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Workshop on Resourcing, Workforce Modeling, and Staffing

Work Measurement Operations Research Session

The National Academies
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Topics

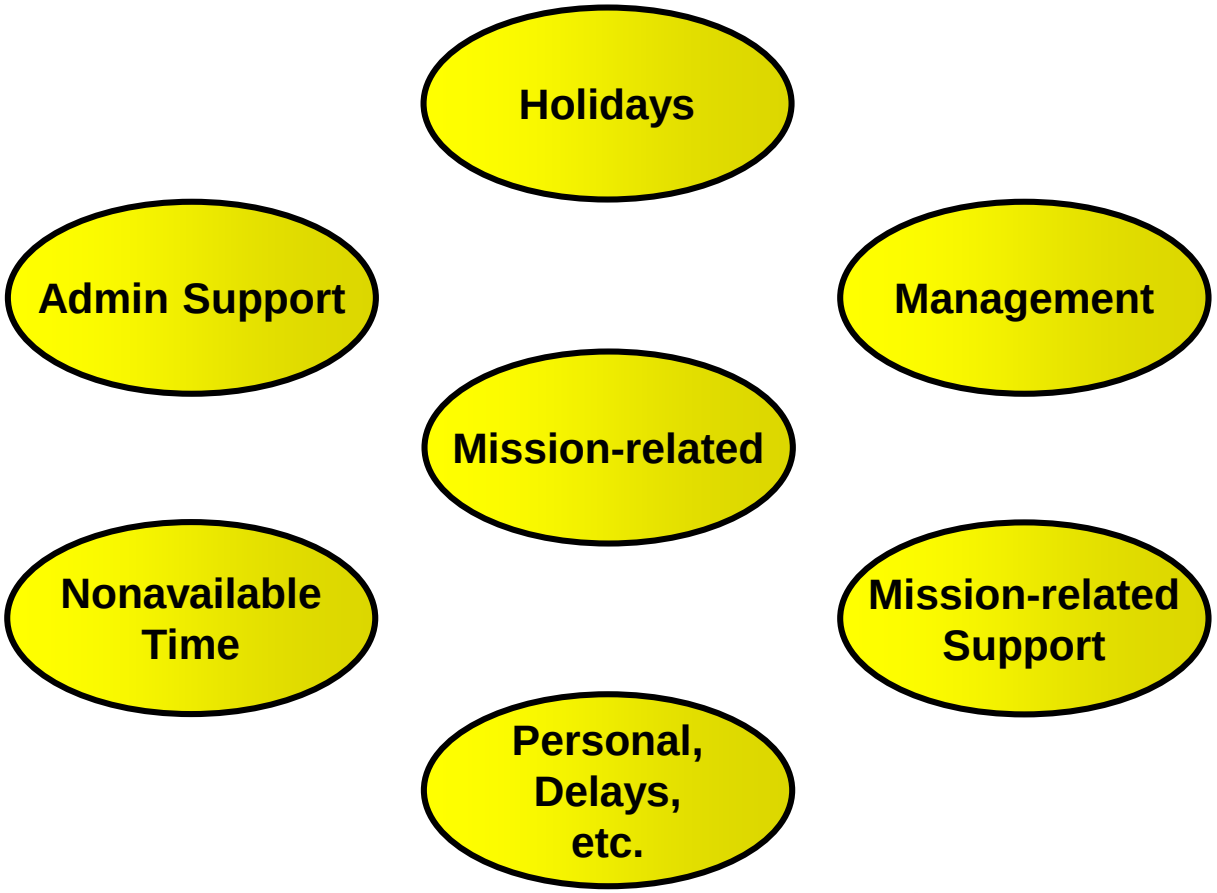
- Purpose
- The Basics
- Conditions for Success
- Your Questions
- Recommendations

Purpose

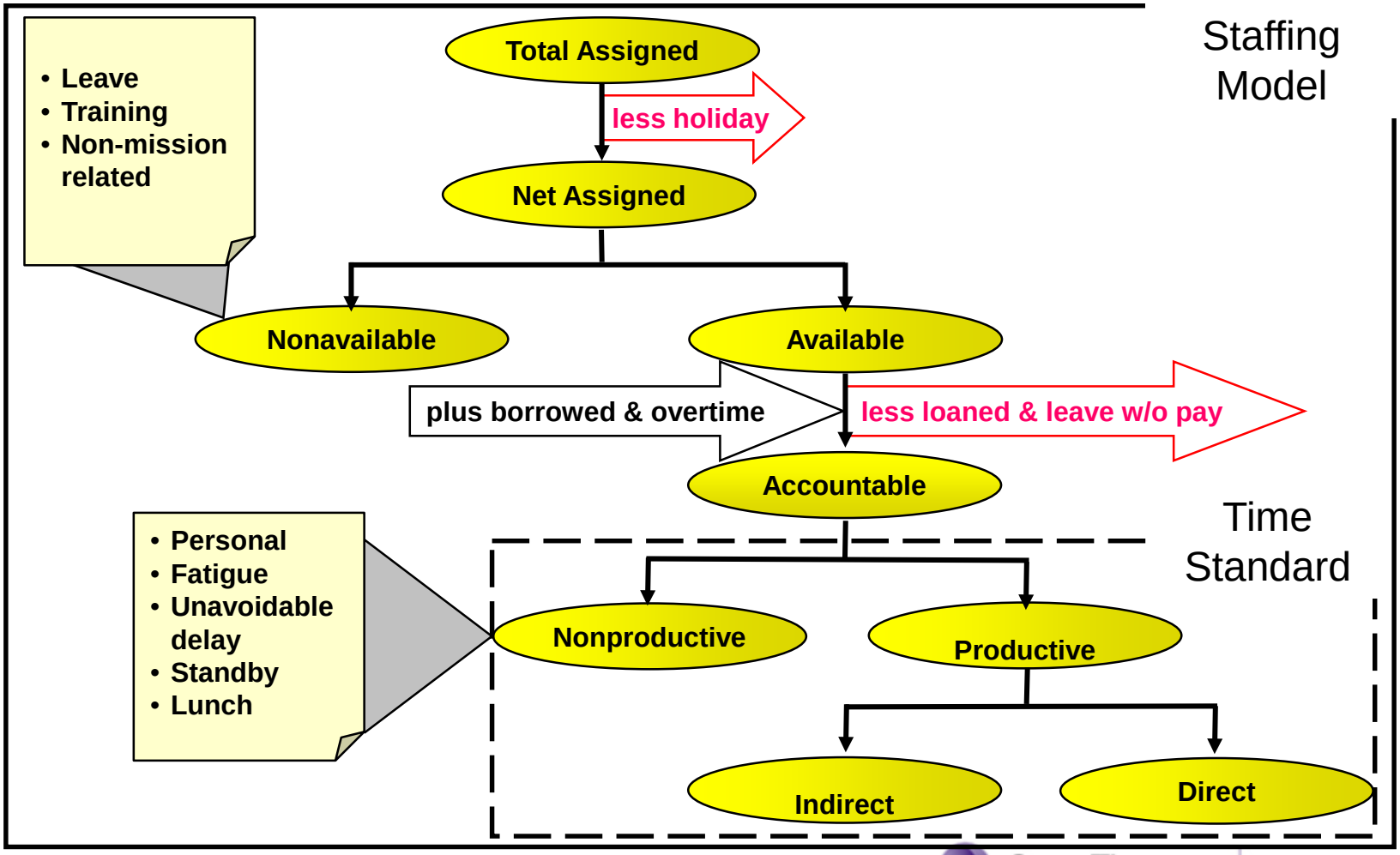
Provide input to the Committee on Facilities Staffing Requirements for Veterans Health Administration (VHA) Facility Management (Engineering) Programs

