Feedback Rich Model Construction with Powersim Studio

International Conference of the System Dynamics Society

20 July 2017

Cambridge, MA

Mindseye Computing LLC

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Powersim Studio: www.powersim.com

- Studio is a system dynamics modeling software from Powersim AS in Norway
- Studio 10 is the current version, initial versions began in 1988 (SimTek)
- Versions: Modeling tools | Developer Suite | End-user tools | Academic tools
  - Premium
  - Expert
  - Professional
  - Academic
  - Cockpit (free)
  - Express (free)
  - SDK and workstation for internet deployment

What we are using today

Plus a fully featured 30 day demonstration version.

- Powersim AS has partnered with Forio and MAS consulting to provide easy to use PC to Web application generators

Studio features*

Topic	Description	Pro	Exp	Pre
Modeling	Stock-and-flow modeling, multiple diagrams for organizing your model	X	X	X
	Drag-and-drop variables into input/output objects to create user interfaces	X	X	X
	Automatic unit control, adding quality to your model	X	X	X
	Series Variables	X	X	X
	Function library with over 200 functions, e.g. delay and array functions	X	X	X
	Custom Functions		X	X
	Team collaboration			X

Topic	Description	Pro	Exp	Pre
Features	Distribution to Studio Executive, Studio Cockpit and Studio Simulation Engine			X
	Number of elements for Dynamic Ranges	100	100	∞
	Risk Analysis, Optimization & Risk Management		X	X
	Password-protected models		X	X
	Monitor Performance			X
	Placeholders	X	X	X

* We will look at the highlighted items with Studio.

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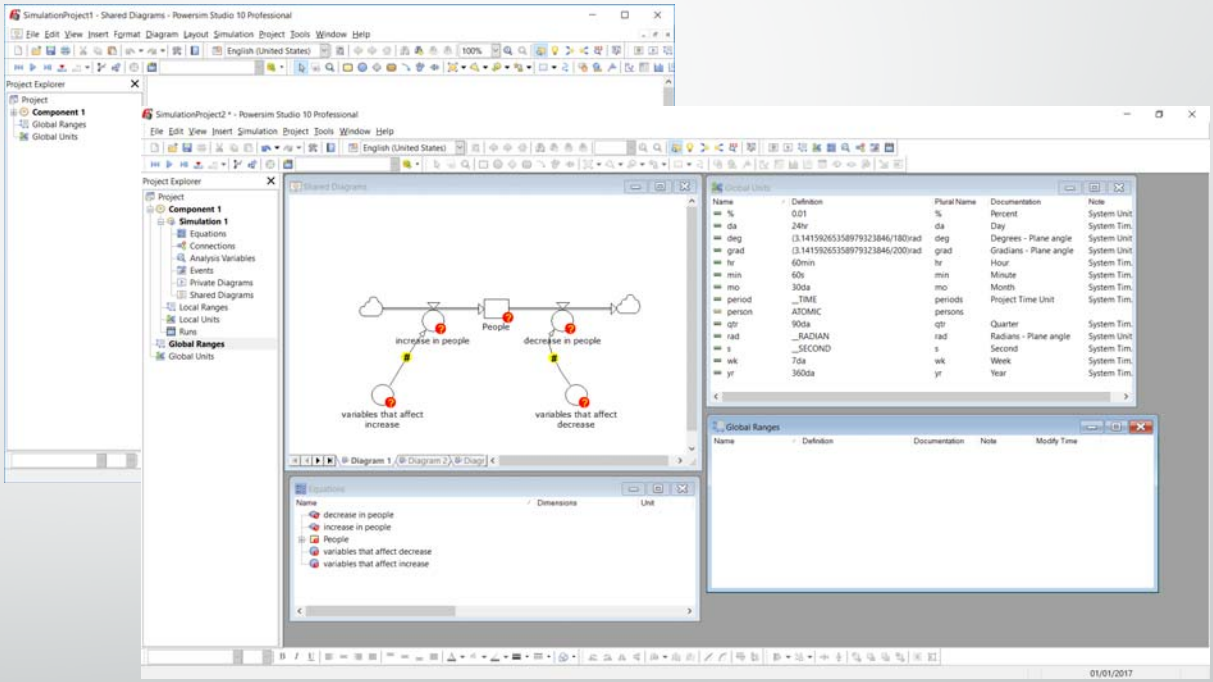
Topic	Description	Pro	Exp	Pre
Presentations	Distribution to Studio Executive, Studio Cockpit and Studio Simulation Engine			X
	Action buttons execute a set of actions, constituting a way to add user interface logic to simulations	X	X	X
	Save reference runs for comparison with your base scenario	X	X	X
	Provide texts for modeling constructs and user interface elements in multiple languages, achieving a multi-lingual model/simulation	X	X	X

Topic	Description	Pro	Exp	Pre
Connectivity	Connect to relational databases through Database Datasets			X
	Placeholders for datasets and data functions[1]	X	X	X
	Connect to Microsoft Excel spreadsheets through datasets, functions or drag-and-drop	X	X	X
	Connect to file databases through database functions[2]	X	X	X
	Connect to server databases through database functions[3]			X
	Connect to external data sources using scripts in Sidekick windows and Show Dialog actions	X	X	X

Topic	Description	Pro	Exp	Pre
Technical features	Amount of memory allowed for variable values in bytes[4]	8M	2G	192G
	Elements allowed per array variable (in up to 6 dimensions) in milllions[5]	0.01	0.5	10
	Maximum number of cores used in multi-core processing when running simulations	2	3	8
	Enable Active Content (VBFUNCTION, etc)		X	X

Studio workspace and interactive development environment

- Windows compliant
- Customizable
- Multiple window enabled



Let's take a look

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First, let's build a model

- Population growth
  - INITIAL POPULATION = 1000 persons
  - Population = Integral of GROWTH RATE , initial value is INITIAL POPULATION
  - GROWTH RATE = 1.1 %/yr
  - Increasing population = INITIAL POPULATION * GROWTH RATE
- How would one start such a model in Studio?
  - Use the blank workspace
  - Use the model building Wizard

