

University of Maryland

Project Management Symposium

NEXT SESSION

Solving Problems in Frameworks: Feature Focused

Christopher "Ax" Axthelm

Agile Philosopher
Project Engineer, a.i. solutions



PROJECT MANAGEMENT
CENTER FOR EXCELLENCE

A.J. CLARK SCHOOL OF ENGINEERING
Civil & Environmental Engineering Department

This session will be recorded.

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Solving Problems in Frameworks: Feature Focused

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Who am I?

- Agile Philosopher – Background in Communication, Sociology, & Software Development
- Project Engineer – Currently working on NASA's Conjunction Assessment Risk Analysis (CARA).
- Fifteen years software development, Twenty years of project management roles





Why we are here

- The NASA Earth Observing System (EOS) Flight Dynamics System (FDS) software team was having a hard time finishing requested work
- Originally using Scrum, then tried Kanban, and found several problems in each
- After figuring out the team's *real* problems, I created a new methodology: Feature Focused
- This is our story, solution, and genesis of Feature Focused



The Problems

Why Scrum and Kanban didn't fit

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Our Code Base

- The code was 22 years old, massively complex, and large parts written (poorly) in MATLAB and PERL
 - It was originally written by aerospace engineers in 1998 for the Terra EOS mission and repurposed for Aqua and Aura
 - Around 2013, some automated processes were tacked on with a crude messaging service
 - Tech debt was ignored until security problems needed to be addressed

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Problems using Scrum

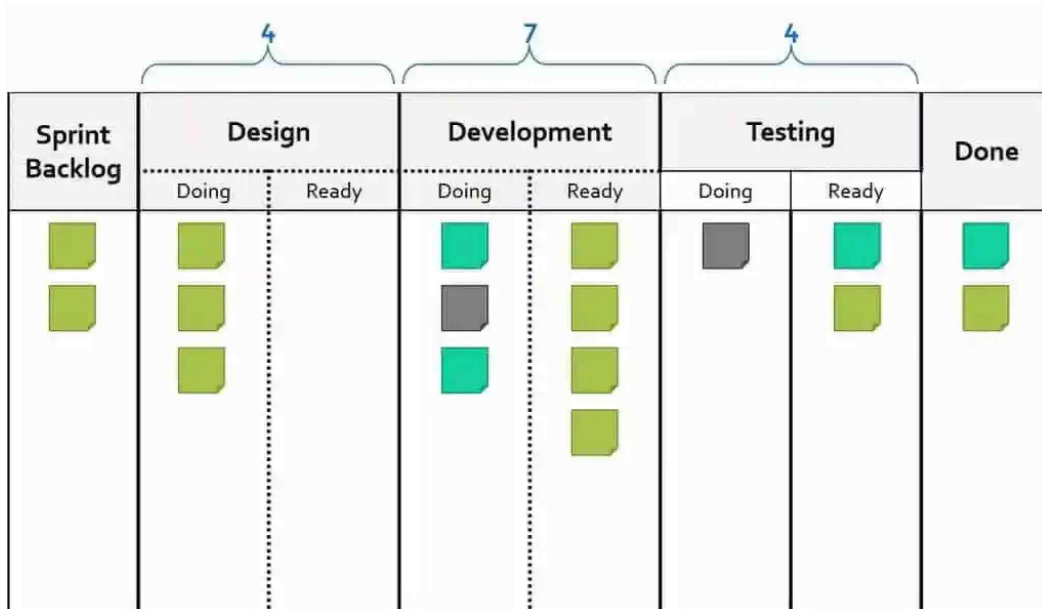
- Almost every change was story pointed with a 20, ?, or infinite due to the need to investigate the old code
- Investigation tickets often took up half the sprint's points
- After investigations, and tickets were broken out, some would get in a sprint, but often not everything
- Attempted pausing running sprints to perform investigations, architecting, and planning

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Problems with Kanban

- As features were investigated the newly created work tickets broke WIP limits
- Tickets were often blocked by needing aerospace assistance, thus clogging the Kanban board
- Because of this mess, features would get half done causing problems testing and cutting off a build

A Clean Kanban Board



- A ticket in design could become eight in development (breaking WIP)
- You couldn't test until all tickets of a feature were done
- If you kept all work together a single ticket could take months to complete





What were the *real* problems?

