All	2		Releast 1 complete	request: tag all linked rooms (2014 o		
About	Help	1	1	waiting for URL		Primary URL sent	
Project Start-Up	Project Information	2					
Productivity	Tag All in All Views	3					
Collaboration	Revit Server Automation	3					
Collaboration	Revit Server Worksharing Monitor	3					
Model Management	Family Template Manager	2					
Project Start-Up	Family Load/Reload	3					
Project Start-Up	Copy Standard Details	3					
Productivity	Test String Search	3					
Productivity	Element Handler	3					
Desi		3					

What to develop?



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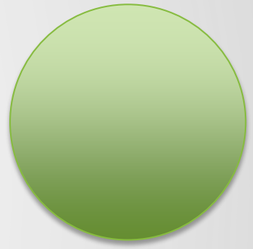
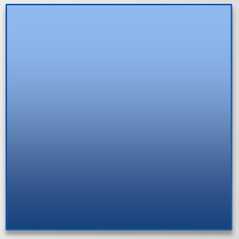
Productivity	Element Hi...	3					
Data...							

- Who are your users?
- Where are their pain points?
- What is there skill level?
- Different constituencies
  - Engineers/Architects
  - Designers/Production Staff
- You cannot make everyone happy, if no one is satisfied, you did your job.





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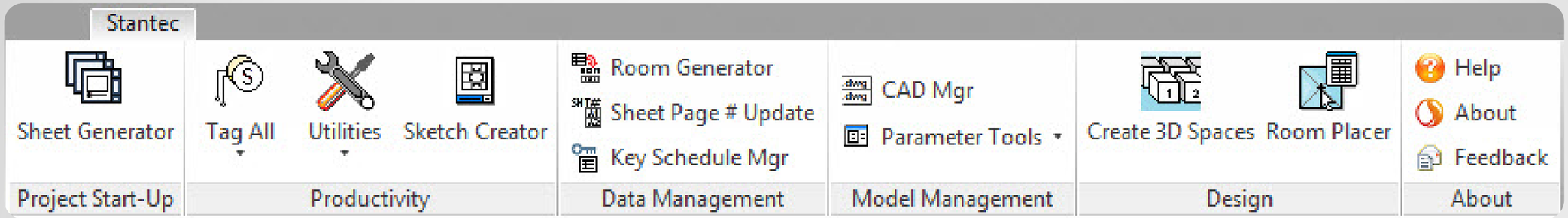
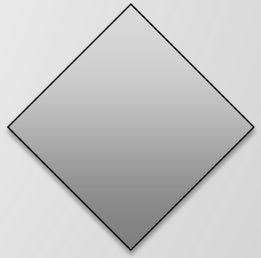
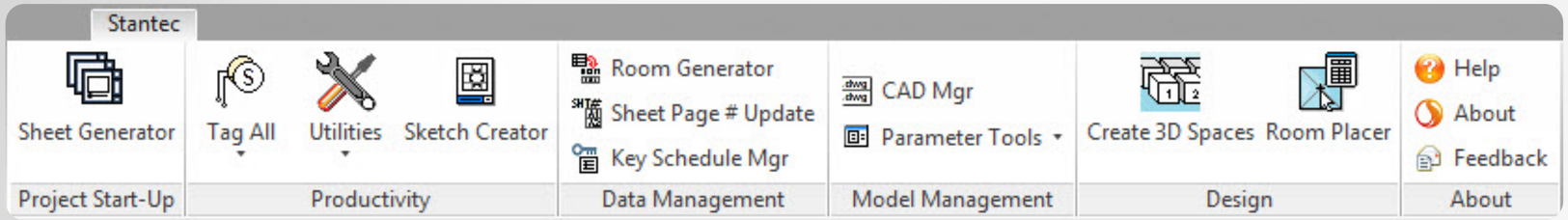
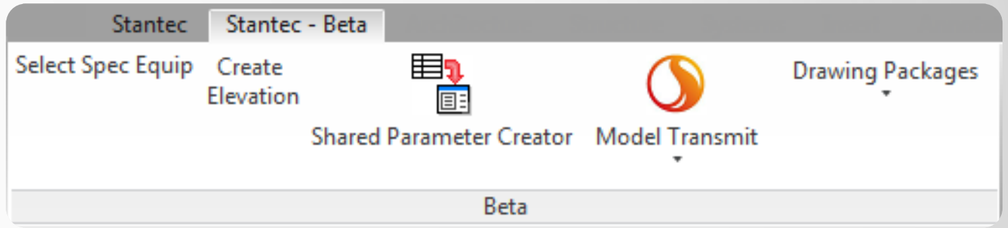


