Design Metrics and Inspection

- **Inspections** are a quality technique focused on reviewing an SE artifact in an organized and thorough manner
- Initially introduced to review code, but also suitable for other artifacts
  - SRS, design, test plans, …
- Intent is to identify quality issues (defects) as early as possible
- Detailed, technical process, but time-efficient

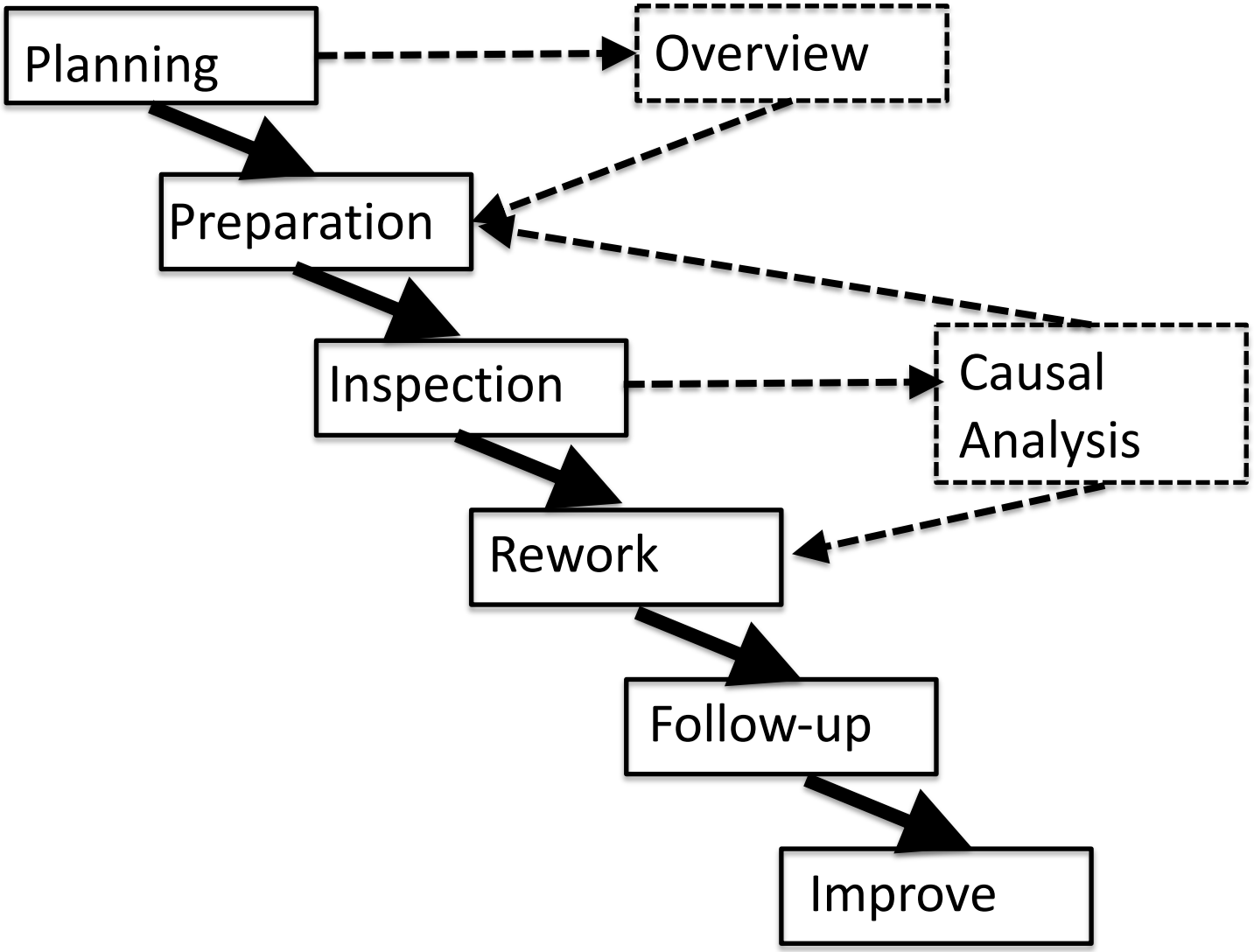
Inspection Principles

- Peer process
  - Individuals familiar with particular artifact
  - Author is always part of team
  - NOT a supervisor/subordinate thing – no punishment
  - Author responsible for artifact submitted **after** inspection
- Defect detection, not repair
- Checklists specific to type of artifact
- Artifact inspected should be “final candidate” status
- Adequate time to review before inspection
- Collect metrics
- Time limit

