

**A Simulation Study of the
Effects of Perceived Risk
and Information Sharing
on the Internal Control
Reporting Process**

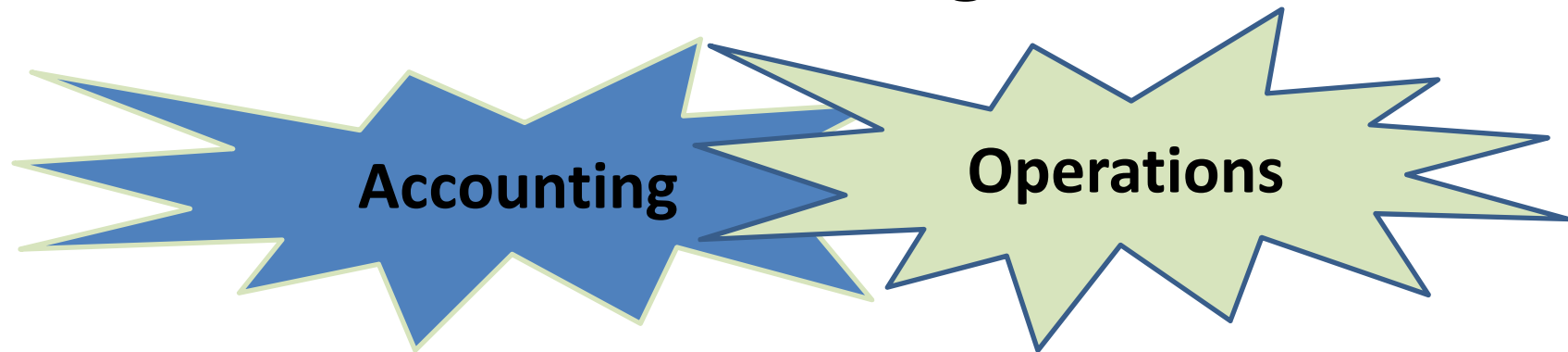
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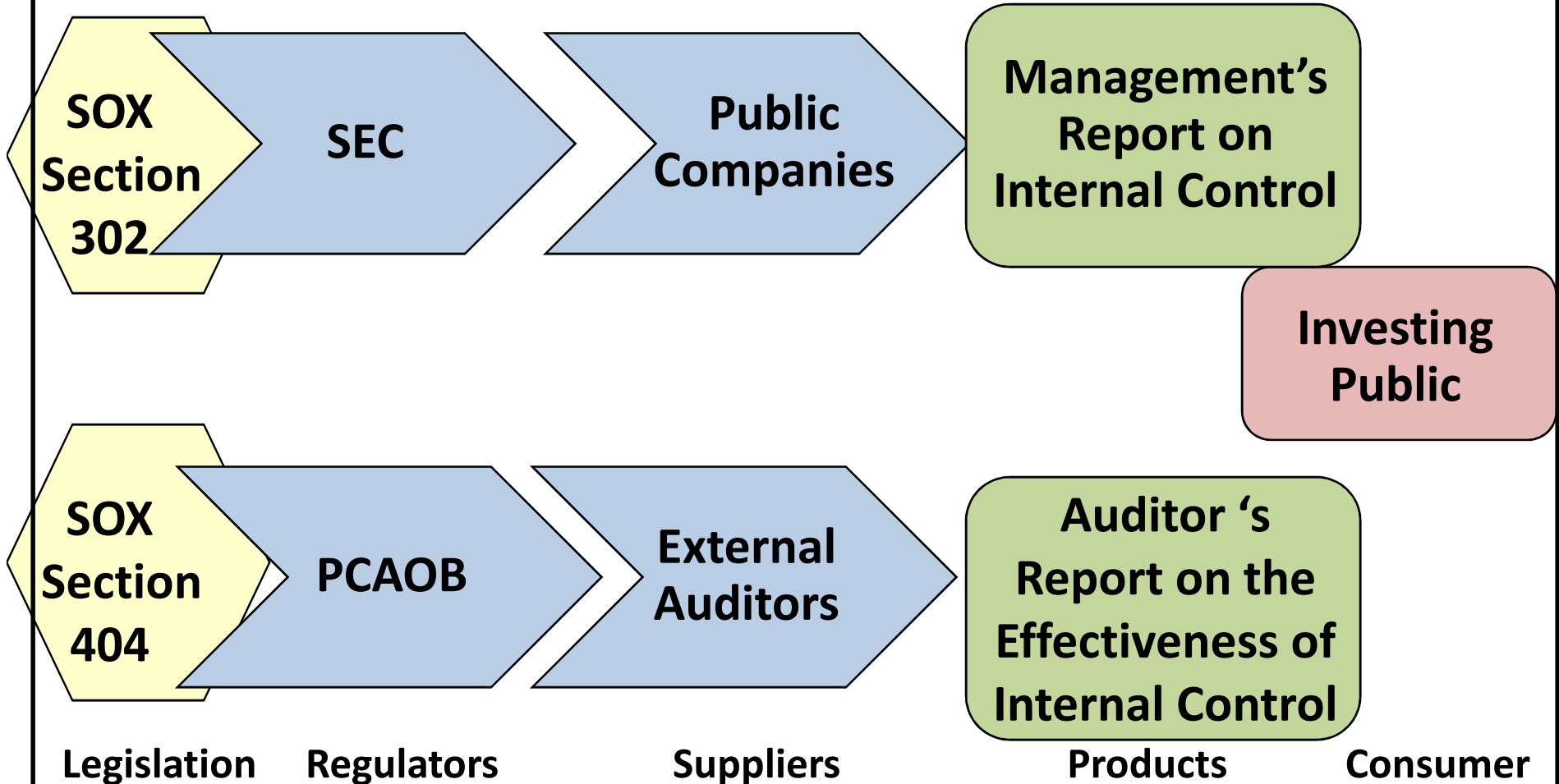
Abstract: The Sarbanes Oxley Act (SOX) mandated the evaluation of internal controls over financial reporting by management and the company's public auditor. Our simulation study investigates the role of perceived risk and information sharing on the internal control audit process. We interpret various scenarios as corresponding to the Pre-SOX period, SOX implementation year, SOX early years, and SOX later years. We use the regulatory guidance from AS2 and AS5 to motivate how variables of the auditor's historical relationship with its client, information sharing and perceived risk affect the tasks in the audit process. We also test for the bullwhip effect, an operations phenomenon of over production, and discuss how the effect can be mitigated.

