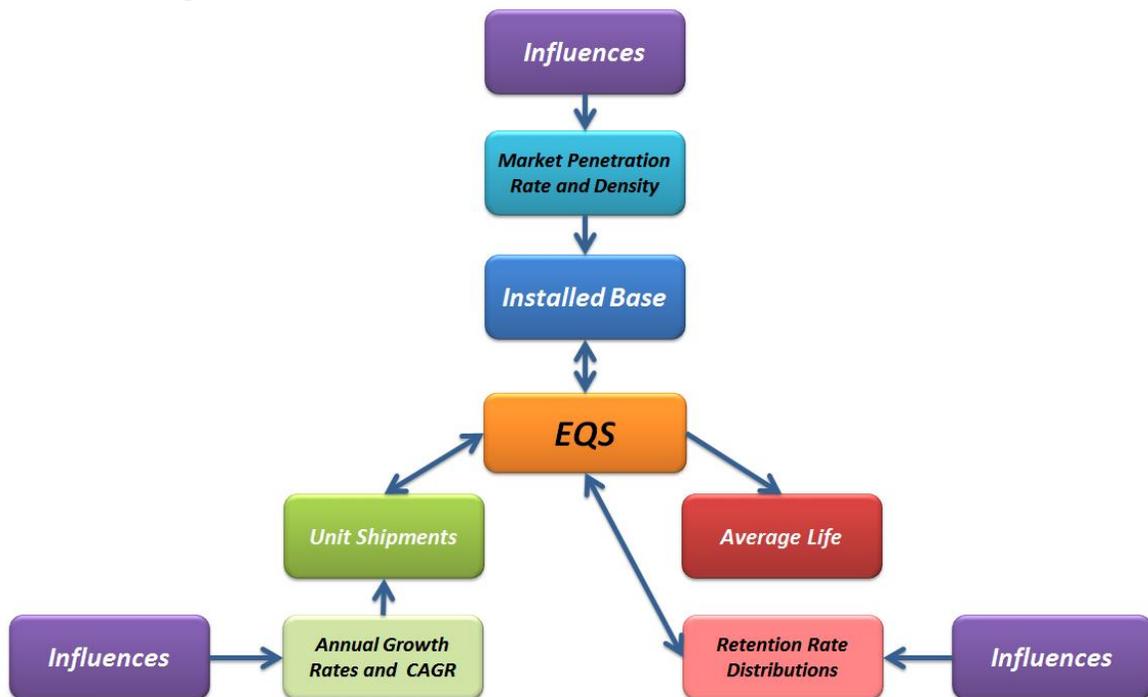


## EquilibriumSolver™ Fact Sheet

**EquilibriumSolver™ (EQS)** is an Excel/VBA application that simultaneously computes a history and forecast of **Unit Shipments**, **Installed Base**, and the **Rate** at which installed base units will be **Retained** or **Replaced** each year. Originally developed for technology products or services, **EQS** is applicable to many other consumer, commercial and industrial product or service.

### The EQS Algorithm



The central component of **EQS** is an installed base algorithm that computes the number of units exiting the installed base in each year as a function of a Retention Rate Distribution (RRD) and installed base unit ages. The RRD is a table that specifies (for each annual cohort of Unit Shipments added to the installed base in each year) the percentage that will remain in the installed base at the end of each subsequent year as a function of age. The table is computed from inputs for the distribution function Mean, Standard Deviation, and Maximum Life. The parameters of the RRD, primarily the mean, vary over time, reflecting economic, demographic, technological, and market condition change.

The central **EQS** algorithm can be configured three different ways in order to compute any of the primary variables as a function of the other two.

1. **Unit Shipments output** is computed from the Installed Base and the RRD-Mean inputs
2. **The Installed Base output** is computed from the Unit Shipments and the RRD-Mean inputs
3. **The RRD-Mean output** is computed from the Unit Shipments and Installed Base inputs. In this case, the validation variables are the resulting computed **Average Life and Replacement Cycle Length (RCL)** outputs.

## Independent Forecasts

Independent input forecast for each of the primary variables, as well as average unit price, maybe constructed utilizing several forecasting methodologies developed by **Daniel Research Group**.

**TrendSolver™** – Forecasts the next value in a time-series as a function of the historic CAGR and the trend of the annual growth rate time-series. It is available to forecast Unit Shipments, Installed Base, RRD-Mean, and Average Price.

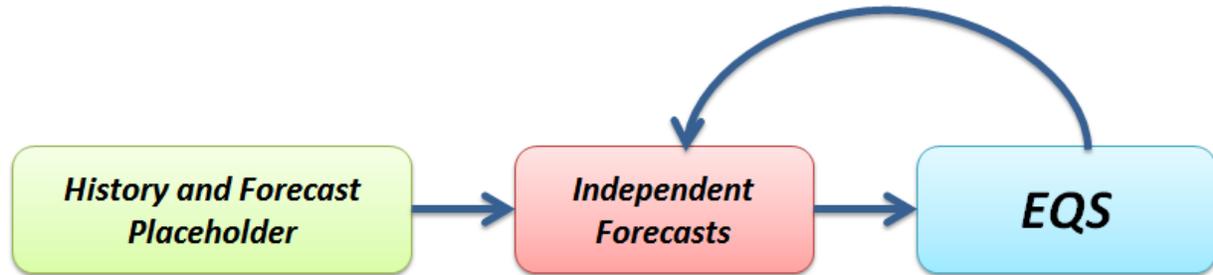
**GrowthSolver™** – Constructs a forecast time-series as a function of a target CAGR, and a relative annual growth rate pattern. The user can change the relative growth rates while keeping the CAGR constant, or conversely, change the CAGR and while maintaining the relative growth rate pattern. It is available to forecast Unit Shipments, Installed Base, RRD-Mean, and Average Price.