1. Both Scrum and Kanban seemed to be built around working in well understood code
 - Using features/stories without breaking them down
 - Do we break down features or attempt to work on more all at once?
2. Our developers were not aerospace experts; relying only on aerospace engineers produced bad code





Not our problems

- The team did not have a problem with:
 - A customer wanting waterfall or who kept changing priorities
 - Wanting the team to 'go faster'
 - Not having enough developers for the work (i.e. money)
 - A lot of current test failures/defects
- The 'Iron Triangle' (time, money, scope) was not causing issues





The Solution

Why Feature Focused was created



What do you mean 'Architect'?

- Taking a large feature and designing the technical solution (a.k.a 'Software Design')
- The goal of architecting is to ensure the team has a complete understanding of the feature and what is required to complete it
- A tech review is performed by the team so that everyone has a chance to learn, give feedback, and ensure the right solution was found



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Built around architecting

- The goals for the new methodology were:
 - Solve all the potential blockers before development work started
 - Create technical tickets so low level that any developer (regardless of aerospace knowledge) could complete them
 - Better educate the team on what the feature was trying to do, change, or add to the code
- Our focus needed to be on better architecting the solution

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Called “Feature Focused”

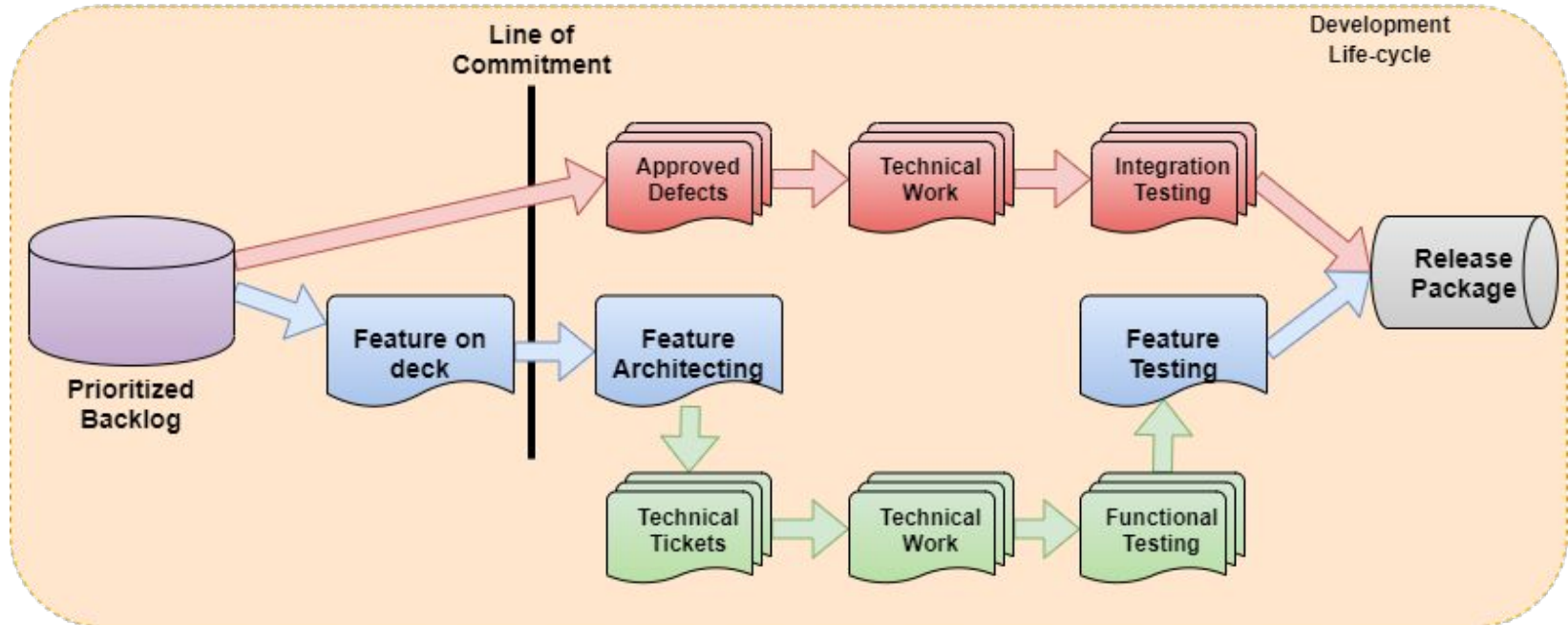
- To focus on the feature the team wanted to ensure:
 - Better documentation on the overall goal and structure of the feature
 - A single contact/owner of the feature to help resolve problems (the architect)
 - All formulas and questions about the feature’s design were resolved
 - Developers didn’t have to worry about ‘how’ to do the work
 - Had a comprehensive way to test the entire feature

