A BRIEF OVERVIEW OF THE MAHD FRAMEWORK™

Modified **A**gile for **H**ardware **D**evelopment

MAHD™

What Is MAHD?

Agile Principles. Methods Optimized for Hardware.

Software teams have discovered Agile is superior to traditional PD processes to enhance customer focus, accelerate development and increase project success rates. Hardware-based teams that need to integrate mechanical, electronic and firmware elements can also get these benefits. However, Agile methods were not designed for the needs of physical product development.

The Modifid Agile for Hardware Development or MAHD (pronounced /mad/) Framework is built on Agile principles but optimizes the methods for hardware development to:

- Adapt to new insights, but allow designs to freeze

- Accommodate a range of disciplines (including SW)

- Incorporate all production considerations

- Manage unavoidable lead times and dependencies

- Integrate with Lean, Six-Sigma or other systems

ON Ramp

The Benefits of Agile for Hardware

Organizations that have adopted Agile methods see major improvements in quality, value and time-to-market leading to significant increases in profit and ROI. After implementing the MAHD Framework companies immediately see a range of benefits:

Intense Focus

Autonomous cross-discipline teams prioritize work based on customer needs to drive fast decisions.

Adapt to Change

As learning occurs, attributes and tasks are re-prioritized each iteration with minimal schedule impact.

Faster Kickoffs

MAHD project kickoffs save months over traditional methods while enhancing strategic focus.

Proven Progress

With IPAC Iterations, internal and external stakeholders can see and touch real progress with each learning cycle.

Reduced Risk

Using learning cycles to focus on the most critical questions early in development naturally reduces project risk.

Engaged Customers

Every Iteration enables customer engagement opportunities to gain valuable insight for refining the product.

Key MAHD Elements

Agile Principles Optimized for Physical Products

Hardware is different than software — requirements must be frozen to ship, prototypes cost money, incremental features impact whole designs, etc. To address these unique needs of physical products, MAHD rethinks Agile tactics while maintaining the benefits of Agile principles.

Five MAHD Pillars for Success

Getting to the Core of Agile Benefits

While the original Agile manifesto shares 12 Agile principles, the MAHD Framework focuses on 5 core success pillars that have been found to drive the right mindset and effectively guide NPD activities.

1 **Strategic Vision:** Success begins with clear priorities

2 **Empowered Teams:** Give teams the autonomy to execute

3 **Customer Insight:** The best data is direcly from customers

4 **Short Development Cycles:** Execute fast, learn and adapt

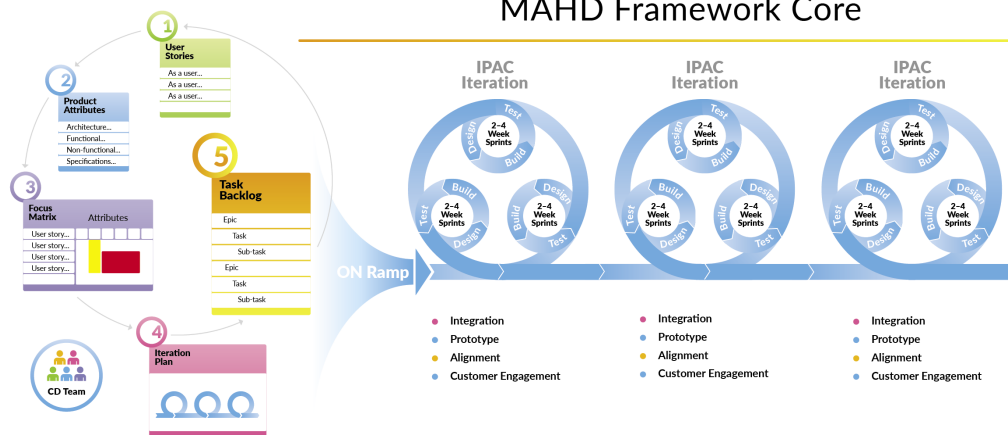**5** **Execution Excellence:** Provide methods and tools to focus

The MAHD On-Ramp

The MAHD On-Ramp includes 5 collaborative activities to clarify customer needs, set goals, evaluate risks and identify important areas for innovation. After a few short sessions, the team is ready to execute.

