Agile Alliance®

Thomas Haver

The Science of Testing

The SCIENCE of TESTING

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ABOUT ME

Thomas Haver

AGENDA

- Testing and Science
- My Journey
- Scientific Method
- Peer Review
- Deduction and Induction
- Exploratory Testing with SBTM
- Hypothesis-Driven Development

TESTING?

Consider how testing is viewed in the workplace.

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SCIENCE?

Consider the difference in how people view science.

MY JOURNEY

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WHAT IS TESTING?

“Questioning a product in order to evaluate it.”

-James Bach

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WHAT IS TESTING?

“Empirical technical investigation of the product, done on behalf of stakeholders, intended to reveal quality-related information of the kind that they seek.”

-Cem Kaner

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WHAT IS TESTING?

"Designing an experiment to gather empirical evidence to answer a question about a risk."

-Elisabeth Hendrickson

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ATTRIBUTES?

What attributes do teams or managers look for in a good tester?

ATTRIBUTES?

What are the attributes we look for in a good...

TESTER?

- Analytical
- Technical
- Inquisitive
- Passionate
- Reflective
- Communicative

SCIENTIST?

- Analytical
- Technical
- Inquisitive
- Passionate
- Reflective
- Communicative

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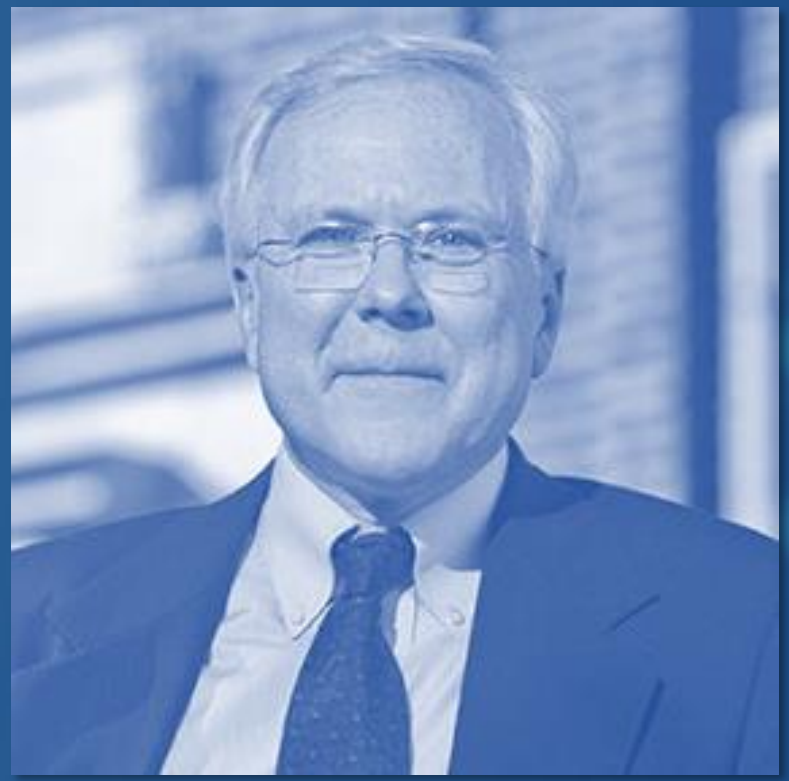
CONNECTION



"Close inspection will reveal that scientists approach and solve problems with imagination, creativity, prior knowledge, and perseverance."

-William McComas

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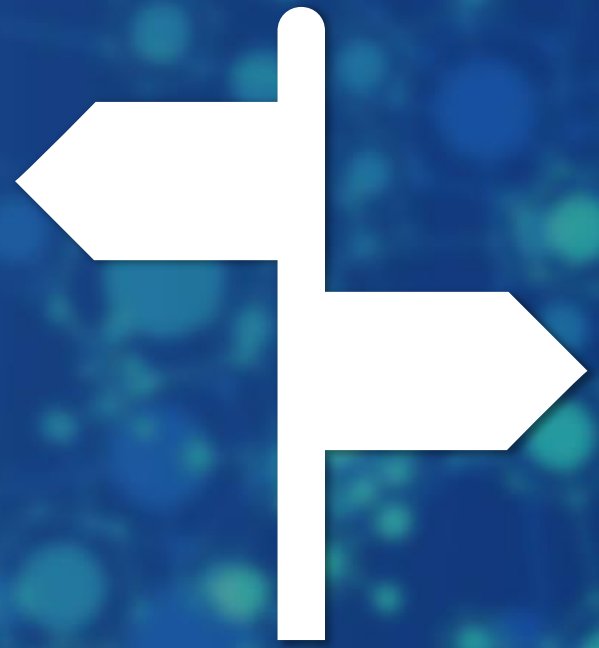
THE SCIENTIFIC METHOD

