

## Session 7

# Managing Spreadsheet Modeling Projects

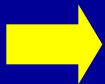
## Spreadsheet Inspections

- Graphics are an effective means of communicating numerical relationships
- Graphics are an effective means of developing your intuition about models
- Use graphics features and styles sparingly
  - Avoid the cluttered look
  - Avoid the “ransom note” effect of multiple fonts
- Use links to create data tables to drive your charts — avoid copying data
- Use links for attached text when that text would require maintenance
- Use Excel names to reduce chart maintenance effort

# Managing spreadsheet modeling projects

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- Using spreadsheet models on an enterprise scale raises subtle issues:
  - Models must be reliable because a lot is at stake
  - Enterprise must avoid dependence on specific authors of the models
  - Costs of models scale up faster than their complexity or fidelity
  - Enterprise must be a learning organization when it comes to modeling
  - Resources and time required for model enhancement must be predictable
- These are the same issues that plague all software systems
- Software engineers have created a set of key process areas to frame the way they deal with these problems
- You might want to use some of them in your course projects
- We will look in detail at one of them: Reviews/Inspections

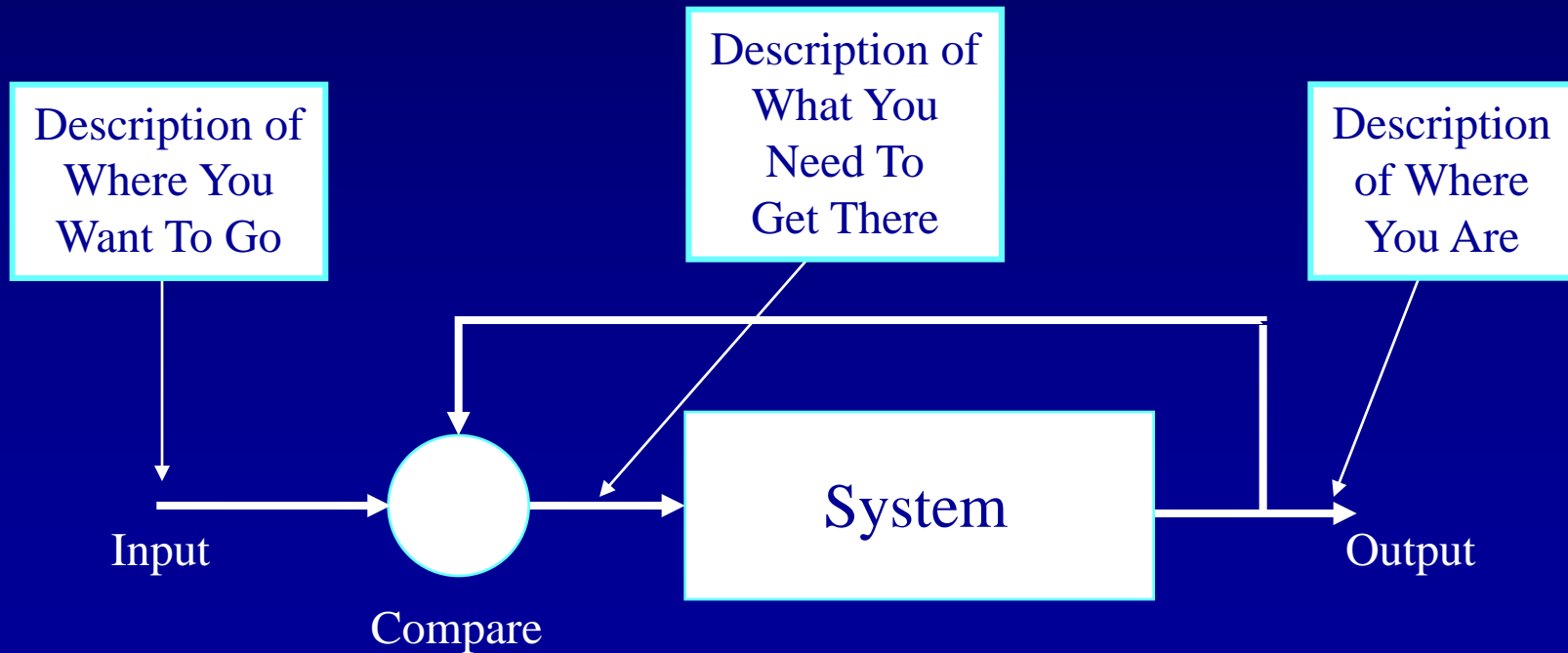


Readings: Design Reviews and Spreadsheet Inspections

# Management as the art of steering a system

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- Three “Knows”
  - Know where you are
  - Know where you want to go
  - Know what you need to get there



