

## The World's Most Truthful System For Early Stage Innovation Sales Forecasting

**Merwyn Business Simulation (MBS)** is an innovation decision support tool. It forecasts the true odds of sales success for 20 different sales, marketing and development scenarios. It does this by modeling both the “most likely” forecasting assumptions AND the uncertainty of each assumption at the current moment in time.

Leading forecasting models use specific estimates of as many as 2,000 inputs to generate a specific estimate of sales. The MBS system uses 84 inputs of key values and the uncertainty of values to generate an assessment of the pessimistic, most likely and optimistic odds of success. Estimates are provided for some 20 different marketing plan and development scenarios.

Unlike “black box” forecasting models, MBS is fully transparent and costs less than many concept testing systems. This means that it can be used early and frequently during the development process to educate and empower the innovation development team as they allocate resources against those aspects of the marketing promise, product reality and profit/volume model that have the greatest need for improvement.

**Development Team Pedigree:** Merwyn Business Simulation was created by the Eureka! Ranch International R&D team. The Eureka! team has over 30 years of experience forecasting odds of success for over 15,000 innovations.



Eureka! Ranch Research clients include such corporate leaders as: Procter & Gamble, Nike, Walt Disney, Hewlett Packard, Schlumberger, American Express, Ford Motor Company and Johnson & Johnson. Following a competitive bid process, the NIST/MEP Network (a Federal and State Partnership) licensed Eureka! Ranch Technologies for use across the USA. Over the past 18 months, independent studies project that Manufacturing Extension Partnership Centers (MEP) using Eureka! Technologies, have generated over \$300 million in incremental sales impact for MEP clients.

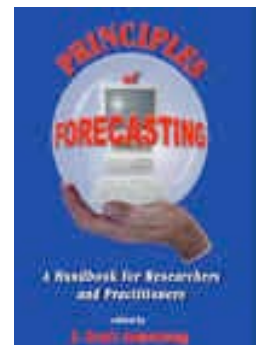
The Eureka! Research team is lead by Doug Hall, a Chemical Engineer by education who spent ten years at Procter & Gamble where he rose to the rank of Master Marketing Inventor. At P&G Doug led a small team that shipped a record 9 innovations in 12 months.

Doug's success was achieved by using Deming Total Quality Management methods of systemic discipline and measurement to improve innovation efficiency and effectiveness.

Doug is the author of five books on the science of innovation. His book *Jump Start Your Business Brain* has been named to Jack Covert's prestigious list of the 100 greatest business books of all time. He has been named by Inc. Magazine, CIO Magazine and A&E Top 10 as one of America's top innovators and has made multiple appearances on DATELINE NBC, *Wall Street Journal*, CBC, NPR, *New York Times* and as a Judge on the first season of ABC TV'S American Inventor.

**Forecasting Methodology:** Merwyn Business Simulation is a specialized version of the Fourt-Woodlock system of sales forecasting. It has been modified to make it effective early in development where there is significant uncertainty and to make it effective for both industrial and consumer products as well as services. (For academic details see: Fourt L.A., Woodlock J.W., 1960. *Early prediction of market success for new grocery products. Journal of Marketing* 25: 31–38.) Fourt Woodlock is also the basis of AC Nielsen/BASES forecasting methodology that holds an estimated 60% share of all innovation sales forecasting by large companies.

Fourt-Woodlock forecasting is based on the class of forecasting known as Decomposition. The bible of forecasting Principles of Forecasting edited by J. Scott Armstrong of the Wharton School and published by Kluwer Academic Publishers defines Decomposition as: *“Decomposition is a method for breaking down (decomposing) the estimation tasks into a set of components that can be more readily estimated, and then combining the component estimates to produce a target estimate.”*



The book documents the effectiveness of Decomposition especially when there is high uncertainty as exists with innovations. It states, *“The research evidence in support of this general principle is enormous and cannot be adequately covered here. Over four decades of research in human judgment and decision making show that decomposition improves judgmental performance over unaided or holistic judgment.”*

# The Merwyn Business Simulation Decomposition Equation

The Merwyn Business Simulation (Fourt Woodlock) decomposition forecasting equation is as follows:

$$AS = FDM \times TR \times FPR + FDM \times TR \times RR \times RPR \times NRP$$

**AS - Annual Sales** This is consumption sales. Or, said another way, the amount of revenue received from sales that went to Final Decision Makers. This does not include sales that are in process such as “pipeline”, or “inventory fill” associated with distributor or retailer inventory.