- We had a list of candidate tools
- Worked with our developer to review
- Attempted to stick to “Easy” & “Medium”



Planning

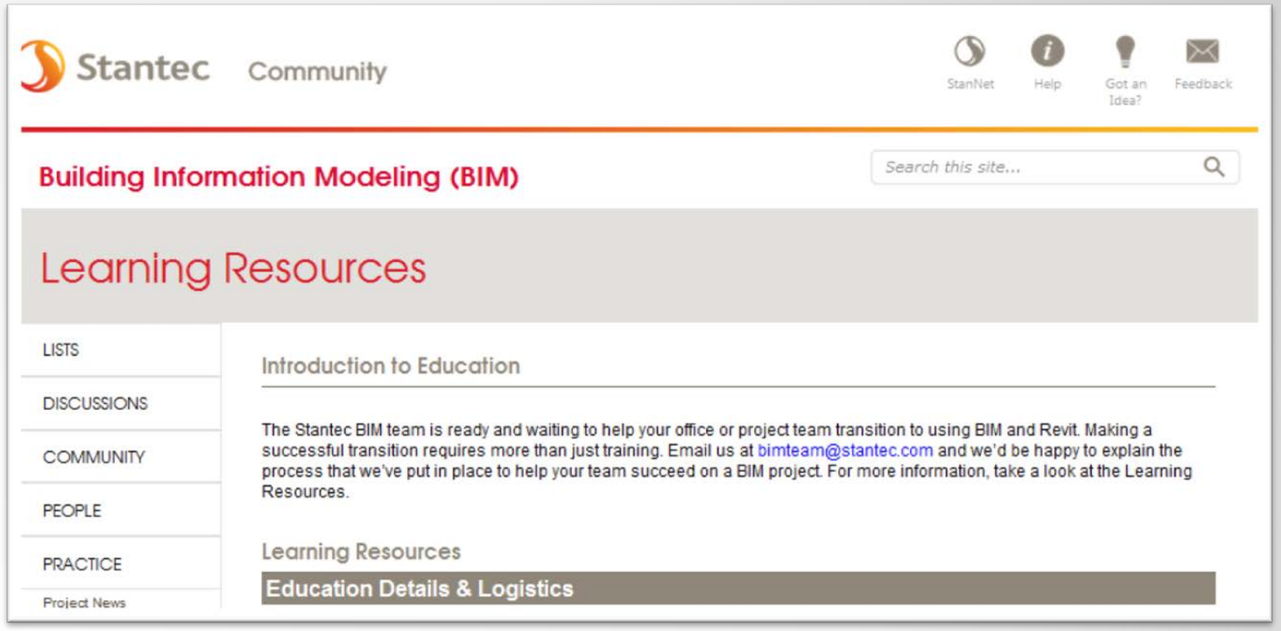


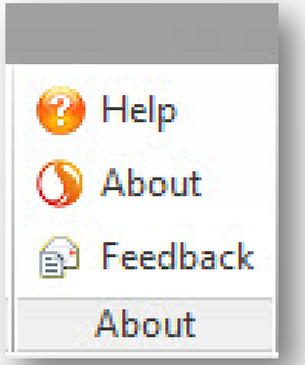


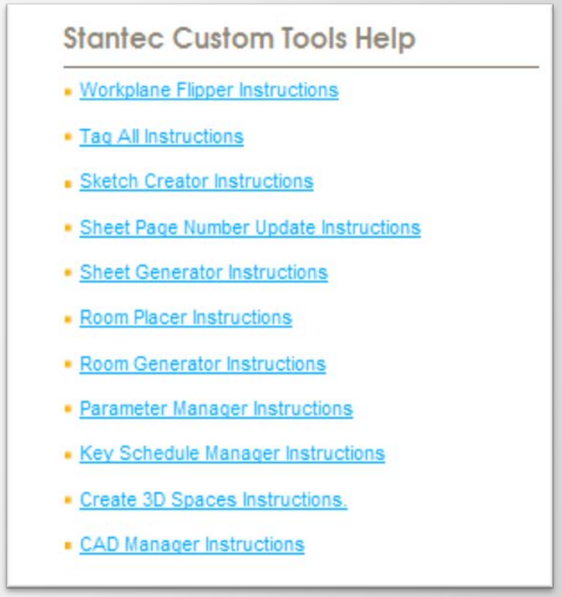
- Other logistics to think about.
- How will you:
  - Develop your User Experience (UX); organize Tabs, Panels, Split Buttons, etc.
  - Deploy the software and manage updates & bug fixes?
  - Manage versioning for Revit?
  - Beta Test software?

Planning

- Help Documentation
  - Clear and concise
  - Easy to update (not a help file)
  - Organized