# Better management makes better models

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- Your ability to manage model development projects limits the complexity and fidelity of the models you build
- Better managing of model development means better steering
- Model building processes can be categorized into patterns of effectiveness
- There are six patterns of sophistication (Freedman and Weinberg)

# Process patterns example: driving

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- Oblivious** What's "driving"?
- Variable** We drive wherever we want to go at the moment
- Routine** We know how to use the steering wheel, we know the recommended routes, and we do the right thing (except when we panic)
- Steering** We have several routes, and we choose from them according to conditions at the time
- Anticipating** We consider the predictions for weather, traffic, construction, etc. when we're deciding our route
- Congruent** We're always improving everything, including steering wheel technology, weather and traffic prediction ... we're even improving how we improve

# Six cultural patterns of organizational model-making

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- Pattern 0: Oblivious  
We don't know that we're making a model
- Pattern 1: Variable  
If it feels right, we build the model that way
- Pattern 2: Routine  
We follow our routines for model-building except in emergencies
- Pattern 3: Steering  
We choose among model-building routines by their results
- Pattern 4: Anticipating  
We establish model-building routines based on experience
- Pattern 5: Congruent  
We're all involved in improving everything we do all the time

# Some key process areas for spreadsheet modeling

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- Pattern 2: Routine

- Requirements management
- Project planning
- Project tracking and oversight
- Subcontract management
- Quality assurance
- Configuration management

## Pattern 3: Steering

- Organization process focus
- Organization process definition
- Training program
- Integrated modeling management
- Model engineering
- Intergroup coordination
- Peer reviews of all work products
- Everything from Pattern 2



# Inspection checklist: workbooks

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- The workbook contains a sheet that gives the version number of the model or tool
- There are no empty worksheets
- All user-modifiable data is segregated

# Inspection checklist: worksheets (1)

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- The sheet's name begins with an alphabetic character
  - Contains only numbers, letters or the period (.) character
  - No other characters are allowed
  - Each word component of the name follows a pattern of initial upper case letter, followed by lower case letters or numbers
  - Sheet names are 10 characters long or fewer
- All range names begin with an alphabetic character
  - Names can contain numbers, letters and the period (.) character
  - No other characters are allowed
  - Names are in mixed case
- For parameter names, each word component of the name follows a pattern of initial upper case letter, followed by lower case letters or numbers

# Inspection checklist: worksheets (2)

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- Links across sheets always use named ranges
- There are no cross-sheet links using explicit cell references
- Row captions
  - Right justified, unless they caption an empty row
  - If all other cells in the row are empty, the row caption need not be justified
  - Row caption cells must be directly adjacent to the first cell of the data they caption
  - Row captions are in mixed case
  - Numeric caption, comment or heading cells can have any alignment, unless otherwise required
- Column headings are centered, in mixed case
- Numeric data cells are right aligned or general aligned

# Inspection checklist: worksheets (3)

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- Dollar amounts are formatted as 1,000
- No pennies are indicated except when the precision is required for meaning
- Percentages are formatted as 27%
- No underline or strikethrough font styles
- Linked blank text displays as blank, not 0
- Worksheets are spell-checked and corrected
- No worksheet cells contain error values
- There are no numeric constants in formulas, except:
  - Parameter cells or parameter arrays
  - Arguments of INDEX or OFFSET or similar situations

# Inspection checklist: worksheets (4)

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- Range names use standard abbreviations
- All numeric constants are held in named cells, and referred to by name, except possibly cells containing 0
- All total cells sum the “correct” ranges
- Array formulas are used where possible
- There are no defined names that no longer exist (#REF!)
- There are no circular reference errors

- Basic idea
  - Team of colleagues examines an author's work in detail
  - Understand the design and implementation
  - Ensure that work product meets requirements
  - Ensure adherence to accepted practices
  - Develop a set of issues to be addressed
- Roles
  - Moderator
  - Scribe
  - Author
  - Reader/reviewers
- Advantages
  - Early removal of defects from modeling work products
  - Defect prevention because of improved understanding of modeling work products