Merge Accounting and Operations to Increase Understanding of Audit Process



- Model the audit process
- Test for bullwhip effect; a phenomenon that occurs when demand is amplified throughout the service process
- Simulate scenarios with Arena software

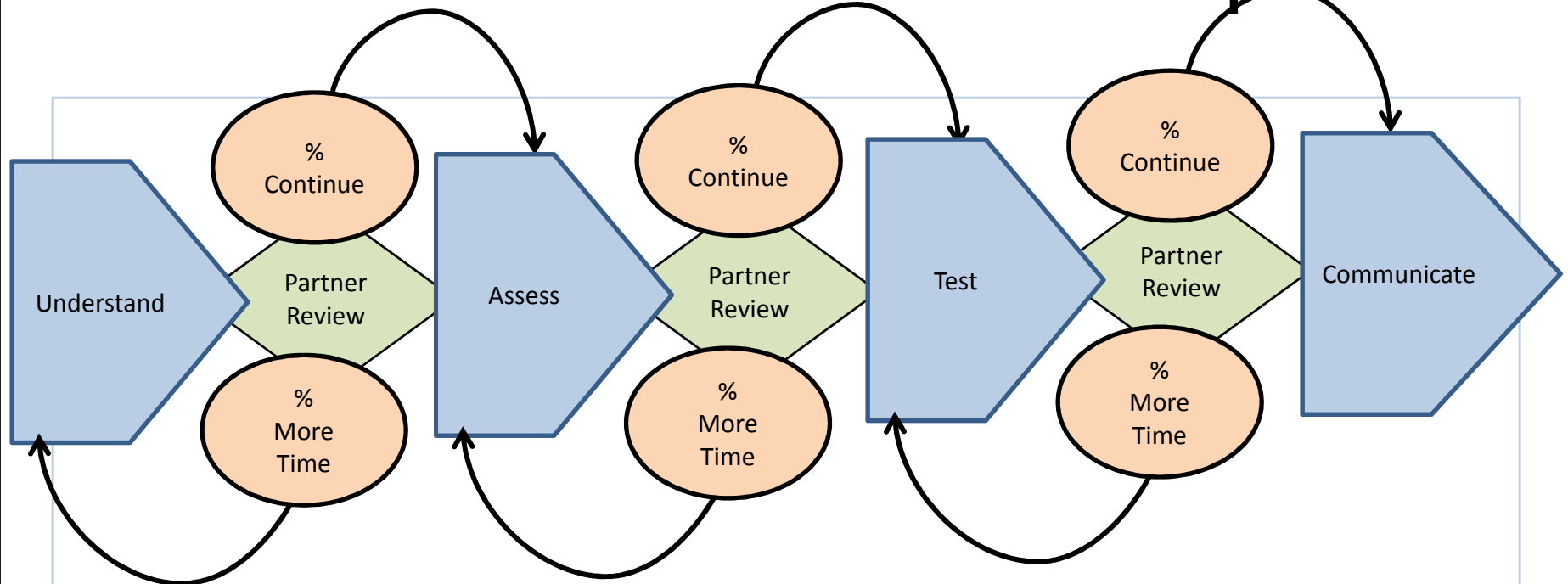
SOX Mandated Internal Control Reporting



Sarbanes Oxley Act (SOX)