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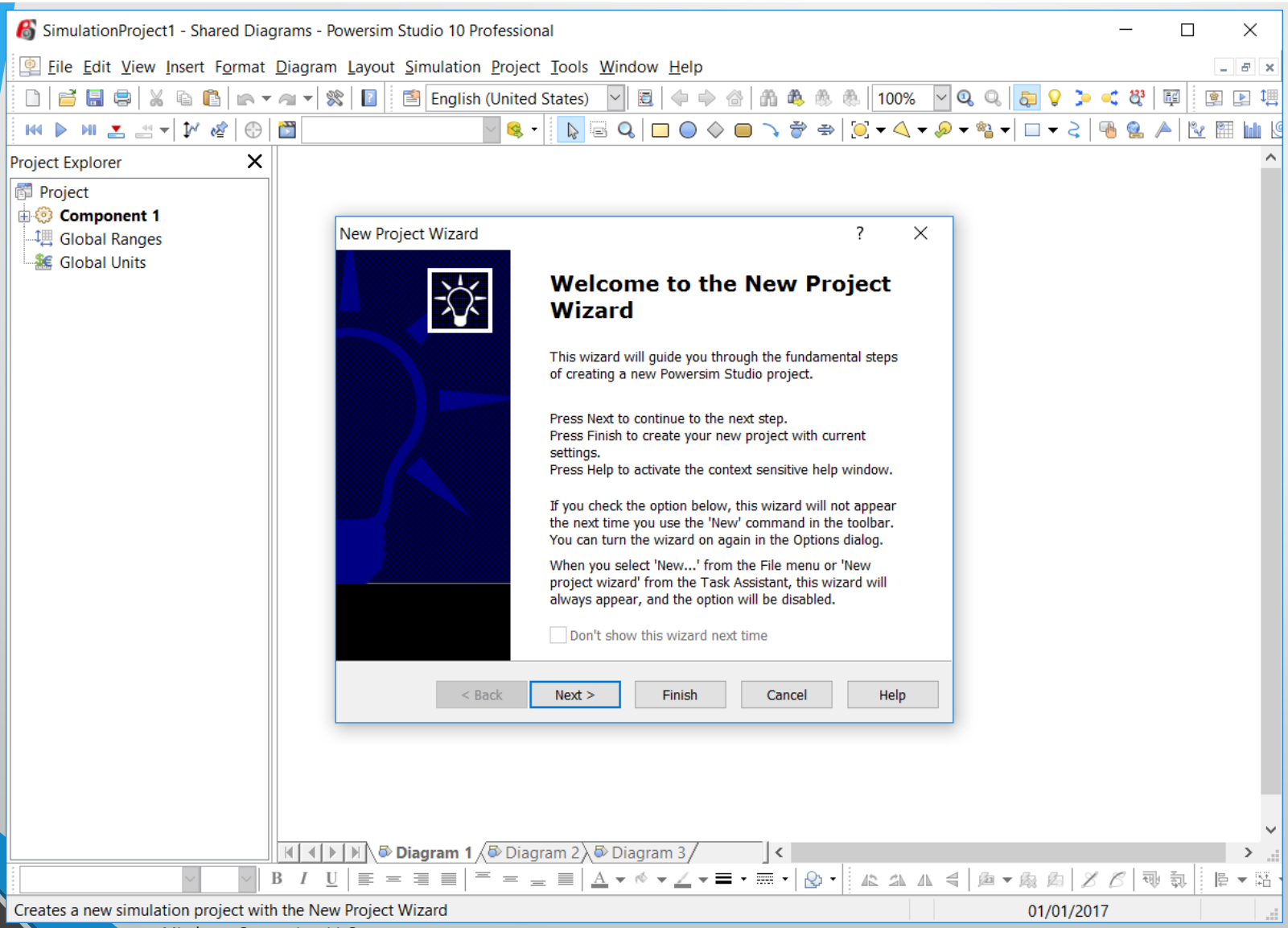

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What does the Wizard help with?

- Wizard screens
  - Language – English, Spanish, French, etc.
  - Compatibility – older versions of Studio
  - Time Unit Consistency – a must
  - Calendar and Time Interval – specific to problem
  - Series variables
  - Time range of the simulation
- Other more detailed settings are under:
  - Simulation Settings
  - Project Settings