- Issues log
  - Each issue is identified with a tag or number
  - 10-word (or less) summary
  - Classification (minor or major)
- Review team does not resolve the issues — the author does
- Final report upon resolution of issues

- Moderator
  - Select reviewers and scribe
  - Arrange a place and time
  - Distribute packet
    - Information about work product
    - Checklists of standards for the review
  - Run the meeting ( $\leq 2$  hours)
  - See that issues are resolved
- Scribe
  - Record issues
  - Distribute issues log after meeting
- Reader/reviewers
  - Prepare in advance (2:1)
  - Find issues during meeting
- Author
  - Represents the development team
  - Might even be the development team
  - Acts as resource
  - Explains things to the readers/reviewers




# Preparing for an inspection

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- As a reader/reviewer your role is to identify issues
- This requires a very clear understanding of what the issues mean
- A common error: misunderstanding what the checklist means
- For the homework:
  - Read and understand what the checklist items are and what they mean
  - Check with your teammates about interpretations

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-  Readings: Design Reviews and Spreadsheet Inspections
  - Freedman, Daniel P. and Gerald M. Weinberg. *Handbook of Walkthroughs, Inspections, and Technical Reviews*, 3rd ed. Boston: Little, Brown, 1982.

# Preview of next time: Financial Models

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- Three external financial statements
  - Income Statement (Revenue and Expenses for a given period)
  - Balance Sheet (Financial Position at the end of the period)
  - Cash Flow (Statement of Changes in Financial Position during the period)
- What are capital transactions?
  - Either purchases or sales
  - They have affects beyond the current reporting period
- Capital transactions affect all three financial statements
  - Income Statement  
Depreciation, Maintenance, Capital Expenditures
  - Balance sheet  
Value of the equipment is added to assets
  - Cash Flow  
If purchased for cash, the purchase affects cash on hand

- Patterns of capability
  - Mark C. Paulk, Charles V. Weber, Suzanne M. Garcia, Mary Beth Chrissis, Marilyn Bush. “Key Practices of the Capability Maturity Model **SM** , Version 1.1,” Software Engineering Institute (CMU), Technical Report CMU/SEI-93-TR-025, ESC-TR-93-178. February 1993.  
<http://www.sei.cmu.edu/pub/documents/93.reports/pdf/tr25.93.pdf>
  - Gerald M. Weinberg. *Quality Software Management Volume 1: Systems Thinking*. New York: Dorset House, 1992.
  - Watts S. Humphrey. *Managing the Software Process*. Reading, MA: Addison-Wesley, 1990.
- Reviews and Inspections
  - M.E. Fagan, “Advances in Software Inspections,” *IEEE Transactions on Software Engineering*, Vol. 12, No. 7, July, 1986, pp. 744-751.
  - D.P. Freedman and G.M. Weinberg, *Handbook of Walkthroughs, Inspections, and Technical Reviews, Third Edition*. New York, NY: Dorset House, 1990.

# Appendix: Other management practices

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The following slides give you an idea of what the other key practices are.

- Requirements are the properties the model *must* have
- Purposes of requirements management
  - Establish common understanding between sponsor and modeler
  - Make a clear statement of “where we have to go”
- Requirements provide basis for project planning

- Establish reasonable plans
  - For building the model
  - For managing the project
- Plans provide the statement “where do we have to go”
- Plans are the basis for project tracking and oversight

# Project tracking and oversight

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- Tracking and oversight answer the question “Where are we?”
- Establish visibility into actual progress
- Basis for corrective action decisions if there is deviation from plans