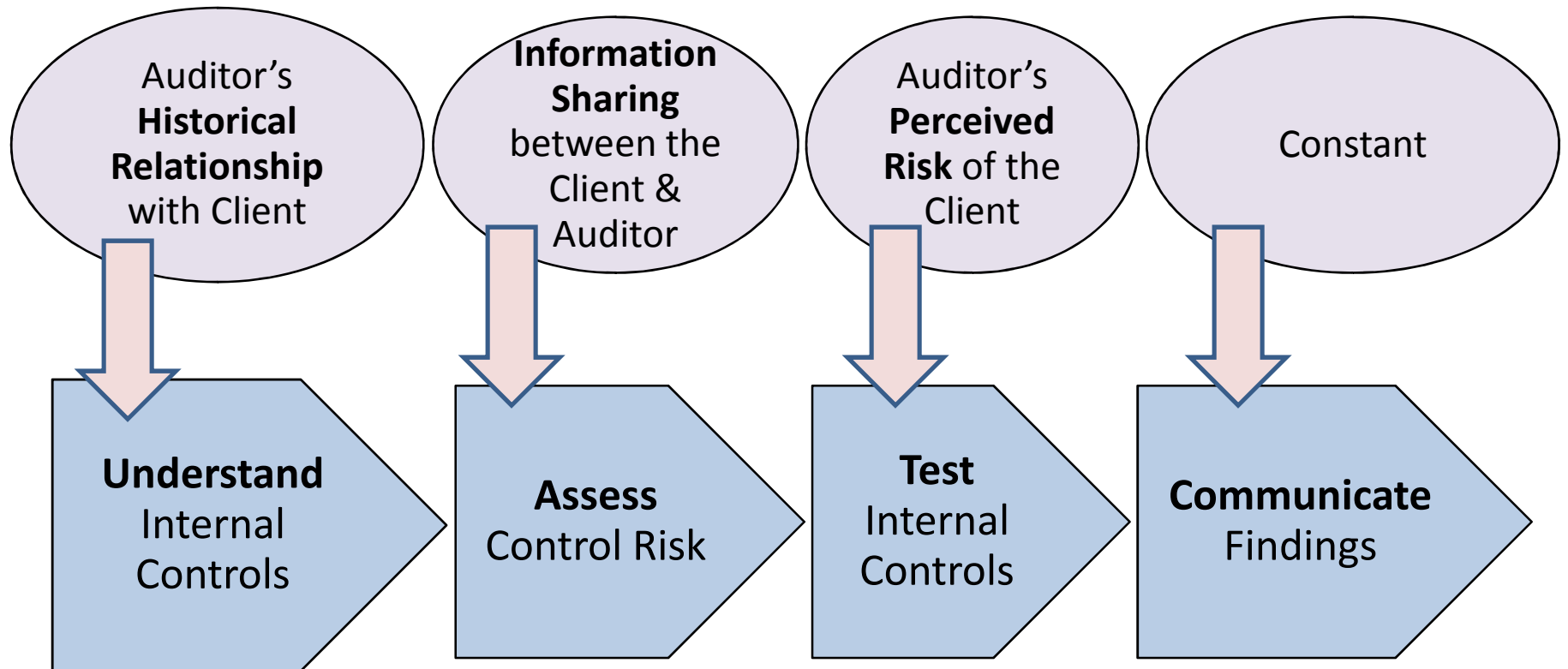
- Sec. 302 Requires the CEO and CFO to evaluate their internal controls
- Sec. 404 Requires companies to attain an opinion from an external auditor on the adequacy of the company's internal controls
- Increased external audit hours and fees in the implementation year

Process and Review Loops



After each task i in the process, the partner reviews the work and decides if the audit can continue ($c\%$) to the next task ($i+1$) or if more time ($m\%$) is required at task i

Variables Affecting the Internal Control Audit Process



H1: A historical relationship with the client is associated with lower audit hours to understand internal controls.

