

Will Snipes, Brian Robinson ABB Corporate Research;

Yuepu Guo, Carolyn Seaman University of Maryland Baltimore County

Defining the Decision Factors for Managing Defects: A Technical Debt Perspective

Power and automation are all around us

You will find ABB technology...



Orbiting the earth and
working beneath it,



Crossing oceans and on the
sea bed,



In the fields that grow our
crops and packing the food
we eat,



On the trains we ride and in
the facilities that process our
water,



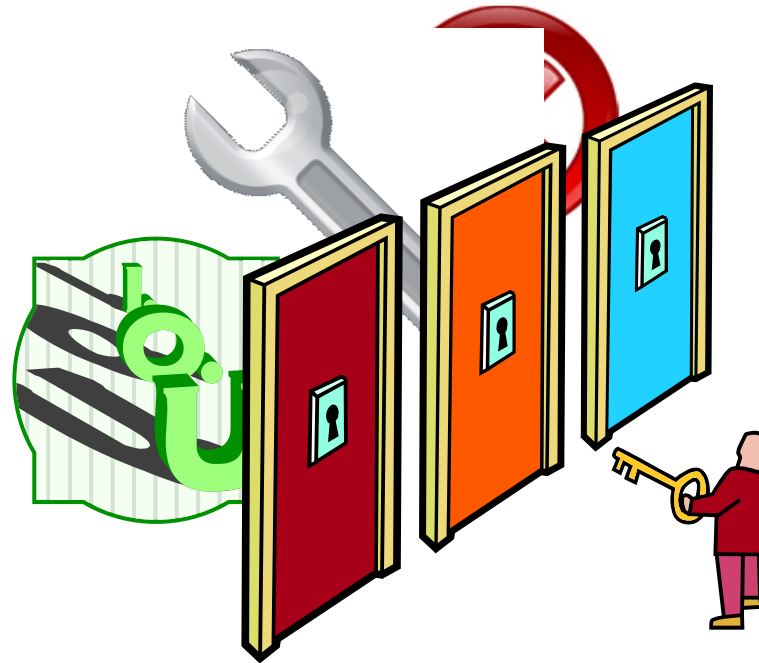
In the plants that generate
our power and throughout our
homes.

Outline

- Background
- Focus and Methodology
- Findings
- Conclusion

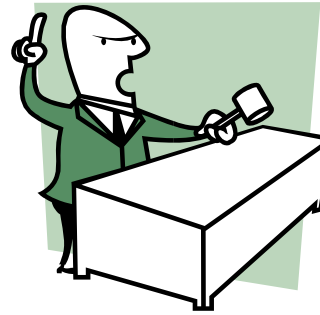
Objective

- Evaluate how do Change Control Boards (CCB) make decisions on when to fix a defect
- Does technical debt apply to the decision making process?



Defects as Technical Debt

- When is a defect technical debt?
- Classifications of technical debt
 - Intentional
 - Short term
 - Long term
 - Unintentional



Change Control Boards (CCB)

