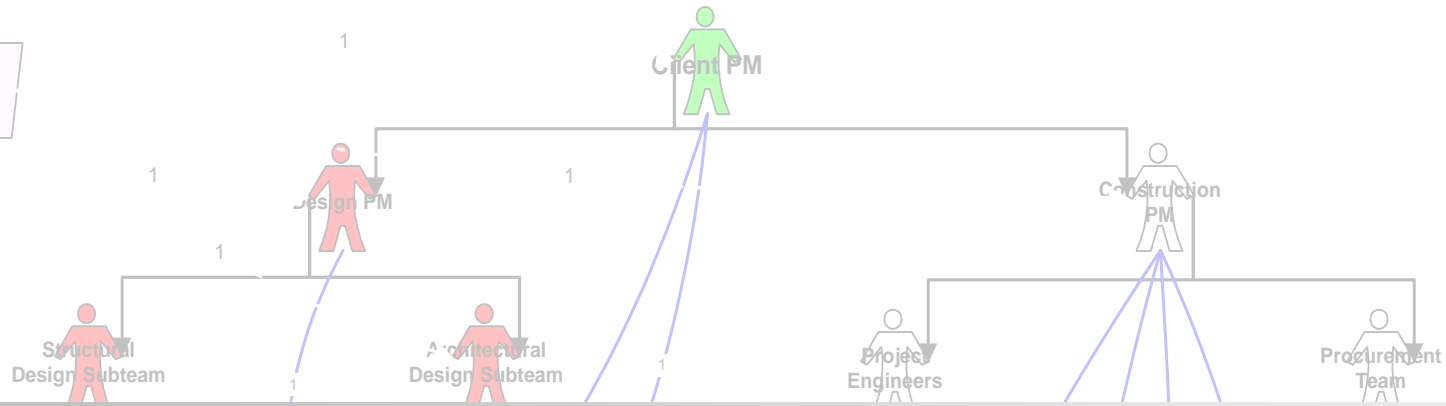
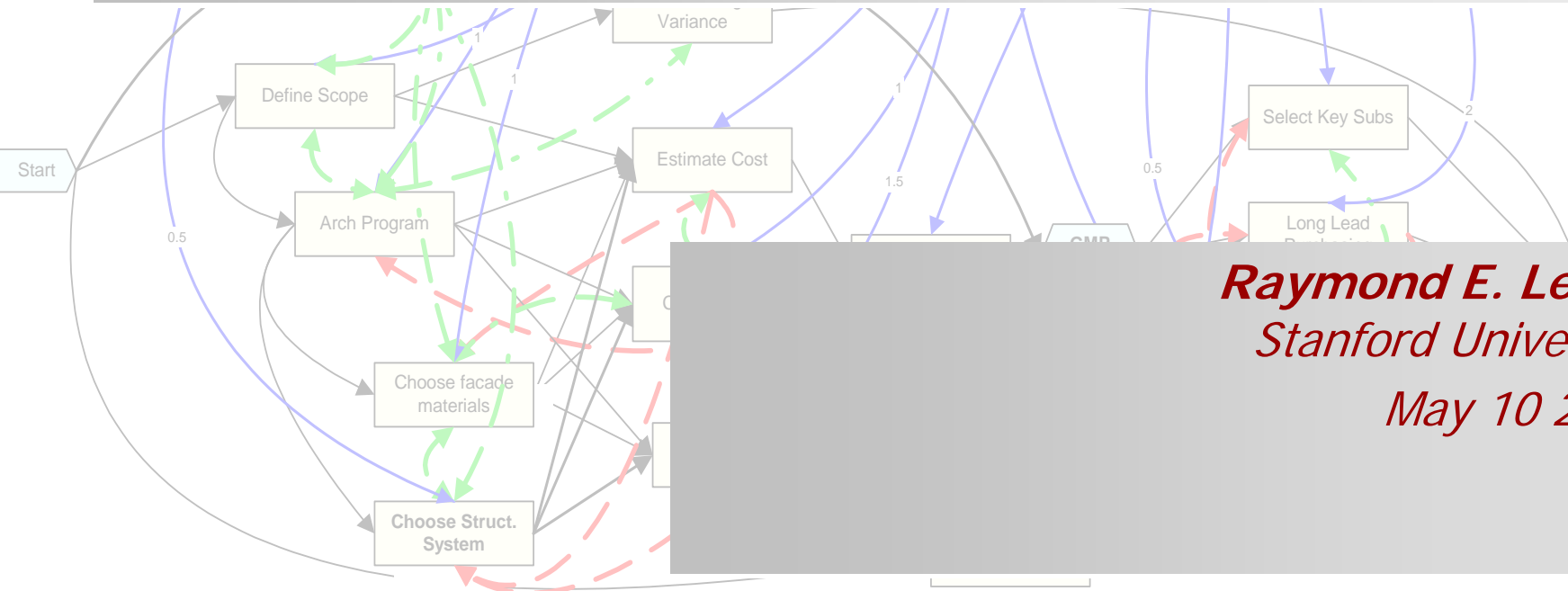


Project
Coordination
Meeting



Designing Organizations Based on Micro-Contingency Analysis



Raymond E. Levitt
Stanford University
May 10 2005



The Big Ideas



1. Validated analysis tools are central to design; they distinguish **real design** from **trial-and-error experimentation!**
2. In the same way that physical-science-based analysis tools help engineers design bridges, airplanes, semiconductors, pharmaceuticals, etc., social-science-based analysis tools can help managers design their organizations systematically
3. A small number of validated organizational analysis tools are already being used by managers to design organizations for projects, programs, and enterprises (**SimVision**, **OrgCon...**)
4. Validated organizational analysis tools also allow researchers to conduct new kinds of virtual computational experiments



Steps in a Formal Design Process

START...

