

# Innovation Decision Orchestration via Integrated Modeling & Simulation



## OVERVIEW

Integrated financial modeling & simulation for structuring, managing, and validating high-risk / high-reward innovation decision making



The proposed integrated process offers: **(a)** a *simulation framework* for finance-based, strategic decision making, integrating Net Present Value (NPV), Monte Carlo, and Real Options Analysis (ROA); and **(b)** a structured, robust *model validation process* which minimizes organizational overhead, utilizing organizational Social Network Analysis (SNA).

**Keywords:** strategic decision making, innovation management, management of uncertainty, portfolio analysis, IP, R&D management, validation, Net Present Value (NPV), Monte Carlo simulation, Real Options Analysis (ROA), Social Network Analysis (SNA)

## 1 SCOPE

Mapping organizational structure to business objectives and model artifacts

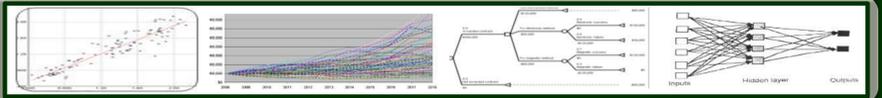


**A. Organizational Assessment:** Social Network Analysis (SNA) allows for a rapid, robust mapping of organizational stakeholders to key model components. Traditional organizational charts often neglect key experts & hidden stakeholders. Mapping formal roles, rights (ownership, change, approval, review), and interactions to key data and decision processes promotes transparency, rigor, and organizational consensus / commitment regarding decision outcomes.

**B. Elicitation of Objectives:** Identification of business needs, requirements, opportunities, challenges, risk tolerance, data

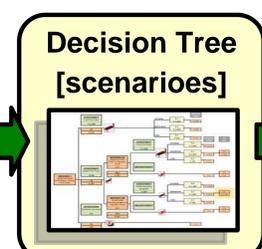
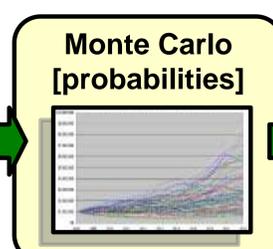
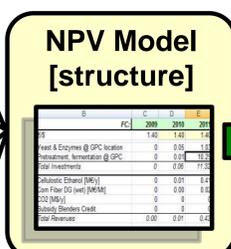
## 2 MODEL

Providing insight into risks / opportunities via integrating probability & scenarios



Static Net Present Value (NPV) analysis presents a highly linear and selective view of a prospect, often overlooking key opportunities and risks. This model framework extends traditional Net Present Value (NPV) analysis via

- Revenue streams
- OPEX costs
- CAPEX outlay
- Financing



integrated Monte Carlo (probability) and Real Options Analysis (scenarios) to facilitate robust analytical discussions of risks and opportunities in order to drive decision-making. Continuously and iteratively refined, the model is an organizational artifact, bringing together diverse experts and stakeholders into a unified, structured conversation. Economy and transparency are key: the model must be as simple as possible with a clear audit path concerning key assumptions.

**Financial model:** uncertainties/ ranges, objectives, revenues, CAPEX/OPEX, market prices, currency rates, etc...  
**Scenario model:** commercialization/ revenue strategies, financing scenarios, market boundaries, key risks, etc...

## 3 OPTIMIZE

Integrated simulation allows for formal volatility, sensitivity, and optimization analysis. Gaining insight into systemic dynamics, particular areas can be targeted for efficiency / exploitation. Structured scenarios can be tailored to optimize profits and reduce costs.