NEXUS of SCIENCE and TESTING

The purpose of science is the pursuit of knowledge for knowledge's sake.



SCIENTIFIC METHOD

- Collect empirical evidence via observation
- Propose a hypothesis; make predictions
- Run tests and experiments to corroborate hypothesis

APPLICATION TO TESTERS

- Learn the product and observe behaviors
- Identify risks and predict failures
- Execute tests to confirm failures

APPLICATION TO TESTERS - EXAMPLE

- Follow the game live
- Preview upcoming games
- Get recaps from past games
- Receive score alerts
- Interact with other fans

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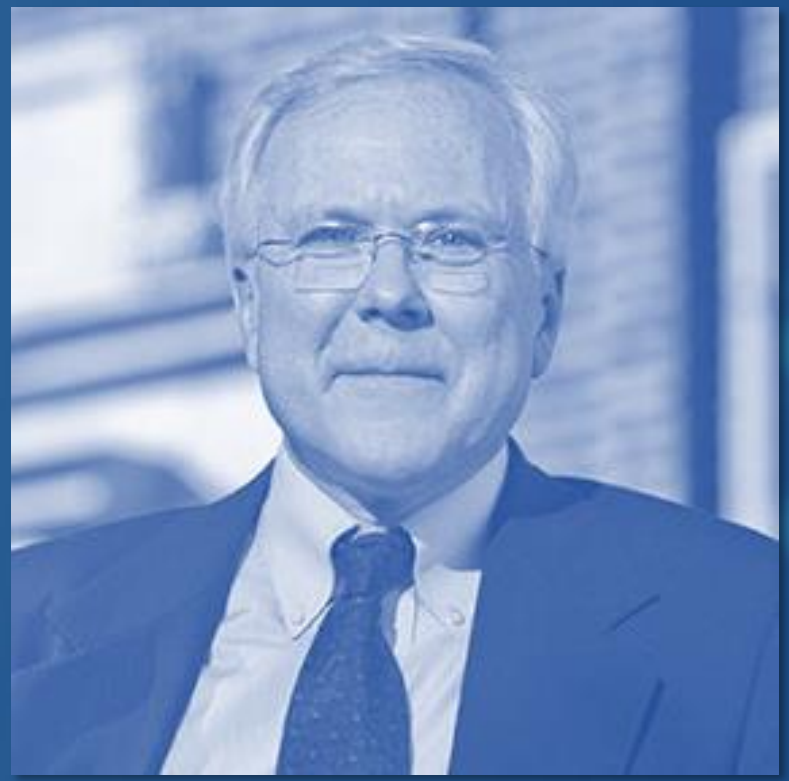
FALSIFIABLE CLAIMS



"Science aims for falsifiable claims, and not claims that cannot be verified."

-William McComas

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FALSIFIABLE CLAIMS

"Testing can show the presence of errors, but not their absence."

-Edsger Dijkstra

FALSIFIABLE CLAIMS - EXAMPLE

- Follow the game live
- Preview upcoming games
- Get recaps from past games
- Receive score alerts
- Interact with other fans

