



# EPICENTRAL

A Newsletter from Epicenter Development Group  
highlighting ideas that improve organizations

Welcome to Epicenter Development Group's newsletter, EPICentral. The purpose of this newsletter is to highlight fundamental ideas that have helped organizations develop and maintain great manufacturing and service operations. We hope that you find our EPICentral newsletter helpful, and we would welcome your comments on its content.

## Solver - A Powerful "What-If" Tool for Excel

If you know me, you probably know that I'm somewhat of an Excel "Geek". When new versions of Microsoft Excel come out, I typically go through the list of new features to see if any new tools have been added that would be useful for analyzing or designing systems. This month's newsletter is around an Excel tool that has been available for a while but not widely used called "Solver." The Solver enables professionals to set up "what-if" experiments to determine the required "inputs" to hit a target output or the best "inputs" to minimum or maximize a specific output.

### Example Uses

- Identify the optimal sales mix to maximize profit.
- Determine the optimal staffing plan to maximize profit.
- Identify (logistically) the best place to make and store your products.
- Generate an optimal training or meeting schedule.
- Determine the best investments to maximize your return-on-investment.

### Using Solver (Basic Steps)

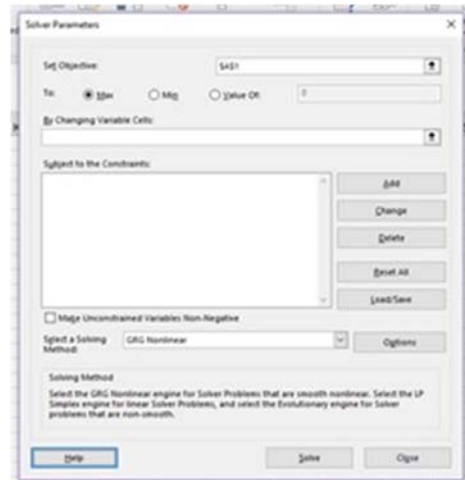
**1. Activate Solver.** - Solver is an optional add-in in MS Excel and needs to be activated.

- In the latest MS Office Excel version, go to "File" ==> "Options" ==> "Add-Ins" ==> "Manage: Excel Add-ins" ==> Press "Go..."
- Click on "Solver Add-in" and Press "OK"

- Excel should install the add-in.

## 2. Start Solver Add-In in Your Spreadsheet.

- Go to "Data" ==>"Analysis" ==> Press "Solver"
- This will open up the "Solver Parameters" window for setting up the scenario.
- You will need to have macros enabled in Excel to use this tool.



## 3. Set the Objective Cell to Maximum, Minimum or Match.

- Set the cell address with the target value (referred to as the Objective Cell) and check either "Max", "Min" or "Value of" (with a value).
- **Examples:** Profit Amount, Cost Amount, Throughput, Lead-Time

## 4. Set the Decision Variable Cells to Change.

- Identify the cell addresses with the values that will be changed by Solver (referred to as Decision Variable Cells).
- **Examples:** Staffing Level, Storage Quantity, Storage Location, Sales Level

## 5. Set the Constraints.

- Click on the "Add" button which will open a dialog for setting the cells with values that must be constrained.
- Identify the constraints.
- Constraints can apply to one or a range of cells.
- There are three options besides numerical limits that can be set which include the requirement that values within a range are all unique, integers or binary.
- **Examples:** Maximum Funds Available, Maximum Staffing Available, Maximum Storage Capacity



## 6. Select the Solving Method and Options.

- There are three different solving methods that can be used depending upon your unique problem, and these are listed/explained by Excel in the parameters window.
- The "Options" button opens up a separate menu with additional options to use like maximum time to consider solutions, constraint precision, random seeds, etc.

## 7. Run the Solver.

- When you are ready, press the "Solve" button to start the Solver.

- Once the Solver is done, it will generate a report which will summarize the results of the analysis (original and final values, slack in the constraints, etc.).

### Considerations:

- The Solver tool is best used when you want to evaluate a large number of "input" combinations. If you are only interested in a single "input" then it would be easier, for example, to use Excel's "Goal Seek" tool.
- The Solver tool only works if you have a mathematical understanding of the relationship between the "inputs" and the "outputs". You can only predict profit, for example, if you understand the costs and income related to the "inputs" selected.
- It is helpful to write out the constraints in words before generating the equations.
- The Solver tool may have different options depending upon the version of Excel you use.
- The Solver tool does have size limitations (200 decision variables, for example). If you have a problem that requires a larger model then you can upgrade to one of FrontLine Solvers Excel add-ins for an additional fee (not built into Excel).

### Next Steps

If you would like more information on this topic or other similar types of tools, please contact Bill Proctor with your request at [wproctor@epicentergroup.com](mailto:wproctor@epicentergroup.com) or 216-702-0952. You can also find previous issues of EPICentral at [Newsletters](#).

Mr. Proctor also speaks on a variety of problem-solving and system design topics that can help companies significantly increase the success and profitability of their businesses. If you are interested in having Bill speak at one of your upcoming meetings/events or would like more information on any of the speaking topics, please visit [Speaker Services](#) or you can email [sales@epicentergroup.com](mailto:sales@epicentergroup.com).

Epicenter Development Group is a unique consulting firm that seamlessly integrates the disciplines of Systems Engineering and Organizational Analysis & Development to create practical design solutions to your toughest challenges. It is on the cutting edge of problem-solving solutions and the creator of a unique process called GreenRoom Engineering. This process adds greater value and cost savings for clients as compared to traditional engineering methods.

William Proctor, Epicenter's founder and president, has provided services around the

### Epicenter News

Epicenter recently completed a simulation modeling project with UnderArmour in Nashville.



country to more than 100 companies consisting of a variety of organizations; and Epicenter continues to grow as a resource for firms of all sizes.

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