Applications of System Dynamics

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Agenda

- How can you help a client
- The Big Enchilada
- The Standard Method

How Can You Help a Client?
(Objectives of An SD Effort)

- Point prediction
- Managing better

Point prediction: Examples

- Litigation (Retrodiction)
- Commodities Markets
- Contract bid

Point Prediction: Problems

- Difficult
- Risky: Benefit comes only at the end
- Less useful than commonly believed: “If I only knew what was going to happen, managing would be simple”
  - Simple cases: Litigation, financial speculation
  - Tough cases: You want to *change* the future

Managing Better: Examples

- Overtime policy
- Pricing policy
- Capacity expansion

Managing Better: Problems

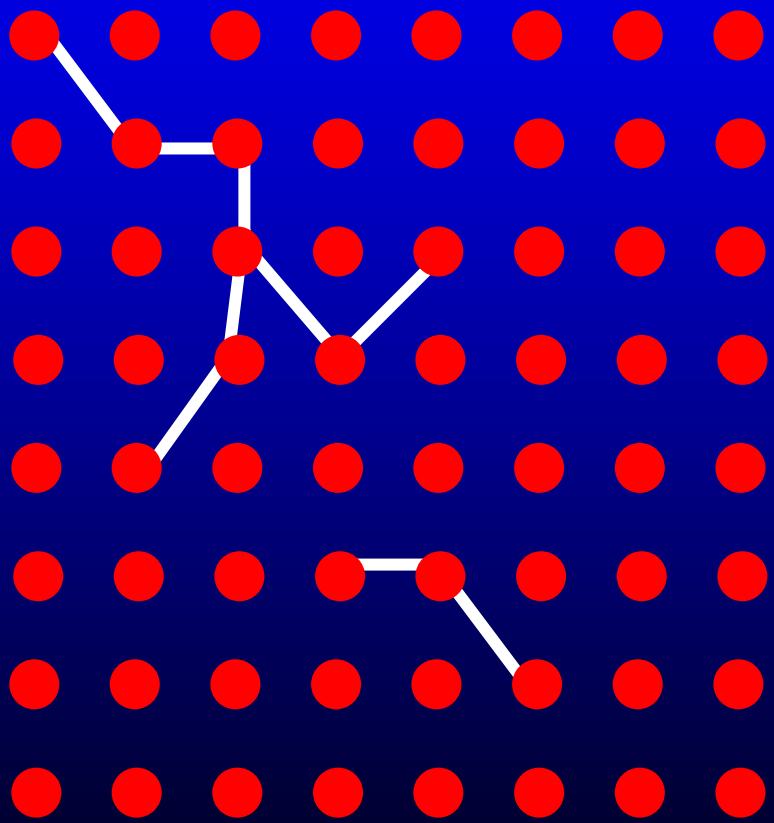
- Hard to sell
  - Clients often pose their problem as one of prediction
  - Difficult to explain what a policy is in the abstract
- Difficult to appreciate what you've learned
  - "I knew it all along"
- Often no clean-cut finish to the project