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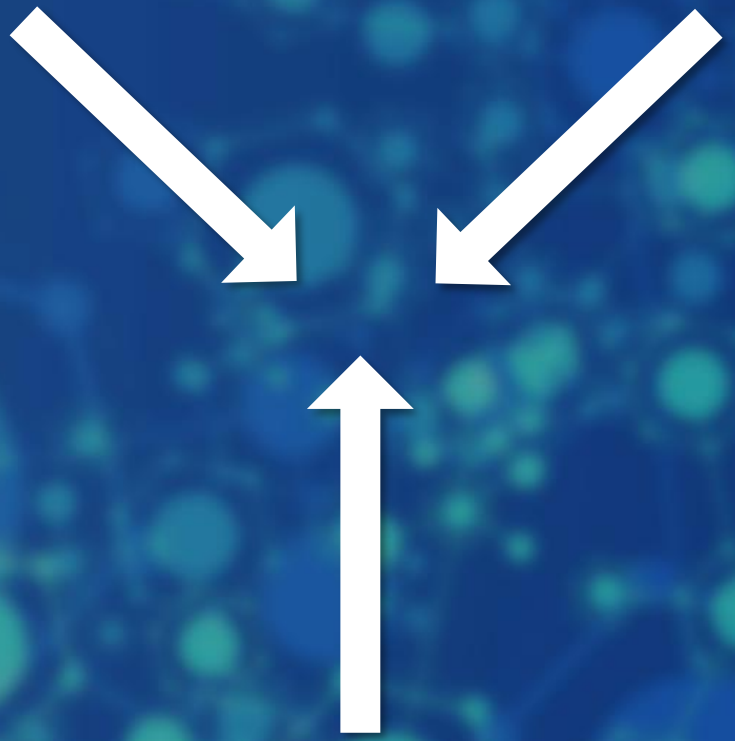
STRUCTURE

PEER REVIEW

A process used for checking the work performed by one's equals (peers) to ensure it meets specific criteria.

DEDUCTION

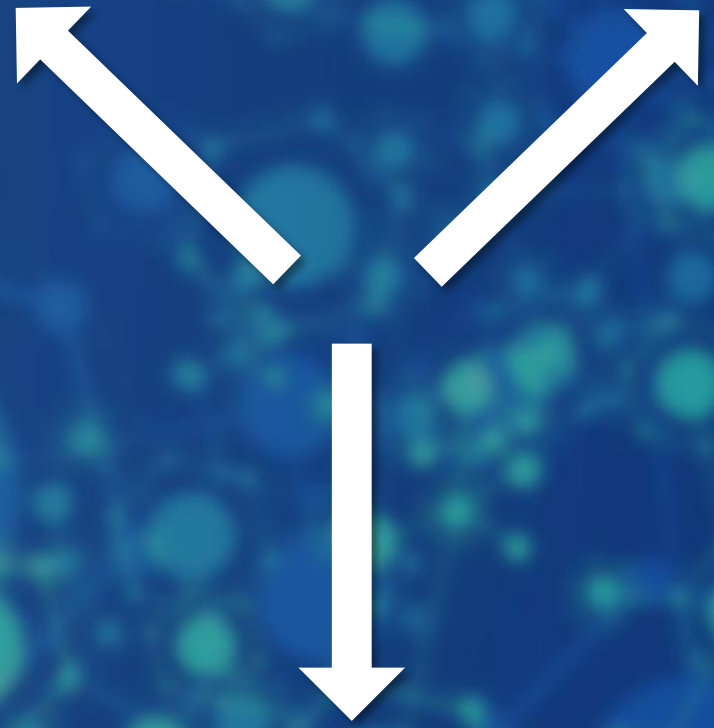
Making a specific conclusion from general knowledge.



DEDUCTION

INDUCTION

Making general conclusions from specific knowledge.



INDUCTION

EXPLORATORY TESTING

with

SESSION-BASED TEST MANAGEMENT

EXPLORATORY TESTING

“Simultaneous learning, test design, and test execution.”

