

Step-by-Step MAHD

Modified Agile for Hardware Development

The Smart Coffee Maker Project

Part 6 of a 9-part series to walk through an agile development project from concept to launch

Step 6:
Sprint One
Complete



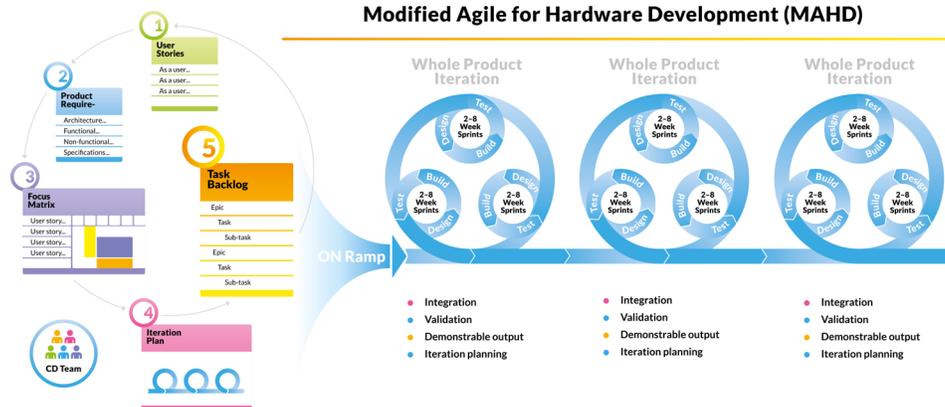
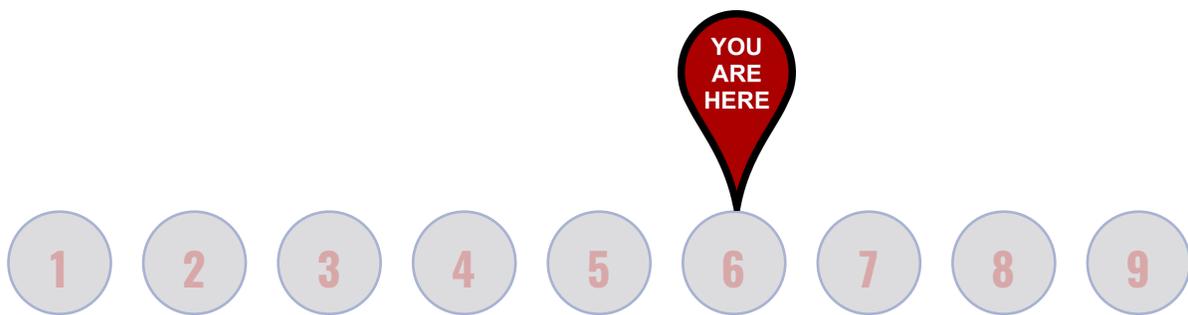
By Dorian Simpson and Gary Hinkle

A Quick Intro to MAHD

Agile methods have proven superior over traditional product development processes to quickly adapt to customer needs, reduce waste and accelerate development. However, the application of agile requires significant changes to support the needs of hardware products. This led to the development of the Modified Agile for Hardware Development (MAHD) Framework – an open-source initiative to embrace the principles of agile while recognizing hardware’s unique needs.

THE COFFEE MAKER PROJECT: STEP-BY-STEP AGILE IN NINE STEPS

To help practitioners visualize the MAHD Framework, we have developed a series of nine articles to explain how agile methods and tools can be used for physical products, who should be involved, the deliverables for each step and tips for how to overcome challenges. We hope you'll join us on this journey as JavaBrew uses the MAHD Framework to develop an innovative new coffee maker.



The MAHD Framework: Similar to Agile for Software, but with Important Differences

Learn More

To learn more about the MAHD Framework, download related ebooks and whitepapers, or sign up for e-learning opportunities, visit www.agileforhardware.org.

Step 6: JavaBrew (Almost) Completes Their 1st Sprint

STEP 6: THE SITUATION

Through the first five steps, the JavaBrew agile team completed the MAHD On-ramp for their new advanced Smart Coffee Maker. They established clear project objectives, wrote user stories, developed an iteration plan with project milestones, identified a rapid prototype plan and prepared the project backlog. In the previous step (Step 5), they planned for their first sprint. It is now two weeks later, and the team has been working on their committed tasks. As this was their first sprint (ever) for an agile project, they naturally ran into problems. While the team successfully completed a little over 50% of their tasks, some of the more critical items were left unfinished. Two notable incomplete tasks include:

1. Lynda committed to developing a customer engagement plan. She got started but found that finding 30 end-consumers to be part of their feedback panel was harder than she thought and would take at least another three to four weeks.
2. Frank committed to having three unique concept designs ready for internal review. He's made good progress, but the designs would need at least another week to complete.