Inspection Roles

- Author
- Moderator
  - Leads process, maintains pace
  - Adjudicates disputes
  - Ensures consensus
- Recorder writes down descriptions and classifications of defects, and action items
- Reader leads the team through work, determines sequence of review
- Focused inspector looks for specific criterion
- Specialized inspector is expert in domain area

Inspection Process



Rough Design Quality Metrics

- Understandability
  - Based on module cohesion and coupling
  - U = (% of “strongly cohesive” modules/2) + (% of modules “connected to very few” others/2)
- Sufficiency
  - How evidently does design accommodate the requirements
  - S = % of detailed requirements clearly accommodated by design

Rough Design Quality Metrics (cont.)

- Robustness
  - How well does design deal with input errors
  - Trace all inputs through design
  - Measure each as
    - 0 = design will crash if any wrong input
    - 10 = design will recover ideally from any wrong input
    - 1..9 = design will crash sometimes, recover sometimes
- Flexibility
  - Use extensibility as a proxy
  - List reasonable extensions to design, evaluate ability to accommodate them

Rough Design Quality Metrics (cont.)

- Reusability
  - Want
    - Abstract enough to get wide coverage
    - Specific enough to be useful
    - Parameterized methods
  - Then rate each class in the design 0, 1, 2 on
    - Degree of coverage of different applications
    - Quality/richness of content
    - Breadth of applicability through method parameterization
  - Average across classes

Rough Design Quality Metrics (cont.)

- Desirable but harder to measure
  - Speed of design
  - Space efficiency
  - Reliability
    - Consider high-risk operations (data collection, complex operations, anomalous situations)
  - Security
    - Estimate of how design supports desirable things like confidentiality, integrity, authentication
    - Estimate design performance at thwarting basic threats, patch latency, password strength standards, precluding illegitimate traffic

SW Engineering Ethics - Product

- SEs shall ensure that their products and related modifications meet the highest professional standards possible
  - Strive for high quality, acceptable cost and a reasonable schedule, ensuring significant tradeoffs are clear to and accepted by the employer and the client, and are available for consideration by the user and the public.
  - Ensure proper and achievable goals and objectives on which they work or propose
  - Identify, define and address ethical, economic, cultural, legal and environmental issues related to work projects

SW Engineering Ethics – Product (cont.)

- SEs shall ensure that their products and related modifications meet the highest professional standards possible
  - Ensure that they are qualified for any project on which they work or propose to work by an appropriate combination of education and training, and experience
  - Ensure an appropriate method is used for any project on which they work or propose to work
  - Work to follow professional standards, when available, that are most appropriate for the task at hand, departing from these only when ethically or technically justified

SW Engineering Ethics – Product (cont.)

- SEs shall ensure that their products and related modifications meet the highest professional standards possible
  - Strive to fully understand the specifications for software on which they work
  - Ensure that specifications for software on which they work have been well documented, satisfy the users' requirements and have the appropriate approvals
  - Ensure realistic quantitative estimates of cost, scheduling, personnel, quality and outcomes on any project which they work or propose to work and provide an uncertainty assessment of these estimates

SW Engineering Ethics – Product (cont.)

- SEs shall ensure that their products and related modifications meet the highest professional standards possible
  - Ensure adequate testing, debugging, and review of software and related documents on which they work
  - Ensure adequate documentation, including significant problems discovered and solutions adopted, for any project on which they work
  - Work to develop software and related documents that respect the privacy of those who will be affected by that software

SW Engineering Ethics – Product (cont.)