◆ **Set Design Goals**

➤ **Design**

● **Synthesize:** Develop a candidate design solution

● **Analyze:** Predict candidate solution's performance

● **Evaluate:** Compare predicted performance *vs.* goals

➤ **Iterate Designs**

◆ **Relax Design Goals**

...TERMINATE—Success or Failure?

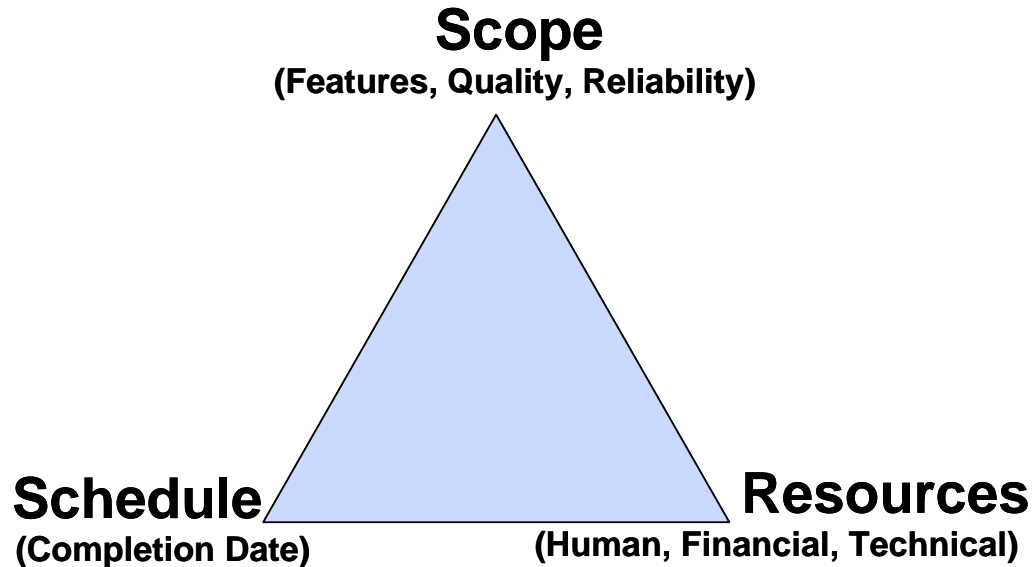


A Usable Analysis Tool Requires:

- ◆ **Metrics:** describe desired outcomes and decision variables unambiguously
- ◆ **Theory:** relates decision variables to outcomes
- ◆ **Model:** provides formal language, with syntax & semantics, to represent candidate solutions
- ◆ **Simulator** (logical, mathematical or computational): operationalizes theory to reason about candidate solutions and predict outcomes



Projects Have Clear Outcome Metrics



- ◆ They also have finite duration, and known participants
- ◆ So first build analysis tools for PROJECT organizations
- ◆ Then extend the tools for more complex organizations



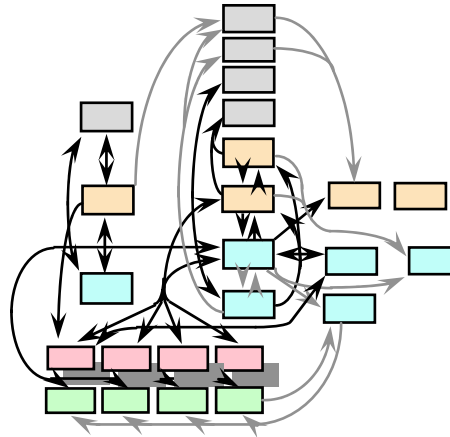
Observations → Intuition:

Fast-Track Projects Fail due to Information-Overload



Product

High performance, complex product has high level of interdependency between its subsystems



Process

Fast-track schedule triggers extra supervision, coordination and rework for middle managers



Organization

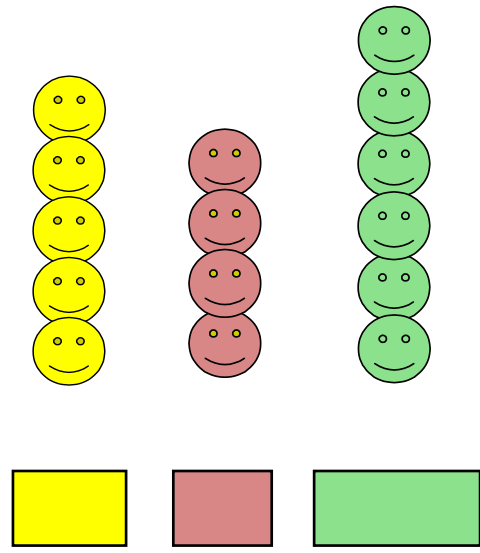
Middle managers get overwhelmed by high volume of information flow under very tight time constraints