Difficult to recall what you got out of the process

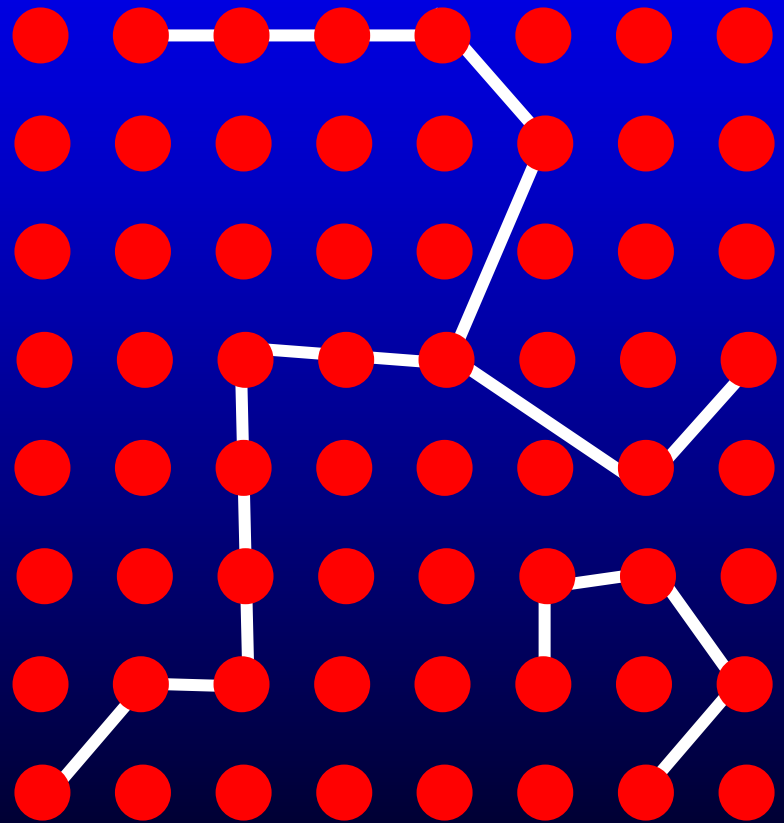
Recommendation	Phase 1	Phase 2	Impact
Outsource Receivables	X		
Use Hedging & Futures markets	X	X	
Tighten Customer payment & credit policies	X		-
Change or abandon CFCT measurement	X		
More reliable demand forecasting	X	X	+
Reduce target inventories & accept increased risk	X		
Reduce Time to ramp up flywheel sales		X	+
Faster planning cycle		X	
Improved dialogue & communication with all stakeholders		X	+
Improved (graphical) interfaces for managing planning cycle		X	
Incorporate dynamic models in planning practices		X	
Improve customer service metrics & feedback			+

Why Its Tough to Realize What You've Learned

Before



After



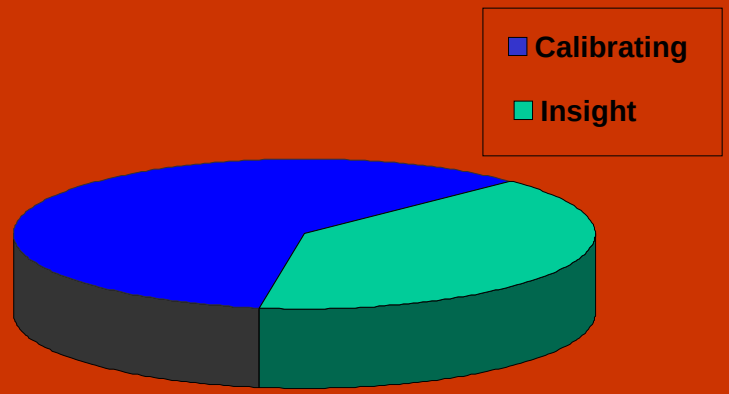
The Big Enchilada

- "Small" Policy Model
  - Understand dynamics of issue
  - Create and explore policies

- "Big" calibrated model
  - More precisely, when should we do X
  - More precisely, how much should we do X
  - More precisely, what is the benefit of X