- SEs shall ensure that their products and related modifications meet the highest professional standards possible
  - Be careful to use only accurate data derived by ethical and lawful means, and use it only in ways properly authorized
  - Maintain the integrity of data, being sensitive to outdated or flawed occurrences
  - Treat all forms of software maintenance with the same professionalism as new development

Aggregation and Composition

Respond at **PollEv.com/rondanielson702**

Text **RONDANIELSON702** to **37607** once to join, then **A, B, C, or D**

A. Both describe relationships between classes **A**

B. Are two ways to describe the same concept **B**

C. Describe different runtime behaviors in creating objects **C**

D. Both A and C **D**

Answer: D

The open-closed design principle

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Text **RONDANIELSON702** to **37607** once to join, then **A, B, C, or D**

A. Helps eliminate code modifications when extending classes	**A**
B. Refers to which developers can see details of which modules	**B**
C. Differentiates aggregation from composition	**C**
A. Both A and C	**D**

Answer: A

Metrics are important to

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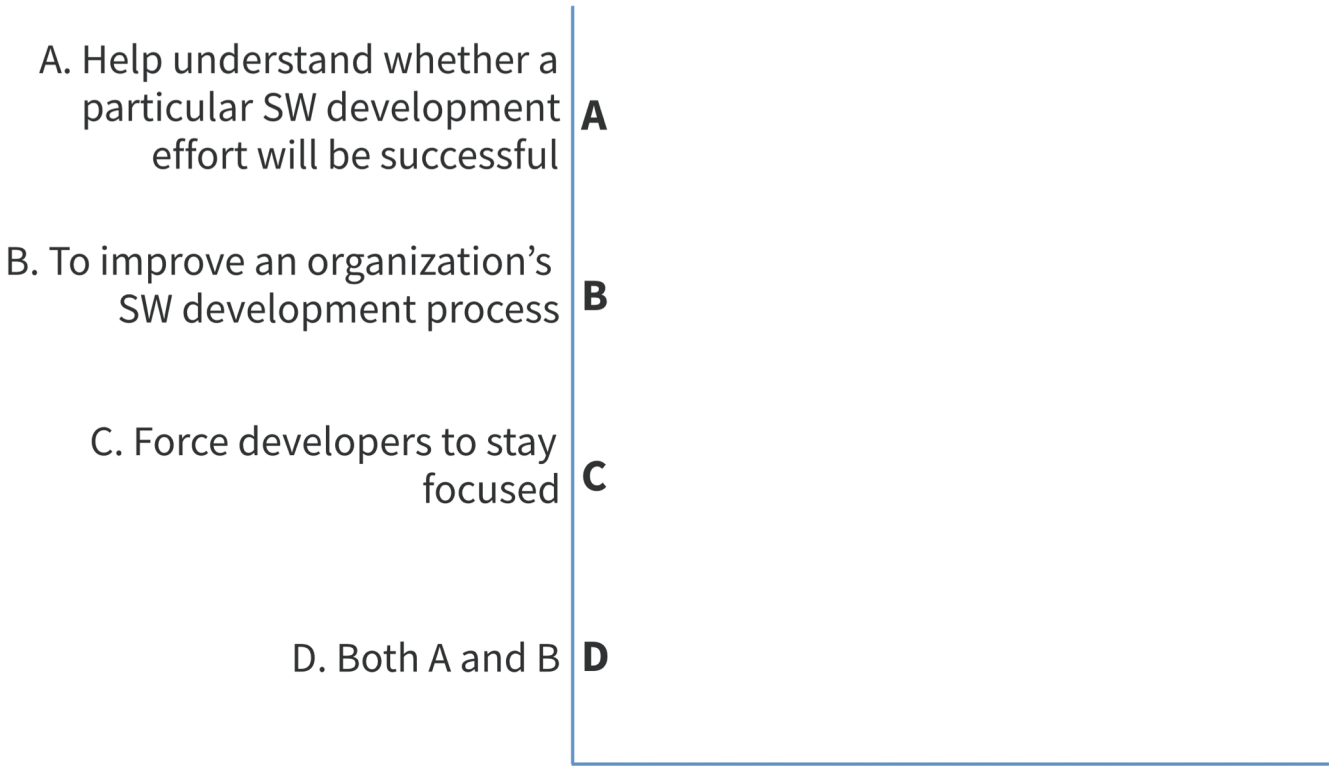