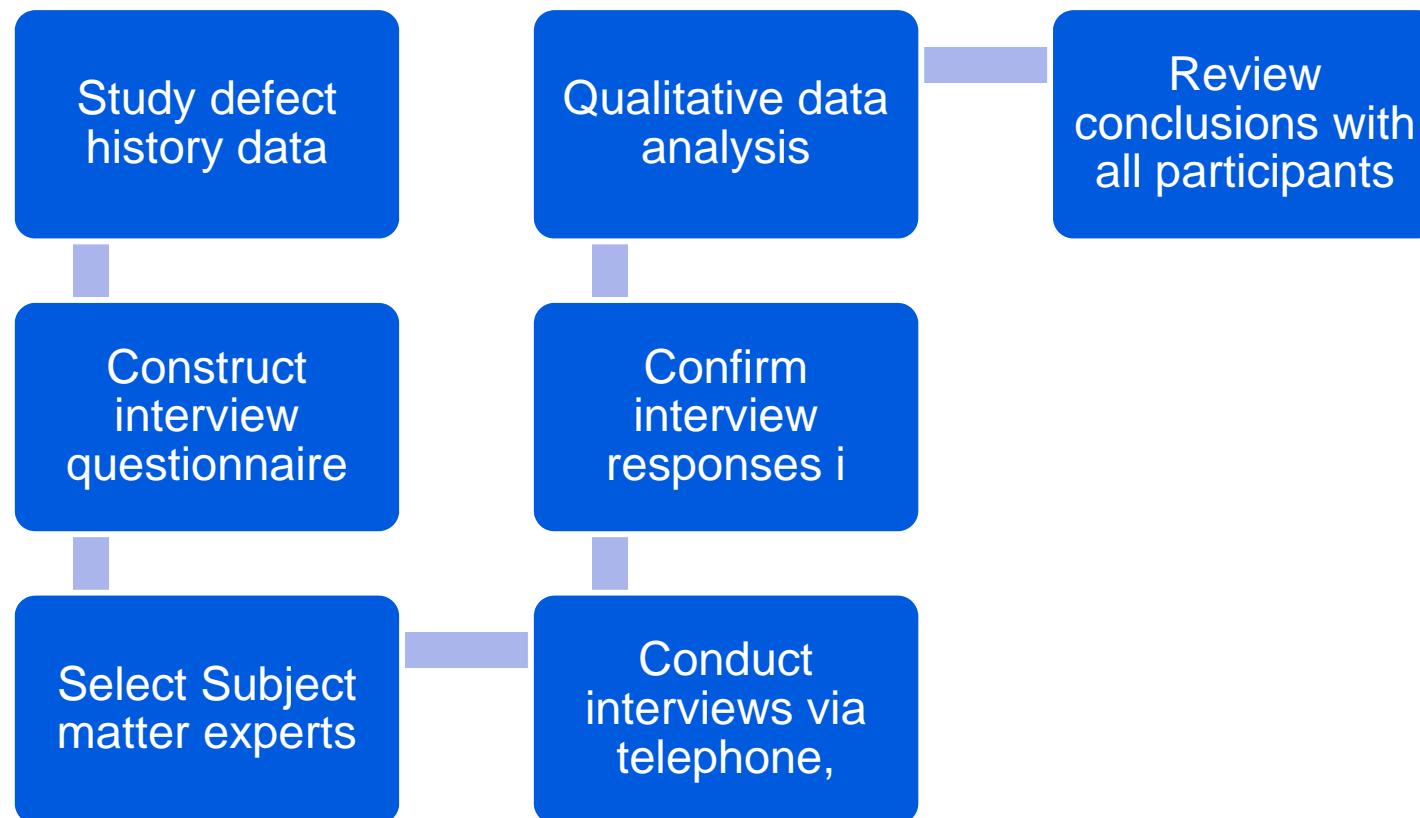
Meets regularly to approve work that makes changes to a product (features and defects)

Decisions regarding defects:

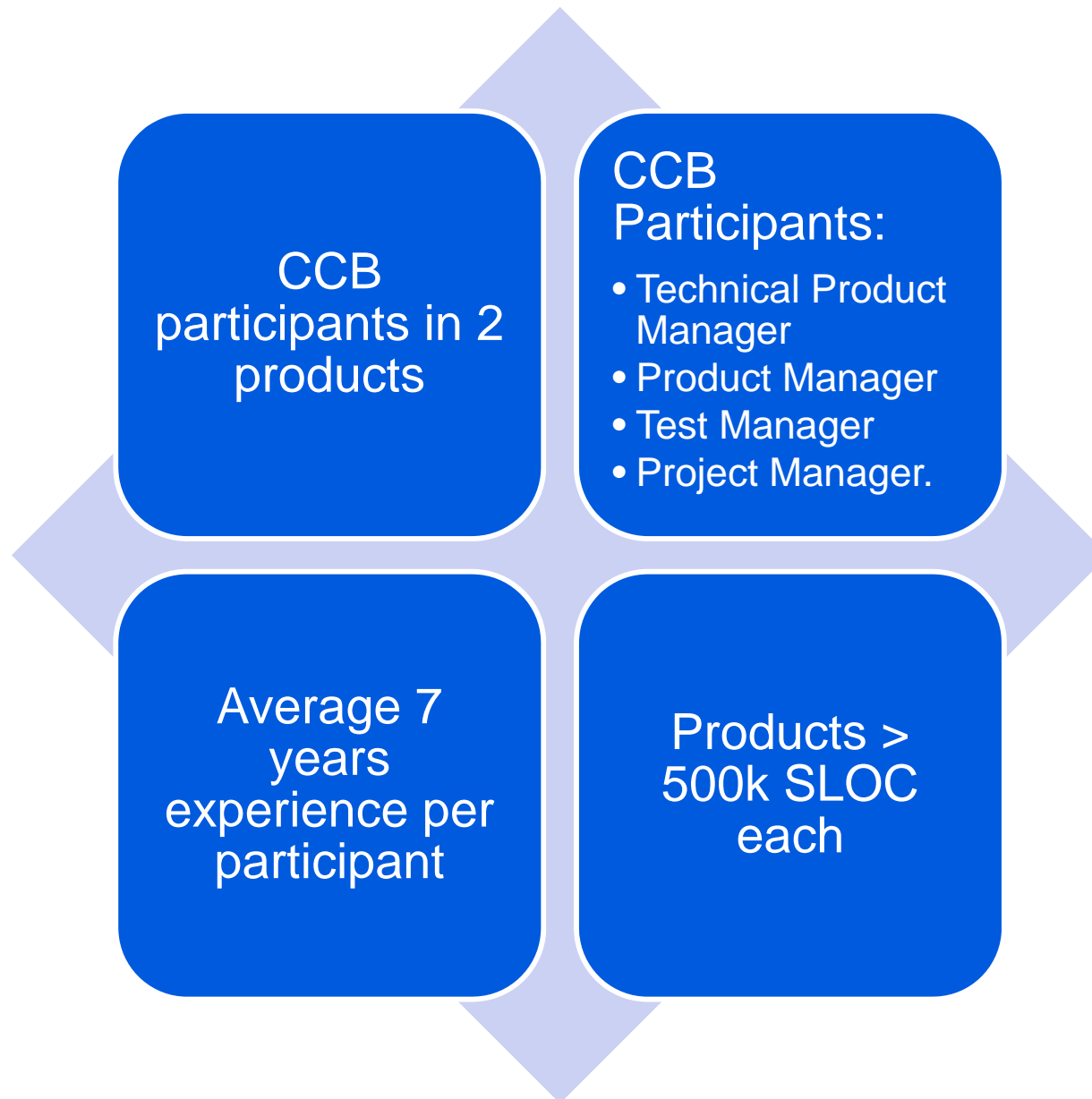
- Fix in current release
- Defer fixing
- Do not fix



Methodology



Interviews of Change Control Board (CCB) Subject Matter Experts



Questionnaire

Open questions to participants:

- Decision factors?
- Cost Categories?
- Actual costs?
- How do costs change with different decisions?
- Were there positive/negative consequences of each decision?



Findings: Decision Factors for CCB's

Decision factors for when to fix a defect:

Severity

Existence of a workaround

Urgency of fix required by customer

Effort to implement the fix

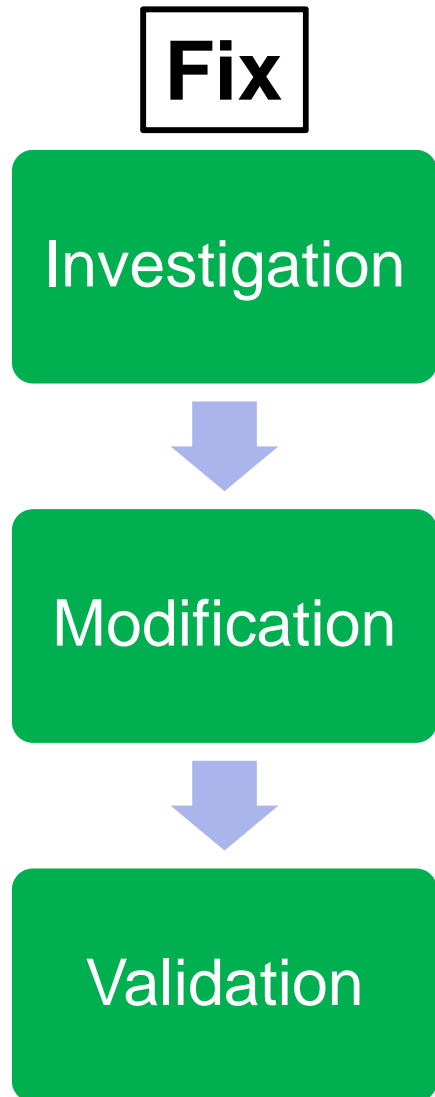
Risk of the proposed fix

Scope of testing required



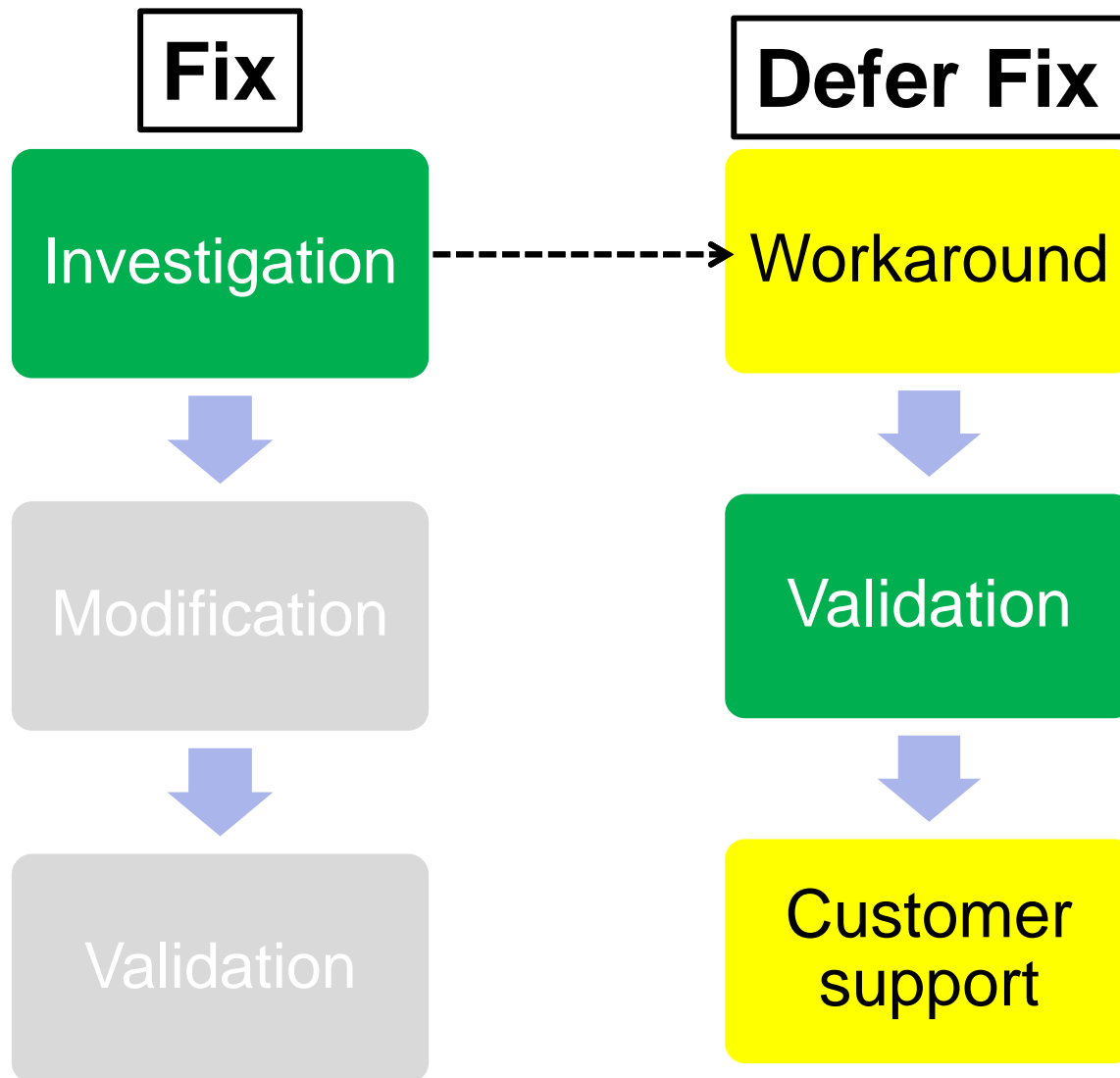
CCB teams make complex decisions with mostly qualitative criteria.