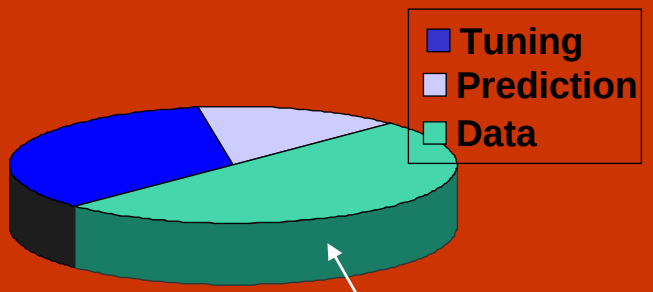
System Dynamics

The Big Enchilada

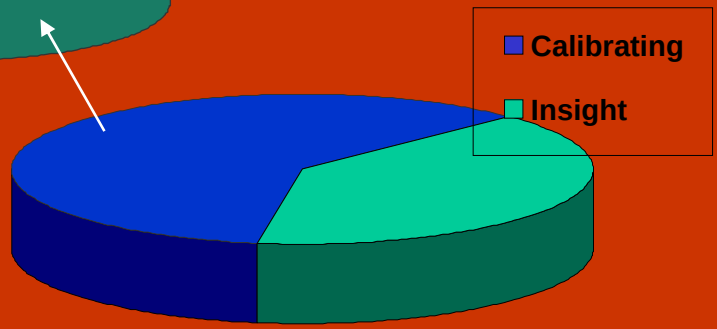


Calibrating

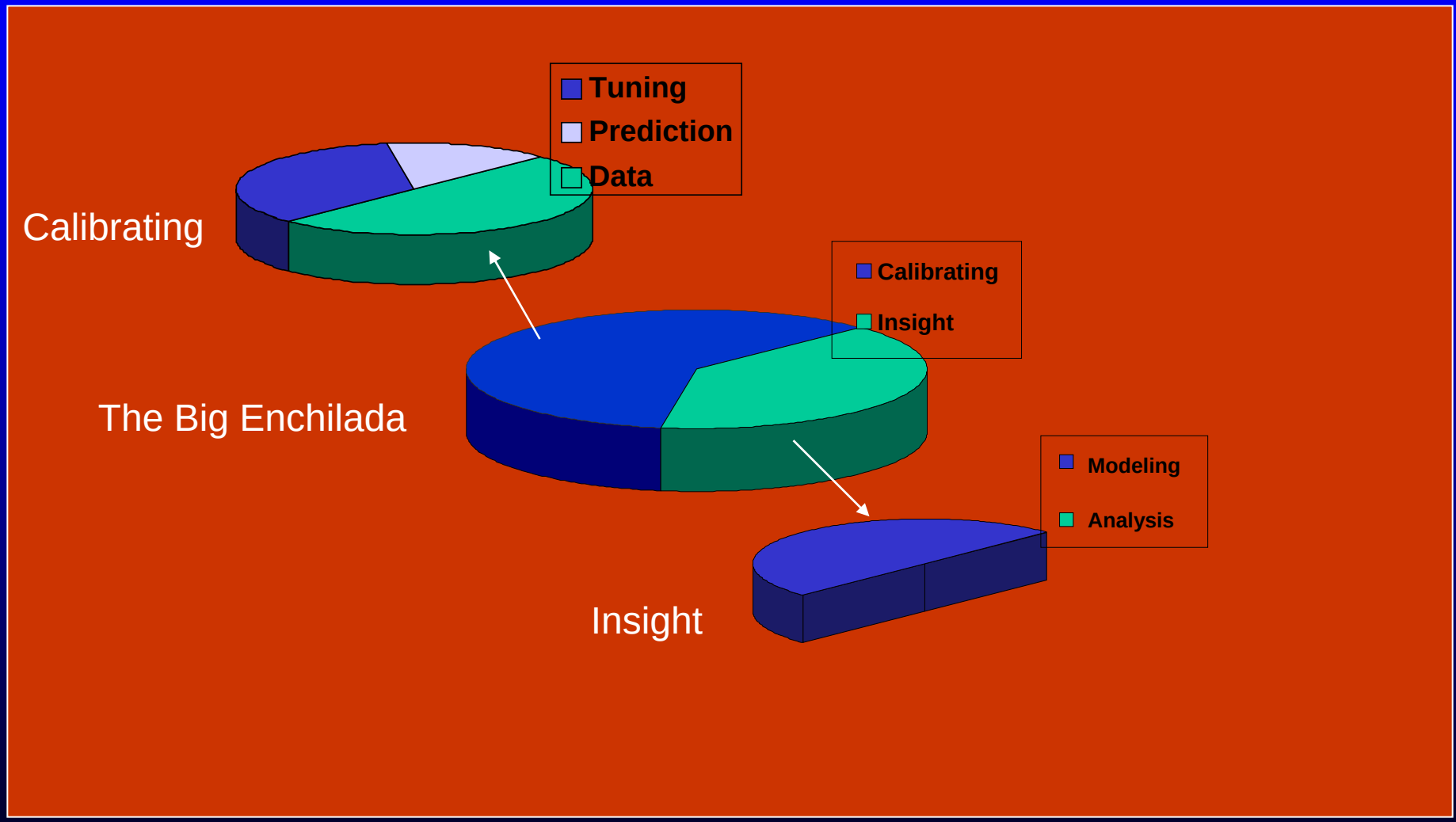
Calibrating



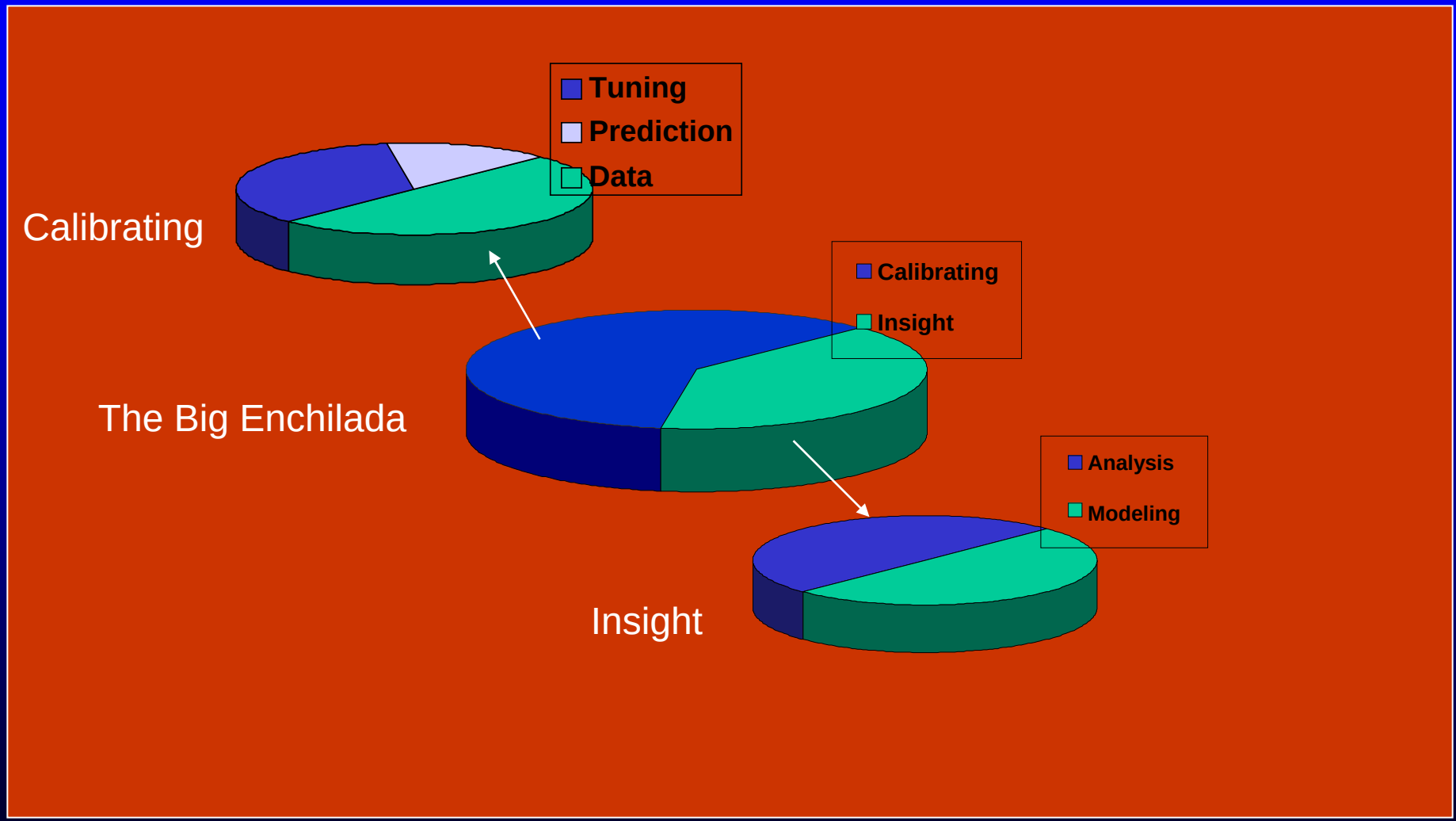
The Big Enchilada



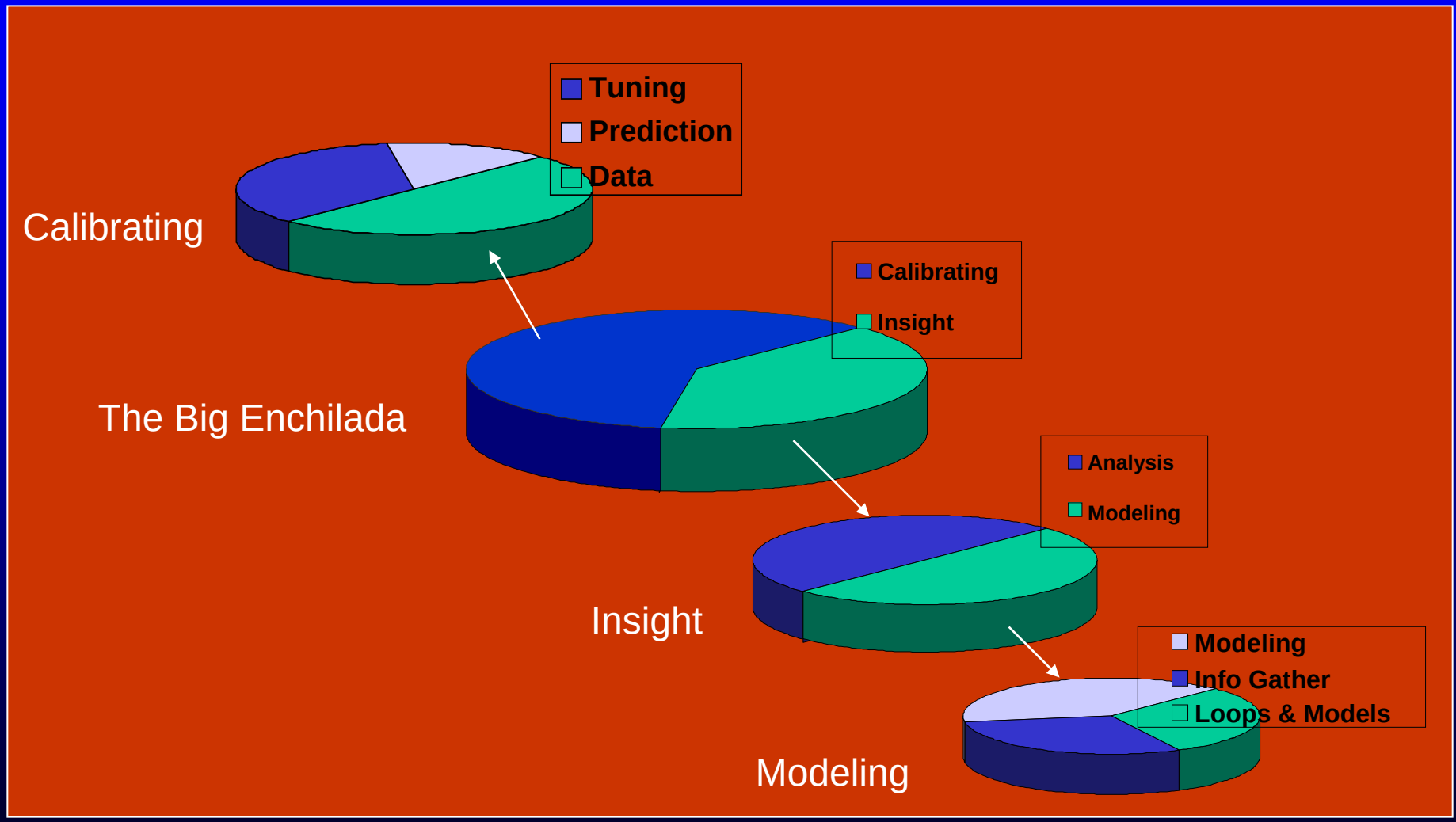
Insight: Modeling



Insight: Analysis



Insight: Modeling breakdown



Danger of big enchilada: Inadequate time and resources

- Fast modeling
- Skip model analysis
- Skip data examination

Concentrate on getting a model that fits the data

The Standard Method

- Reference modes
  Causal loop model
- Simulation Model
  Analyzing model

} Creating and exploring
Insights and Policies

The Standard Method (detail)

- 1) Problem definition
  - a) List of variables
  - b) Reference modes
  - c) Problem statement
- 2) Momentum policies
- 3) Dynamic hypotheses
- 4) Model first loop
- 5) Analyze first loop
- 6) Model second loop
- 7) Analyze second loop
- 8) Etc.

Insights and Policies

Guiding the Initial Focus

- Important to team members (so you get their time)
- Dynamic (i.e. reference mode)
- Enough time to work it without panic, not so much time that there is no conclusion