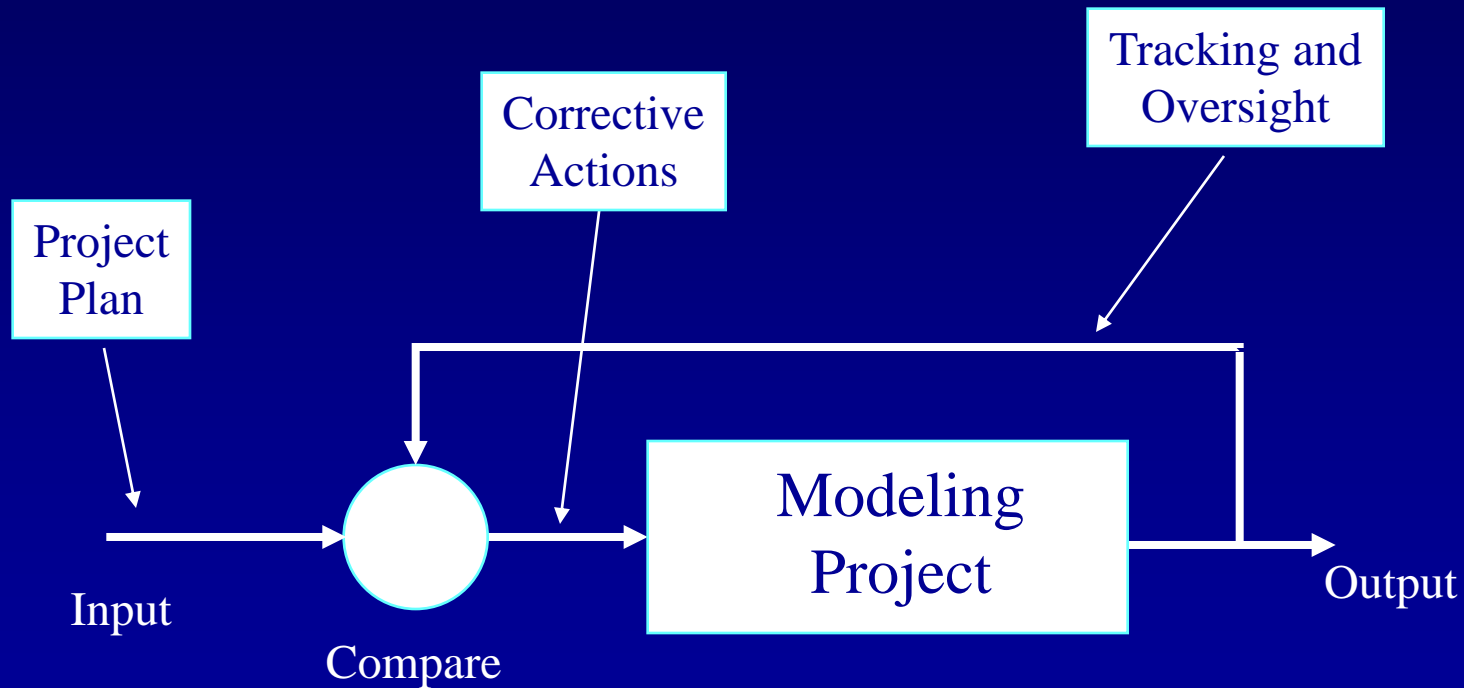
Pattern 2: Routine



# Steering a modeling project

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## Pattern 2: Routine



- Purpose
  - Select qualified subcontractors
  - Manage them effectively
- Basic management control of subcontractors
- For subcontractor activities, this combines
  - Requirements management
  - Project planning
  - Tracking and oversight
  - Quality assurance
  - Configuration management

- Purpose is to make visible the effectiveness of the process of building the model
- Usually involves measurements
  - Number of unmet requirements
  - Requirements volatility
  - Tests to determine presence of defects
  - Number of defects per cell
  - Time required to repair a defect
  - Number of known defects outstanding
  - And many others
- If the number of known defects is rising, you're nowhere near done

- Purpose is to establish and maintain model integrity
- Define versions of model components
- Define compatible sets of versions of various model components
- Provide for protection of sensitive components
  - Against unintended modification
  - Against unauthorized modification
- For Excel files
  - Version stamping
  - Utilities to check versions of components

- Establish organizational responsibility for modeling process activities that improve the modeling capability
- Result is a set of modeling process assets shared by modeling projects
- Reinventing the wheel is minimized, and lessons learned are shared

- Develop and maintain a standard modeling process for the organization
- Develop and maintain a set of modeling process assets
  - Model life cycles
  - Standards and definitions
  - Utilities and tools
  - Templates
  - Process tailoring assets
- To capture process learning
  - Reuse what you can
  - Design things so they can be reused
  - Use macros instead of complex manual procedures

- Purpose is to develop skills and knowledge of modelers and managers
- Training may be part of the project plan
- Settings for training
  - Classroom
  - On line or textbook
  - Practice on pseudo-projects
  - Practice on real projects
- Practice (as training) on real projects entails
  - Errors and defects
  - Repair and rework
  - Much higher costs than any other setting

- The modeling process extends beyond the immediate modeling activity
- Model-building groups participate actively with other organizational groups
  - Finance
  - Investment committee
  - Marketing
- Intergroup coordination ensures that the team meets the needs of the sponsor of the model