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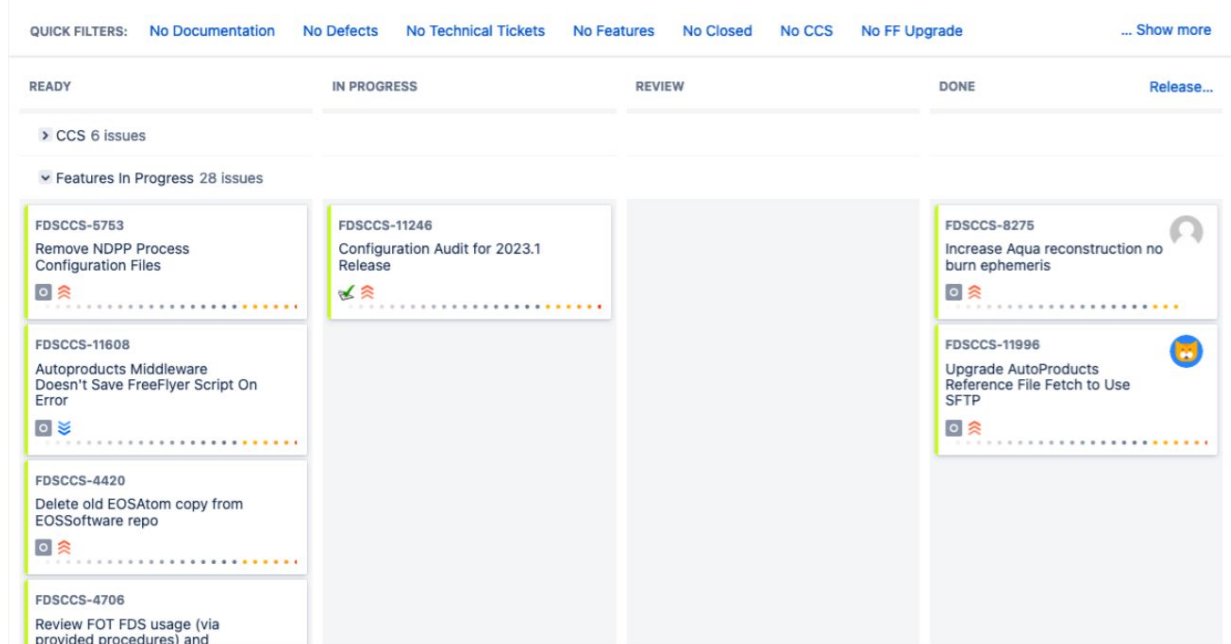
Aspects of the process

- Using Lean philosophy and Kanban mindset
 - Product Owner sets the feature's priorities in the backlog
 - Line of Commitment is used to ensure each feature has the minimum information needed to be successful before being worked on
 - Pull (not push) of tickets through the system
 - Use throughput as the main metric of work
- Blocker and approvals are handled by the feature's architect

Feature Focused Process



Team Jira Board



- Worked surprisingly well
- Gave fidelity to the technical tickets
- Swimlanes were used for stages of features:
 - Critical
 - Feature in progress
 - Approved defects
 - Planned
 - Backlog
- Feature tickets (Epic) are moved by the architect






Technical Tickets

- Technical and defect tickets required enough information so that any developer could pick up and be successful with it.
- Major pieces of information includes:
 - Background for context of the ticket
 - The required work to be done; often in list format which can be easily reviewed as acceptance criteria

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- Artifacts (e.g. images) referenced





AXT-1723

CREATE LOGIN PAGE HTML & CSS

DETAILS

PRIORITY:	⤴ MEDIUM	STATUS:	MERGED (VIEW WORKFLOW)
AFFECTS VERSION/S:	NONE	RESOLUTION:	UNRESOLVED
COMPONENT/S:	FRONT-END	FIX VERSION/S:	AXT 2021.3
LABELS:	UI		