- Address selected questions provided by the Academies
- Participate in Q&A

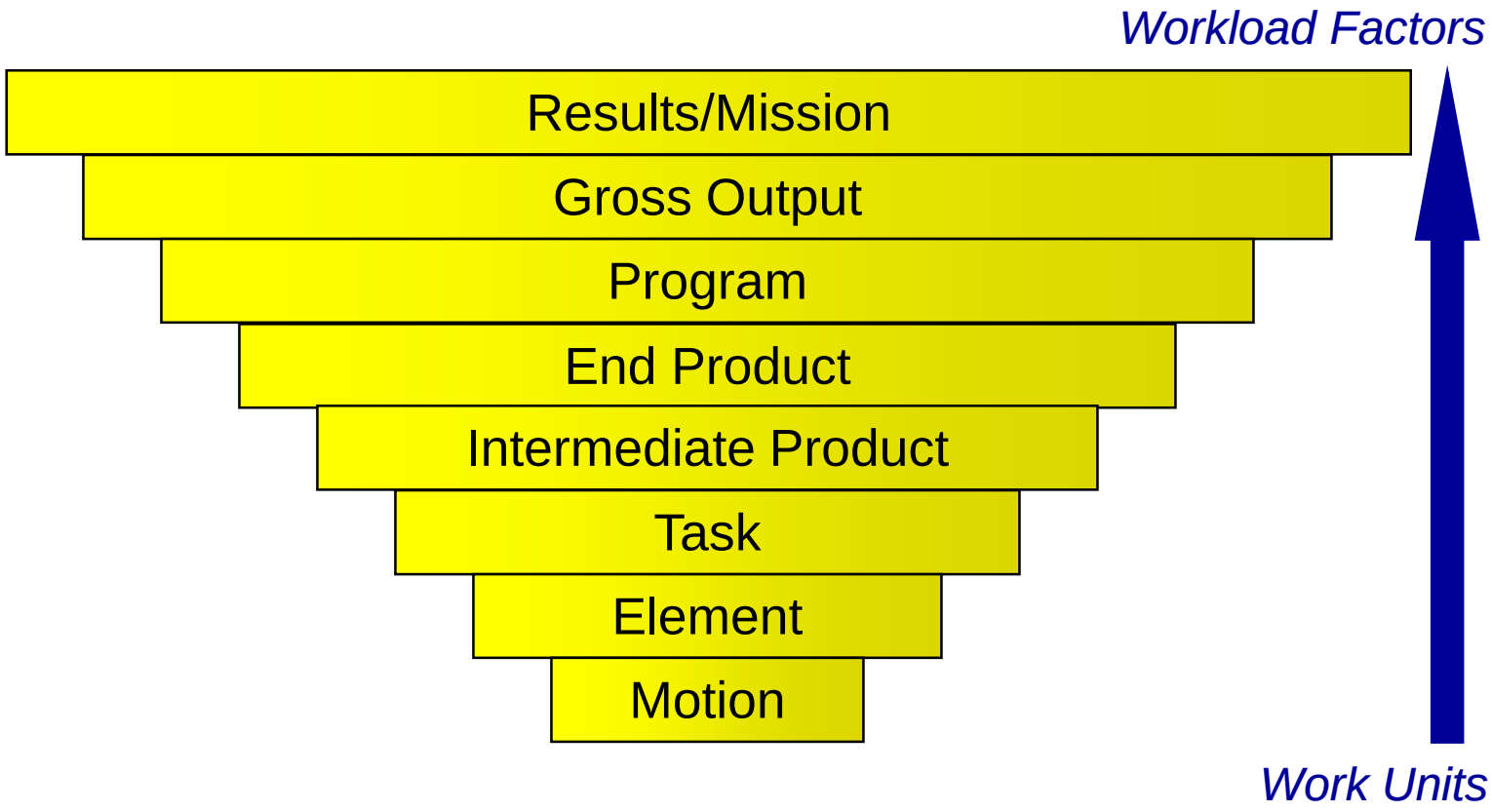
The Basics
Duty Time Components



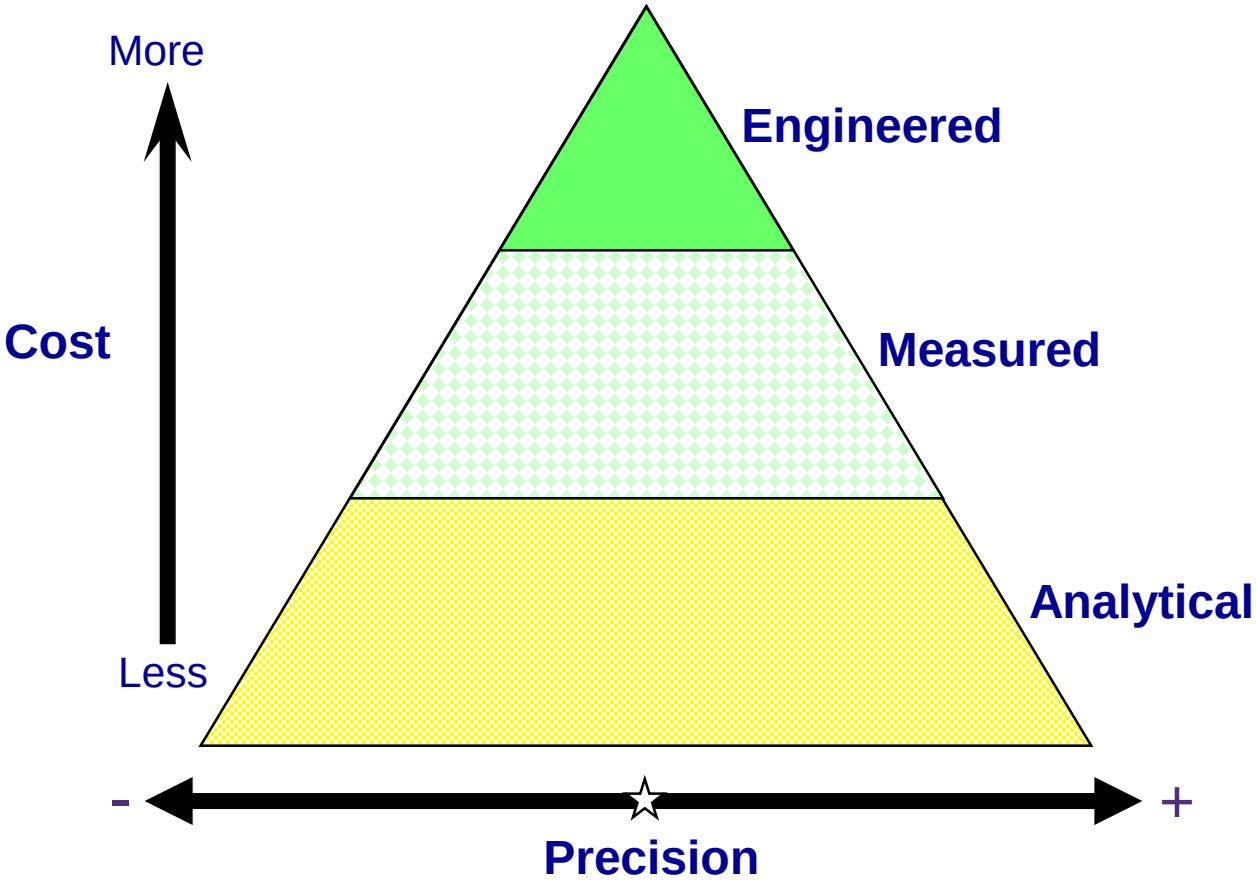
The Basics
Work Time Classifications



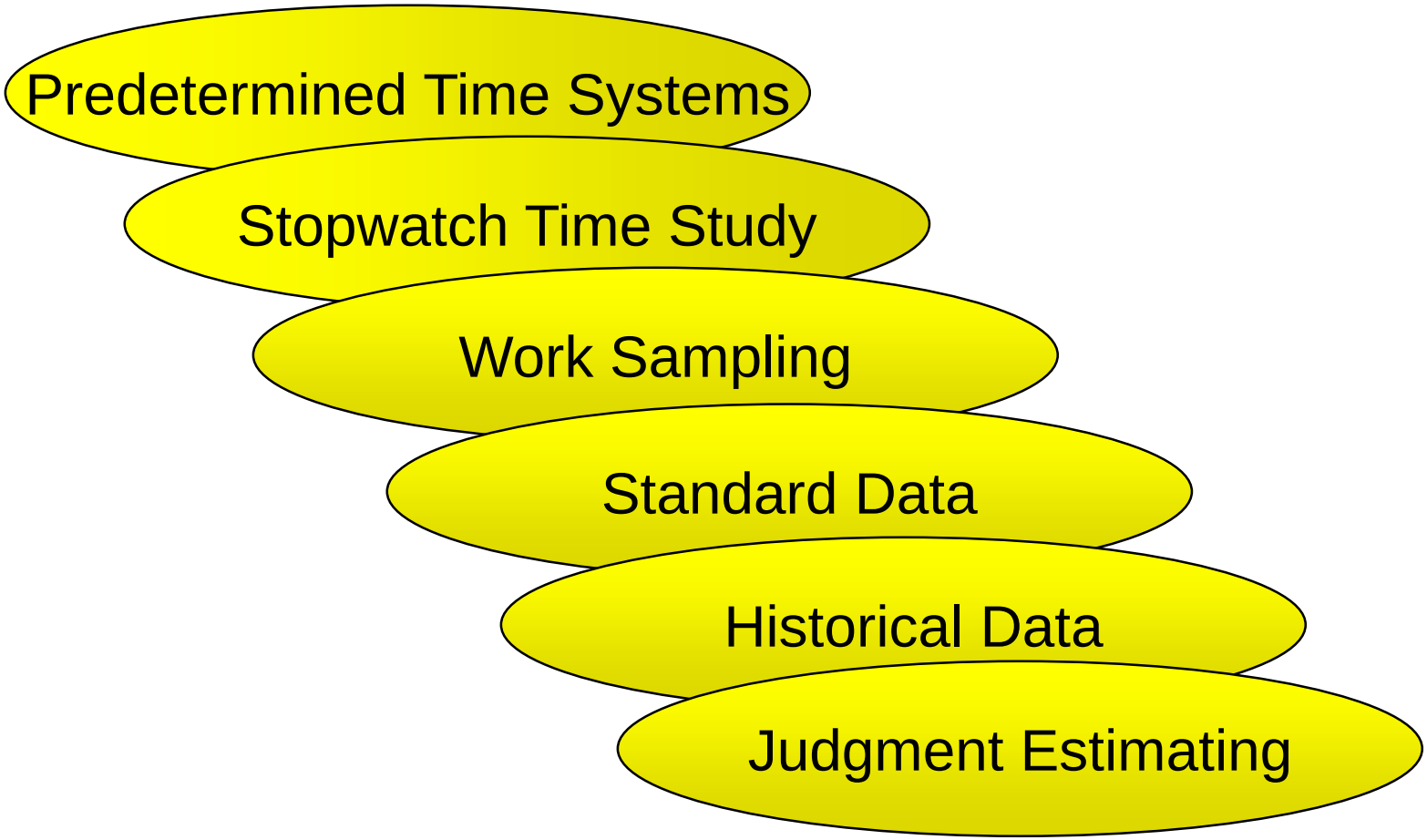
The Basics
Orders of Work



The Basics
Measurement Techniques



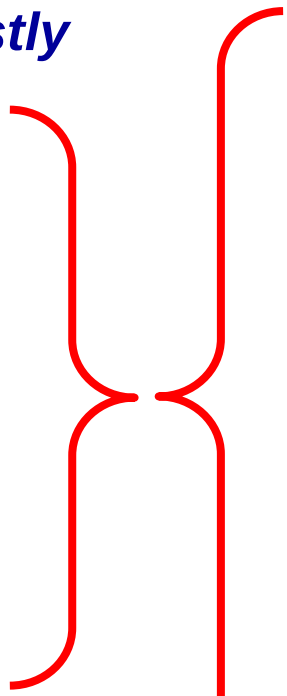
The Basics
Measurement Techniques (contd)



The Basics
Techniques versus Environmental Factors

More Precise, More Costly

Predetermined time systems
Stopwatch time study
Work sampling
Standard data
Historical data
Judgment estimating



Business cycle
Client's belief system
Data availability
Location of each work crew member
Management/labor relationship
Number of locations
Past practice
Precision (accuracy) needs
Resource constraints ($, people, time)
Task duration, repetition, and variety
Type of work to measure