-James Bach

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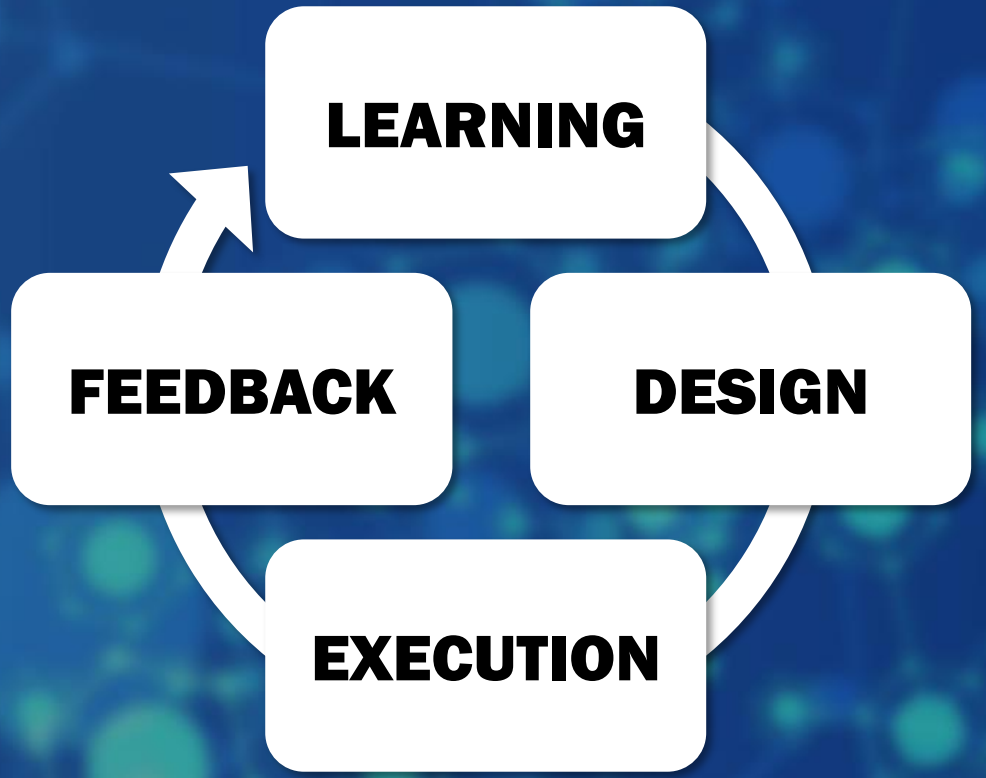
EXPLORATORY TESTING

- Interact with system, designing and executing tests in succession.
- Results from the prior test lead the next test.
- Adaptive
- Tests the capabilities and limitations of the software.



EXPLORATORY vs. SCRIPTED

EXPLORATORY

- Individual
- In the Moment
- Investigation
- Adaptable
- Learning

SCRIPTED

- Requirements
- In Advance
- Confirmation
- Predictable
- Decided

SESSION-BASED TEST MANAGEMENT

"We want to be accountable for our work, give a status report that reflects what we actually did, and provide a detailed map of our travels.“

-James Bach

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SESSION-BASED TEST MANAGEMENT

- Charter
- Time-Box
- Reviewable Result
- Debriefing

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CHARTER

A clear mission for the session.

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CHARTER

- Explore [TARGET] with [RESOURCES] to discover [INFORMATION]
  - **TARGET**: What are you exploring?
  - **RESOURCES**: What supplies will you bring?
  - **INFORMATION**: What are you hoping to find?

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TIME-BOX

Focused test effort of fixed duration.

TIME-BOX

- **Brief enough…**
  - **…for accurate reporting**
  - **…flexible scheduling**
  - **…to allow course correction**
- **Long enough…**
  - **…to get solid testing done**
  - **…for efficient debriefings**

REVIEWABLE RESULT

A scannable session sheet.

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REVIEWABLE RESULT

- Charter
- Start Time
- Tester Name(s)
- Breakdown
- Data Files
- Test Notes
- Bugs
- Issues

REVIEWABLE RESULT - EXAMPLE

Charter *(a clear mission for the session)*

Huntington.com Main Search Navigation via Windows7 Desktop IE11 in production to examine search results.

Coverage Areas *(product areas, product elements, quality criteria, or test techniques)*
PBI 57229
Scenario 5
Scenario 3

Start Time
3:23pm

Tester Name(s)
Damian, Thomas, and Santhosh

Time Breakdown
_____ *total session duration*
_____ *test design and execution*
_____ *bug investigation and reporting*
_____ *session setup*
_____ *charter/opportunity*

Data Files
N/A

Test Notes *(what happened during this session)*

What terms are considered for predictive results?
List of questions and answers
Start typing for results versus a recognized word
What are valid search criteria?
Max length character length 120 on main page and max character length 255 on intelliresponse page.