Findings: Cost Categories and Decisions

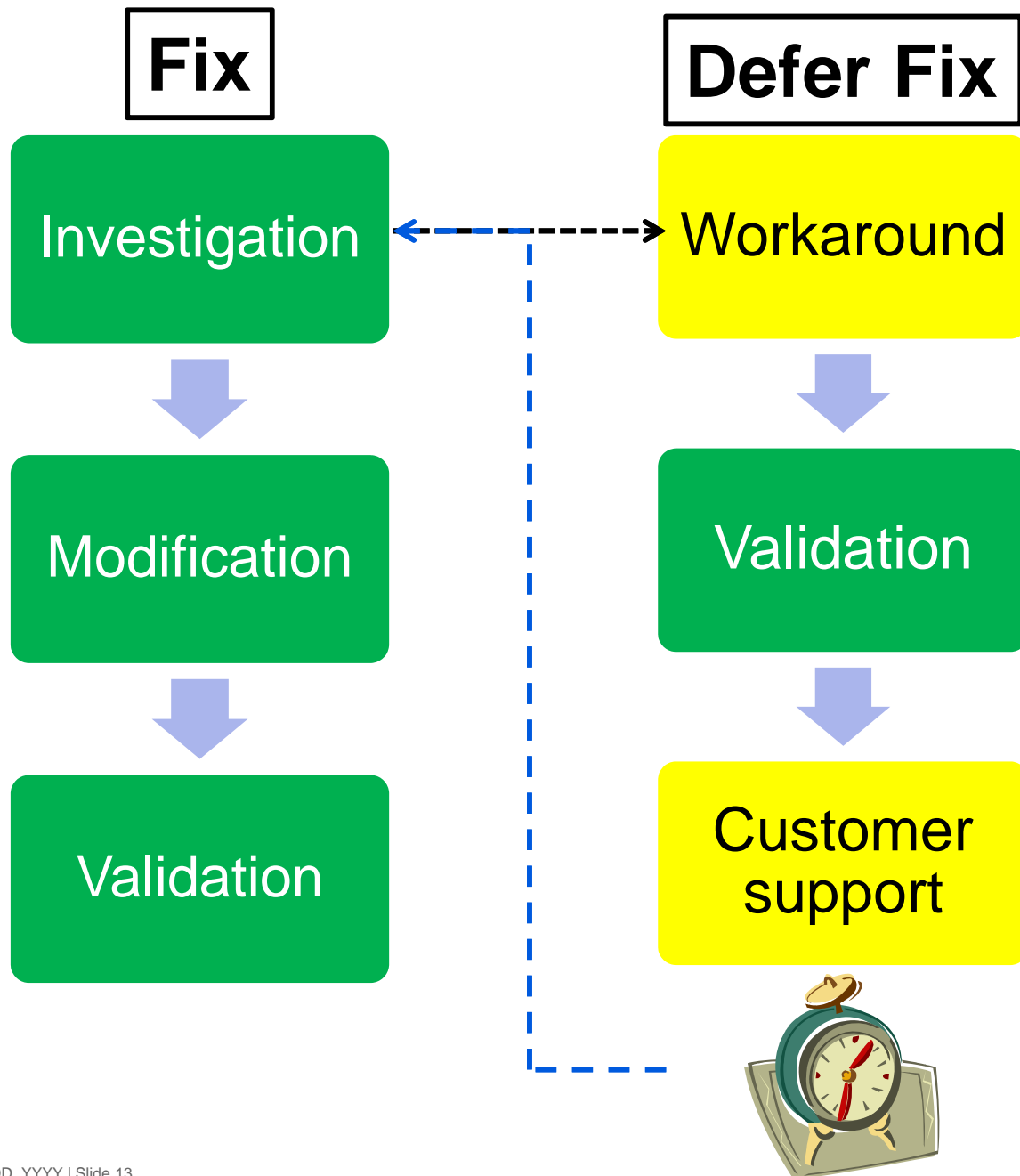


Fix in the current release for a discovered defect

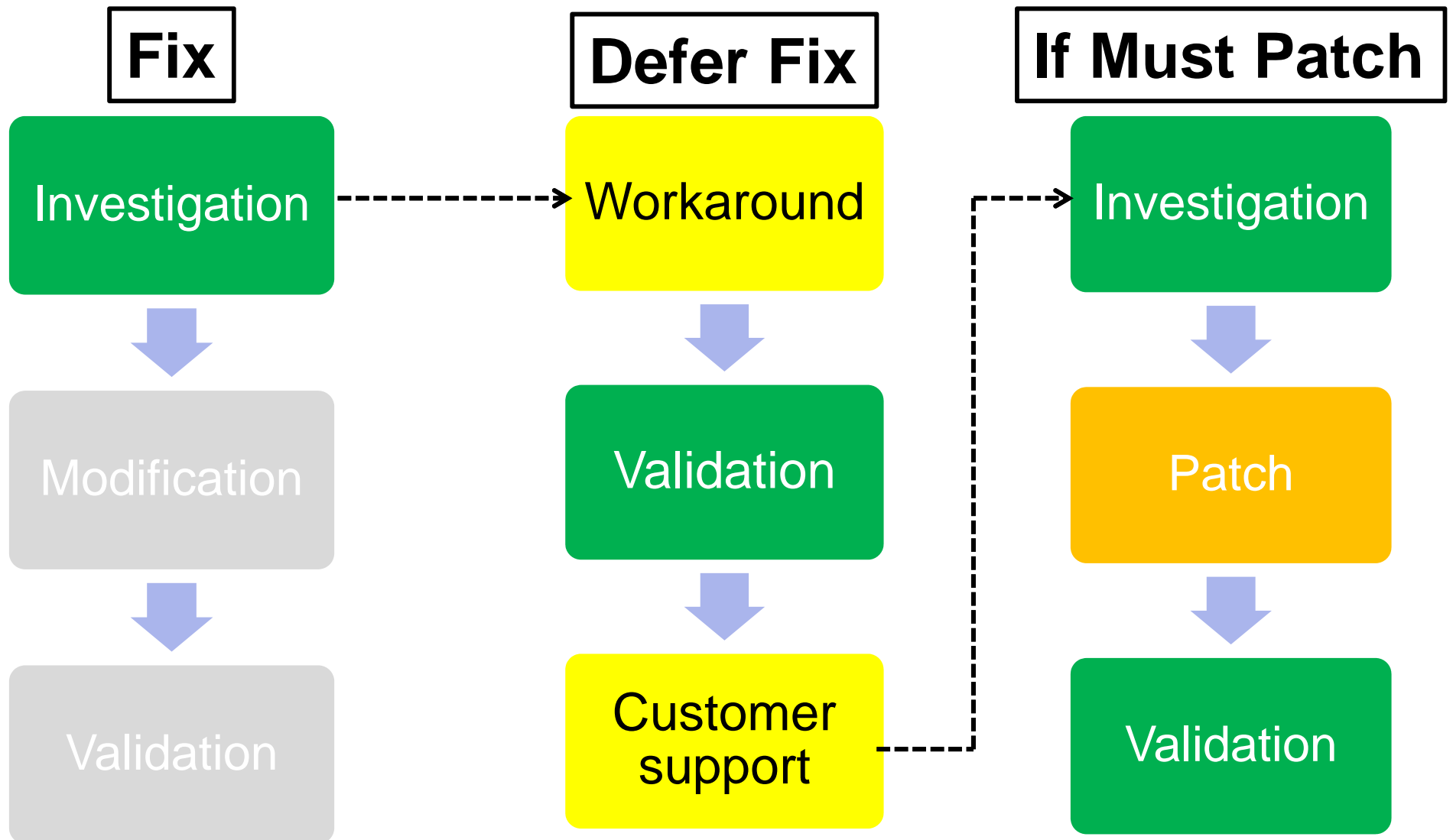
Findings: Cost Categories and Decisions



Findings: Cost Categories and Decisions



Findings: Cost Categories and Decisions



Findings: Costs in relative terms

Fix



Principal

Findings: Costs in relative terms

Fix



Defer Fix



Principal

+

Interest

Findings: Costs in relative terms

Fix



Principal

Defer Fix



Interest

If Must Patch



Penalty

+

+

Findings and Opportunities

- Findings:
 - Severity of impact to the customer's operation is the key factor
 - Deferring a defect introduces interest cost and risk of penalty
- Opportunities
 - Apply cost-benefit analysis for decision support

Conclusions

CCB's :

- Manage current and future cost
