Estimating software-intensive projects
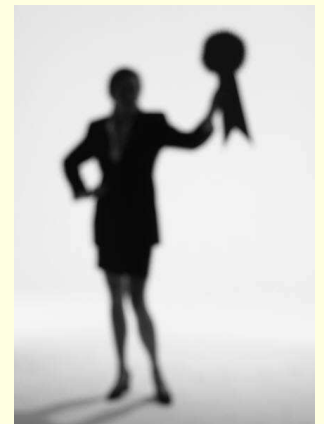
Combining techniques for the right result.

Emmanuel Gonnet, September 2008

GEMUP INC.
CONSULTING
Take the higher ground

PROMOTING WORLD-CLASS SOFTWARE DEVELOPMENT IN THE TORONTO AREA
TORONTO
SOFTWARE PROCESS IMPROVEMENT NETWORK

Game Time

- You can win a prize!
- Estimate how many slides I will go through during my presentation?

Agenda

- Solving business problems
- Examining some fundamentals
- Reviewing the estimation methods
  - Historical data
  - Counting
  - Decomposition
- Combining methods for better results
- Concluding – Best practices

What business problems?

- Estimation solves issues related to "guesstimation" by:
  - Reducing gaps between targets and reality
  - Enabling planning and monitoring activities
    - Resource planning
    - Scheduling
  - Gating the investment process
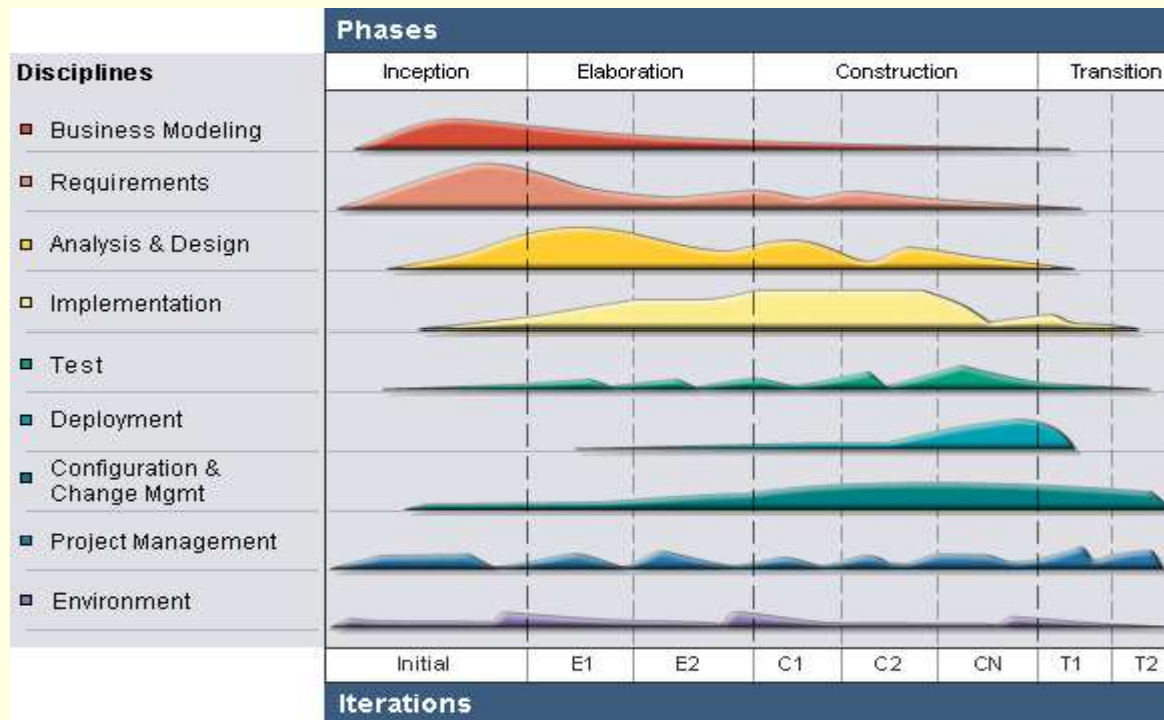 - Facilitating communication and transparency