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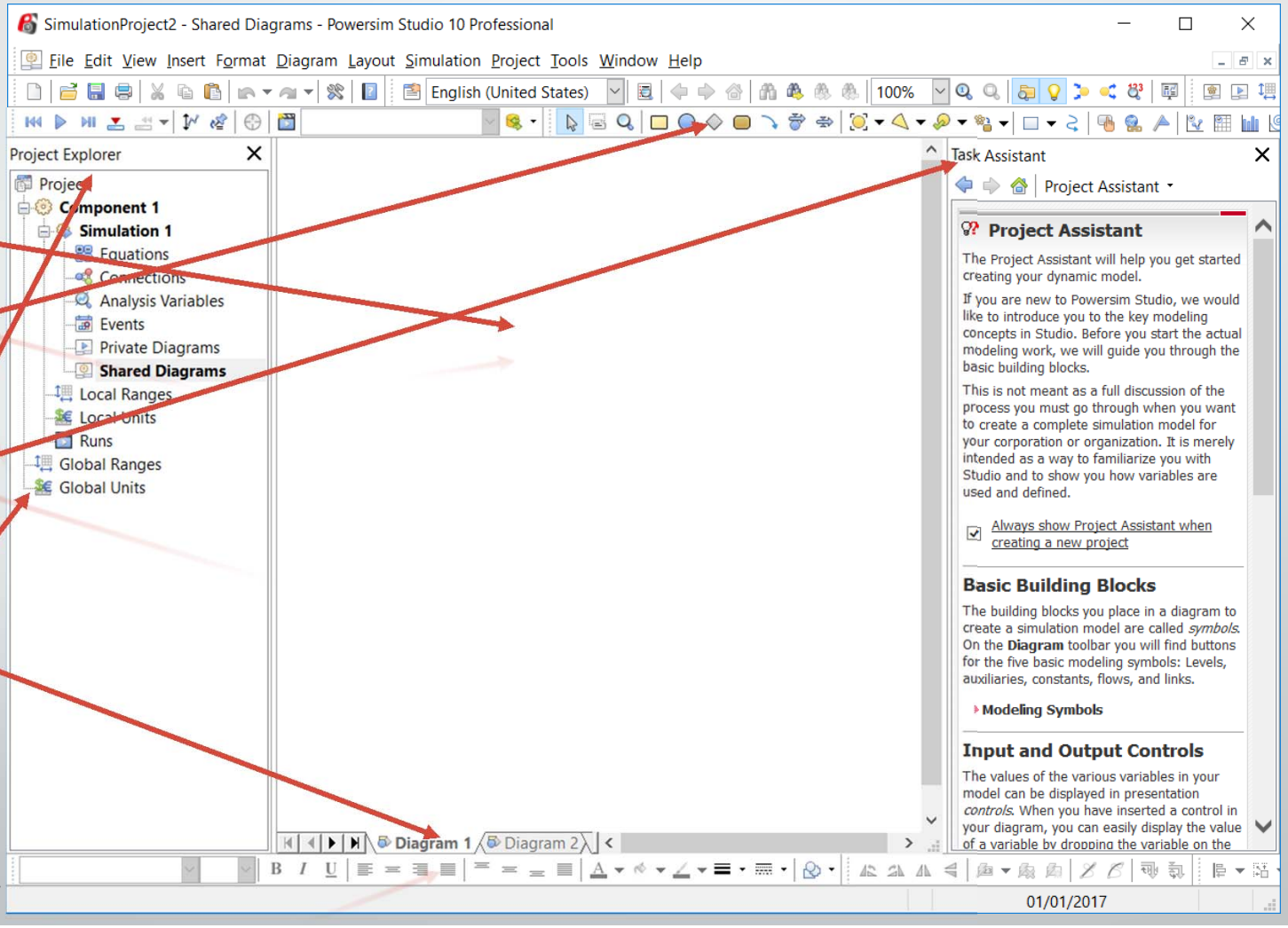
After the Wizard

- Model worksheet
- Modeling Tools
- Project Explorer
- Task Assistant
- Global Settings
- Model Tabs



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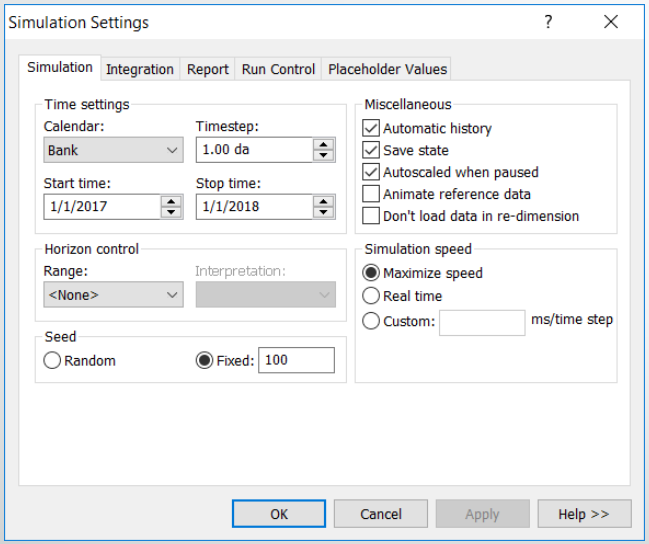
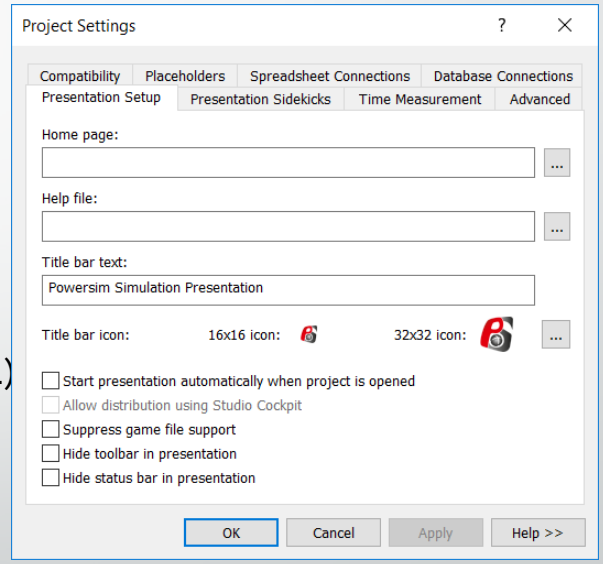
Detailed settings

- Time
- Integration
- Reporting
- Run control
- Placeholders



- Compatibility
- Placeholders
- Spreadsheet
- Database
- Presentations
- Sidekicks (HTML)
- Time
- Advanced



