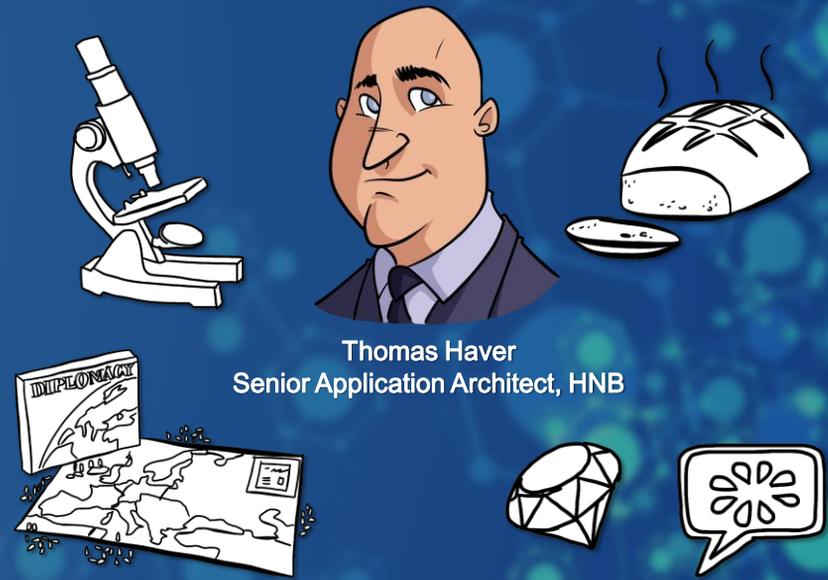


# The SCIENCE of TESTING

Software Test Professional Conference | April 2019

1

## ABOUT ME

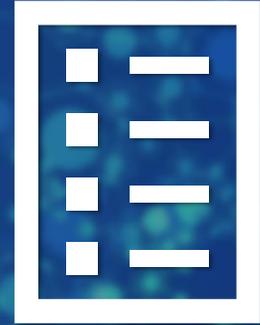


Thomas Haver  
Senior Application Architect, HNB

2

## AGENDA

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



3

## TESTING?

**Consider how testing is  
viewed in the workplace.**



4

# SCIENCE?

**Consider the difference  
in how people view  
science.**



5

# MY JOURNEY



6

## WHAT IS TESTING?



**"Questioning a product in order to evaluate it."**

**-James Bach**

7

## 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**

8

## WHAT IS TESTING?



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

**-Elisabeth Hendrickson**

9

## ATTRIBUTES?

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



10

## 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

11

## CONNECTION



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

**-William McComas**

12

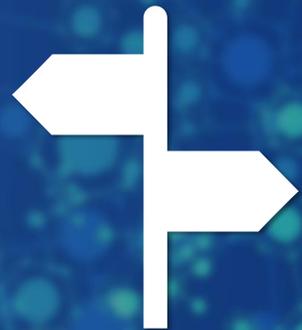
# THE SCIENTIFIC METHOD



13

## NEXUS of SCIENCE and TESTING

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



14

## SCIENTIFIC METHOD

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



15

## APPLICATION TO TESTERS

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



16

## APPLICATION TO TESTERS - EXAMPLE



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

17

## FALSIFIABLE CLAIMS



**“Science aims for falsifiable claims, and not claims that cannot be verified.”**

**-William McComas**

18

## FALSIFIABLE CLAIMS



**“Testing can show the presence of errors, but not their absence.”**

**-Edsger Dijkstra**

19

## FALSIFIABLE CLAIMS - EXAMPLE



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

20

# STRUCTURE

21

## PEER REVIEW

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



22

## DEDUCTION

**Making a specific conclusion from general knowledge.**



23

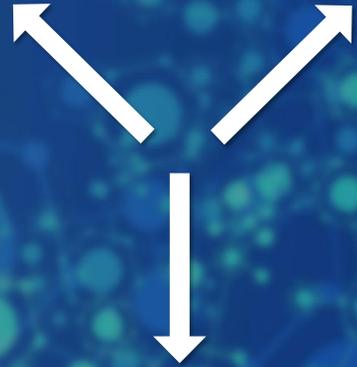
## DEDUCTION



24

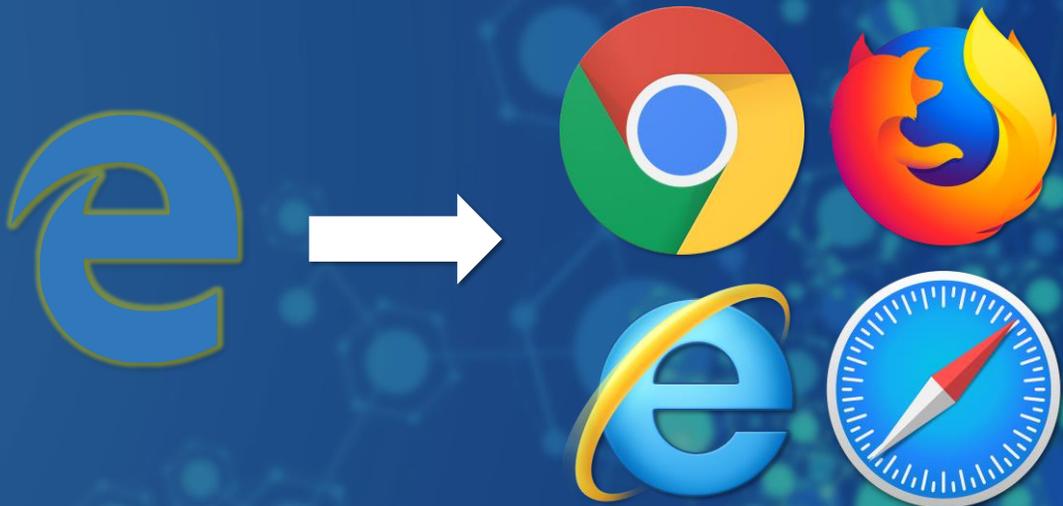
# INDUCTION

**Making general conclusions from specific knowledge.**



25

# INDUCTION



26

# EXPLORATORY TESTING with SESSION-BASED TEST MANAGEMENT

27

## EXPLORATORY TESTING



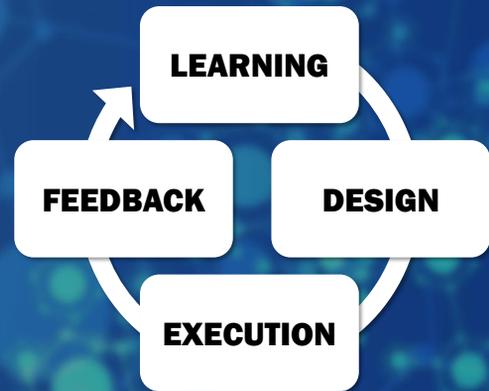
**"Simultaneous learning, test design, and test execution."**

**-James Bach**

28

## 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.



29

## EXPLORATORY vs. SCRIPTED

### EXPLORATORY

- Individual
- In the moment
- Investigation
- Adaptable
- Learning

### SCRIPTED

- Requirements
- In Advance
- Confirmation