- Use customer oriented decision criteria
- Balance Risk
- Fix/Defer decision can use cost-benefit analysis



REFERENCES

1. "IEEE standard glossary of software engineering terminology," Tech. Rep., 1990.
2. C. Jones, "Strategies for managing requirements creep," Computer, vol. 29, no. 6, pp. 92-94, Jun. 1996.
3. K. Tate, Sustainable software development : an agile perspective, A. Cockburn and J. Highsmith, Eds. Addison-Wesley, 2006.
4. S. McConnell. (2007). 10x Software Development. Available: <http://forums.construx.com/blogs/stevemcc/archive/2007/11/01/technical-debt-2.aspx>
5. M. Fowler. (2009). Technical Debt Quadrant. Available: <http://www.martinfowler.com/bliki/TechnicalDebtQuadrant.html>
6. J. Rothman. (2006). An Incremental Technique to Pay Off Testing Technical Debt. Available: <http://www.stickyminds.com/sitewide.asp?Function=edetail&ObjectType=COL&ObjectId=11011&tt=DYN&tt=siteemail&iDyn=2>
7. N. Brown, Y. Cai, Y. Guo, R. Kazman, M. Kim, P. Kruchten, E. Lim, A. MacCormack, R. Nord, I. Ozkaya, R. Sangwan, C. Seaman, K. Sullivan, N. Zazwork, Managing Technical Debt in software-reliant Systems, a, Proceedings of the 18th FSE/SDP Workshop on Future of Software Engineering Research, 47-52, 2010
8. C. Seaman and Y. Guo, "Measuring and Monitoring Technical Debt," Advances in Computers, vol. 82, pp. 25-46, 2011.
9. Y. Guo, C. Seaman, A Portfolio Approach to Technical Debt Management, , Proceeding of the 2nd Workshop on Managing Technical Debt, 31-34, 2011
10. B. W. Boehm, "Software Risk Management: Principles and Practices," IEEE Software, vol. 8, pp. 32, 1991.
11. M.B. Miles, A.M. Huberman, "Qualitative Data Analysis: An Expanded Sourcebook", 2nd ed., Sage, 1994.