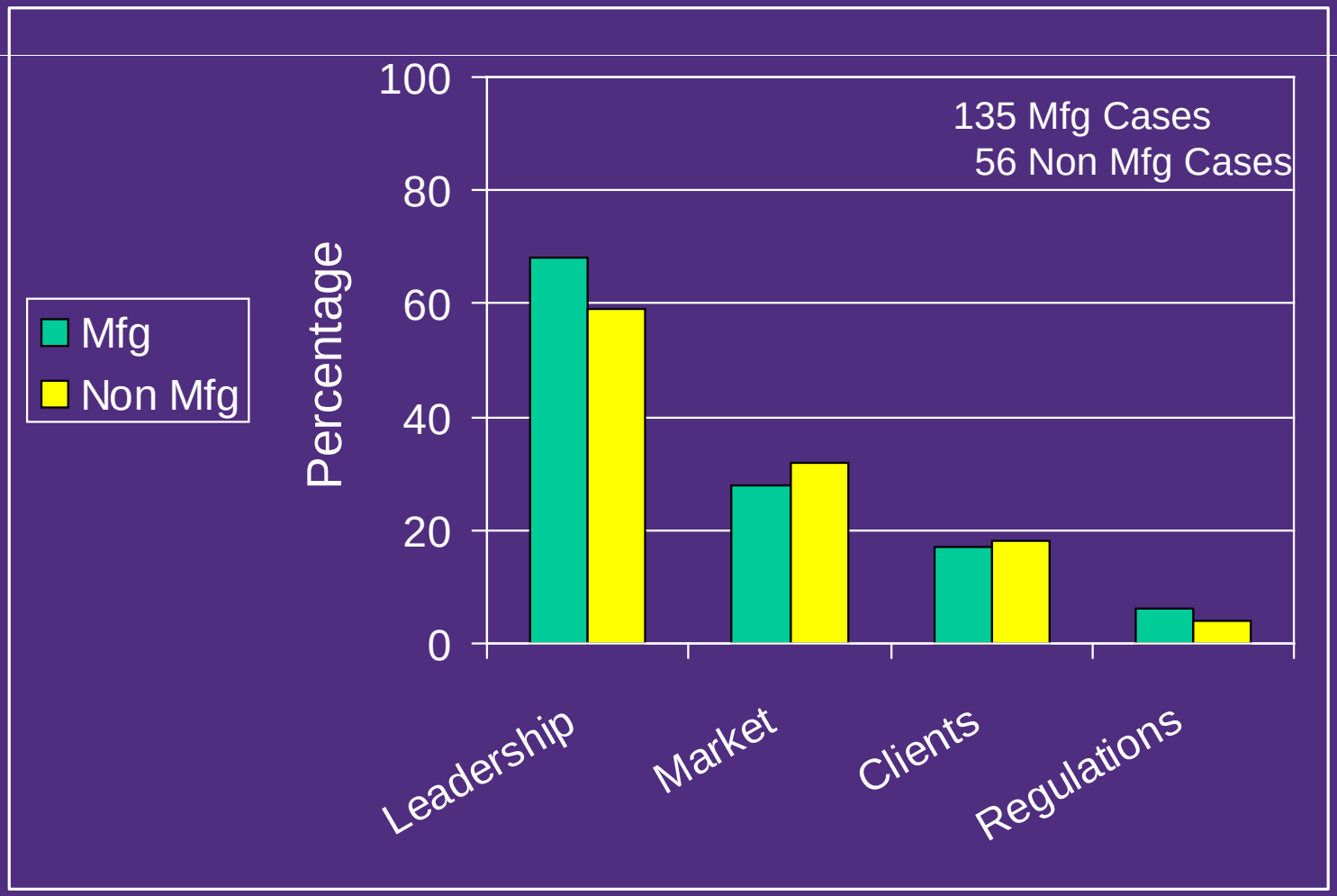
Less Precise, Less Costly

Conditions for Success

- Executive leadership, management, and key stakeholder support, including necessary resources

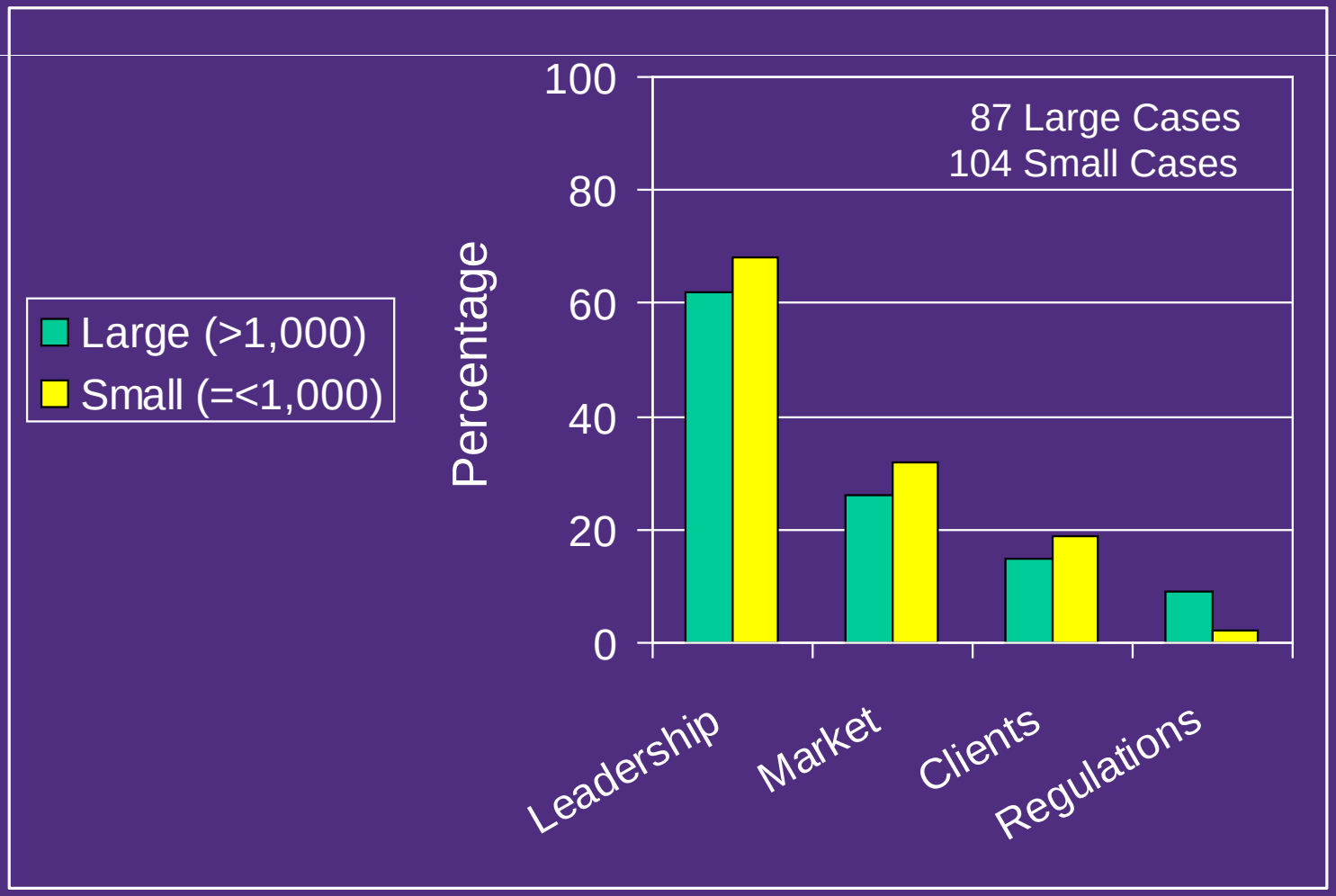
Conditions for Success

Motivators to Measure Work in Private Sector



Conditions for Success

Motivators to Measure Work in Private Sector (contd)