Workers Work & Coordinate Interdependencies; Managers Handle "Exceptions"

Metrics
Theory
Model
Simulator

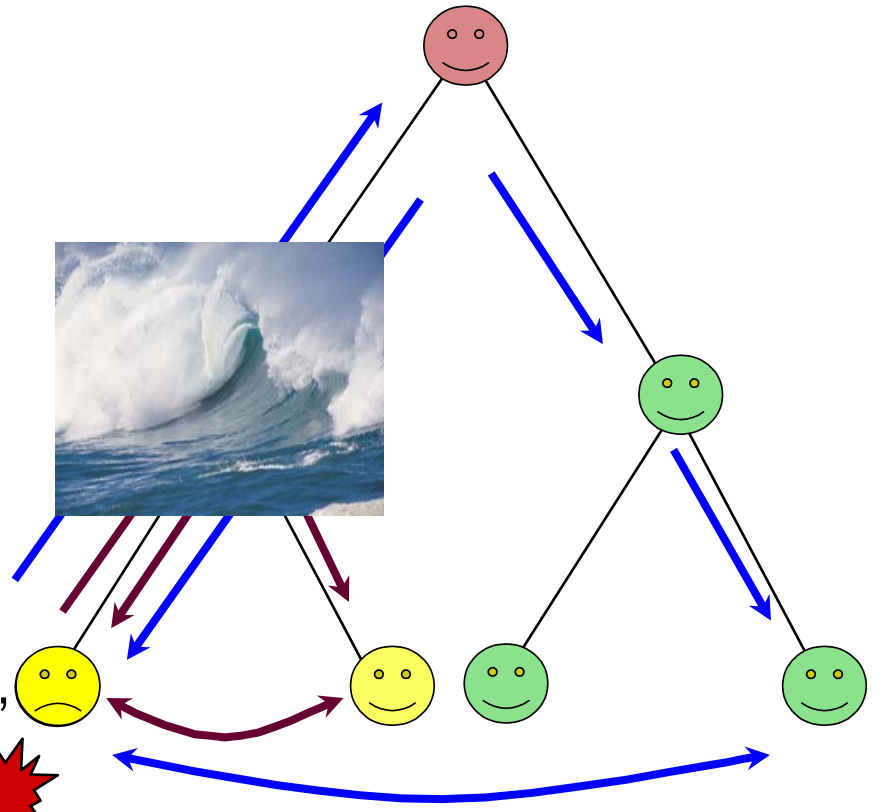
Project Participants Perform Assigned Tasks



+



"Exception"

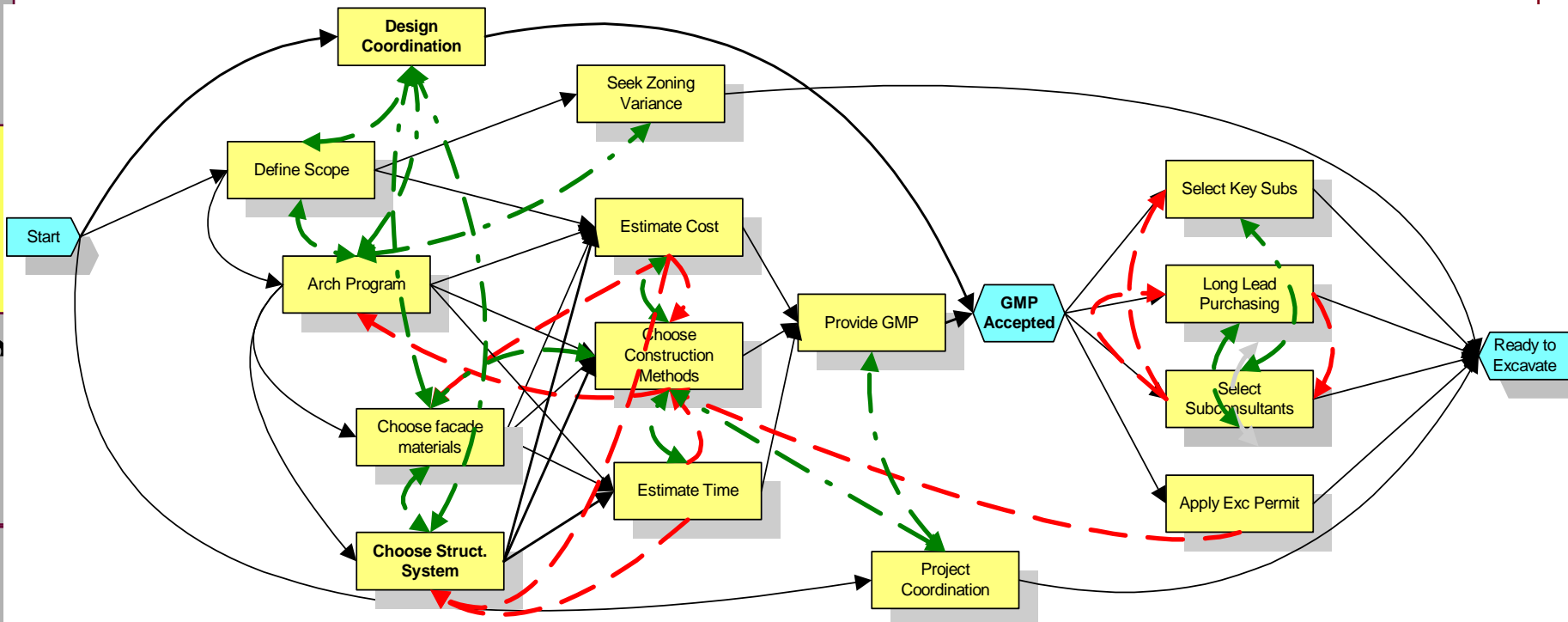


(Jay Galbraith, 1973)