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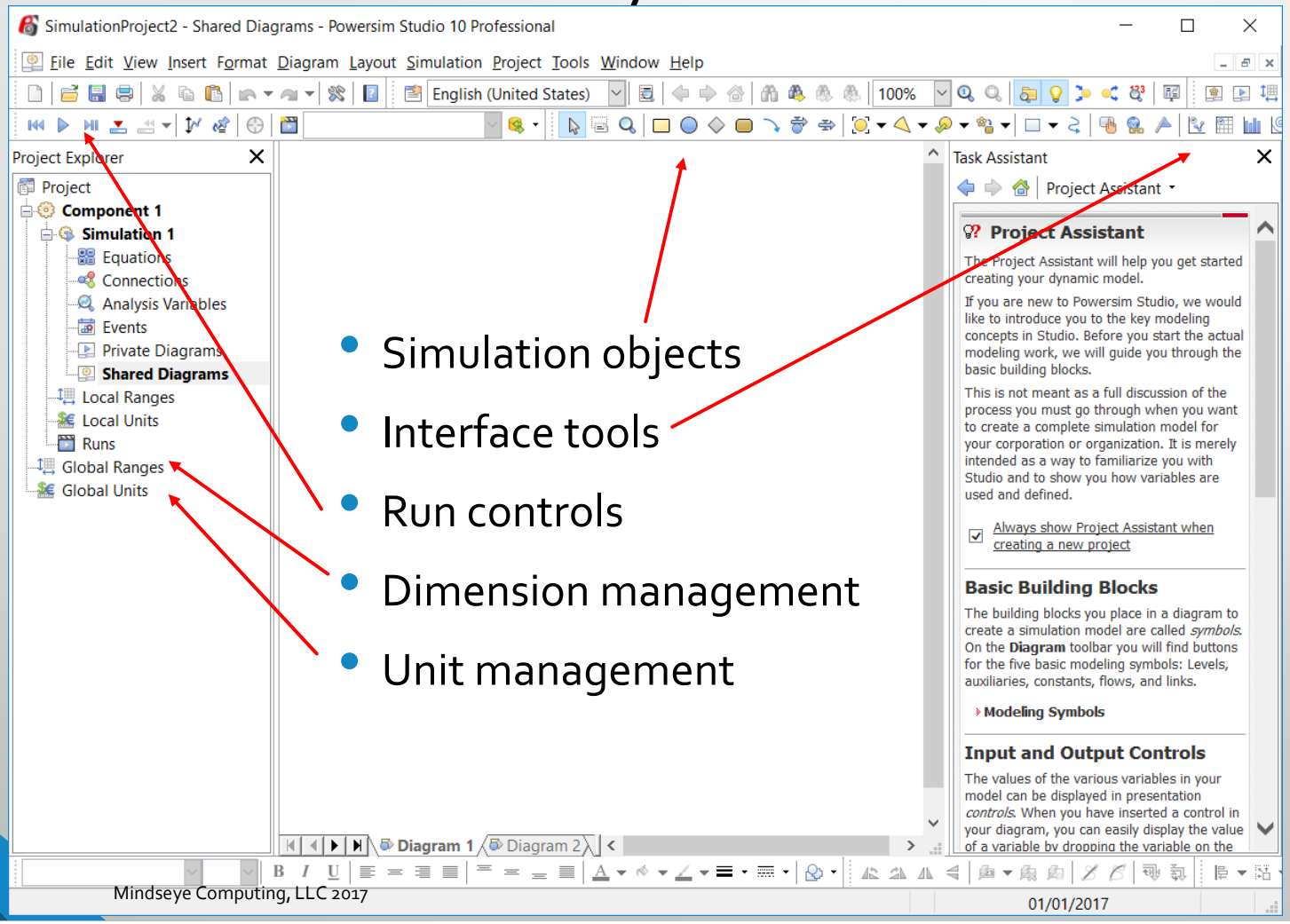
Commonly used features



- Simulation objects
- Interface tools
- Run controls
- Dimension management
- Unit management

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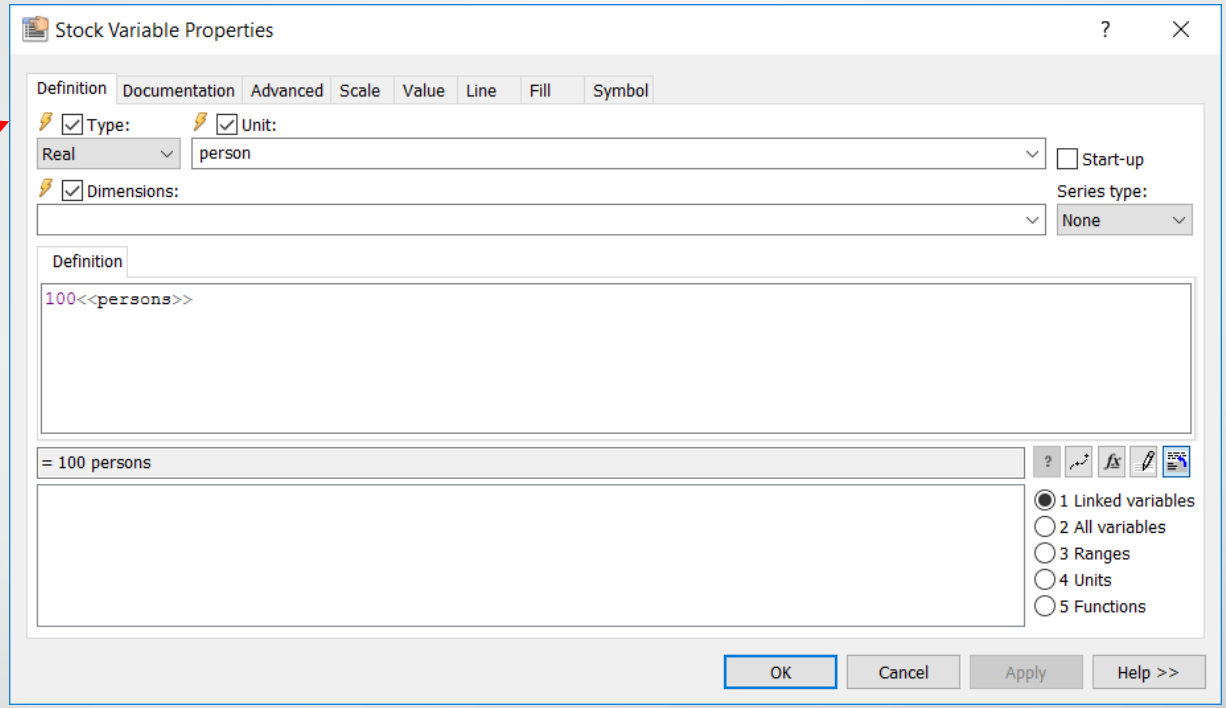
Variable definition