Conditions for Success *(contd)*

- Executive leadership, management, and key stakeholder support, including necessary resources
- Qualified development, execution, implementation, and maintenance team(s)
  - Appropriate measurement technique
  - Accepted description of activity to be covered by measurement data
  - What is measured must align with workload data
  - Representative sample of universe of selected function(s)
  - Rigorous attention to detail, data analysis, validation, and documentation
  - Direct and indirect activity accounting for off-clock time, borrowed and loaned resources
- Stakeholders must be committed, even if the journey is long

Your Questions

1. What is the measured validity of WM techniques, i.e. do they accurately predict job completion time?

   Answer: Depends on how well "Conditions for Success" are satisfied.

- Executive leadership, management, and key stakeholder support, including necessary resources
- Qualified development, execution, implementation, and maintenance team(s)
  - Appropriate measurement technique
  - Accepted description of activity to be covered by measurement data
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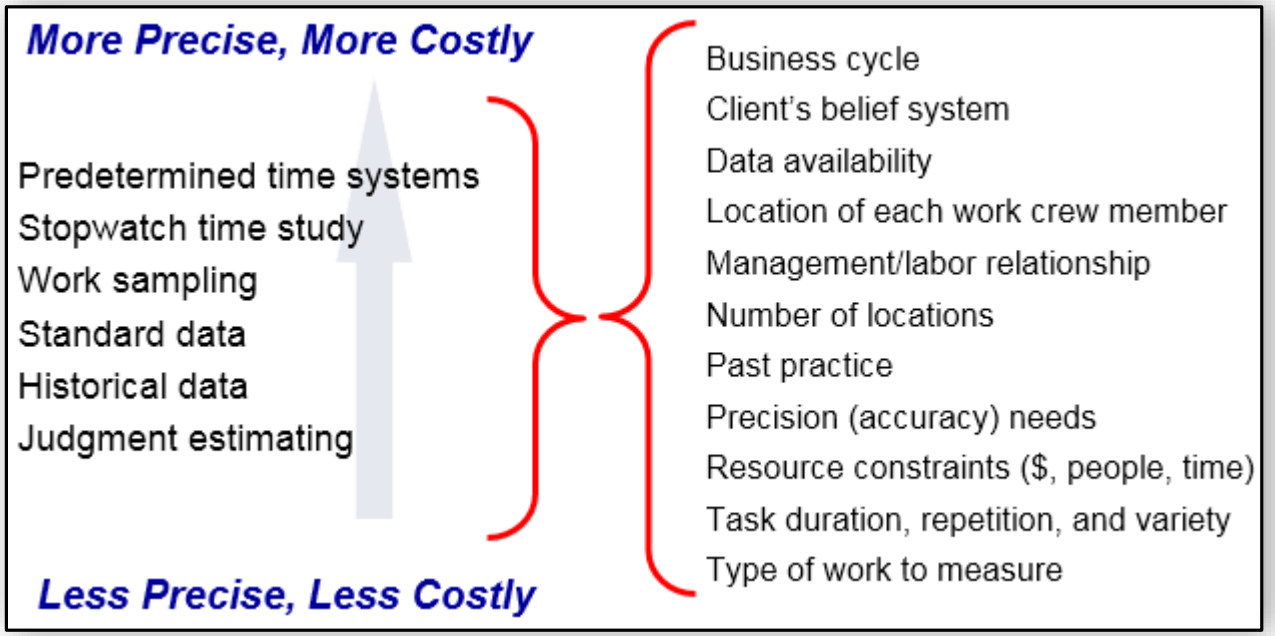
Your Questions *(contd)*

2. Job completion time may be highly variable for maintenance tasks: How do WM techniques take this into account when many were developed for short-cycle repetitive tasks?

   Answer: Refer to "The Basics: Techniques versus Environmental Factors" and "Conditions for Success."



Your Questions *(contd)*

3. How do WM techniques deal with quality of task output? Is the traditional speed/accuracy trade-off (SATO) taken into account?

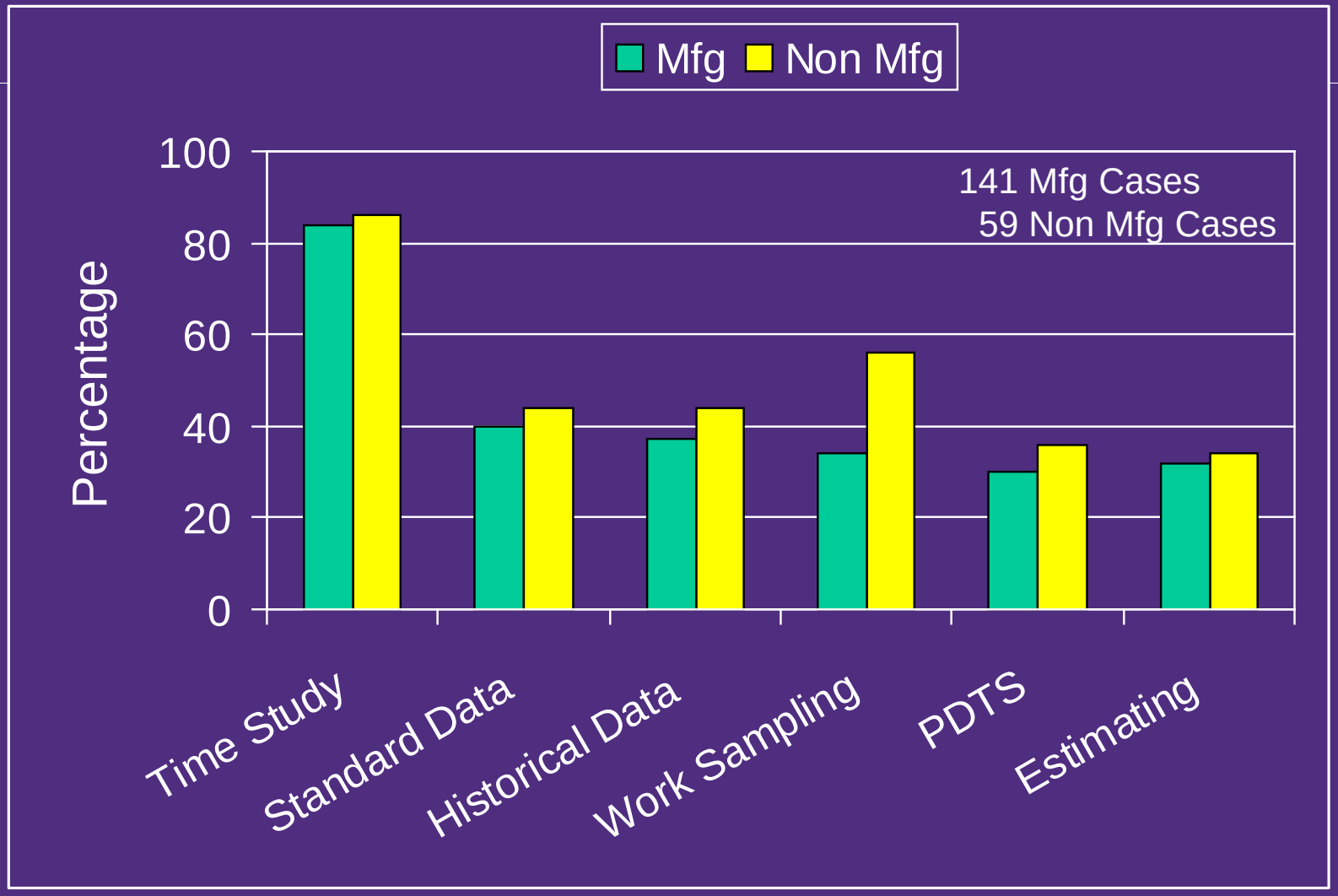
   Answer: Yes. Time measurement data needs to reflect production results acceptable to management. Measurement data must be (a) derived from situations when work results are acceptable to management, or (b) measurement data needs to be adjusted by the application of performance ratings. If none of these is possible, stakeholders need to accept results as they are.