Total Info. Processing Load Derived from Direct Work, Communications, Rework

Metrics Theory Model Simulator



Organization Info. Processing Capacity Derived From: # Actors; Skill Set; Experience; Structure; Policies

Simulator
Model
Theory
Metrics



Actor Properties

Structural Design Subteam

Name: Design PM Architect Design Sub

Description:

Role: SL FTE

Application Experience: High Cost/FTE

Skill:

- Design Coordination
- Architectural
- Biotechnology
- Mechanical

Low

Add... Edit... Delete

Scenario-1 Properties

General Organization Probabilities Simulation Settings

Centralization: High

Formalization: Low

Team Experience: Medium

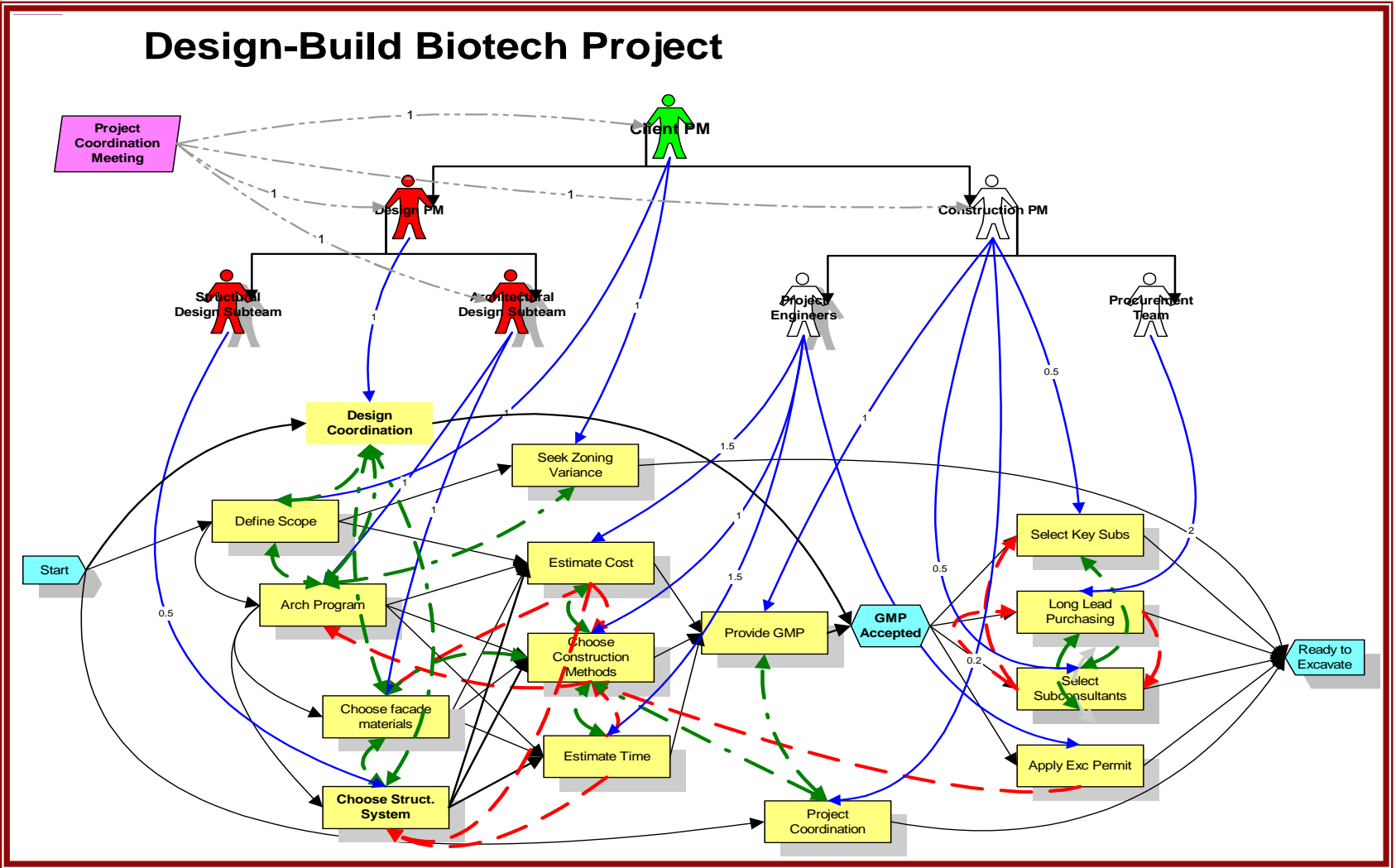
Matrix Strength: High

OK Cancel Help



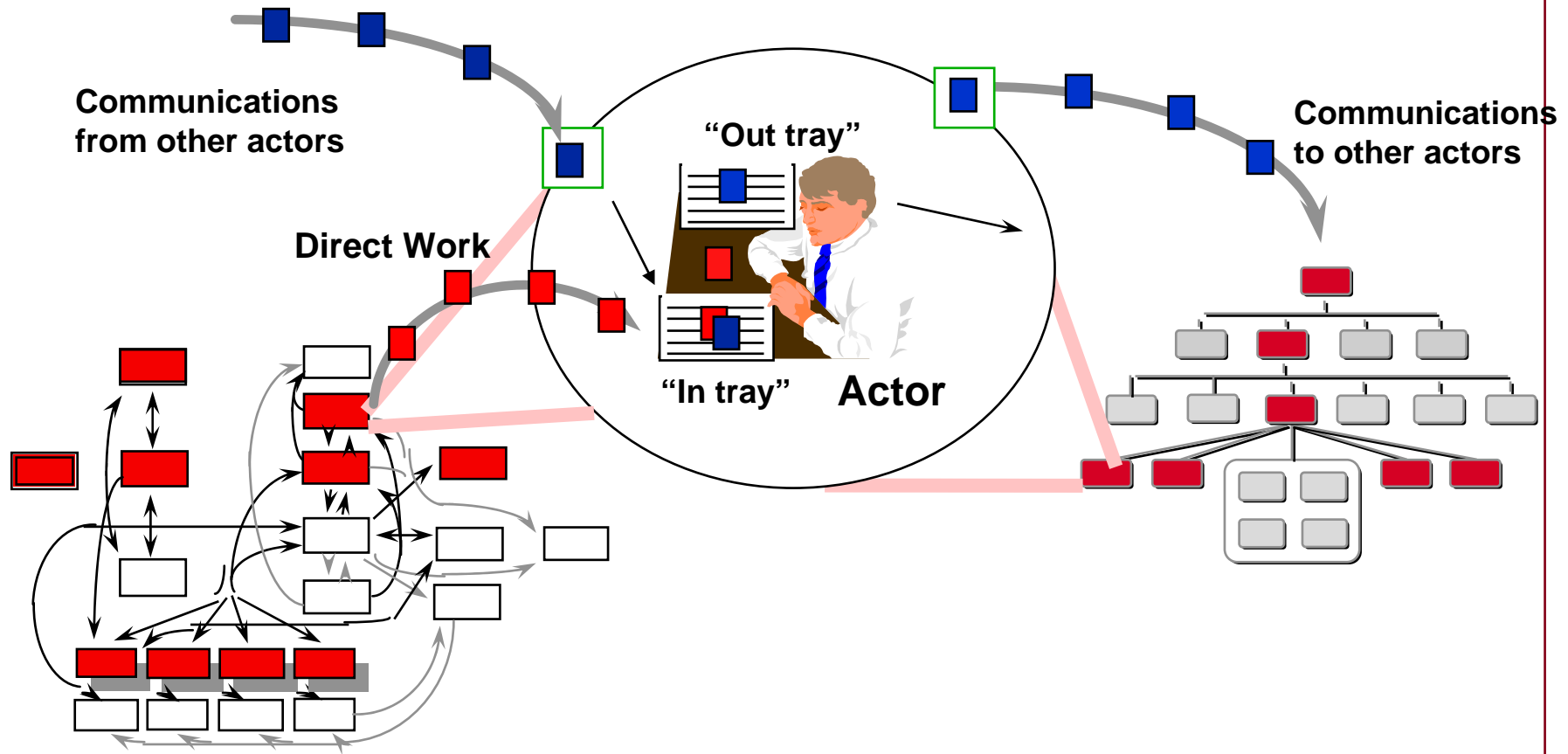
VDT Information Processing Model: IP Capacity \geq Total IP Load for all Actors?

