



Applying Agile to Systems Engineering

*Incremental Automated Test Capability of the
Multi-spectral Targeting System Platforms*

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Agenda

- Introduction / BIO
- MTS T&E Automation
- Agile vs Waterfall
- Systems Engineering Role
- Adaptive Test Requirements
- Automation Deployment using Agile
- Lessons Learned / Summary



Biography

Amar Modi

Amar holds a B.S and a M.S in Electrical Engineering from UT Arlington. He has over 10 years of systems engineering experience by starting his career with Lockheed Martin – MFC in 2005 and transitioning to Raytheon in August 2008. His experience spans all the different areas of Systems Engineering from requirements development to production support. He has over 8 years of EO experience by supporting EO platforms on missiles, land combat vehicles, fixed & rotor wing crafts as well as ships.



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Joshua Strain

Josh started his career at Raytheon Space and Airborne Systems in May 2009. He holds a B.S. in Computer Engineering from the University of Oklahoma and is working towards a M.S. in Systems Engineering from Johns Hopkins University. He is a Certified Agile Product Owner and currently works as the Systems Software Architect in the Systems Verification Center. He specializes in database design and distributed architectures utilizing the Microsoft .NET platform.



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MTS T&E Automation

Multi-spectral Targeting System (MTS)

- Complex platform, over 30 variations
- Deployed in both manned and unmanned systems
- Different sensors and lasers requires *complex test environment*