  - Feedback link/button (built-in)



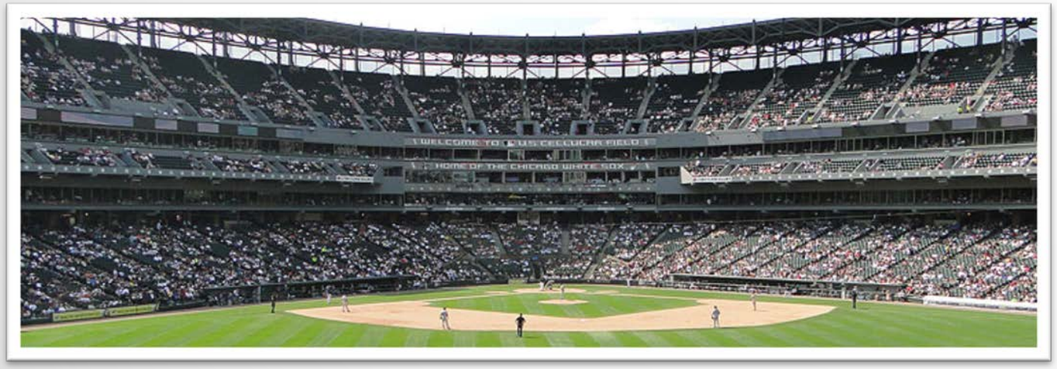




Executing

Organize

- Prioritize
  - Value to user/practice (return)
  - Cost to Develop (effort)
- Combine the two and reach a “Development Priority”
- This was not a scientific process.



Practice Priority	Dev LoD	Development Priority
2	2	Beta 1
2	3	1
2	2	Release 1 complete
2		1.5
2	1	done
2		2
2		2
1	1	3
1	1.5	Beta 1 complete
		Beta 1

Paying for development

- To fund development you need a plan:
- Tool X will cost: $1000
- Tool X can save our users: 10 minutes each time
- Users will use Tool X: Once per day

One User:

