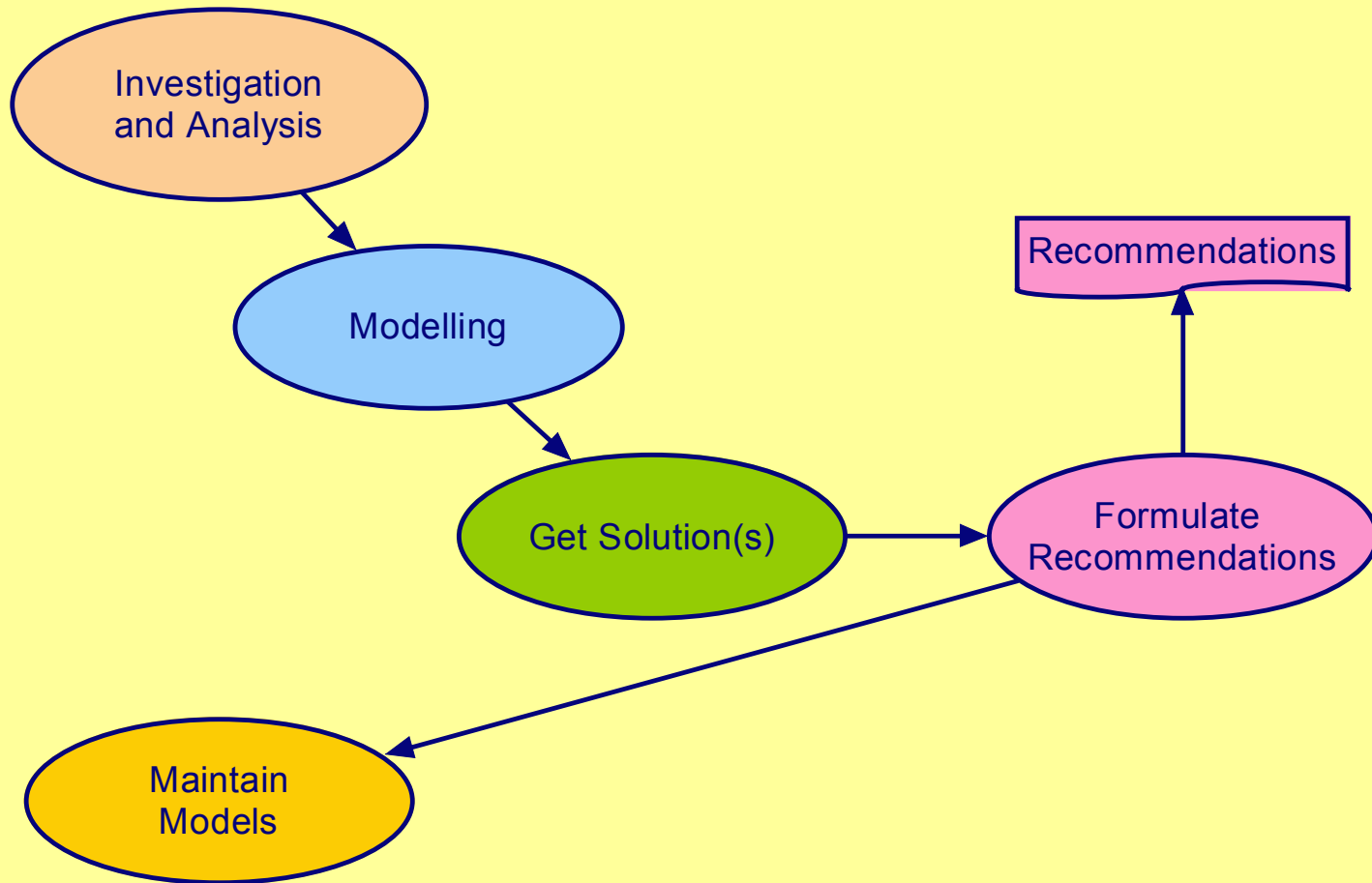


Management Science

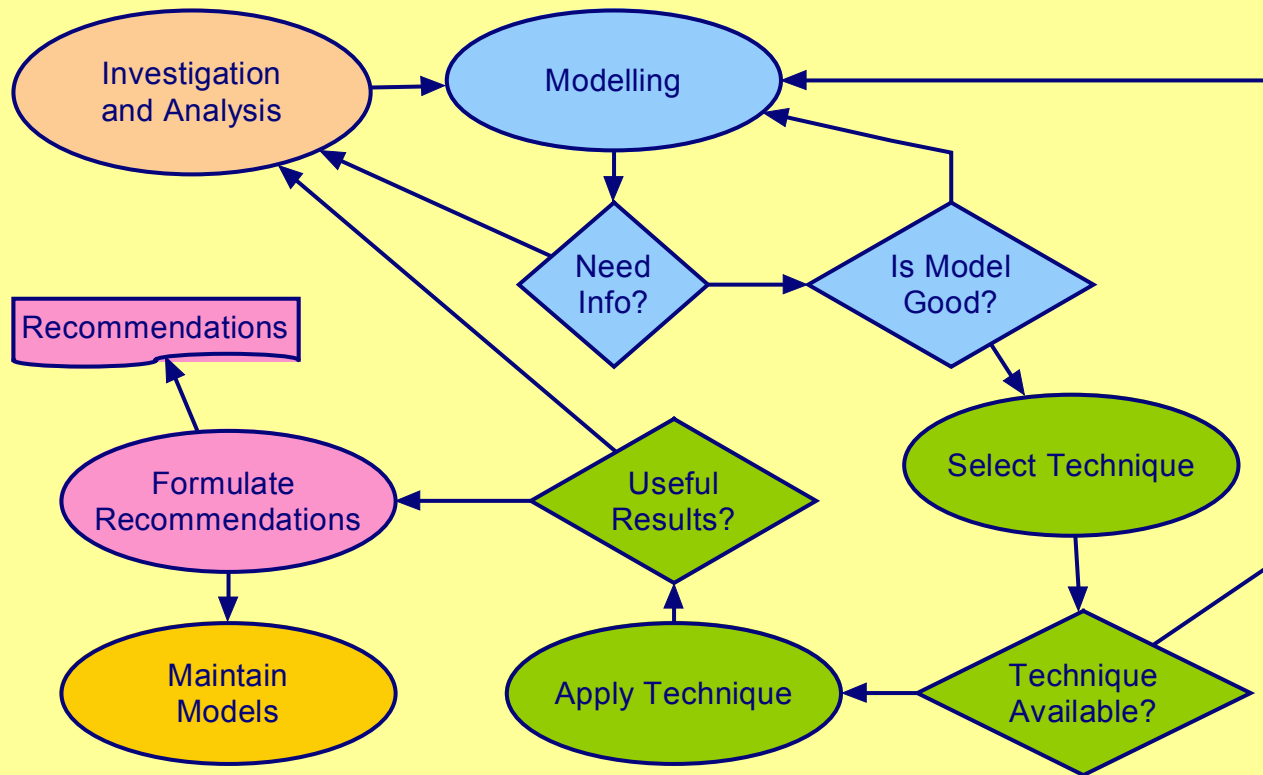
Lecture 2 The Process



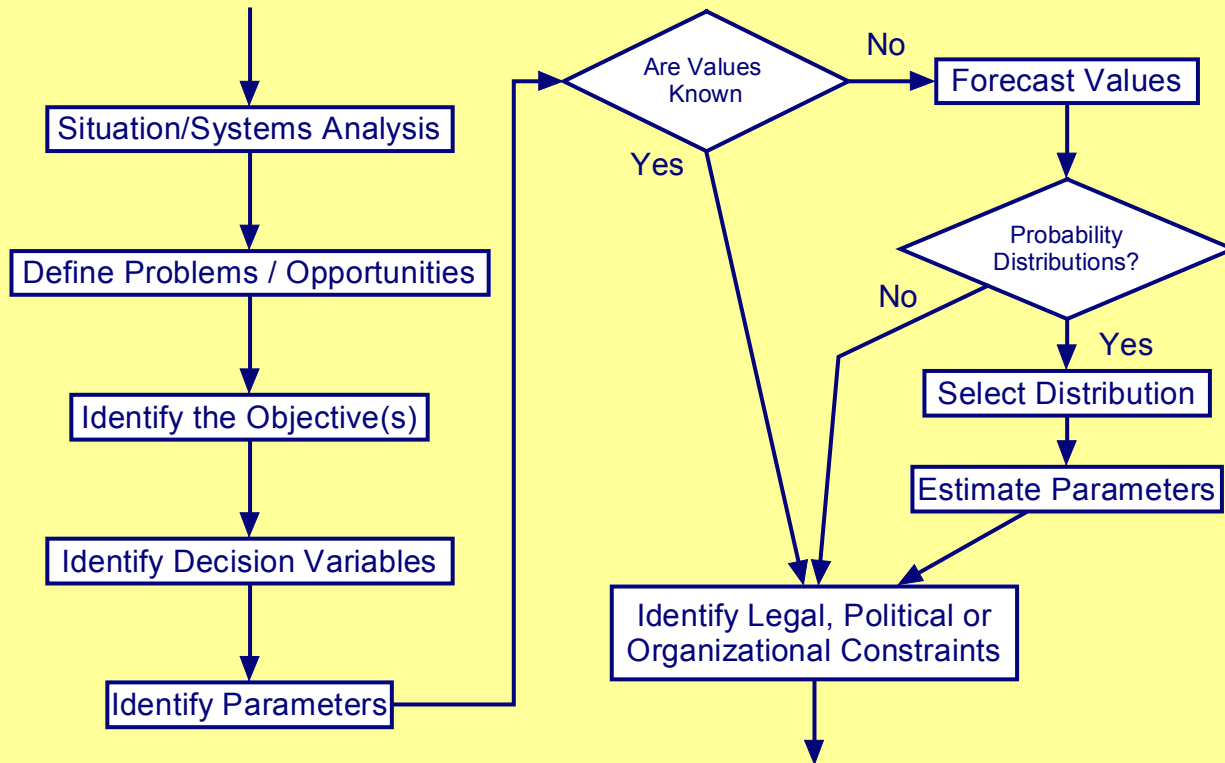
Management Science



Not So Simple as That!



Investigation and Analysis



Investigation and Analysis

- Is there a problem or opportunity?
- What is the Scope?
- What is cost effective?
- Can the solution/approach be sold to management?
- Consider personnel and skills constraints!



Models

- Models are abstractions from reality.
- They tell the truth, but not necessarily the whole truth.
- We may leave elements out of the model if we think they are not important or significant enough to be worth the cost of including them.



Modeling - Model Classes

- Mathematical models comes in 3 main classes.
 - Deterministic.
 - Optimization or Prediction Models.
 - Stochastic or Probabilistic Models.
- This course deals with linear models only, and does not address quadratic and other non-linear models.



Modeling - Problem Type

- There are a number of standard problem types including, but not limited to:
 - Constrained Maximization.
 - Constrained Minimization.
 - The Assignment Problem.
 - The Transportation Problem.
 - The Blending Problem.



Modeling

- Draw a picture or a diagram of the situation.
- Add features to the model to make it easier to understand or solve.
- Express the objective mathematically.
- Express the constraints mathematically.



Modeling cont...