Historical Relationship

The diagram consists of two main shapes. The top shape is a light purple oval with a black outline, containing the text 'Historical Relationship'. A large, light orange arrow with a black outline points downwards from the bottom center of this oval to the top center of the bottom shape. The bottom shape is a light blue arrow pointing to the right, with a black outline, containing the text 'Understanding Internal Controls'.

**Understanding
Internal Controls**

Hours to Understand Internal Controls

High

Low

Key:

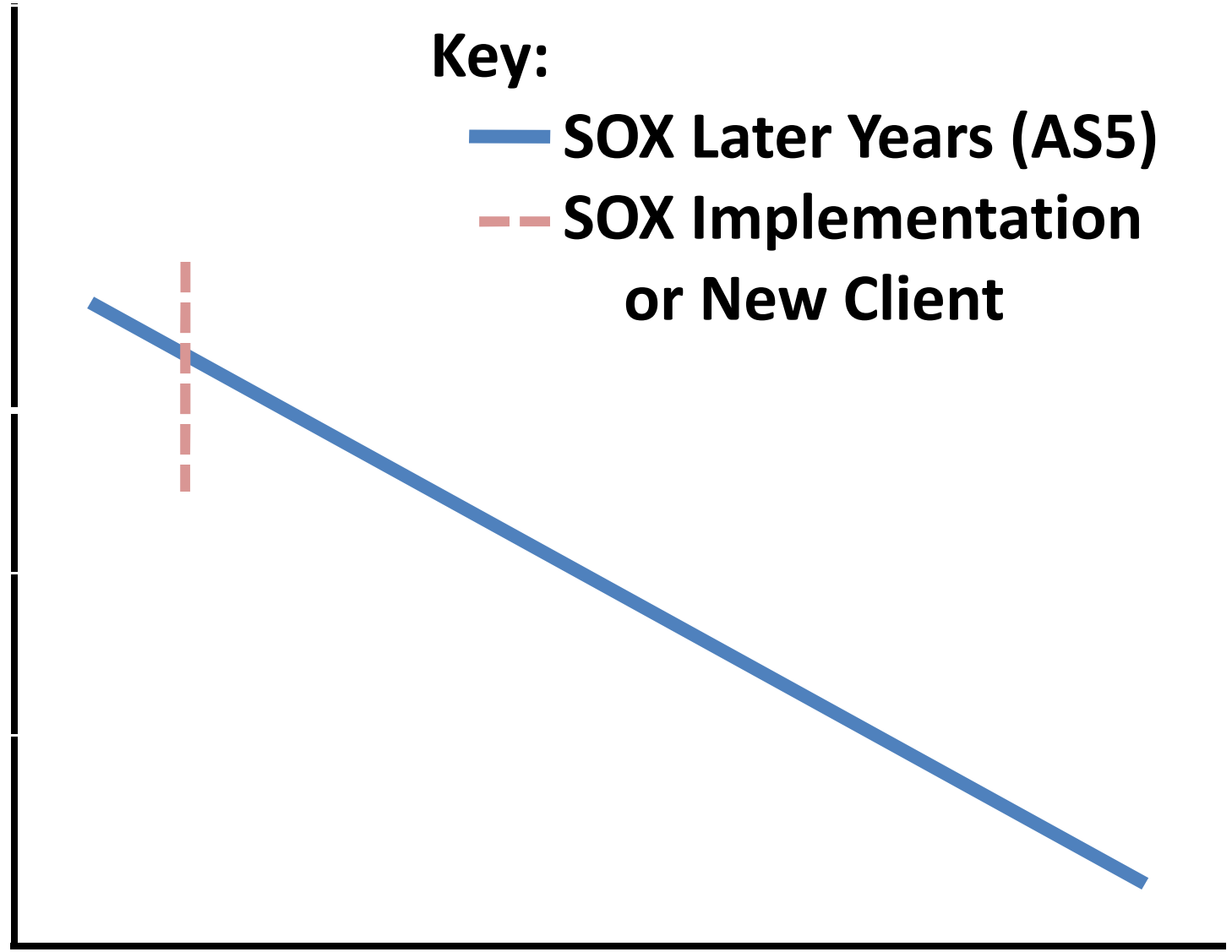
— SOX Later Years (AS5)