BACKGROUND

USERS SHOULD BE MADE TO LOG INTO THE WEBSITE TO ACCESS THE MAIN CONTENT. THE NEW LANDING PAGE FOR THE WEBSITE SHOULD BE THIS LOGIN PAGE, IT SHOULD VERIFY USER CREDENTIALS AND, IF ACCEPTABLE, REDIRECT THE USER TO THE MAIN PAGE. THIS TICKET CREATES THE PAGE AND ADJUSTS ANY CSS STYLING NEEDED.

REQUIRED UPDATE

CREATION OF THE LOGIN PAGE (HTML) WITH:

- 1) MAIN WEBSITE BANNER & WEBSITE STANDARD "LOOK & FEEL"
- 2) TWO TEXT INPUTS: ONE FOR USERNAME, ONE OBFUSCATED FOR PASSWORD
- 3) ONE SUBMIT BUTTON
- 4) ONE "FORGOT PASSWORD" HYPERTEXT (CONNECTION NOT A PART OF THIS FEATURE)
- 5) UPDATE THE MAIN CSS

SEE THE ATTACHED MOCK-UP IMAGES FOR LAYOUT. THE JAVASCRIPT TO WIRE THE PAGE TOGETHER IS IN TICKET [AXT-1724](#) AND THE "FORGOT PASSWORD" FUNCTIONALITY IS IN EPIC [AXT-1662](#).



Results

How did it go?

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It helped!

- In first year of implementation (2020, team size of 8)
 - Completed **16 features**, composed of **119 technical tickets**, and additional **52 defects**
 - Largest feature had **29 technical tickets** and took **3 weeks to architect**
 - Only 5 more technical & defect tickets completed 2020 vs. 2019, however a large portion of 2019 tickets were completed by aerospace experts.
- We did not go faster, but there was significantly less

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Not a Fluke

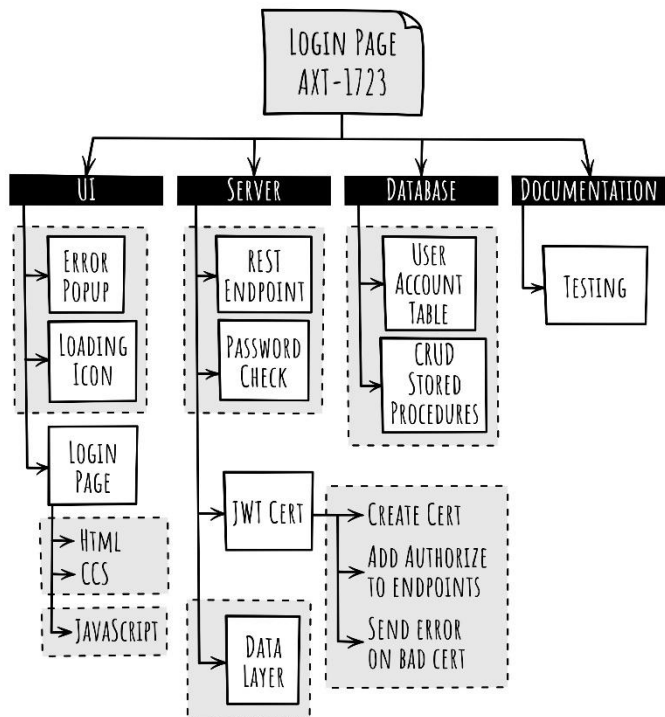
- The second year (2021) had half the number of features:
 - Completed **8 features**, composed of **116 technical tickets**, and additional **58 defects**
 - This year had three giant retrofits to upgrade MATLAB from version 2013a to 2021b for Aqua and Terra, and the supported FreeFlyer software (orbital mechanics) from 6.5 to 7.6.1
- Even with the need for more aerospace expert involvement in the retrofits, everyone was still happy with Feature Focused

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Extra things we learned

- Work Breakdown Structures (WBS) helped organize content
- MUST ensure features are ready to be architected
- Aerospace customer likes to see more outputs during the architect process
- Architecting got faster as new features touched previously architected spaces

Work Breakdown Structures (WBS)