Bugs *(a problem the tester believes represents a risk to the quality of the product)*

Issues *(a problem the tester believes inhibits the testing process such as missing data, environment issues, lack of expertise or knowledge, questions that arise during the session etc.)*

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DEBRIEFING

Measurement begins with observation.

DEBRIEFING

- Review for understanding
- Tester answers any questions
- Session metrics are checked
- Charter may be adjusted
- Session may be extended
- New sessions can be chartered
- Coaching

DEBRIEFING - EXAMPLE

Charter
- Did you review relevant approved session reports?
- Does it match the bulk of the testing that was actually done?

Areas
- Is there at least one O/S keyword (unless it's not applicable)?
- Is the build keyword accurate?
- Is there at least one strategy keyword?
- Is there at least one product area, as specific as meaningful to specify?

Duration
- Is the duration code in line with the actual duration?
- Was the session continuous and uninterrupted?

TBS
- Have the TBS definitions been followed?
- Have the TBS precedence rules been followed?
- Do the TBS numbers relate to On Charter work only?

Opportunity
- If the opportunity number is over 0%, what was the opportunity?
- If the opportunity number is over 25%, consider modifying the charter.
- If the opportunity number is over 50%, modify the charter for this session and consider doing a new session based on the original charter.

Data Files
- If there were no data files, why not?
- If there were data files, were they original or re-used? If re-used, were they modified in any way? If so, how do they now relate to other sessions that refer to the same data?
- Is there an associated test coverage outline that should be referenced?

Test Notes
- Are they comprehensible?
- In conjunction with the charter, do they answer the question "what happened in this test session?"
- Do they include information about coverage, oracles, and strategy?
- Is there anything in the notes that can be re-used in a future session? If not, that may be okay, but remember: part of the reason for the notes is to build a better plan for testing.
- Is this section free of issues and bugs?

Bugs
- Is enough information included to reproduce the problem?
- Is the section free of test notes and issues?

Issues
- If there are no issues, does that mean there was no confusion, no remaining questions, and no obstacles in the path of testing?
- Do any issues require actions to be taken?
- Is the section free of test notes and bug reports?

Overall
- Will metrics based on this session sheet faithfully represent the testing that was done?
- Do the results of this session suggest the need for another session?
- Should this session be extended and amended?

http://www.satisfice.com/sbtm/debrief_checklist.htm

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METRICS

- # of sessions completed
- # of problems found
- Function areas covered
- % of session time...
  - ...setting up
  - ...testing
  - ...investigating problems

HYPOTHESIS-DRIVEN DEVELOPMENT

HYPOTHESIS-DRIVEN DEVELOPMENT

"Hypothesis-Driven Development is thinking about the development of new ideas, products and services – even organizational change – as a series of experiments to determine whether an expected outcome will be achieved.“

-Barry O'Reilly

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WHY HDD?

The key outcome of an experimental approach is measurable evidence and learning.

HDD PROCESS

- Make **observations**
- Formulate a **hypothesis**
- **Design an experiment** to test the hypothesis
- State the **indicators to evaluate** if the experiment has succeeded

HDD PROCESS

- Conduct the **experiment**
- **Evaluate the results** of the experiment
- **Accept or reject** the hypothesis
- If necessary, **modify** and test a new hypothesis

HDD TEMPLATE

- We believe [THIS CAPABILITY]
- Will result in [THIS OUTCOME]
- We will have confidence to proceed when [WE SEE A MEASURABLE SIGNAL]

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We believe <THIS CAPABILITY>

Define a test capability of the product to be built, which will determine the functionality and hypothesis to test.

