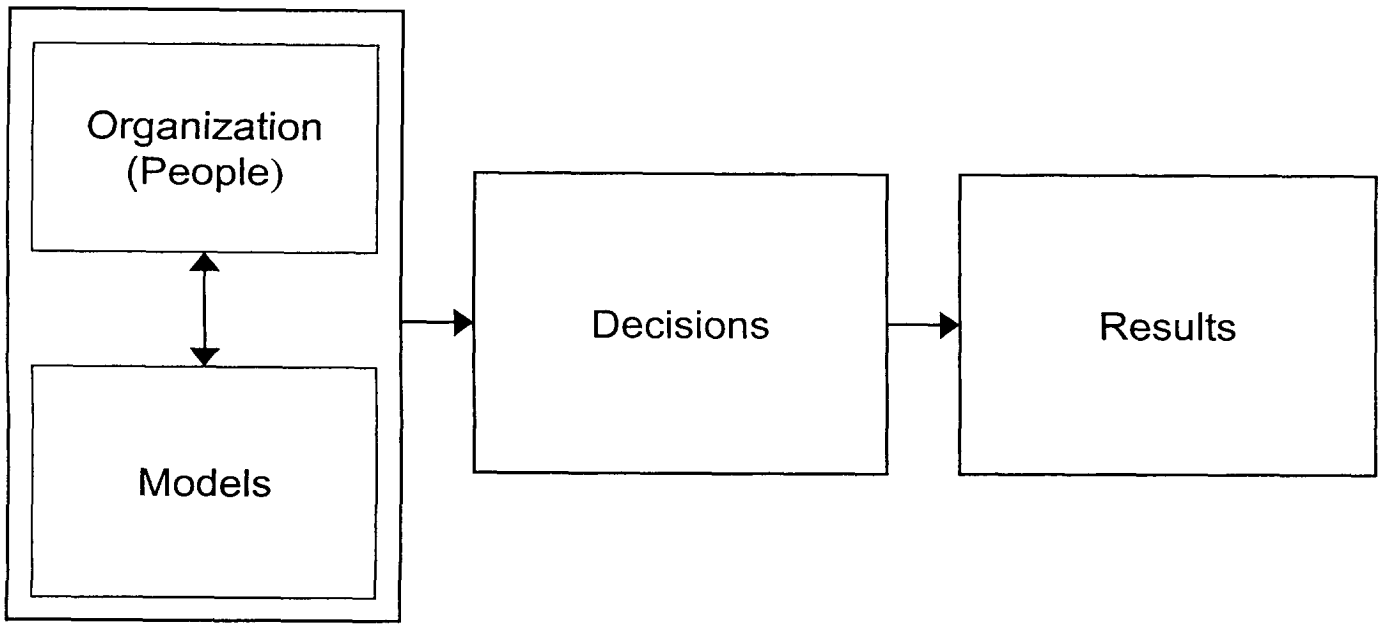
The Effective Use of Actuarial Models

James N. Stanard

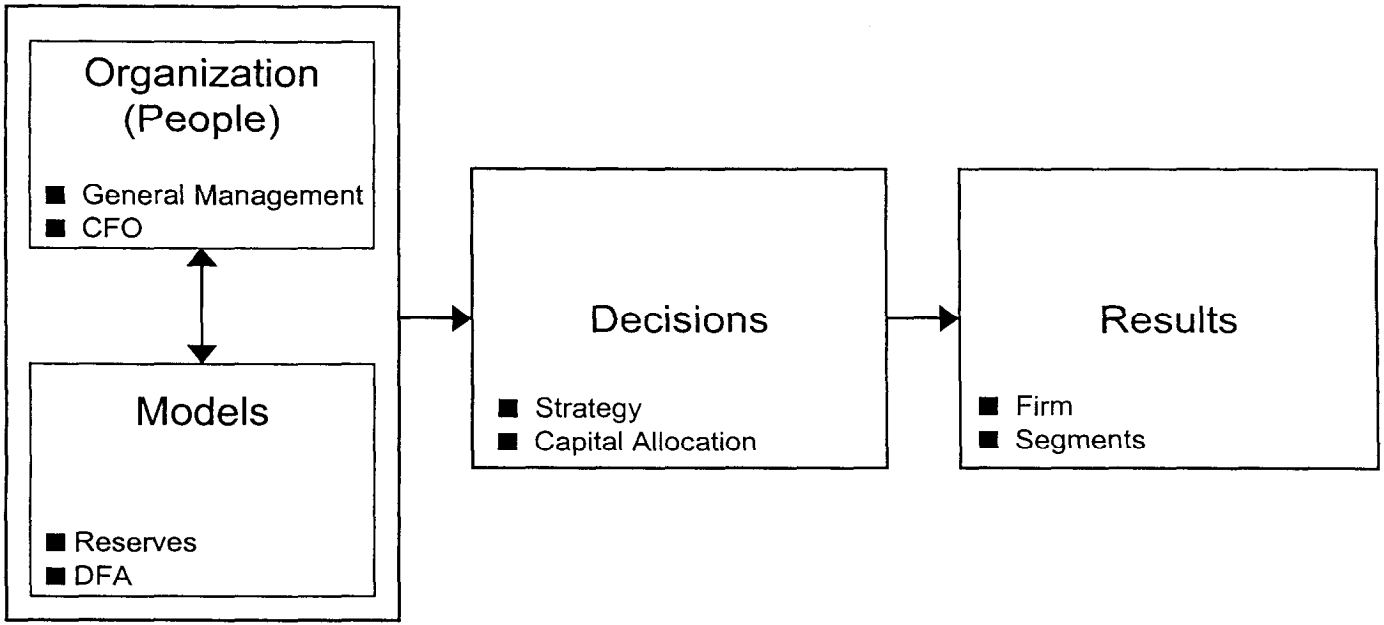
ASTIN - Tokyo, Japan

August 1999

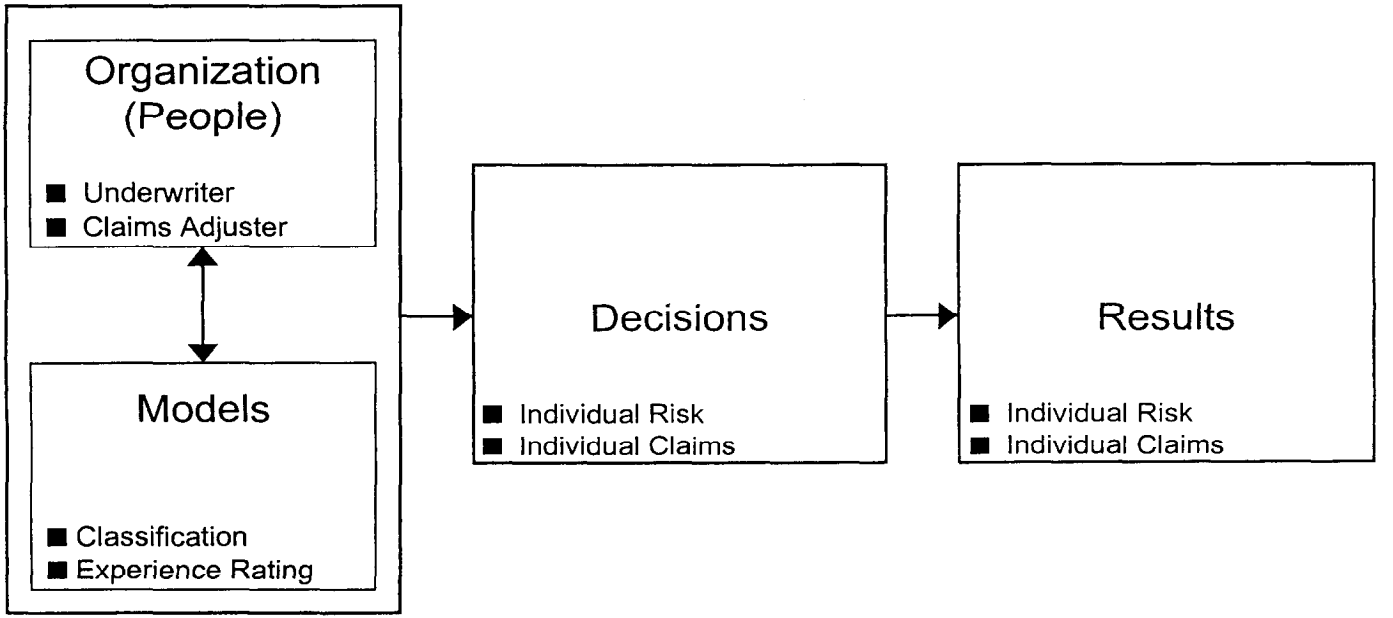
Actuarial models are only effective if they lead to the desired results



Modeling/Decision systems can be at the firm level - "macro decisions"



… or at the individual risk level - "micro decisions"



Model Problem #1 - Bad Model

Burning cost rating of casualty excess reinsurance
(1970's style)

$$\text{PRICE} = \frac{\text{average known losses + 10\% IBNR + 10\% trend}}{\text{100\% - (10\% profit + 10\% brokerage)}}$$

Model Problem #2 - Good model that simplifies out key decision factor or is not suitable for decision at hand