For the first sprint, many of the tasks were related to investigations to define the product, identify committed resources and prepare for success. Frank blamed his delay on another high priority project, while Lynda just didn't have time to work through the details of how they would get access to potential target customers. Now the whole team is behind and it's only the first sprint! Can they get back on track to complete a successful iteration?

It's Friday afternoon and the team gathers in their project room for their sprint review. Jordan, the Agile Project Manager will facilitate the meeting and lead the retrospective discussion. After the current sprint review, they will go right into sprint planning for their second sprint.

STEP 6: AGILE ACTIVITIES

Jordan displays the team's sprint tasks and status on the screen as the team files in. As eyes scan the results, there is jovial banter as each person ponders what the big "50% complete" on the bottom of the slide really means.

Before diving in, Jordan explains that the sprint review and retrospective meeting has three goals:

1. All team members will share their outcomes from their tasks including what was completed, any roadblocks and next steps.
2. They will review overall project status and determine if they risk missing the iteration goals.
3. They will share what worked and what didn't from a team perspective and brainstorm ways to improve.

The Current Sprint Review:

David, the electronics lead went first. He shared his interface plan with a diagram and document. He received acceptance from his peers but noted that it could not be complete without having a final product definition. All good. Next, Lynda shared her progress. She was able to complete the prototype brochure to get early feedback on the concept by working closely with Frank (their lead designer.) Working on the brochure was valuable but became the primary reason that Frank fell behind on his tasks. However, Lynda could not get any feedback on the concept except from the internal team since she was unable to identify and contact customers. She had asked sales to give her contacts at their retailers but was not given a response. For now, everyone accepts her status.

This continued with each team member sharing their successes and failures.

The Retrospective:

After the sprint review, Jordan lead a discussion on what went well in their first sprint and what might be improved. They went around the room and each person provided one item that went well and one idea for improvement. They could add a fresh idea or build on a previous one. The main themes discussed were commitment and estimation. All agreed these two themes were highly related. Both Lynda and Frank agreed that they had overestimated what they could accomplish in the first sprint. With no clear solution, all decided to think more deeply about their tasks, try harder to estimate accurately and commit to completing the task even if it meant extra hours.

Sprint Two Planning:

After reviewing the backlog and iteration plan again the team dove into planning for the next sprint. To refresh the team, Jordan shared Iteration 1 goals:

Prototype	Key Questions	Milestones
Preliminary Brochure	<ul style="list-style-type: none"> • Is the value proposition right? • Which features drive value? • Is a physical interface needed? 	<ul style="list-style-type: none"> • Concept approved • Plan approved (including resources)

They had planned three sprints to achieve these goals, but with only one sprint allocated to finish the iteration they had concerns. If Lynda fails again they will surely continue to fall behind. Lynda quickly agrees to call a review with the right people to figure out how to develop the customer panel and remove the roadblock.

STEP 6: CONFLICT AND RESOLUTION

In the first five early planning steps the team worked through the MAHD On-ramp. Life was fine since they could work at a high level and defer details. This quick start is a key advantage of agile, but as the team got started, they realized they must manage this uncertainty. Big questions still loomed. Management wanted a schedule and committed delivery date... complete with a full product definition. Several senior managers (whose names would not be disclosed) felt that the product must include voice control to take advantage of a big trend. In fact, they had already started talking with partners and retailers, nearly promising them that these features would be available. But the team, including Lynda, was not convinced voice control was needed or be desirable with customers and would just add cost, time and complexity to the new coffee maker.

To manage this conflict, the team focused on their priorities. They needed to validate with real customers whether the product should have a physical interface and/or include voice control. To answer these questions to the satisfaction of management, they needed to scope out the technology as well as get validation with real customers. But how could they do this without having a fully working prototype?

To remove this roadblock, Lynda immediately set up the meeting as she promised in the sprint review. After intense discussion, the team agreed on three things:

1. They would extend Iteration 1 another two sprints to meet the goals. This didn't affect the overall schedule since they could continue working on important tasks, but allowed them more time to get more clarity with customers to satisfy management needs.
2. Management agreed not to talk about voice control until the team had a chance to validate the technology and get feedback from customers.
3. To remove Lynda's roadblock of finding customers, they agreed to create a panel of customers using social media. They would have customers opt-in to be part of their project feedback loop and asked each participating customer to sign a non-disclosure agreement (NDA).

STEP 6: OUTCOMES

The outcomes from step 6 were as follows:

Exhibit 1: An Updated Iteration Plan

They team agreed to extend Iteration 1 by three sprints and shorten Iteration 2 from five sprints to three sprints as shown in Exhibit 1 below. So far, the overall plan did not change, but milestones and priorities did.