**PenetrationSolver™** – Forecasts the percent of a defined Total Available Market (TAM) that will purchase and use the product or service. The TAM maybe defined in terms of buyers/users, units of the product or service, or units of an enabling or prerequisites product or service. The penetration forecast uses the Fisher-Pry formulation of the Logistics (S-Shaped) function. The  $\alpha$  and  $\beta$  parameters may be directly specified by the users, or derived from a regression analysis of a specified section of the historic data. The user may also forecast the density – average number of units of product or service per penetration unit. This methodology is available for forecasting the installed base.

**ProjectionSolver™** – Forecasts the current year unit shipments as a function of year-to-data monthly or quarterly actual results, and derived or assumed monthly or quarterly trends. This methodology is available for forecasting the Unit Shipments using the **GrowthSolver** Methodology.

**Direct Entry** - Users may also externally develop forecasts for any of the primary variables, and average price, and copy those into the independent forecast modeling areas.

## Basic Operation



1. Input or use **EQS** to create the history and forecast placeholders for the primary variables
2. Create an independent forecast for one of the primary variables, usually Installed Base or Unit Shipments
3. Send the new Forecast to the **EQS** and solve for one of the other two, usually the RRD-Mean
4. Repeat steps 2 and 3 as needed
5. Repeat steps 2, 3 and 4 for either of the other two primary variables

**EQS** models may be constructed to produce a history and forecast for any market segmentation.

- Geography
- Industry, Vertical, or Market Sector
- Product or Service
- Price Bands
- Product or Service Attributes
- Customer or User Attributes
- Vendors
- Model Parameters and Scenarios

## Multiple Models

The **EQS** application offers two options for manage multiple models.

**Aggregation** – A separate tool, the **Aggregator**, imports the output data from one or more **EQS** models into a single database. Pivot Tables connected to this database support subsequent analysis and creation of production content.

**Path and Batch** - Each **EQS** model, provides the capability to define multi-step processes as paths that may be stored, re-called and executed as a single process. Paths may include options for changing inputs time-series or parameter values, allowing a large number of case/scenarios to be run in batch mode. The results are collected into a database and exported as a separate file for subsequent analysis.

**EQS** models may also be organized in a linked hierarchical structure.

## Input-Output

- **Primary Input**
  - Unit Shipments
  - Installed Base
  - Retention Rate Distribution - Mean
  - Average Price
  
- **Secondary Input**
  - Retention Rate Distribution - Standard Deviation
  - Retention Rate Distribution - Maximum Life
  - Total Available Market
  - Total Available Market Historic Penetration Percents
  
- **Primary Output**
  - Unit Shipments
  - Installed Base
  - Average Life
  - Replacement Cycle Length
  - Average Price
  - Revenue
  - Total Available Market Penetration Percent
  - Total Available Market Penetration Units
  - Density – Installed Base Units per Penetration Unit
  
- **Secondary Output**
  - Derivative Metrics
    - Annual Growth Rates
    - CAGR
  - Units Existing Installed Base
  - Average Life Standard Deviation
  - Unit Shipment New vs. Replacement
  - Disposition of Exiting Units \*
  - Depreciated Value of Installed Base \*

\* Custom Version

## Specifications

- File Size – 700 Kb
- Excel Version – Excel 2010
- History and Forecast Maximum Number of Year – 74
- Monthly/Quarterly History Maximum Number of Years - 10
- Maximum Number of Defined Total Available Market Time-Series – 5

## Benefits

**EQS allows the user to create more accurate market forecasts that meets multiple validation criteria and tests of reasonableness in significantly less time than any other forecasting process.**

**Increase Forecast Accuracy** - because the forecasts must meet both quantitative and qualitative validation criteria for a larger number of variables than other methods and processes. Because more advanced and sophisticated forecasting methodologies are provided.

**Increase Forecast Content** - Because the output produces more market metrics than other methods and processes. Because the output reflects causal influences more clearly than other methods and processes.

**Decreased Analyst and Management Time** – Because the entire forecasting process is integrated into one application than can be easily modified as new information, assumptions, and insights arise.

**Decreased Forecasting Cost** – Because the entire forecasting process will require less analyst and management time and effort.

## More Information

**EquilibriumSolver™** was developed by **Daniel Research Group**, a leading expert and consultant in the field of forecasting technology products, services, and markets. For 30 years, **Daniel Research Group** has worked with major technology market research firms and organizations, as well as mid-sized and boutique firms, and individual consultants, helping them improve the quality and accuracy of their forecasts, while significantly reducing their invested analyst and management time.

For more information about [Daniel Research Group](#) or the [EquilibriumSolver™](#).

Contact - Steve Daniel

[Steve@DanielRG.Com](mailto:Steve@DanielRG.Com)

(617) 484-6225

[www.DanielResearchGroup.com](http://www.DanielResearchGroup.com).