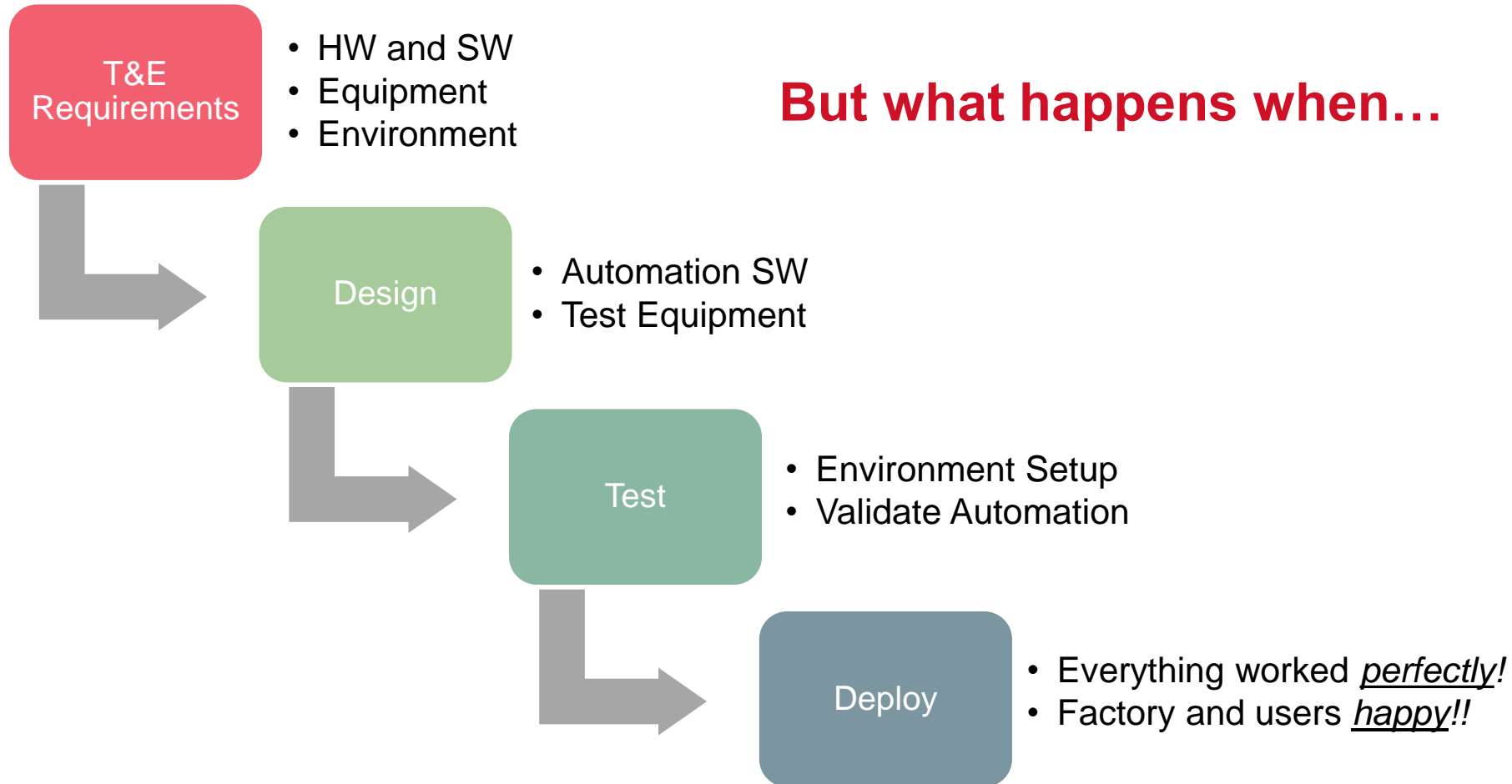


Creating an Automation Platform

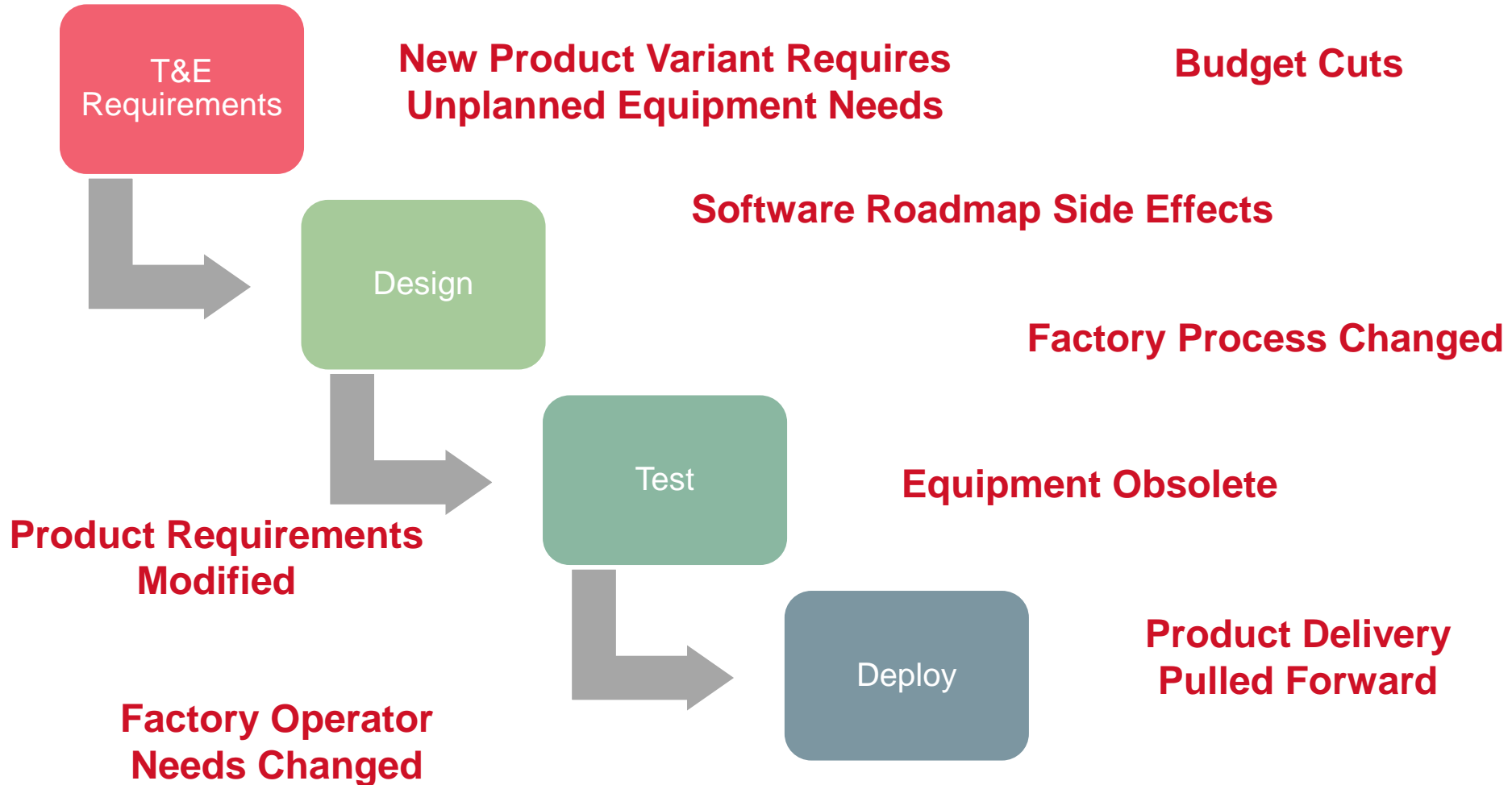
- Provided commonality in testing across product line
- Control of complex test equipment such as slide rails, light sources, chambers, target wheels, etc...
- Reduced operator variability and overall cycle time by **30%**