**- - - SOX Implementation
or New Client**

New Client

Repeat Client

Historical Relationship



Historical Relationship and Understanding Internal Controls

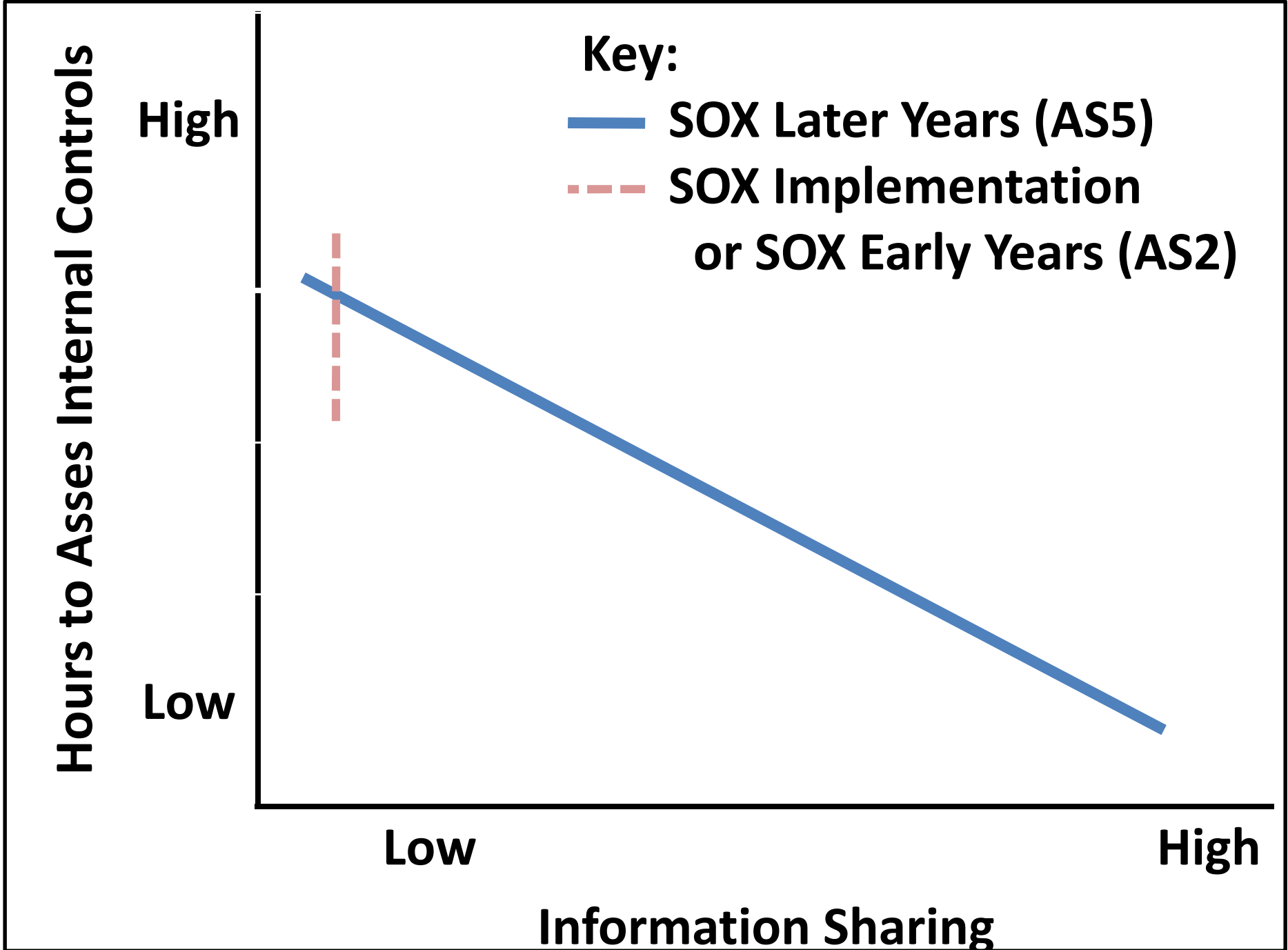
- Repeat Client → Lower hours; Later SOX Compliance Years
- New Client → Higher hours due to learning curve; SOX Implementation Year)

H2: Information sharing between the client and the auditor is associated with lower audit hours to assess internal controls.

The diagram consists of two main components. At the top is a light purple oval containing the text 'Information Sharing'. A large, light orange arrow with a blue outline points downwards from the bottom center of this oval to a light blue arrow-shaped box below it. This box contains the text 'Assessing Internal Controls'. The entire diagram is enclosed in a black rectangular border.