Metrics Theory Model Simulator

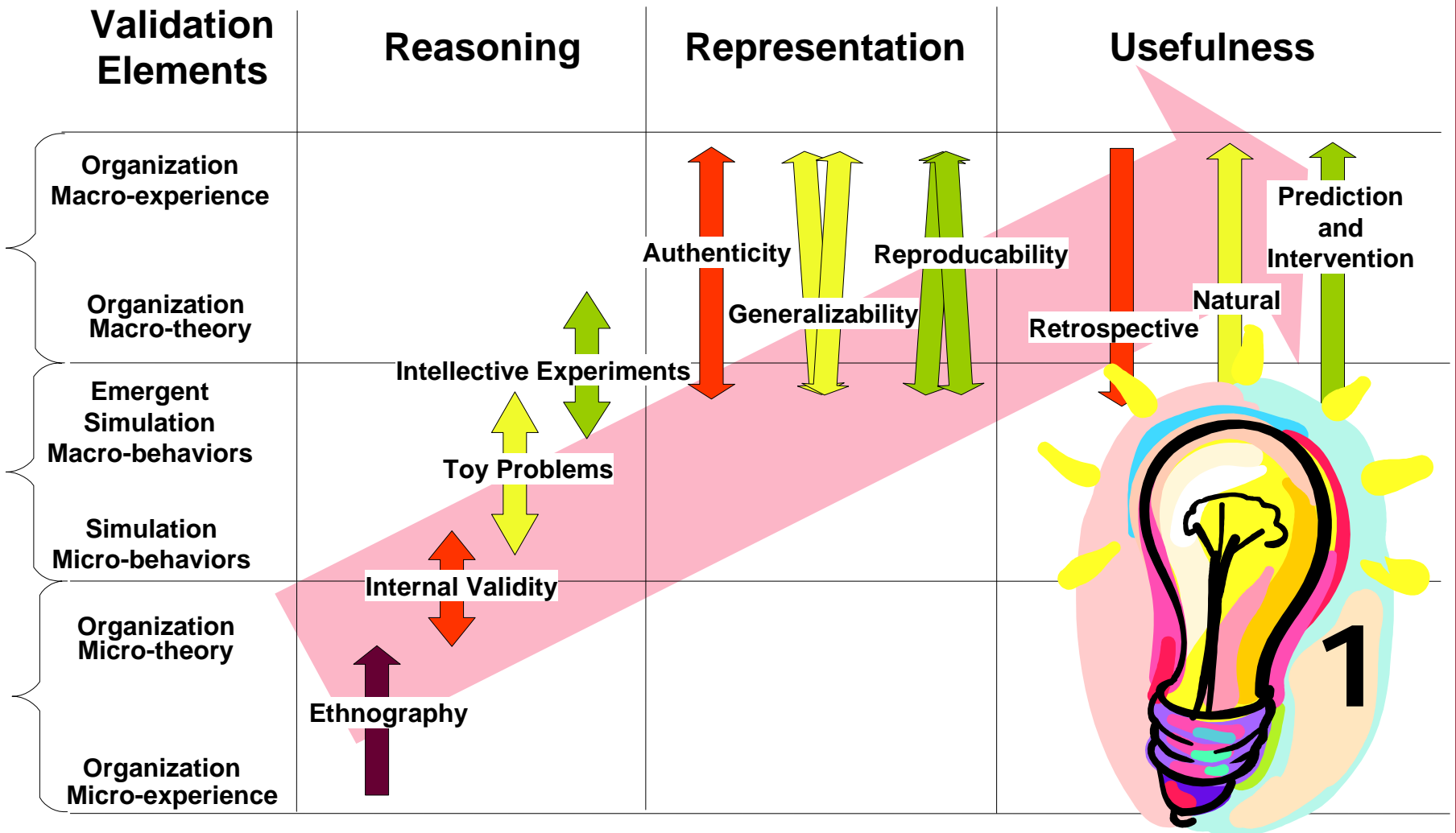


VDT/SimVision Simulates All Information Processing: Direct Work, Exceptions, Communication, Rework and Waiting