## 4 ITERATE

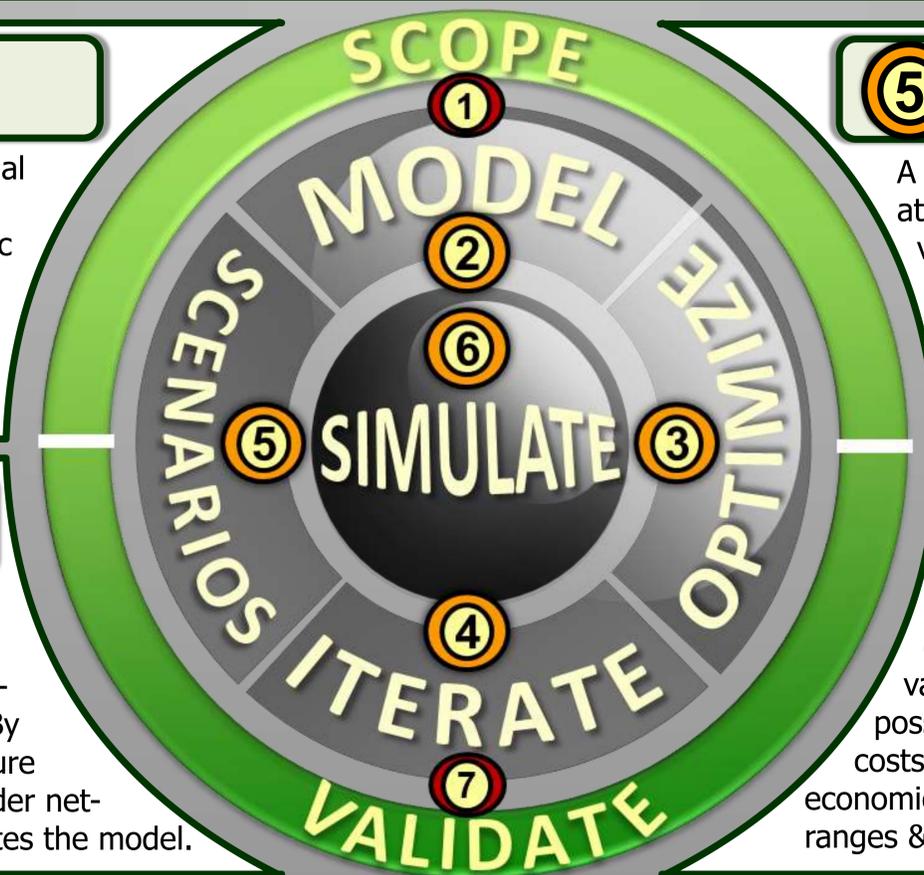
Implicit perceptions & assumptions are made explicit and verified continuously throughout the development and refinement of the model. By formally linking organizational structure and roles to the model, the stakeholder network continuously refines and validates the model.

## 5 SCENARIOS

A number of strategies for commercialization are attached to the model, either via simulation or linked decision trees. NPV analysis allows strategies to be refined: structured finance, hybrid models (i.e. licensing, risk sharing), scale, timing optimization, tax, etc.

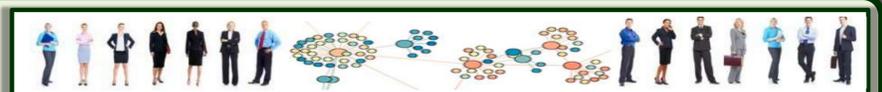
## 6 SIMULATE

Utilizing ranges (min, max, average) collected from data and experts, key variables are simulated in unison to vary possible outcomes: capital and operating costs, revenue streams, technical factors, economic variables, etc. Results show expected ranges & sensitivities via NPV outcomes.



## 7 VALIDATE

Establishing concordance between model, organizational assumptions & outcomes



Integrated financial models are inherently complex and thus sensitive to initial assumptions. Robust validation is required to ensure both quality and organizational acceptance. The use of SNA promotes a tight connection between model artifacts / outcomes to organizational structures / roles. The integrated validation and valorization process centralizes and structures organizational conversations concerning strategic risks and opportunities. The analysis thus provides not only structured financial insight, but also a collective organizational understanding of the often unstated assumptions regarding the practical "real" circumstances surrounding the opportunity under evaluation.