Answer: D

The difference between the Henry-Kafura and Henry-Selig complexity measures is

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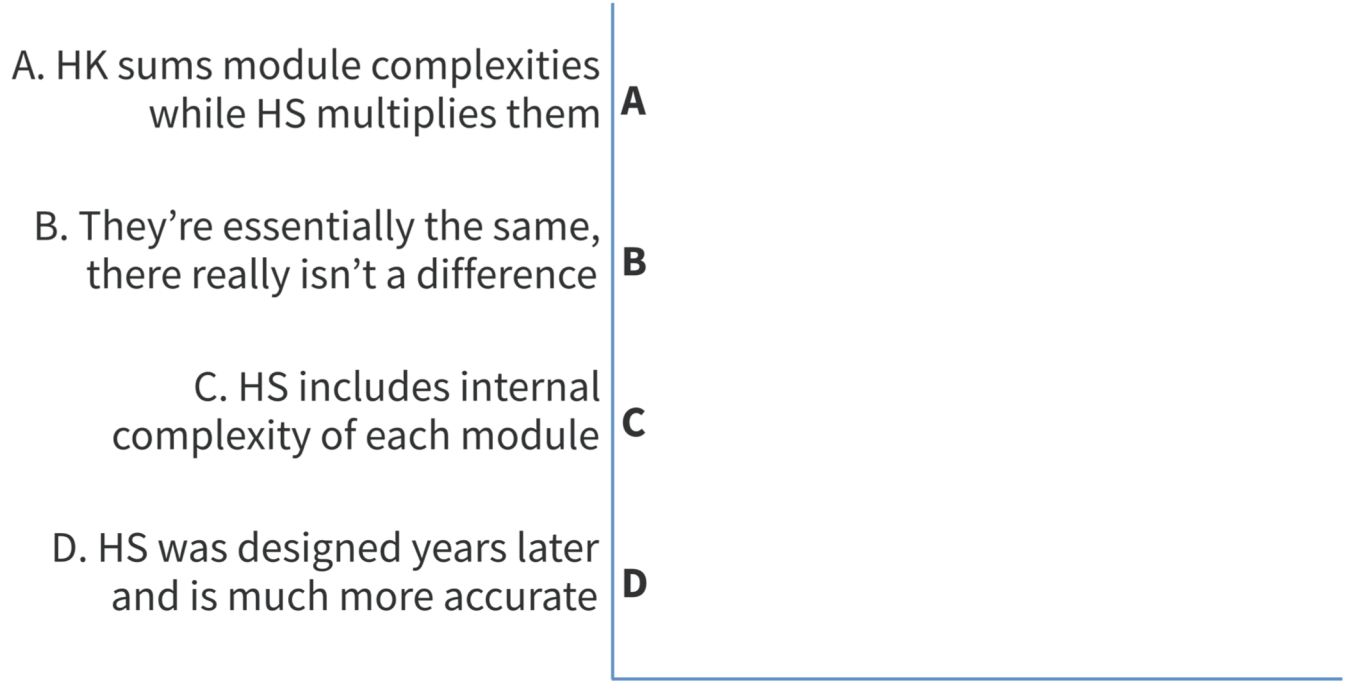

Answer: C

Coupling measures

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Text **RONDANIELSON702** to **37607** once to join, then **A, B, C, or D**

A. How interrelated a set of modules are — **A**

B. The degree to which a module depends on other modules — **B**

C. How compact the implementation is — **C**

D. Both A and B — **D**

Answer: D