- Feature rich definition
  - Define
    - Functions
  - Document
  - Scale
  - Design
  - Advanced



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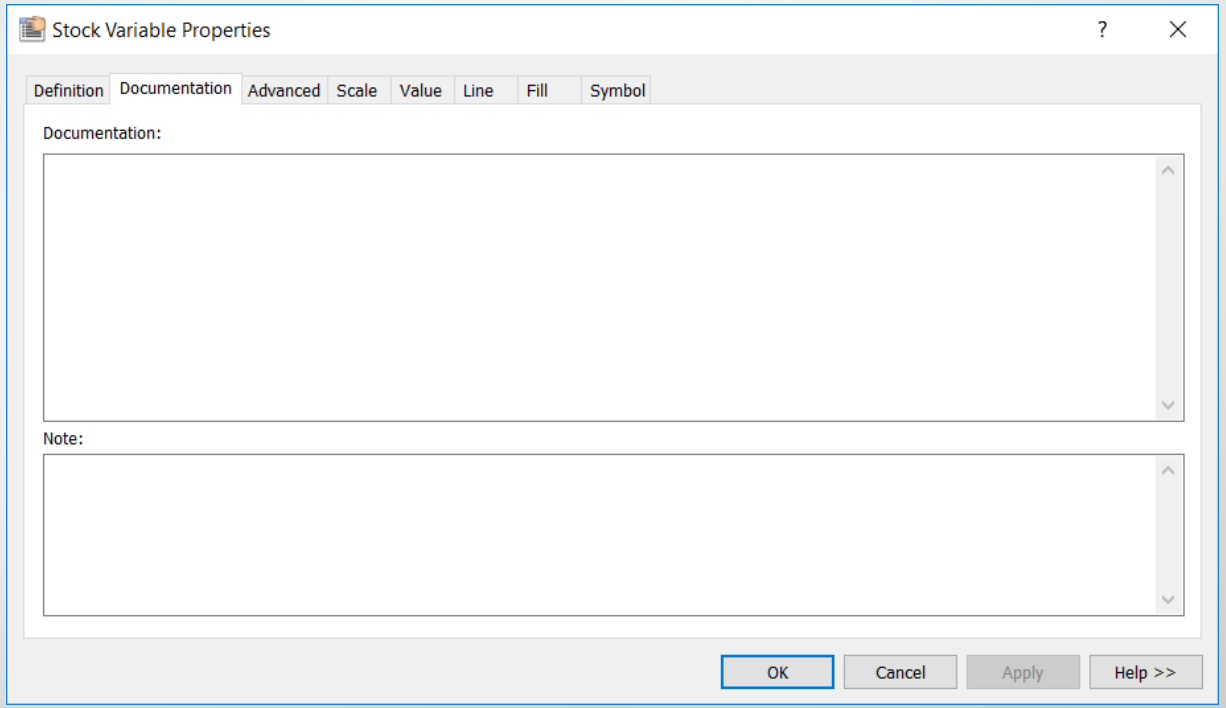

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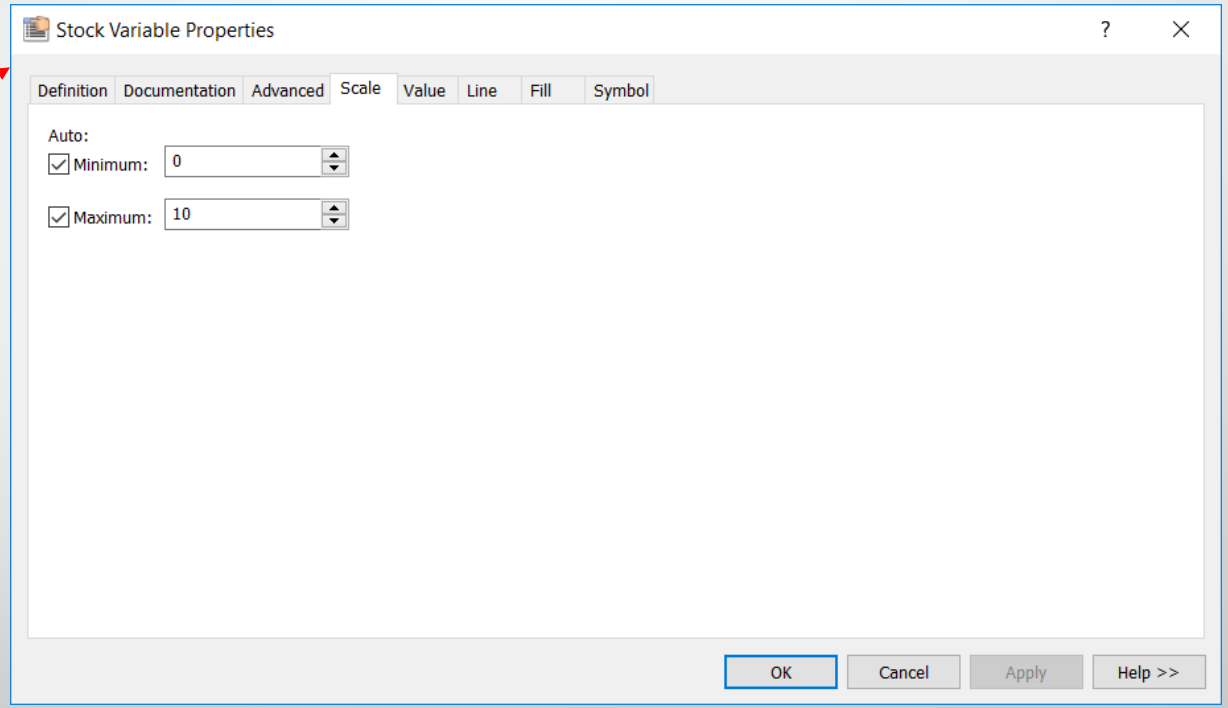