- Decision needed on individual account profitability
  - Model estimates aggregate reserves on portfolio of business
  - Crude system of allocating reserves to account (e.g. by premium)

Model Problem #3 - Model that gives unbiased estimate, but with high variance of estimator, especially when variance is not itself estimated

- Experience rating with small number of losses
- Long tail reserve estimates

Model Problem #4 - Inability to link which assumptions are driving the conclusion

- Complex models such as:
  - Asset portfolio optimization
  - Econometric
  - DFA
  - Hurricane/Earthquake

Model Problems #5 & #6

- Too much output - just piles of data

- Great result, two weeks after decision needed to be made

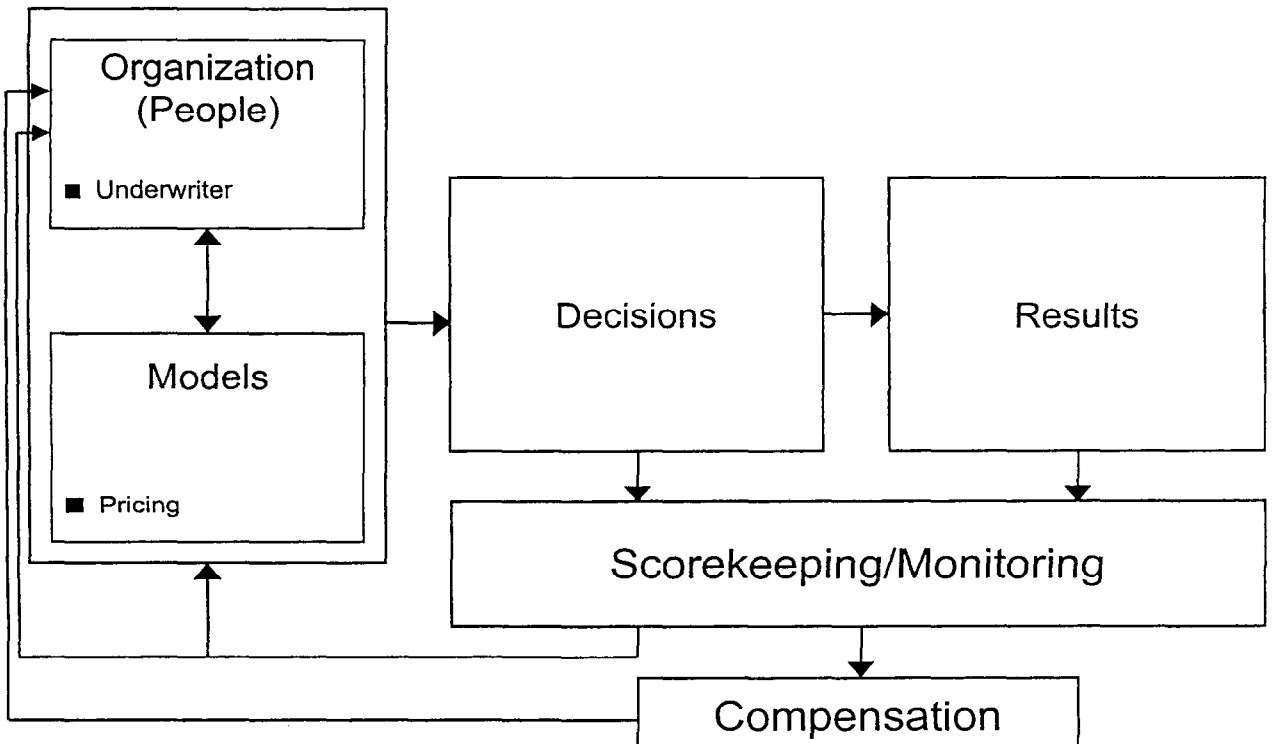
An Effective Model:

- Produces reasonably unbiased estimate for the decision needed
- Is clear about key assumptions and what the effect of changing those assumptions is on the estimate
- Inner workings of model are understood by the decision maker
- Output is well organized
- Result is produced within the timeframe that the decision is needed

Effective models cannot by themselves produce good results if there are organizational problems

- Incentives not aligned with desired results
- Desired results not clear
- Lack of clear accountability for results
- "We/They" between decision maker and modelers
- Too much or too little trust in the models
- Thinking model results are "facts", not estimates

An effective organization has feedback loops to evaluate results



A decision maker must be selected, trained and incented so that he or she:

- Knows clearly what authority he has
- Knows what results he is accountable for and how those results are measured
- Understands the inner workings of models he uses in decision making, and feels that the model improves the decision process
- Reviews results of past decisions in a systematic way to improve future decisions (both organization and model)
- Feels that his personal wealth or income is affected by the results of the decision