Outcome 2: Team Learning and Refinement

They team learned a lot in their first sprint. They committed to work on estimation accuracy and completing assigned tasks.

Outcome 3: Updated Agile Artifacts

They team continued to add to the backlog, estimate longer-term major tasks and breakdown the major tasks into sprint-by-sprint execution tasks. This will never end until the project is

NEXT STEPS

The team will continue to complete sprints every two weeks. After each sprint they will update the backlog and review their progress against the overall plan with an intense focus on hitting the current iteration's milestones. In Step 7, we'll see how they are doing after their first iteration. This will be an important time for the team to determine if they are finding agile useful, have learned how to manage the uncertainty of projects without formal project plans and to evaluate how they are doing versus their overall project goals.

Exhibit 1: Updated Iteration Plan

The plan JavaBrew developed is close to the original plan highlighted in Step 3, but Iterations 1 and 2 now allow more time to set up their customer panel and get feedback on the product definition.

	Iteration 1	Iteration 2	Iteration 3	Iteration 4	Iteration 5	Iteration 6
Major Deliverables	<ul style="list-style-type: none"> Preliminary concepts Preliminary features scoped Establish customer panel 	<ul style="list-style-type: none"> Cost estimates, initial industrial design, electronics design Smart features defined – app/voice 	<ul style="list-style-type: none"> Coffee making mechanism design Integrated device with smart control for testing 	<ul style="list-style-type: none"> Integrated device with ~80% target feature set Smart app 90% complete 	<ul style="list-style-type: none"> Mechanical and electronics designs complete Packaging design complete BOM complete 	<ul style="list-style-type: none"> Production drawings, user guide, website, materials, packaging Forecasts, marketing plan
Prototypes	Preliminary brochure	3D video highlighting smart features and ease of use	Rough working prototype – smart features + physical design	Fully working prototype	Production-ready prototype	Production starts
Key Questions	<ul style="list-style-type: none"> Is value proposition right? Which features drive value? Physical interface needed? Value of Voice Control 	<ul style="list-style-type: none"> Value of voice control? App features? Can cost meet targets? 	<ul style="list-style-type: none"> Do customers love it? Any design show-stoppers? Can we hit the market window? 	<ul style="list-style-type: none"> Can we really lock down features? Are retailers on board? Can we create demand? 	<ul style="list-style-type: none"> Is it ready for production? Is the quality “good enough?” Are costs under control? 	<ul style="list-style-type: none"> Are retailers ready to take orders? Can we hit the forecast? Is sales engaged?
Milestones/ Approvals?	Concept and plan approved	Cost estimates approved	Major feature lock-down	Design/feature lockdown, prototype tooling approved/ordered early in iteration	BOM complete, launch plan, final tooling, compliance & certifications	Pricing, sales and channel ready
Risk Mitigation	<ul style="list-style-type: none"> Team momentum – need committed resources. Early customer engagement. 	<ul style="list-style-type: none"> Schedule risk – team velocity on target? FCC compliance. 	Design approvals	<ul style="list-style-type: none"> Prototype tooling approvals. Final feature set approval. 	Production tooling approvals.	<ul style="list-style-type: none"> Sales and marketing risks. Engage with channel partners.
Target Date	4/12/19	5/24/19	8/2/19	12/6/19	4/10/20	7/3/20
# of Sprints	5	3	5	9	9	6 (2 sprint buffer for 7/31 launch)

To Be Continued...

GET THE SERIES

To see the previous steps and receive each new step of this project as it is published, visit www.AgileForHardware.org. Each step will be available for download and sent directly to your email.

ABOUT THE AUTHORS

The MAHD framework is an open-source process, available for all to use, build on and improve. We look forward to hearing from you and your experiences with agile, waterfall and other processes. The MAHD framework was developed by Gary Hinkle and Dorian Simpson to address the needs of hardware development.

To learn more, get involved, or just join our community for discussion, visit:

www.AgileforHardware.org

About Gary Hinkle

Electronics, mechanical and software engineering are all part of Gary Hinkle's background, working in design, management and executive leadership of communication, industrial, telemetry, audio, avionics, computers, test & measurement, among other industries. Today, he's principal consultant at Auxilium, a company he founded to help engineering-oriented businesses increase productivity.

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Dorian Simpson is an innovation and product development consultant, trainer, speaker and author of *The Savvy Corporate Innovator*. Companies he's worked with include ABB, Tyco, Owens Corning, Technicolor, FEI, VTech and Freightliner. Before consulting, Dorian held positions at Motorola and AT&T in product management, sales, marketing, business development, and engineering.

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