**FDM - Final Decision Makers.** This is the person that makes or very strongly influences the final purchasing decision. Final Decision Maker can be end users such as consumers or they can also be decision makers such as factory production managers, architects, doctors, etc. This term is used in place of the classical definition of number of consumers to make MBS applicable for industrial and business to business situations. In the case of MBS this value is the number of “POSSIBLE” Final Decision Makers NOT the net number that will purchase. The number of actual purchasers is calculated by the MBS Model.

**TR – Trial Rate** The percentage of Final Decision Makers who will make an initial purchase. This number is calculated from the persuasive power of the idea itself as measured by concept testing adjusted for marketing support as measured by percent Awareness and percent Distribution. In the case of MBS these values are entered as constants. See page 4 of MBS results for the Sales & Marketing Assumptions utilized as part of that report. Adjusting for Marketing support is important because if a Final Decision Maker is not aware of the innovation (awareness) or can't find a product (distribution) they can't purchase it.

In the case of Merwyn Business Simulation – Concept testing is based on benchmarking the potential for “customer pull” by evaluating the description on 50+/- factors that have each been found to correlate with marketplace trial at the 95% confidence level or higher.

The concept score is translated to actual percent trial using an algorithm developed and confirmed through three independent data sets. The resultant percent trial value is then discounted based on the appropriate awareness and distribution levels.

Open Access: The MBS system is designed to use concept scores from alternative systems such as 5 point purchase intent/ uniqueness scales as used by BASES,

and 11 point purchase probability/new and different scales as used by AcuPOLL

**FPR - First Purchase Revenue** This is the amount that a Decision Maker will purchase the first time they purchase. For example if you were selling tires the Final Decision Maker might purchase 2 tires or 4 tires. Or 50% of customers might purchase 2 tires and 50% might purchase 4 tires thus the AVERAGE purchase would be 3. In this case, if tires cost 50.00 each the MOST LIKELY estimate of First Purchase Revenue would be  $3 \times \$50 = \$150$ .

**RR – Repeat Rate** The percentage of Final Decision Makers who will make a second purchase within 12 months of their first purchase. Examples of repurchases include: 1) If the innovation is an industrial or consumer consumable such as a cleaning product then final Decision Maker may purchase multiple times, 2) If the innovation is an industrial production product then Final Decision Makers might purchase a sample of it to test leading to a larger purchase order and 3) If an innovation is an industrial machine their could be a separate service contract or supplies for the machine. With many industrial products or consumer hard goods repeat rate is zero as the first purchase is the only purchase.

With large companies Merwyn predicts year one sales. With small companies it usually predicts year two sales. The difference is in the speed and scope of sales and marketing investment that large companies make relative to small companies.

**RPR – Repeat Purchase Revenue** The revenue received when Final Decision Makers make additional purchases. This can be the same number as FIRST PURCHASE revenue; however, it doesn't have to be. For example – many times a Final Decision Maker will buy a small amount first to try out a product then buy more on an on going basis. Or, sometimes the first purchase is for the equipment and the repeat revenue is for supplies or a service contract.

**NRP – Number of Repeat Purchases** The number of repeat purchases that are estimated to be made within a 12-month period of time.

## What Makes Merwyn Business Simulation Unique

There are seven factors that individually and collectively make it possible for Merwyn Business Simulation to provide more truthful sales forecasts early in the innovation development process, when there is high uncertainty and when the Innovator or Company who is submitting the concept for forecasting does not have high expertise or readily available test data on the actual innovation.

### **Difference #1. Improved reliability by segmenting data into 3 streams and processing each differently.**

A cornerstone of the Merwyn Business Simulation methodology is to separate data forecasting inputs into three categories and to handle inputting of the data and processing of data differently for each data stream.

Facts: Factual inputs are easy to input and use. Examples include Innovation Development Status and Proprietary Protection Level which are used when forecasting fair market royalty rates.

Estimates: Estimates require four handling steps to aid accuracy and transparency: 1) Calibration, 2) Estimates of most likely values and confidence ranges, 3) Quantification of Uncertainty and 4) Documentation of Basis for Estimate. Each of these are the basis for the next four points of difference.

Unknowables: Unknowable inputs are not likely to be correct even when the four special handling steps are applied by Fortune 500, small company innovators or independent inventors. To compensate for this, each unknowable is inputted into the MBS model as a constant and reported as such.