The automation success was driven by applying Agile

Why Not Waterfall?



Why Not Waterfall?

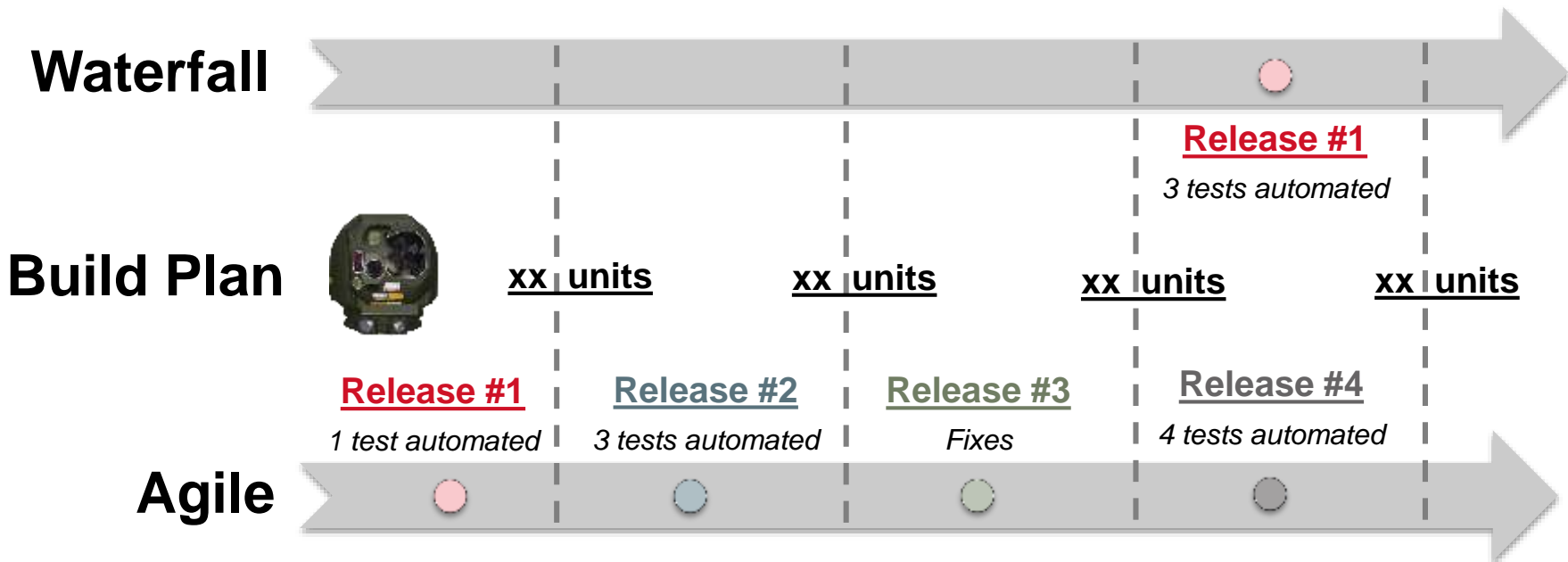


Not Adaptive to T&E Environment



Using Agile for Automation

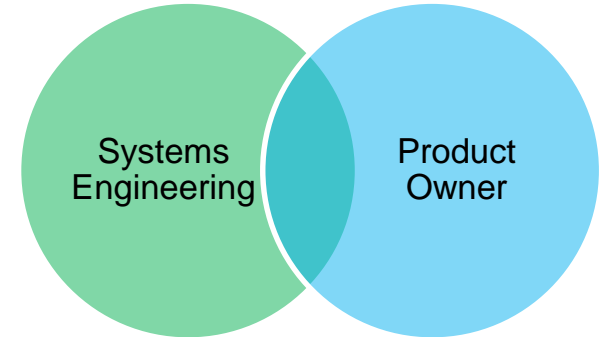
- Allows for flexibility in re-planning (*changing priorities*)
- Faster incremental deployments (*reduction realized sooner*)
- End users involved early and often (*validate product is right*)
- Team ownership of end product (*greater productivity*)