IPAC Iterations

An essential difference of the MAHD Framework from Agile for SW is the use of IPAC Iterations. These milestones align disciplines while driving prototype and customer engagement strategies.

MAHD Framework Core

A Focus On Success Factors

The MAHD Focus Matrix is a powerful hardware development tool used to highlight areas of risk and innovation potential to form the basis of prioritization and Iteration Plans.

Production and Launch Readiness

Design and technical decisions are systematically nailed down through IPAC learning cycles. As the team nears product completion, IPAC Iterations focus more on production challenges and preparing for launch.

Picture Going MAHD

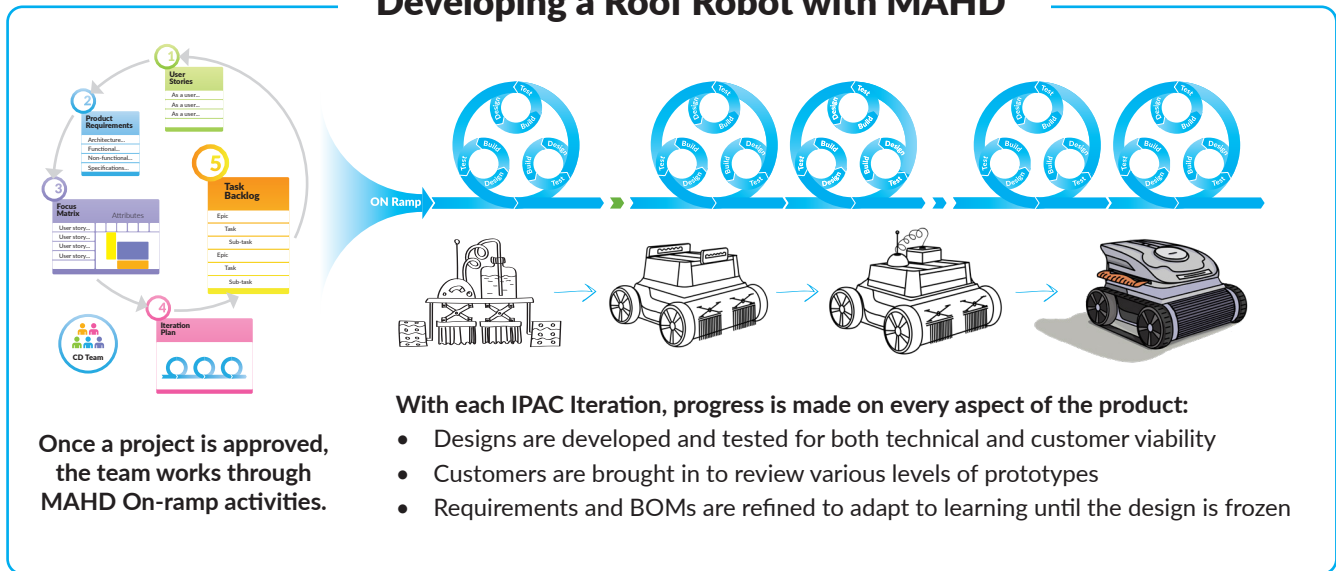## Plan. Execute. Learn. Repeat.

Consider a recent project where you may have used a traditional process. Did the project get initiated with a fast, focused start? Were you forced to make painful tradeoffs late in development? The MAHD Framework eliminates these common challenges.