4. What are the costs and benefits of particular measurement techniques, e.g., are we talking about workflow analyses that require an observer - as in classic time/motion studies?

   Answer: Unable to provide quantitative comparison.

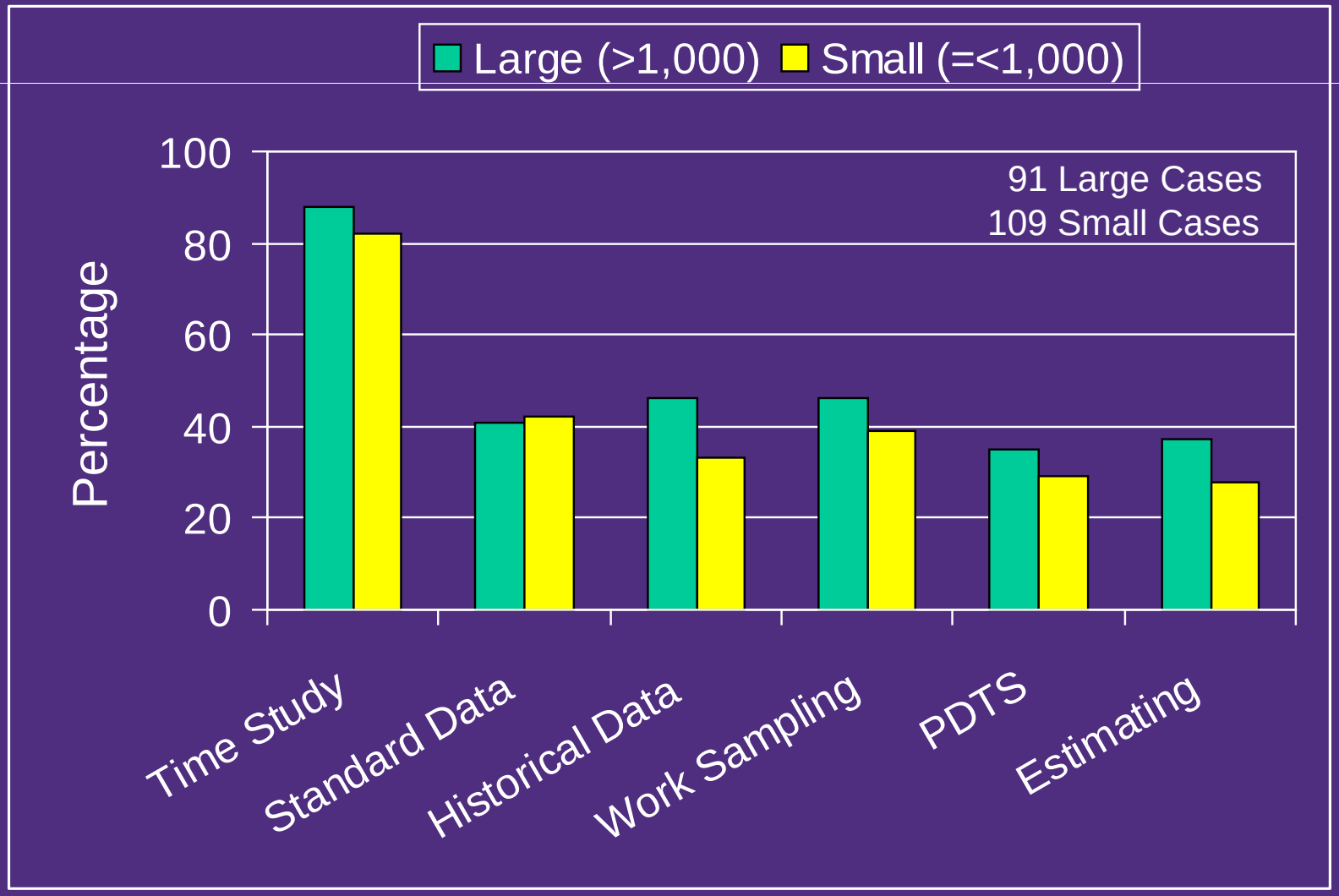
Your Questions

Techniques Used to Measure Work in the Private Sector



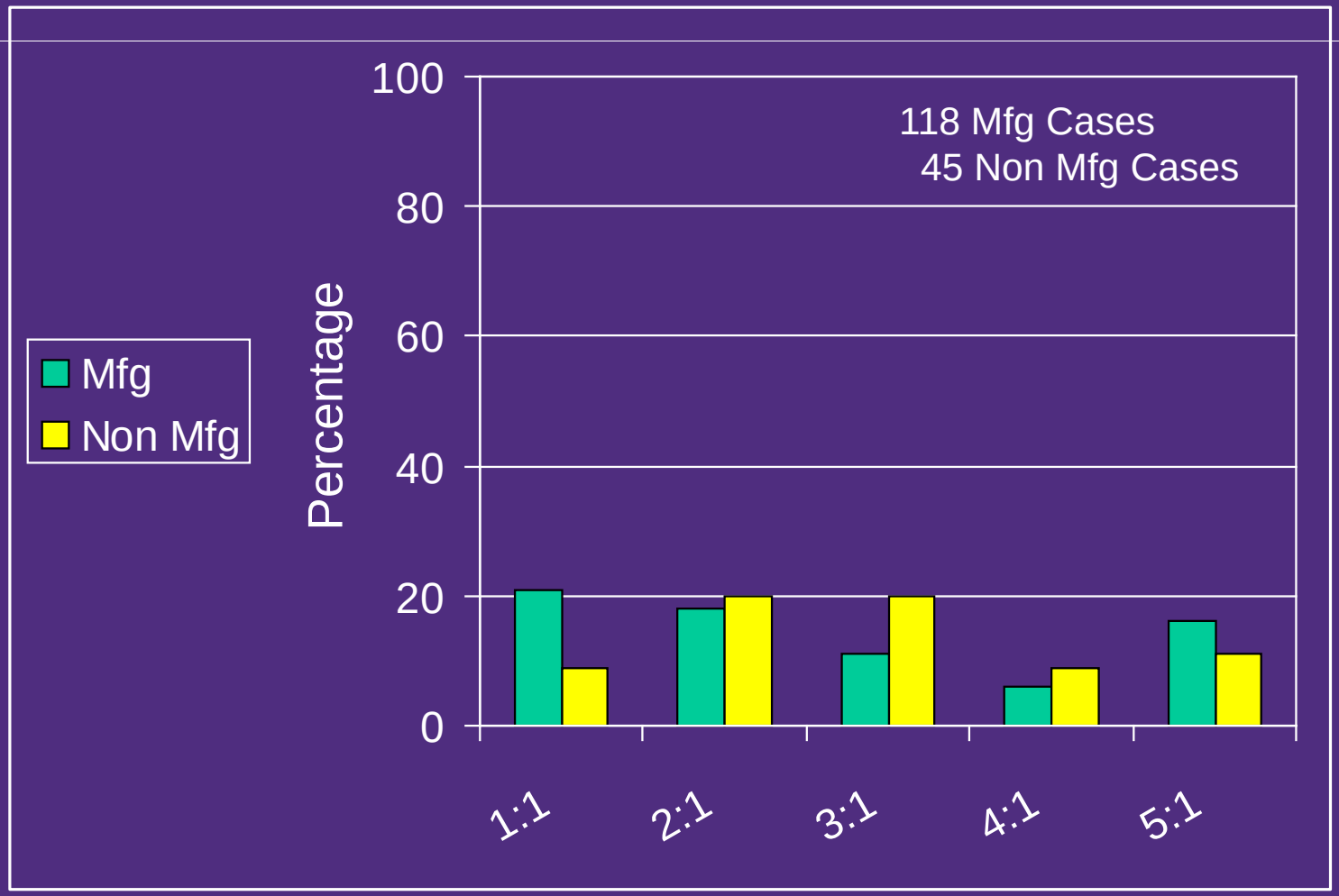
Your Questions

Techniques Used to Measure Work in the Private Sector (contd)