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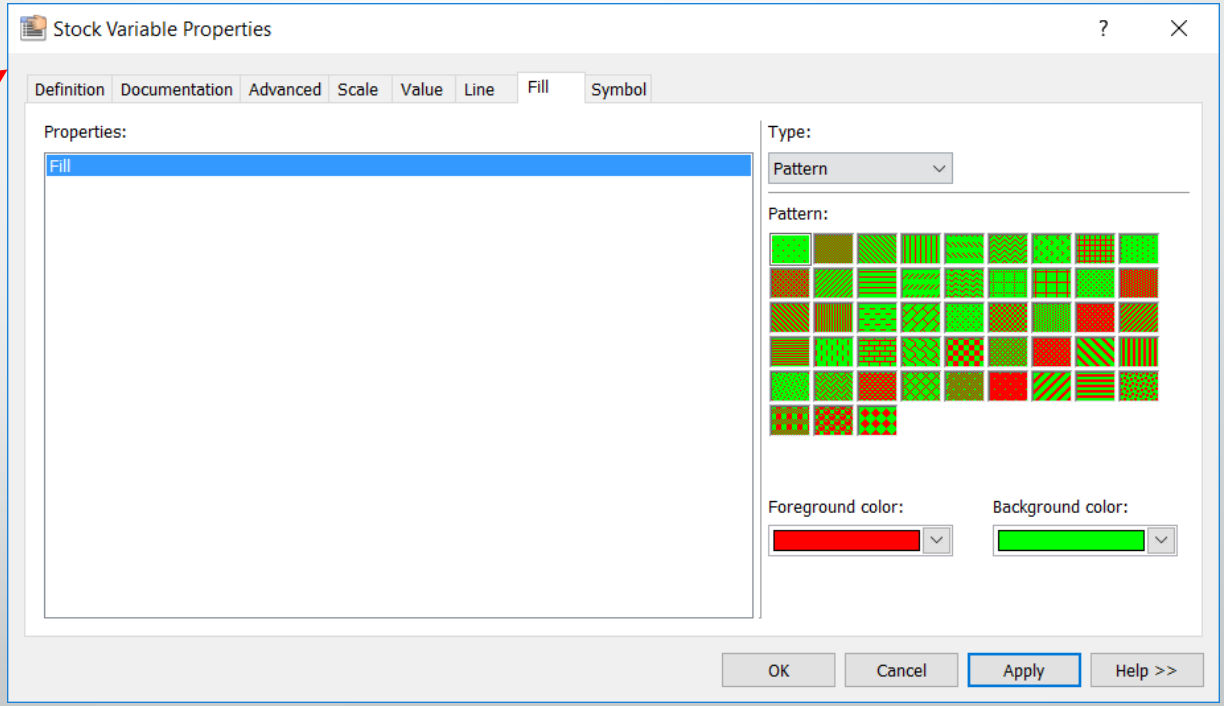

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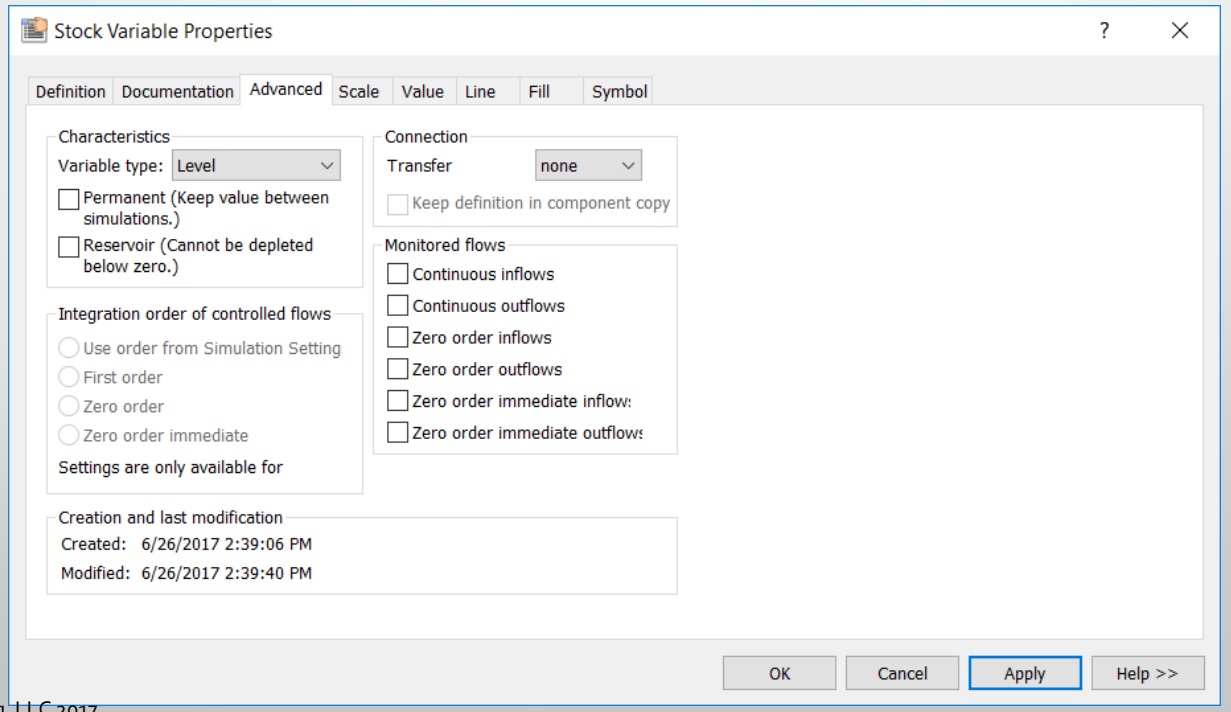