Role of the Systems Engineer

Agile Product Owner

- Develop and maintain the roadmap
- Refine the backlog and create stories
- Prioritizes work items



T&E Systems Engineer

- Defines test requirements
- Leads Integration, Verification, and Validation
- Coordinates system concepts and technical resolutions
- Works with end users for needs analysis

Can Roles be Merged?

- Benefit to have SE fully emerged in Agile process
- Downside is balancing time between roles

Adaptive Test Requirements

Define Overall Testing Requirements and Plan

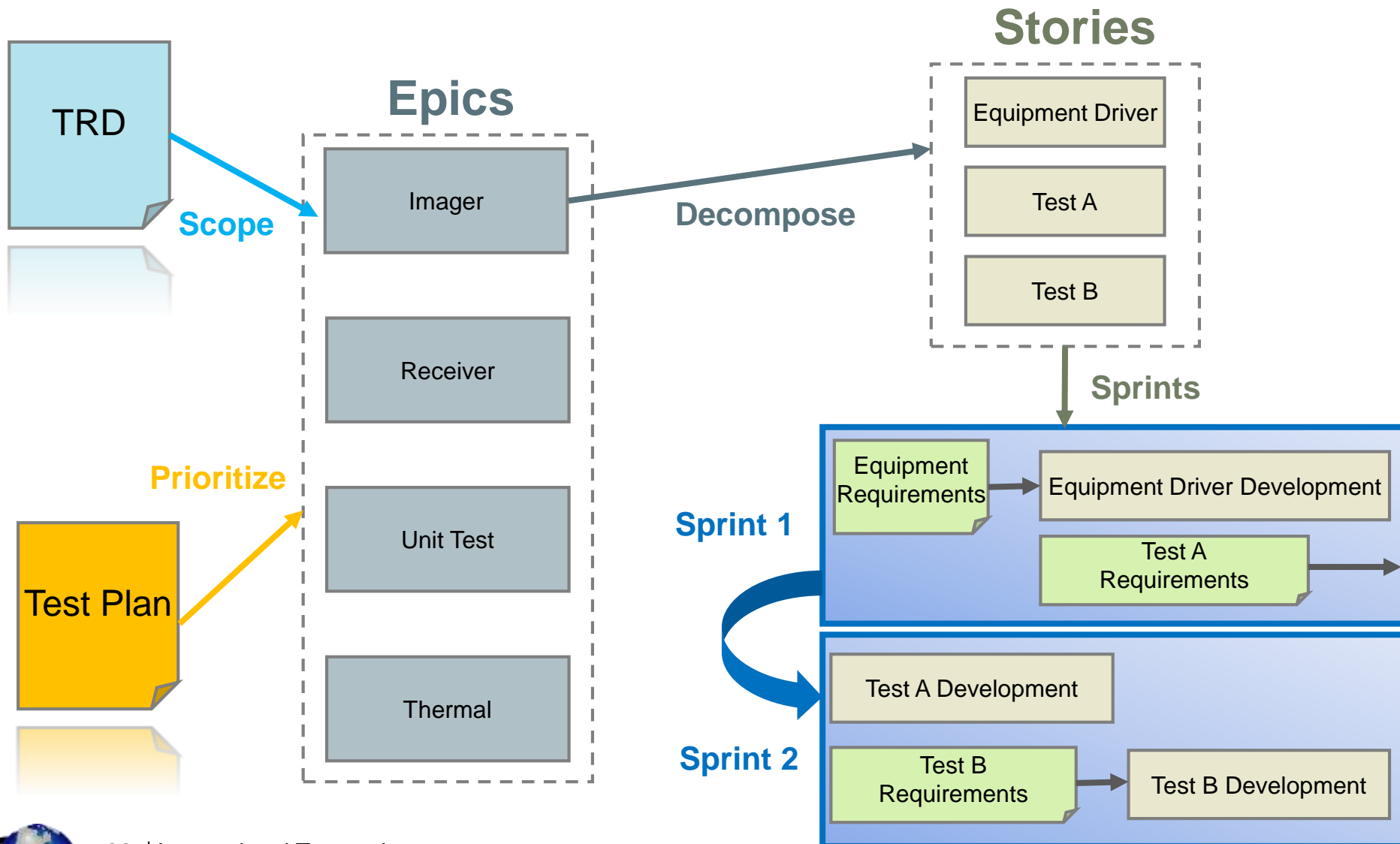
- Think of the TRD as the A-Spec level
- Define a test plan to establish guidance and expectations