$$10\ minutes\ \times 250\ days\ = 2500\ minutes$$

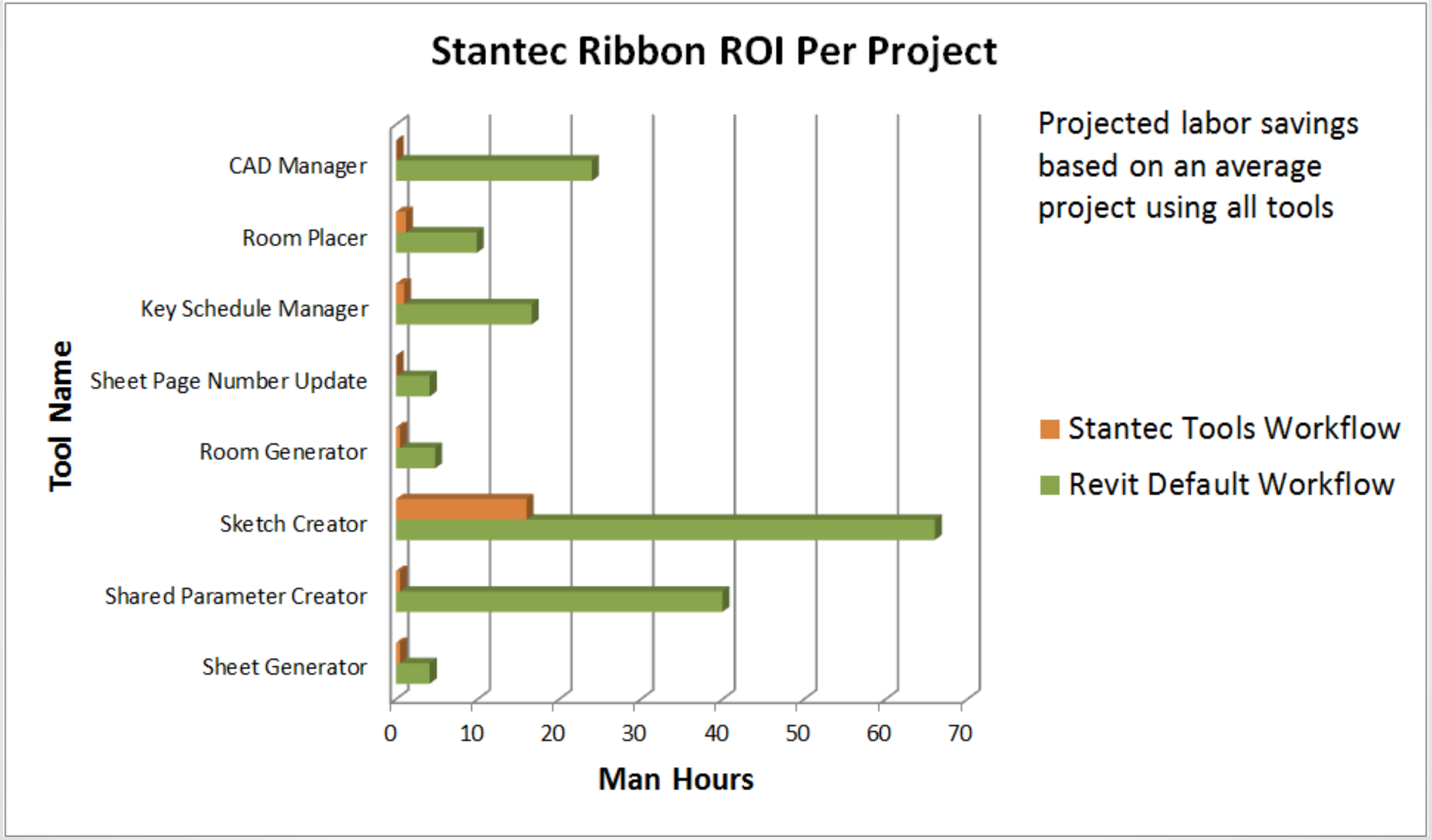
$$2500\ mins/60\ mins\ = 41.6\ hours$$

$$41.6\ hrs\ \times \$75\ rate = \$3120$$

$$\$3120\ - \$1000\ dev\ cost = \mathbf{\$2120\ annual\ savings}$$

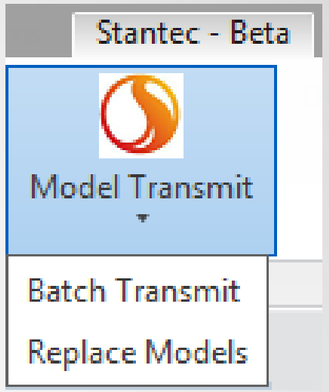
Our ROI Graph

Total Savings (hrs) =	150	x ave rate	$ 95.00	=	$14,220	SUMMARY ROI PER PROJECT



Paying for it

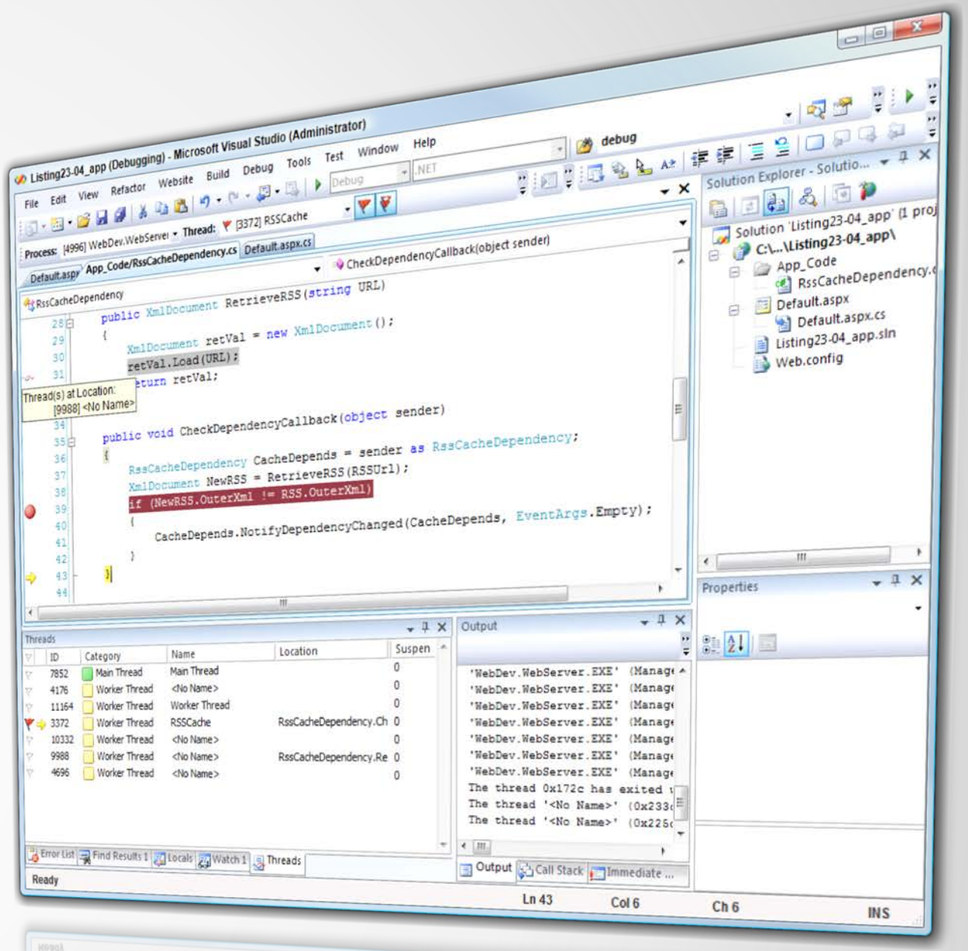
- Encourage Projects to pay for development
- Potential to be “deployed”
  - Depends on level of finish
  - Value to other teams
- It is all still the company’s money
  - Avoid territorial claims up front.
  - The tool belongs to the company



$$\begin{aligned} & 20\ models \\ \times\ & 6\ minutes \\ \hline & 2\ hours \\ \times\ & 50\ weeks \\ \hline & 100\ hrs \\ \times\ & \$75\ rate \\ \hline & \$7500 \end{aligned}$$

Executing the work

- You need a developer
- This is more than AutoLISP
- C# & VB are both full languages for writing applications
- Familiarity with data structure can be helpful.
- Experience counts!
- Creativity & thinking skills



Finding the right person

- Things to consider:
  - Internal or External?
  - Which attributes are most important?
    - Database experience
    - Application Development
    - Industry Experience
  - “Ownership” of final product
  - Intellectual Property Rights
    - very murky and grey area when it comes to software and code

Executing the work

- Clear chain of command
  - Our developer reports to “me” (BIM R&D Leader)
- No different than any other project.
  - Watch the budget.
  - Assure goals can be achieved
  - Make the tough decisions when you have to, “we have to stop here/now”.
  - Feedback Loop(s)

Justification & Execution

- How do you assure you receive fair value?
  - Start simple, short term project/contract.
  - From the roadmap identify one or two easy projects.
- Do the math for leadership:
  - If we develop Tool X our return on investment will be $x
- User feedback helps.

“I just want you to know that this is FANTASTIC!! this saved a few days of my time.”

“because of your help…I now have all of the required parameters loaded into the models”

Conclusion

- Customization makes sense for many different reasons
  - To do something the software cannot currently do.
  - To alleviate users of repetitive low value tasks.
  - To eliminate error and improve quality.
  - A combination of the above.
- Find the reason that makes sense for you, build a case

Please fill out surveys.

Questions?

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