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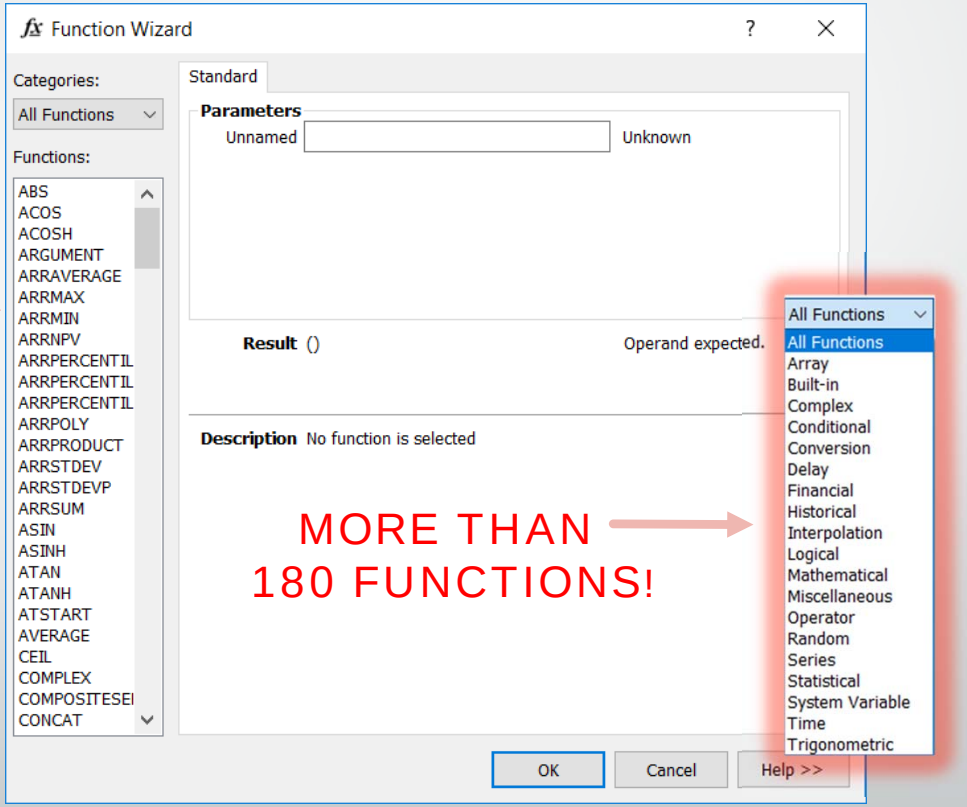

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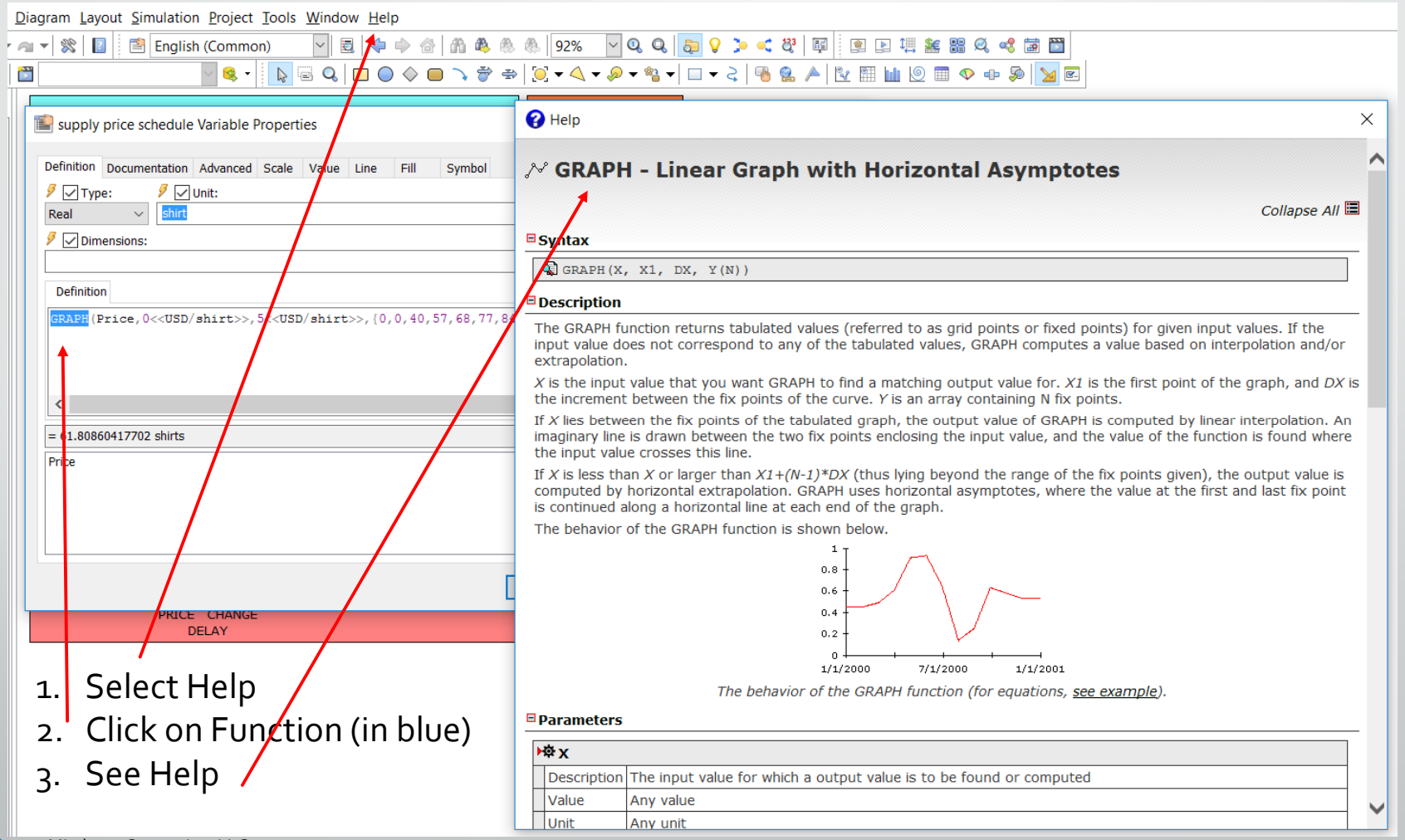
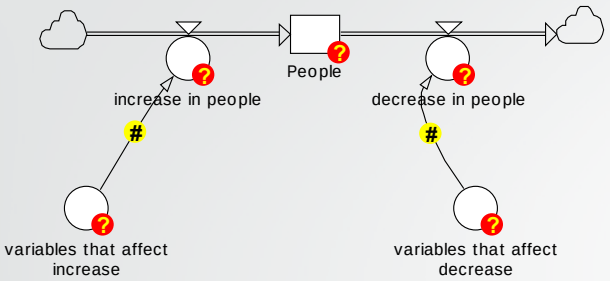
Context sensitive Help