Deriving Incremental Requirements

- Split-up project into logical small requirement groupings
- Write and review requirements in the sprint before planned work begins
- Allows design to start earlier in life cycle
- Release cycles based on requirements validation
- Requirements can be adapted to current sprint findings



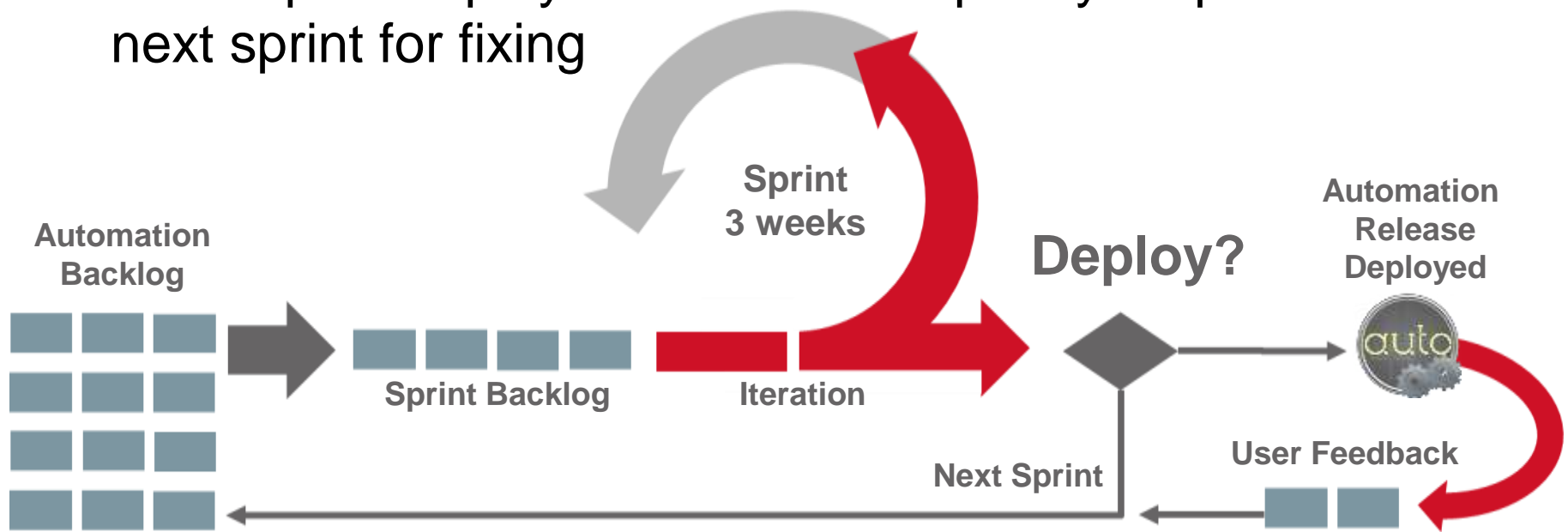
Adaptive Test Requirements



Deployment Using Agile

Smaller Incremental Releases = Smooth Deployment

- Capabilities extended incrementally
- Users better adapt to small changes
- Less errors introduced, defect tracking manageable
- Allows post deployment issues to quickly be prioritized into next sprint for fixing



Lessons Learned

- **Systems Engineer in Product Owner Role**
Works if SE ensures proper time allocation
- **End User Satisfaction**
Usability Testing early gives factory ownership
Ensure constant end user feedback loop in place
Always highly prioritize sustainment in backlog
- **Automation Software Supports Agile Deployment**
Dynamic plug and play architecture
Allow mix of manual and automated testing
- **Agile Method Buy-In from Team and Factory**



Summary / Questions

- Waterfall Difficult in Complex Test Environments
- Ensure T&E Success thru Incremental Releases
- Leverage Agile in Systems Engineering

Questions?