In the case of sales forecasting the primary unknowable is Trial Rate. Specifically, the level of Marketing Support (awareness & distribution) as well as the concept persuasion or “pull”. Errors with these numbers from small company innovators and independent inventors are usually a result of ignorance in the quantification of marketing support and persuasion impact. Errors with Fortune 500 Clients are a result of over optimism especially early in the process when actual investment levels are highly variable due to lack of definition of actual marketing message impact, media plan design and efficiencies. This over optimism is generally accepted as the reason

for the 25 to 80% error between sales forecasts at the moment of innovation development decisions and actual marketplace results. Obviously, all forecasts are highly accurate after the fact, when the true input data is known.

Instead of inputting marketing, advertising and promotion plans and then translating the plans into effective awareness and distribution impact levels - the MBS system utilizes five stock assumptions for distribution and awareness. This results in dramatic cost savings in forecasting as well as reduction in error as a result of overly aggressive marketing support levels. The five levels include: 1) Very Low Marketing, a word of mouth type of support, 2) Low Marketing, typical of smaller companies, 3) Medium Marketing, typical of a smaller company making a major investment or a larger company supporting a smaller innovation or line extension, 4) High Marketing, typical of a larger company supporting a major introduction and 5) Very High/Highly Targeted, typical of a big brand introduction or a smaller company that has a market with a very small number of easily identified customers that can be efficiently reached.

In the case of Large Corporations - each of the five marketing support levels can be customized based on historical levels of distribution and awareness (both median values and variance i.e. standard deviation) achieved by the company during previous introductions of innovations.

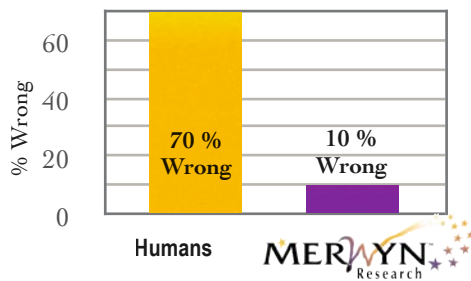
Testing of the persuasion power of the innovation concept is used to predict trial rates. Any marketplace validated concept testing system can be used. A popular choice is to use Merwyn Concept Testing at the earliest stages of innovation development then move to more expensive and involved research systems such as AcuPOLL or BASES as the innovation moves closer to the marketplace.

Merwyn Concept Testing evaluates ideas by benchmarking the overt benefit claims, real reasons to believe, dramatic differences, clarity and focus of the innovation based on evaluating a written innovation description as it would be presented to a Final Decision Maker.

A total of 50 +/- success factors are evaluated. Each have been validated as predictive of marketplace

results with direct links to marketplace success. A set of 5 raters as well as a “computer reading” evaluate each factor relative to predetermined benchmarks. Each rater scores only the presence or absence of each success factor. The Merwyn computer model assigns the weight and importance to each factor to generate an overall probability score as well as assessments of the three most important diagnostics: Overt Benefit, Real Reason to Believe and Dramatic Difference.

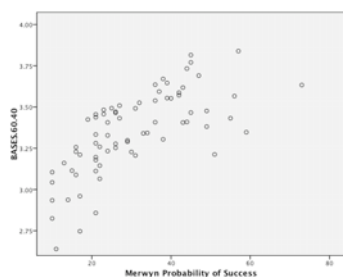
The Merwyn score is translated into a trial rate that is a adjusted downward based on the assumed level of distribution and awareness.



Merwyn Concept Testing is 7 times smarter than human judgement when it comes to picking winners.

Research indicates that Merwyn Concept Testing is 7 times smarter than project leaders when evaluating concepts probability of success as it has no emotional connection or bias.

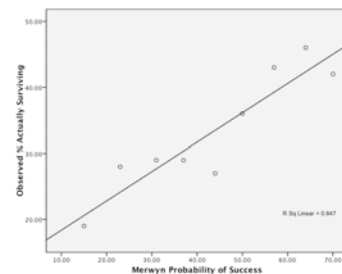
Research has validated Merwyn Concept scores versus AcuPOLL, BASES, Direct Mail Response Tests and other test systems in the USA and Internationally. It's important to note, that Merwyn is an overall measure of the odds of sustained success - it is NOT a simple measure of purchase intent. The closest analogy to the Merwyn concept score is called “Meaningful Difference.” This is most closely replicated in classic concept research through a blended score that incorporates 60% Purchase Intent and 40% New and Different perception.