- Predictable
- Decided



30

## 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**

31

## SESSION-BASED TEST MANAGEMENT

- **Charter**
- **Time-Box**
- **Reviewable Result**
- **Debriefing**



32

## CHARTER

**A clear mission for the session.**



33

## 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?



34

## TIME-BOX

**Focused test effort of fixed duration.**



35

## TIME-BOX

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



36

## REVIEWABLE RESULT

**A scannable session sheet.**



37

## REVIEWABLE RESULT

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



38

# REVIEWABLE RESULT - EXAMPLE

**Charter** (a clear mission for the session)  
Hurlington.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 intallresponse 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.)

39

# DEBRIEFING

Measurement begins  
with observation.



40

# 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



41

## 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, crashes, 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](http://www.satisfice.com/sbtm/debrief_checklist.htm)

42

## METRICS

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



43

# HYPOTHESIS- DRIVEN DEVELOPMENT

44

# 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

45

## WHY HDD?

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



46

## HDD PROCESS

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



47

## HDD PROCESS

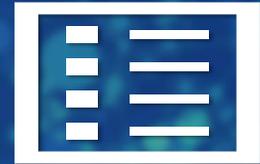
- Conduct the **experiment**
- **Evaluate the results** of the experiment
- **Accept or reject** the hypothesis
- If necessary, **modify** and test a new hypothesis



48

## HDD TEMPLATE

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



49

We believe **<THIS CAPABILITY>**

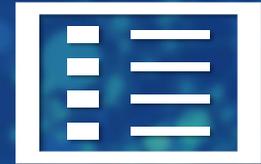
Define a test capability of the product to be built, which will determine the functionality and hypothesis to test.



50

Will result in **<THIS OUTCOME>**

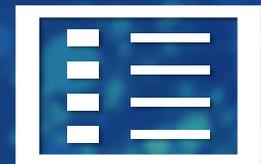
The expected  
outcome of the  
experiment.



51

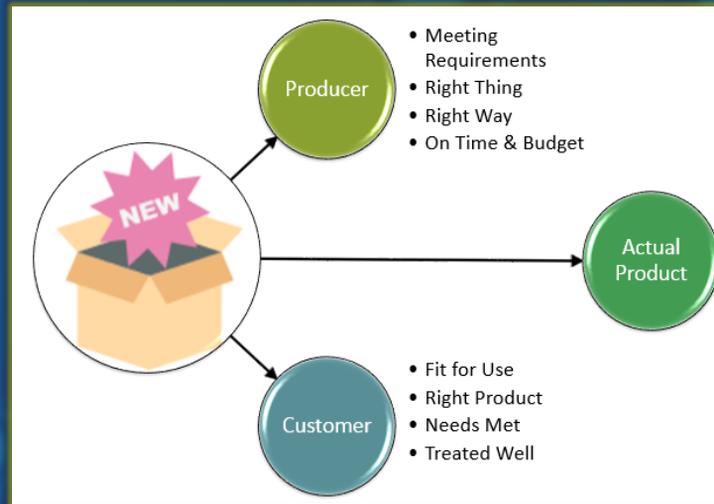
We will have confidence to proceed  
when **<WE SEE A MEASURABLE SIGNAL>**

The criteria to reject  
the hypothesis.



52

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



53

## 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]**



54

## HDD - EXAMPLE



on

on

55

## 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!**



56

The  
**SCIENCE**  
of  
**TESTING**

Thomas Haver  
thaver@gmail.com  
Twitter: @cogsfun

**THANK YOU!**