Information Sharing

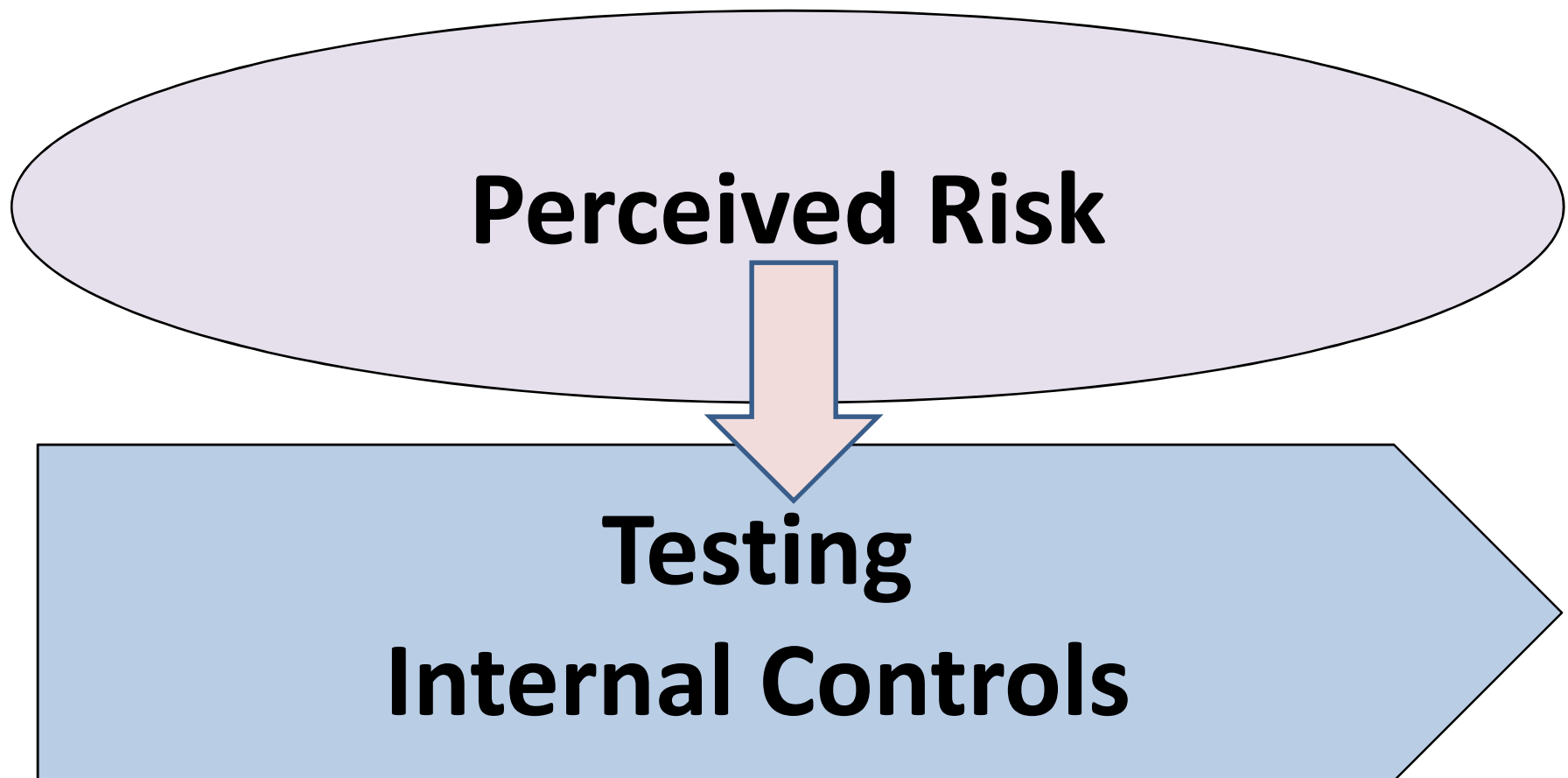
**Assessing
Internal Controls**



Information Sharing and Assessing Internal Controls

- High Information Sharing→ Lower Hours; SOX Later Compliance Years under AS5**
- Low Information Sharing→ Higher Hours; SOX Implementation Year and SOX Early Compliance Years under AS2**

H3: The auditor's perceived risk level of the client is associated with the audit hours to test internal controls.