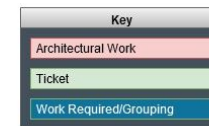
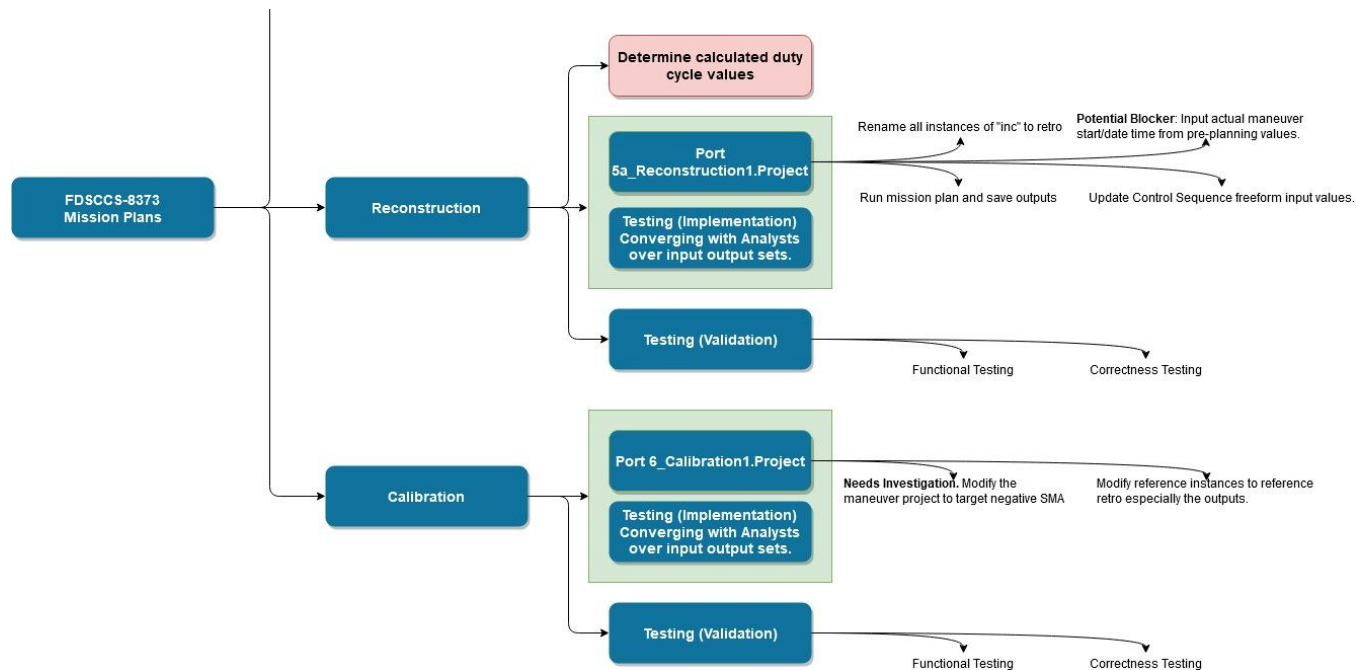


- WBS helps map out functionality, and group items into useful tickets
- Can use functionality, modules, classes, or processes as blocks
- Callout potential blockers, which blocks are tickets, unknowns, and other extra information





Work Breakdown Structures (WBS)





Problems with Feature Focused

- (Non-Critical) Defect tickets are naturally deprioritized
 - May require raising them to critical, purposefully not pulling in a new feature, or dedicating a developer to defects to knock out defects for a release
- Does not have the ‘urgency’/immediacy constraints like sprints
 - Leads need to focus more on people’s output and work cadence
 - The team ended up timeboxing architecture with bi-weekly statuses and reimplemented stand-ups for technical tickets
- Architects needed to learn some project management



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Key Takeaways

- The methodology you use should match the problem you are trying to address
 - This means understanding your team's problems and your team better
 - Tailoring must occur to help fit the methodology to specific team quirks
- Feature Focused helped solved our specific problems
 - The need to architect complex features
 - Highly trained specialists that couldn't do all of the work



Questions?

Full Methodology information can be found in the
whitepaper

Further questions, assistance implementing, or let me
know how it worked for you; Contact me at:

Christopher 'Ax' Axthelm

AgileAXiom@outlook.com





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