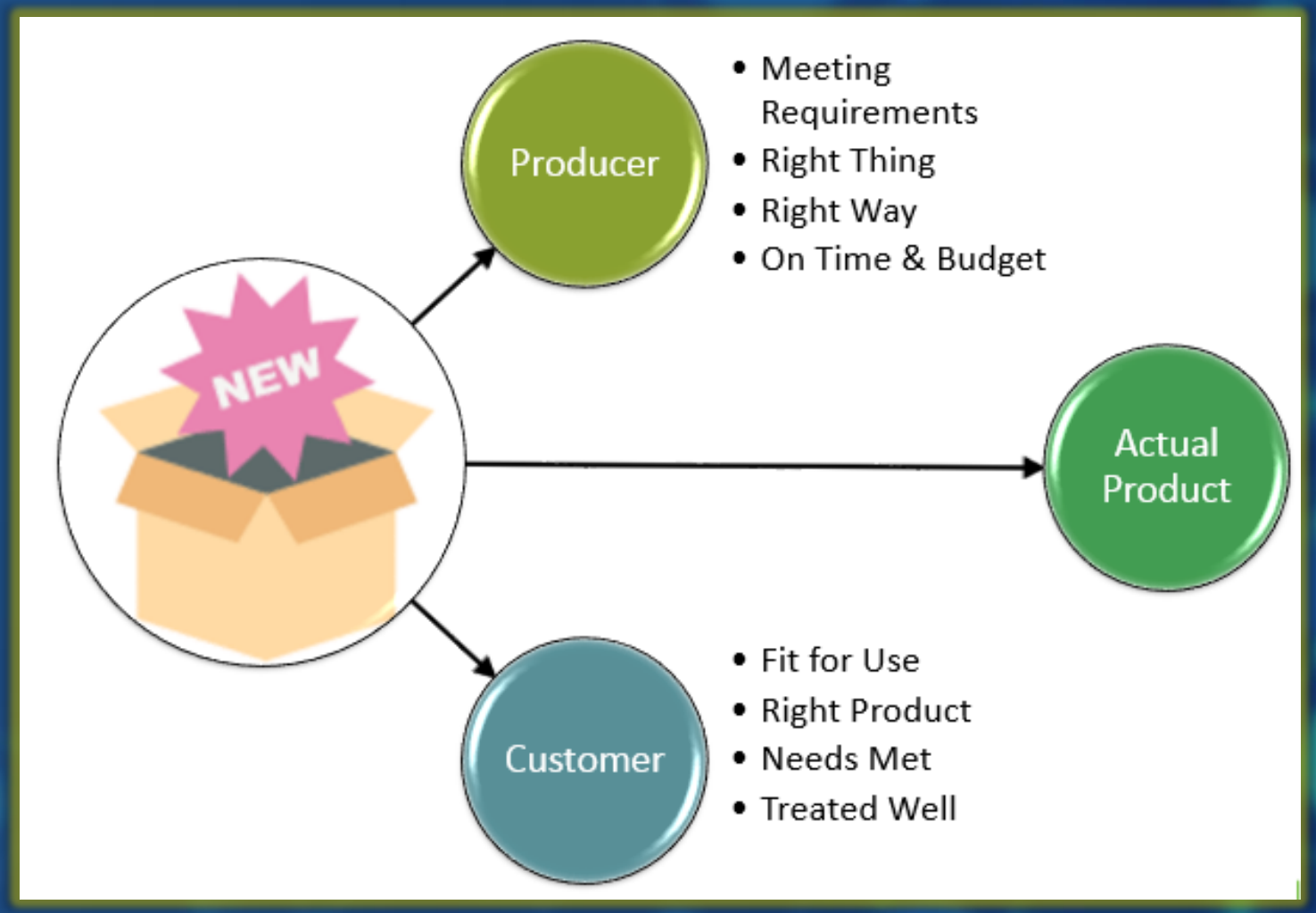
Will result in <THIS OUTCOME>

The expected outcome of the experiment.

We will have confidence to proceed when <WE SEE A MEASURABLE SIGNAL>

The criteria to reject the hypothesis.

As testers, we shift from testing features of a product already determined to whether or not the users actually WANT the feature.



HDD - EXAMPLE

- We believe [that increasing the size of Miche images on the My Panera registration page]
- Will result in [improved customer conversion]
- We will have confidence to proceed when [we see a 10% increase in customers completing My Panera registration over the registration page with original Miche images]

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HDD - EXAMPLE

on

on

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CONCLUSION

- Science and Software Testing share parallels in both observation and experimentation.
- The rigors of Science should be used to help understand and inform Software Testing – both Testers and Outsiders!

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Tech Agility in Action

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