Hours to Test Internal Controls

High

Low

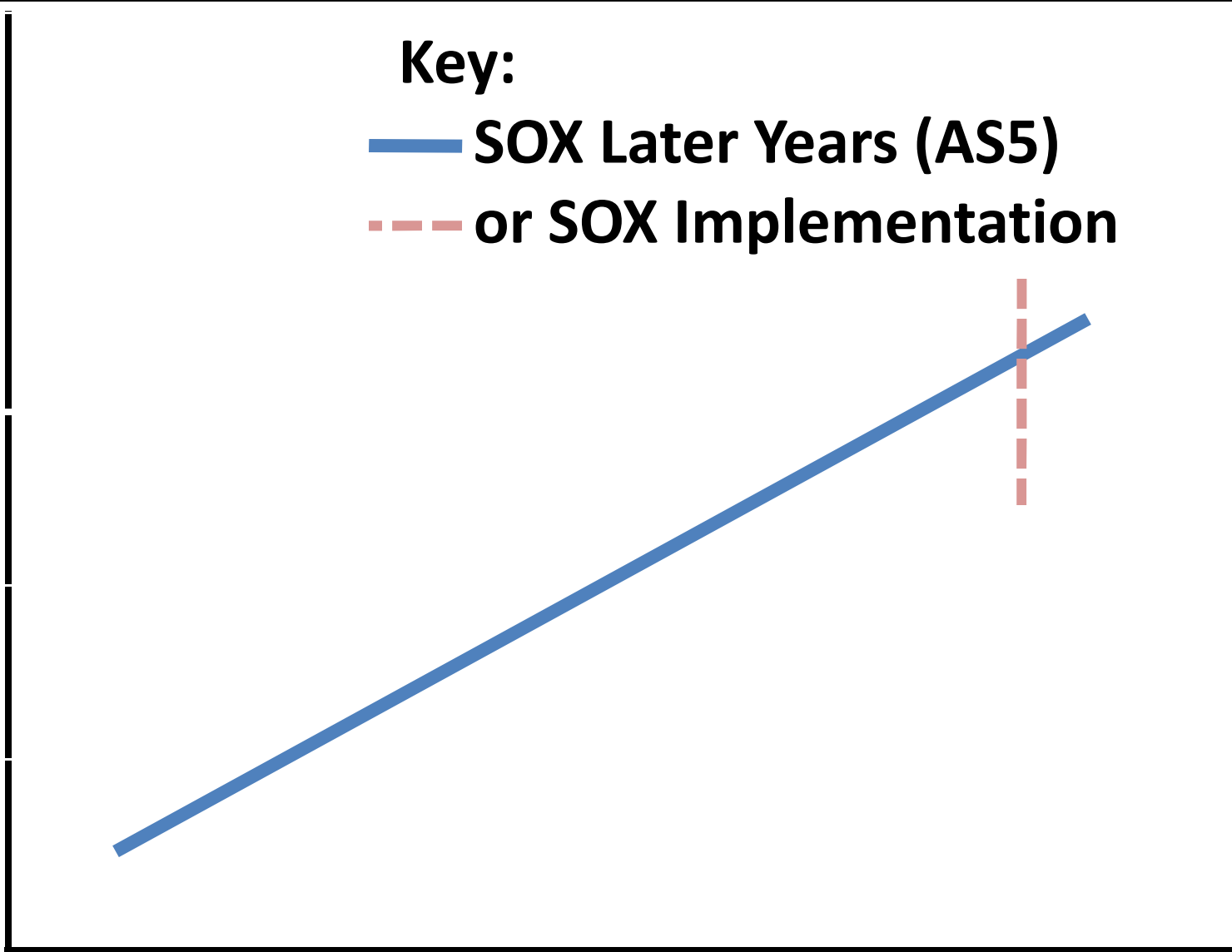
Key:

- SOX Later Years (AS5)**
- - - or SOX Implementation**

Low

High

Perceived Risk



Perceived Risk and Testing

Internal Controls

- Low Perceived Risk → Lower Hours; Low Risk Clients, SOX Later Compliance Years under AS5
- High Perceived Risk → Higher Hours; SOX Implementation Year, SOX Early Compliance Years under AS2, High Risk Clients during Later Compliance Years under AS5

Constant

The diagram consists of a light purple oval at the top containing the word 'Constant'. A large, light orange arrow with a blue outline points downwards from the bottom center of the oval to the top center of a blue arrow-shaped box below. The blue box contains the text 'Communicating Internal Controls'.

**Communicating
Internal Controls**

Additional Hypotheses

H4: The process for evaluating internal controls experienced the “Bullwhip Effect” when SOX was implemented.

H5: Information sharing and risk based judgments mitigate the bullwhip effect.