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  - Expert judgment
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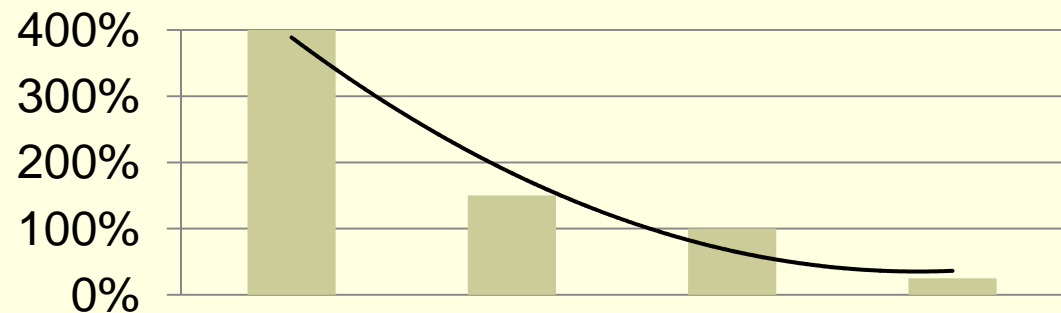
Accuracy varies with time
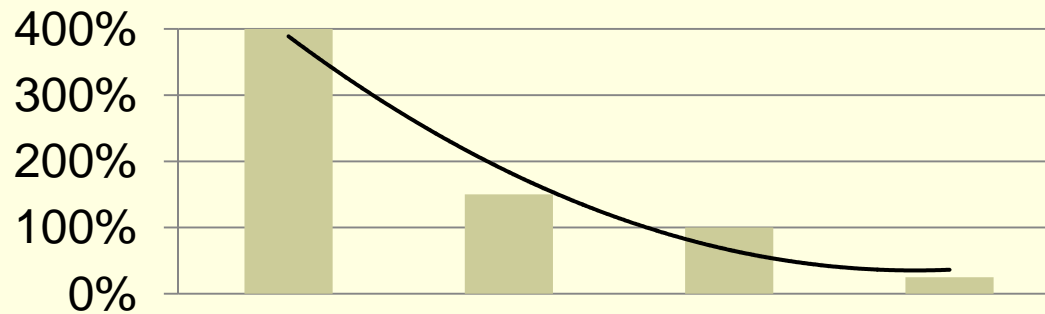
Source: COCOMO

Source: The Rational Unified Process

Implications

- Single point estimates are not accurate
- Accuracy should improve with time
- The estimation method should change as the project progresses.

Choice of an estimation method

- The choice of estimation method depends on:
  - The nature of the software (embedded, …)
  - The size of the project (small, medium..)
  - The point in time when the estimation is done
  - The type of project (Greenfield, maintenance…)
  - Others?

Implications

- Organizations should master multiple estimation methods that map to the possible scenarios they may face.
    - Some estimation techniques are not appropriate for certain combinations of variables
- A decision tree is needed to identify the right technique in the right context

Cost is size times productivity

Cost = Size * Productivity

Where
- Cost could be "days"
- Size could be "number of work units"
- Productivity could be "days/number of work units"

Implications

- Regardless of the technique used:
    - Size of the effort should be estimated
    - Productivity and contextual assumptions should be articulated.
- Sizing and productivity information should be transferable between estimation techniques
    - Establishing "work units" is paramount
    - Productivity is a major data element

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⇒ - Reviewing the estimation methods
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Historical data

- Based on past experience and recorded information
- Techniques are:
    - Expert judgments (i.e. wideband delphi)
    - Industry benchmarks
    - Recorded data (i.e. Timesheets)
    - Analogy
- Are you records in the C=S*P format?

Counting

- Based on the computation of certain elements
- Techniques are:
    - Function points, use case points…
    - Proxy-based methods
    - What else can you count?
- Good way to size the effort
    - Still require productivity information

Decomposition

- Based on the division of work into "bite-size" components
- Techniques are:
    - Decomposition into WBS
    - Decomposition of functions…
- Still requires historical data and counts:
    - List of tasks
    - Counting the functions …
- Benefits from the law of large numbers

Focus on use case points

- (AW + UW) * TF * EF * PHF
  - Where (AW+UW) * TF represent the size
  - Where EF*PHF represents the productivity
- Requires
  - The counting of use cases and actors
  - Measures of productivity elements (data)
- Preferred method for the unified process post inception-phase