Merwyn Concept Testing has a significant correlation with BASES Concept scores  $r = .7$

Comparison of Merwyn Concept results to high precision Information Resources scanner data finds significant correlations with % trial, purchase

frequency, percent repeat purchase and \$/1000 customers. Impressively, these correlations are raw data to raw data i.e. they are not corrected for differences in marketing support and results.



Merwyn Concept Testing has a significant correlation with % Survival In the Marketplace (n=900 clustered into 9 sets of 100/  $r = .85$ )

To further improve the truthfulness of Merwyn Concept Testing both the “most likely” value and the variance (standard deviation) are used in the Merwyn Business Simulation to reflect the true dynamics associated with the innovation concepts persuasive power.

**Difference #2. Calibration of Input Estimates to Provide Marketplace Grounding.** Calibration data charts help the person providing the inputs assess, evaluate and determine the proper estimates. Calibration benchmarks include hundreds of listings of the number of final decision makers, number of additional repeats, EBIT percentages, repeat rates, proprietary protection and development status. In the case of custom corporate models calibration data is based on the company's actual historical results.

**Difference #3. Estimates of most likely values and confidence ranges.** To model the true uncertainty of each data input three numbers area requested for each input.: 1) Most Likely Estimate, 2) Pessimistic Estimate and 3) Optimistic Estimate.

- **Most Likely:** This is the value that based on testing, experience and judgment is the most likely value the innovation will achieve.
- **Pessimistic:** This is the value where there is only a 1 in 5 chance (20%) that the true number is WORSE than this number. Note, this is not the “worst” possible value. Rather, it's the mostly likely lowest value. In the case that an inventor has “measured data” on the question being asked they are instructed to provide the low end of one standard deviation.
- **Optimistic:** This is the value where there is only a 1 in 5 chance (20%) that the true number is BETTER than this number. Note, this is not the “best” possible

value. Rather, it's the mostly likely highest value. In the case that an inventor has "measured data" on the question being asked they are instructed to provide the high end of one standard deviation.

The three numbers are translated into a probability distribution. This natural mapping of the true uncertainty into dynamic forecasts is one of the reasons why Merwyn Business Simulation is significantly more truthful than point estimate forecasting systems. It's important to note that MBS is designed to be appropriately conservative. As such, the bias in the case of all modeling is towards protecting from "false positives" e.g. overly high estimates. Net, the MBS system appropriately "rounds down" key dimensions.

**Difference #4. Quantification of Input Estimate Uncertainty To Increase Transparency.**

To enhance transparency and credibility of forecasts, innovators are required to provide quantification of their level of certainty in their most likely estimate on a scale that runs from 10% Judgement to 90% Direct Measurement. To aid rapid review, scores are color-coded red, yellow, green making it easy for evaluators to identify the weakest links to forecasts and to help focus development resources.

**Difference #5. Detailing of Data Sources and Basis for Assumptions To Increase Transparency**

To further enhance credibility of forecasts, innovators are required to document their data sources and basis for assumptions for each forecasting input. This complete transparency allows those viewing the report to quickly and easily assess the wisdom and integrity of the innovator's assumptions

**Difference #6. Monte-Carlo Simulation of Inputs More Closely Simulates the Real World**

All input data is processed using a Monte-Carlo simulation. In simple terms, Monte Carlo involves randomly selecting a value from a probability distribution for each variable in the sales forecasting equation. The values are randomly distributed across the range of possible values for each variable. The random values are then inserted into the volume equation and a sales forecast generated. The process is completed some 10,000 times for each marketing support and alternative development scenario (improved product, marketing concept or overall improvement of product and marketing concept).

The big benefit of Monte-Carlo simulation is that it takes into account the true individual and cumulative uncertainty associated with the forecast. In effect, MBS translates innovation uncertainty into defined and quantified business probabilities.

**Difference #7. Probability Matrix Report Format Aids Decision Making**

To aid decision-making, the uncertainty of all inputs is translated into a report that details three estimates that together incorporate the variance of inputs and more closely model the real risk and uncertainty associated with the innovation.

Results from the 10,000 Monte-Carlo simulations for each level of marketing support are rank ordered and the 2,000<sup>th</sup> value from the bottom reported as the pessimistic estimate. This means there is an 80% chance that the actual sales for this innovation will be at least this amount. The median or 5,000<sup>th</sup> value is reported as the Most Likely (50%) value. The 8,000<sup>th</sup> value is reported as the optimistic forecast meaning there is a 20% chance that the true value will be higher than this.

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