Timeline and Regulatory Guidance

Time	Pre-SOX	Implementation Year	SOX Early Years	SOX Later Years
Regulatory Guidance	AU316	AS2		AS5

AU316 Consideration of Fraud in a Financial Statement Audit

- Only requires the auditors to gain an understanding of management's antifraud programs and controls

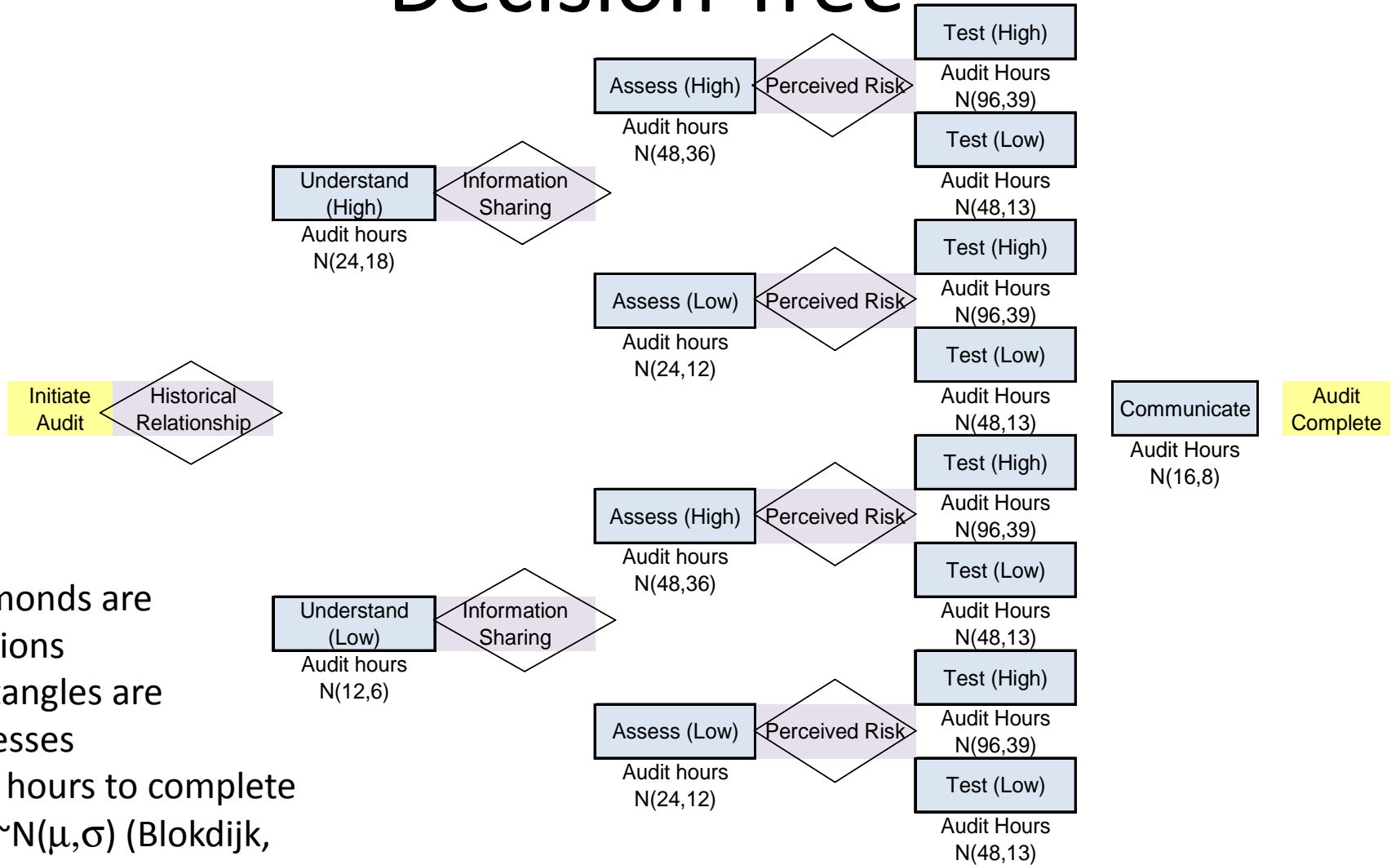
AS2 An Audit of Internal Control Over Financial Reporting Performed in Conjunction with An Audit of Financial Statements

- **Limited Information Sharing:** "There is no difference in the level of work performed ... by the auditor when expressing an opinion on management's assessment of effectiveness or when expressing an opinion directly on the effectiveness of internal controls ..."

AS5 An Audit of Internal Control Over Financial Reporting That Is Integrated with An Audit of Financial Statements

- **Encourages risk based judgment:** "A direct relationship exists between the degree of risk ... and the amount of audit attention that should be devoted to that area. ... The auditor should focus more of his or her attention on the areas of highest risk. "

Decision Tree



Key:

- Diamonds are decisions
- Rectangles are processes
- Low hours to complete task $\sim N(\mu, \sigma)$ (Blokdijk, et al., 2006);
- High hours $\sim N(2\mu, 3\sigma)$