AW: Actor Weight, UW: Use Case Weight, TF: Technical Factors, EF: Environment Factors, PHF: Person Hour Factor
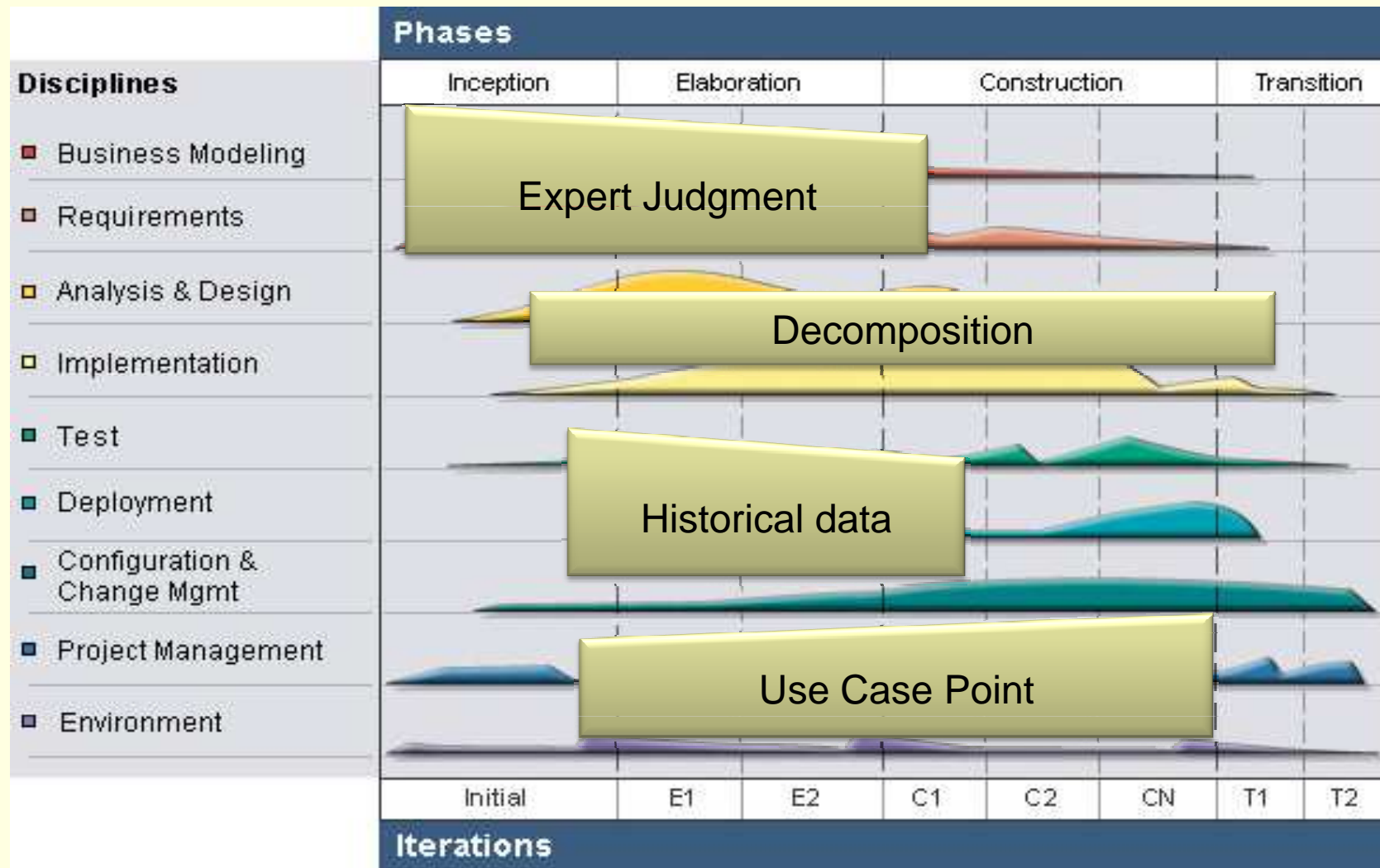
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Example: combining techniques for better accuracy

	Inception	Elaboration	Construction	Transition
Phases				

Disciplines

- Business Modeling
- Requirements
- Analysis & Design
- Implementation
- Test
- Deployment
- Configuration & Change Mgmt
- Project Management
- Environment

Expert Judgment

Decomposition

Historical data

Use Case Point

Initial	E1	E2	C1	C2	CN	T1	T2

Iterations

Best practices

- Contextualize the estimation process
  - Adopt the method that matches the situation
  - Combine methods for better results
- Choose work units and a data collection scheme
  - Measure both size and productivity
  - Employ measurable work units
  - Record data for better calibration and process improvement (learning)

Thanks you! Q/A

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www.gem-up.com

Winners?

- This presentation had 21 slides.