- Identify and Express mathematically other assumed or implicit bounds or constraints.
- Identify costs and add these parameters to the model.
- Identify model class and problem type.



Modeling - Solutions

- Identify solution method appropriate to problem type.
- Apply solution method.
- Interpret results and perform "sensitivity" or "what if?" analysis.
- Review and revisit model as appropriate.



Test and Validate the Results.

- Do the results make sense or do they seem unlikely to be correct?
- Can the result/solution be implemented?
- Do "What if" analyses.
- Look at sensitivity of solution to changes in the environment.



Formulate Recommendations

- Identify the key player who will make the decision to proceed or not.
- Work out how to present the solution in a way which is likely to appeal to the key player.
- Work with organizational, legal or political constraints not embedded in your model.



Formulate Recommendations cont...

- Work out the cost/benefit case.
- Develop an outline implementation plan with measurable milestones.
- Describe the likely impact in changes in the parameters to the problem i.e. sales prices, purchase prices, resource limits etc...



Woosley's Laws

1. Managers would rather live with a problem they can't solve than use a technique they don't trust.
2. Managers don't want the best solution; they simply want a better one.
3. If the solution technique will cost you more than you will save, don't use it!



Communicate Recommendations

- Start with a single page Management Summary.
- Summarize the current situation.
- Describe the assumptions made or values approximated.
- Explain the problems or opportunities.



Communicate Recommendations

- Describe the type of model selected, with good diagrams to ease understanding.
- Describe the solution and its advantages.
- Present the pertinent result of the “What if” (sensitivity) analyses.



Communicate Recommendations

- Present the Cost/Benefit analysis and the assumptions in the Cost/Benefit analysis.
- Put all the complicated clever stuff into appendices.
- Put all the boring, but necessary stuff into appendices.



Writing the Document

- Be concise.
- Use informative graphics.
- Use quotidian expression in place of monstrously verbose erudition. (Use common, everyday language).
- Use spelling and grammar checkers.
- Get someone else to read it.



Implementation

- You will need a good and detailed plan.
- You need to be clear about what you need people to do, when, and about who has the necessary skills.
- You will need to work hard to communicate the plan to the team.
- You should assume that nothing will go according to plan.



Review and Maintenance

- Nothing stands still, so the solution will not be the best solution for ever.
- You should plan to review the success of the new system at intervals after the implementation.
- As the values of parameters change you should re-run your models to assess the impact of these changes.