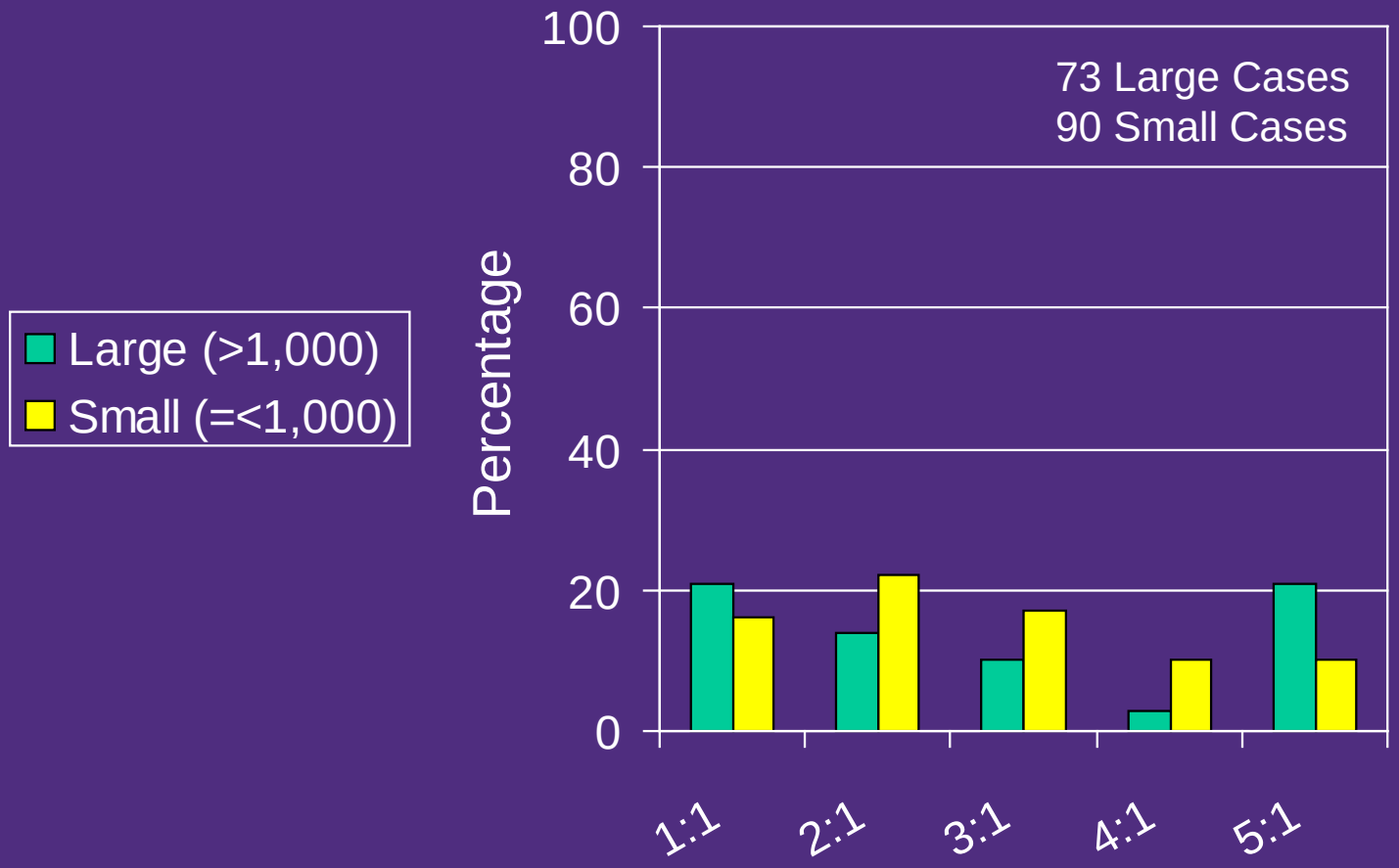
Your Questions

Benefit-to-Cost Ratio of Private Sector Work Measurement Programs



Your Questions

Benefit-to-Cost Ratio of Private Sector Work Measurement Programs (contd)



Your Questions *(contd)*

5. Are archival data (e.g. actual recorded task completion times used for scheduling or payment) a valid predictor of how long a task should take, or just of how long it does take currently?