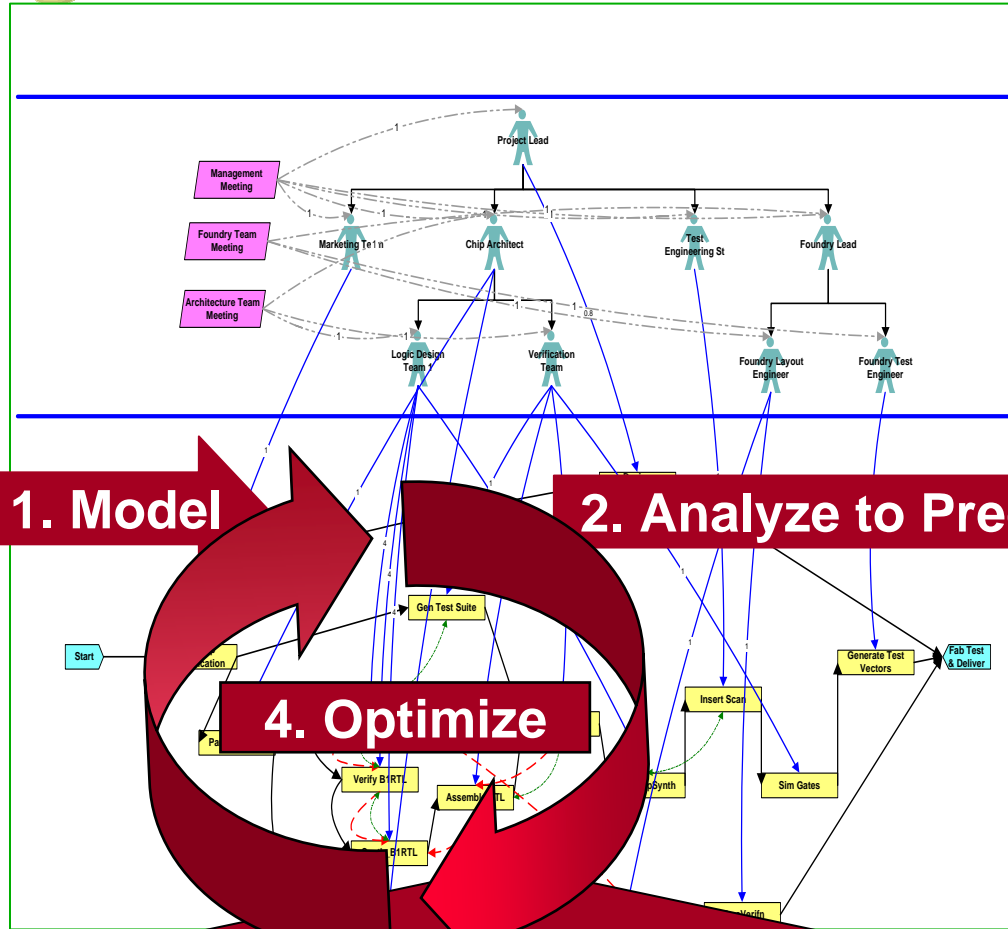
Metrics
Theory
Model
Simulator



Validating an Organizational Analysis Tool



Steps in Organizational Design



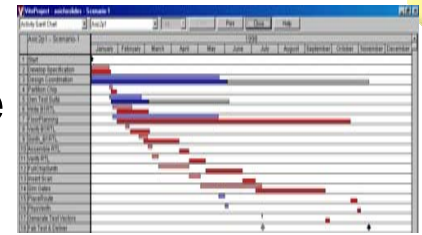
1. Model

2. Analyze to Predict Outcomes

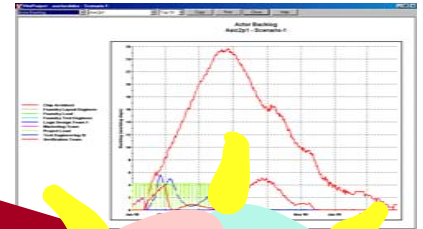
4. Optimize

3. Intervene to mitigate risks

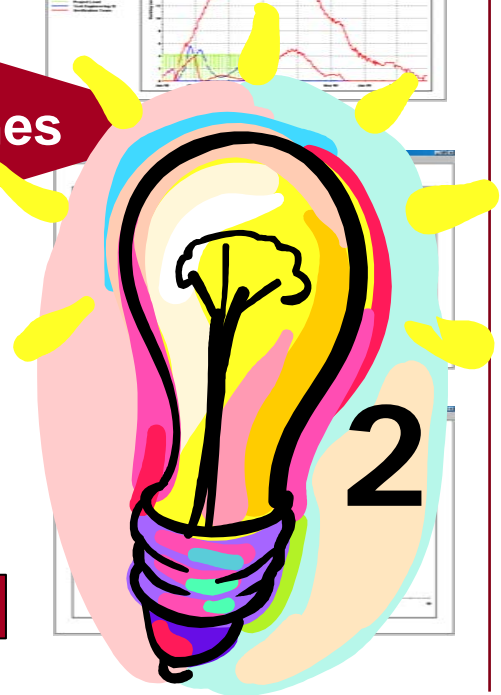
Schedule



Backlog



Quality



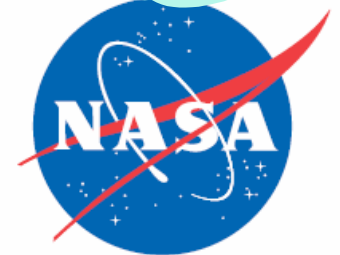
Cost



VDT/SimVision® is Supporting Real Organization Design

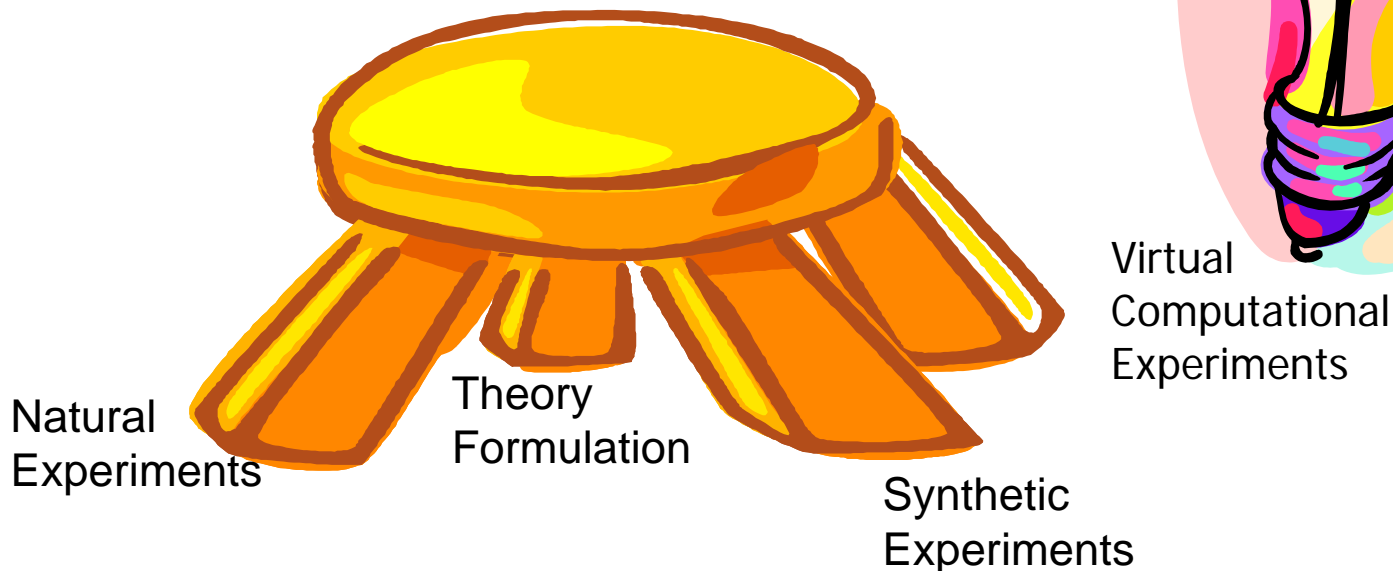


Procter & Gamble

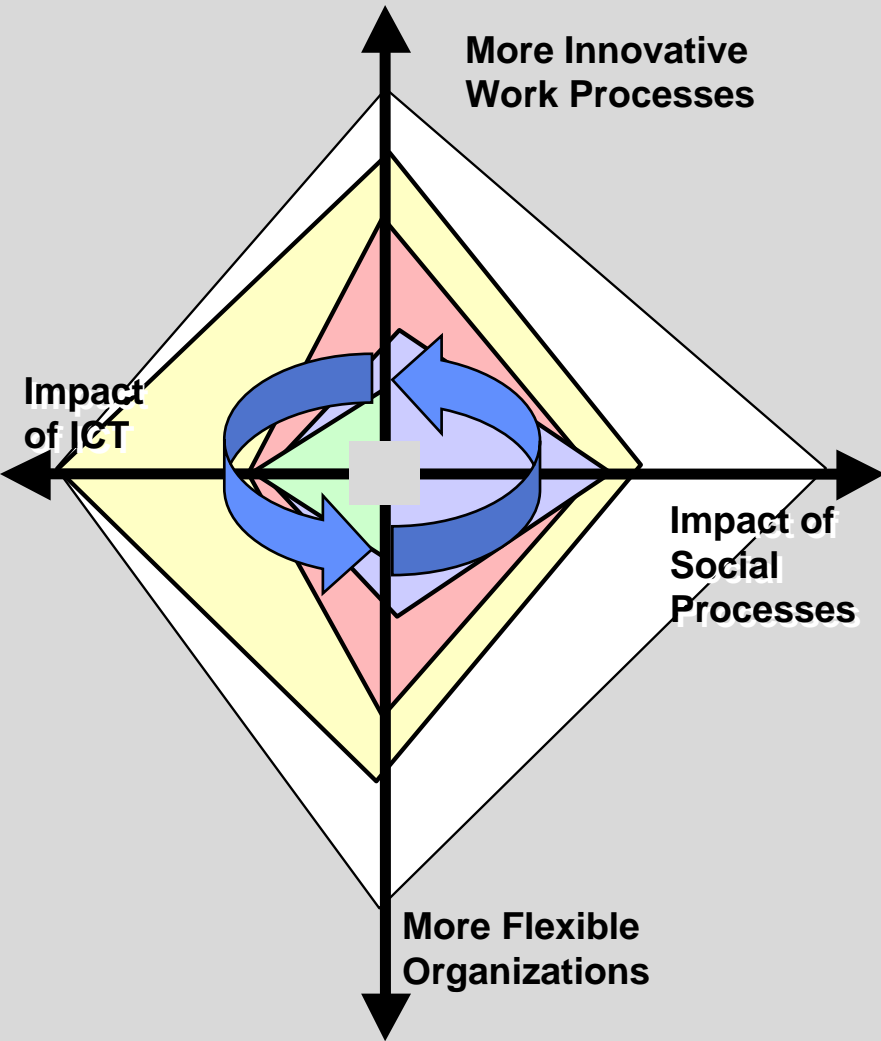


Validated Analysis Tools Can Also Support Computational Virtual Experiments

- ◆ Virtual experiments using VDT/SimVision are being used to augment natural and/or synthetic organizational experiments
- ◆ *CMOT Journal, Org. Science, Mgt. Science* have begun publishing papers involving *Virtual Computational Experiments*
- ◆ Future research may integrate *Virtual Computational Experiments* with Natural and/or Synthetic experiments



VDT Research Program Trajectory



Past Work		VDT 1,2: Coordination Costs 88-94: Cohen/ Christiansen
		VDT 3: Diff't Goal Emphases 95-99: Thomsen, Kish
		VDT-4: Dynamic Work Proc. 96-99: Fridsma/Cain
		VDT-5: Knowledge Networks 99-02: Lambert/ Buettner
		VDT-I Institutional Costs 03-... Mahalingam /Horii/ Orr/Taylor
Ongoing Work		Design Optimizers Murray/KHosraviani



Ongoing Research

- ◆ Optimizing Organization Designs
 - OR/AI Approaches
 - Genetic Programming Optimizers
- ◆ IWPI: Impact of IT Investments
 - Classes of knowledge workers
- ◆ DoD: Designing “Power to the Edge” Org’s
 - How can participants develop swift trust?
 - How can we model knowledge flows
- ◆ NSF: Effects of Institutional Differences on Global Projects
 - Largest area of concentration at this time: Ethnographies, Case Studies, Computational Modeling of IJVs
- ◆ CIFE: Diffusing Systemic Innovations in Project-Based Industries
 - Case studies, computational models



Comments and Questions?