1. Select Help
2. Click on Function (in blue)
3. See Help

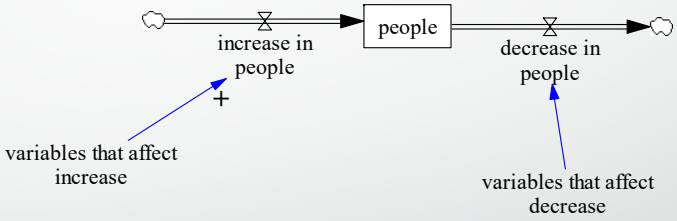
Build stage: 3 tools - design

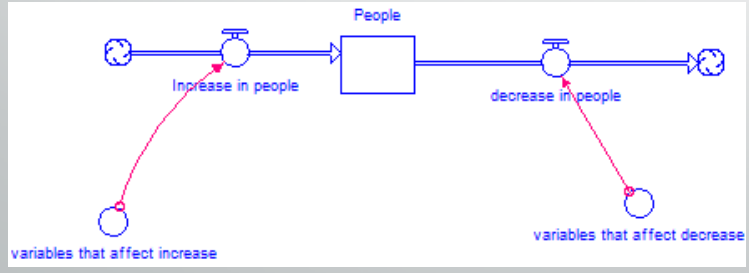


This is what you would see building a model by just placing objects on the screen. Studio has only one definition window => immediate feedback!

Powersim Studio

Ventana Vensim

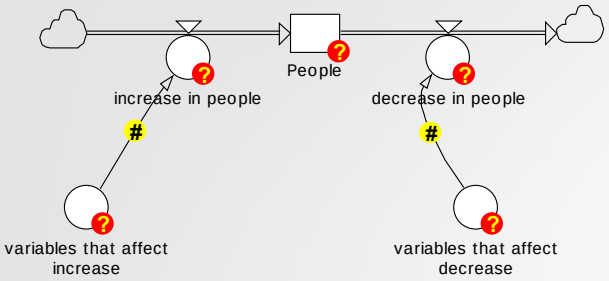




ISEE Systems iThink – Map

Definition stage: 3 tools - definition

This is what you would see when selecting Model (Stella/iThink) or *f(x) (Vensim)*; Studio has only one definition window => immediate feedback!



Powersim Studio

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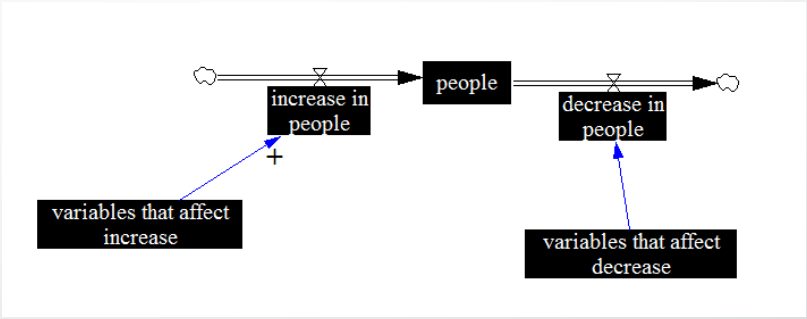

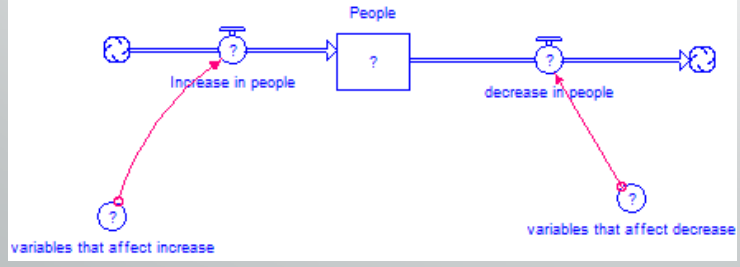

isee systems iThink – Model view

Our recommendation: define as you go, take advantage of all the power of Studio

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Conclusion

- Powersim Studio
  - Most powerful tool on the market – Why?
    - Unit handling
    - Model size
    - Array handling
    - Collaboration
    - Ease of use: excellent context sensitive help
    - Functionality
    - Custom functions: internal (VBScript) and external (C++)

Thank You

www.mindseyecomputing.com

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Further Information

- Mindseye Computing
  - Email: mindseye@mindseyecomputing.com
  - Web Page: www.mindseyecomputing.com
  - Phone: 208-520-3055
- Powersim Software AS
  - Email: sales@powersim.no
  - Web Page: www.Powersim.com

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