   Answer: Maybe. If there is a sound work measurement program in place, good supervision, a high performing workforce, all work time is paid time (or at least accounted for during measurement), a valid mapping between recorded task times and recorded tasks completed, and a process to monitor the data for outliers, trends, and reporting compliance, task times, on average, should be good predictors of how long a task should take. If any of the foregoing are missing, archival data is a measure of how long it takes, not what it should take.

   That said, if nothing can be or is done to improve performance of management and the workforce, the "does take time" is still a reference point and useful.

Your Questions *(contd)*

6. Is the use of focus groups of SMEs a valid way of measuring time for a job?

   Answer: Focus groups of SMEs, No. SMEs, Yes.

Case Study
Study Scope

- Direct labor
  - engineer, quality, safety, samplers, technician
- Indirect labor
  - shop supervisor, pad leader
- Borrowed resources
  - camera crew, crane riggers, fire & medical, life support, NASA quality, x-ray technicians

Case Study
Fractionated Professional Estimate

- A standard time set by one or more persons
- Persons must be knowledgeable in the subject matter of the work unit(s)
- First step is to describe the work using discrete, homogeneous steps, sufficiently small so that estimates of time and frequency of occurrence for each step may be made with reasonable accuracy

Case Study
Information Produced

- Direct labor job time by labor category by certification
- Indirect labor job time by labor category
- Outside support requirements
- Estimate of job duration
- Reusable time estimates

Case Study
Information Produced (contd)

- 31 jobs measured
- Job duration (computed)
  - 5.7 hr avg, 0.3 to 19.0 hr range
- Job time (measured)
  - 16.4 hr avg, 0.5 to 69.2 hr range
- Elements per measured job
  - 52 avg, 3 to 148 range
- Yield per interviewee hour invested
  - 36 hr direct and indirect labor

Case Study
Testimonial

More confidence in the information obtained from this test than what is currently available from the mini schedules.

Facility Manager
NASA Contractor

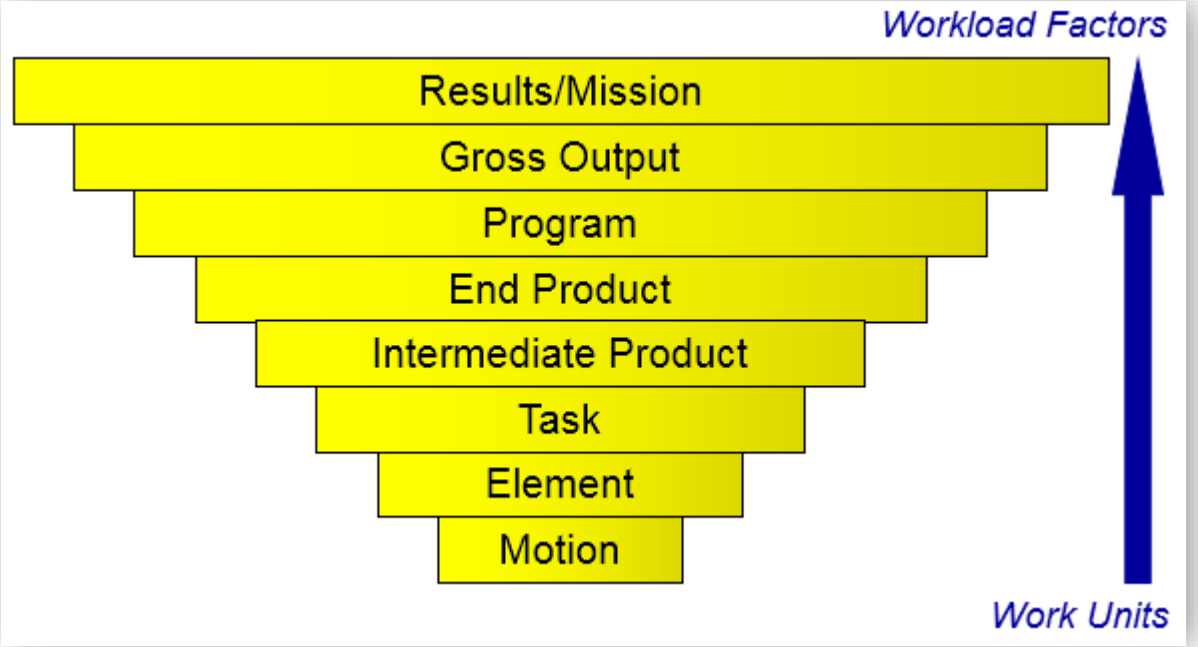
…get close, get a good answer…quick and dirty ain't all bad.

Thomas Usher
Chairman and CEO
USX Corporation

Your Questions *(contd)*

7. Are there automated measurement processes & what is their validity and cost? How granular are the measurements (and given that we want to do staffing), how granular do they need to be?

   Answer: Unable to answer the first question. Refer to "The Basics: Orders of Work" for second question.



Your Questions *(contd)*

8. What are the respondents' reactions to the measurement process and to implementation of any measurement-based policies, e.g. for payment systems or sanctions (in other words, is the workforce okay with this stuff).

   Answer: Generally, No.

   …there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things. Because the innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new.

   Nicolo Machiavelli: The Prince
   1469-1527

Your Questions *(contd)*

9. Do the measurement techniques meet such basic measurement requirements as minimizing criterion deficiency (missing important aspects of the job or task) and criterion contamination (does the technique pick up variance due to non-workflow related factors?)

   Answer: Depends on the technique and how well Conditions for Success are satisfied.

Recommendations

- Provide recommendations appropriate for the client's situation
- Assess client appreciation for work measurement, and if appropriate, include recommendation that client attain basic level of understanding prior to launching a work measurement program
- Conduct literature review
  - U.S. Government Accountability Office (U.S. GAO)
  - The National Academies
  - Professional organization publications, e.g., Institute of Industrial & Systems Engineers (IISE) and International Facility Management Association (IFMA)
  - Related publications, e.g., *Efficient Plant*
- Visit and learn from the top 5 to 10 healthcare companies based on outcomes
- Collect information about computerized maintenance management systems (CMMSs)

Bibliography and References

1. OMNI Engineering & Technology, Inc. in association with the Institute of Industrial & Systems Engineering. *Staffing Models* course material, 2013. (Slides 5 to 10)
2. Schmeidler, Neal F., and Lawrence S. Aft. "So is Anyone Using Work Measurement?" *Proceedings*, Industrial Engineering Solutions Conference 2004, May 2004. (Slides 12, 13, and 18 to 21)
3. Schmeidler, Neal F. "Measurement with SMEs." *Proceedings*, Industrial Engineering Solutions Conference 2001, May 2001. (Slides 25 to 29)
4. Mundel, Marvin E. and Danner, David L. *Motion and Time Study: Improving Productivity.* Ed. Fabrycky, W.J., and Mize, J.H. Englewood Cliffs, N.J.: Prentice Hall, 1994.
5. Headquarters, Department of the Army. *Manpower Staffing Standards System.* (Army Regulation 570-5.) Washington, D.C.: June 1989.

Thank You

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