To see how MAHD enhances NPD performance, it may help to visualize a new product being developed.
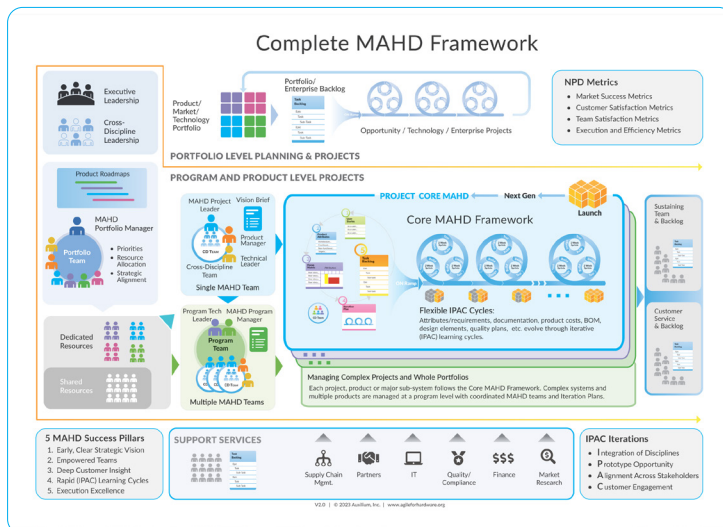
MAHD Differs from Waterfall

1 Teams start with intelligent uncertainty

2 Requirements evolve through learning

3 Real insight drives fast, sticky decisions

4 Walls between disciplines are removed

Developing a Roof Robot with MAHD

Once a project is approved, the team works through MAHD On-ramp activities.

With each IPAC Iteration, progress is made on every aspect of the product:
- Designs are developed and tested for both technical and customer viability
- Customers are brought in to review various levels of prototypes
- Requirements and BOMs are refined to adapt to learning until the design is frozen

Scaling MAHD for Whole Company Agile

While every MAHD project uses the core set of agile for hardware methods, the MAHD Framework can be scaled to manage complex systems with continuous releases, whole product portfolios and sustaining engineering efforts. Visit **mahdframework.com** to learn more about the Complete MAHD Framework.

Complete MAHD Framework

Scaled MAHD utilizes:

- **Team-of-teams approach**
  Complex projects use coordinated sub-system and functional MAHD teams.

- **New responsibilities**
  Additional skills and responsibilities are needed to manage larger projects and whole portfolios.

- **Multiple Iteration Plans**
  For large systems and portfolios multiple Iteration Plans manage each major workstream.

How Is MAHD Different?

There are many ways you can approach adding agility to your current NPD process. The following three methods are the most common and compared to the MAHD Framework below. All of these can work given enough time and tinkering. However, the MAHD Framework was developed with HW development needs at its core and teams can quickly learn and trial the methods to determine if MAHD is a better way.

Scrum for HW	Hybrid Stage-Gate®	SAFe®
Scrum for HW applies basic agile methods to HW development.	Applying iterative development cycles between NPD gates.	The Scaled Agile Framework for Enterprise scales SW efforts.

How the MAHD Framework Compares with Other Methods

ATTRIBUTE	MAHD	Scrum for HW	Hybrid Stage-Gate	SAFe
Project Kickoffs	Fast	Fast	Very Slow	Medium
Learning Curve	Fast	Fast	Medium	Slow
Designed for HW	Yes	No	Yes	No
Production Considerations	Yes	Limited	Yes	Limited
Manages Lead Times	Yes	No	Limited	Limited

Who's Going MAHD

The MAHD Framework is quickly being adopted by leading product development companies in a wide range of industries. Contact us for more detailed case studies and success stories or visit: www.mahdframework.com

vision-box   Epiroc   TRIXELL   RAD URBAN

iridium   QUALCOMM   BAE SYSTEMS

LEGO   SIEMENS Healthineers   KEPLER   INFINITY|Q⟩

Getting Started

The Best Way to Implement MAHD Methods Is to *Use* MAHD Methods

An advantage of Agile methods is that it's easy to get started quickly. Regardless of your situation, the best way to start with the MAHD Framework is by initiating a pilot program and expanding as you learn. The following table outlines three ways we recommend to get started:

1 — GET AN OVERVIEW

Contact a Certified MAHD Service Provider to set up a free 45-minute consultation

- Review your situation and goals
- Overview of the MAHD Framework
- Determine if MAHD is right for you
- How to best get started

2 — TRAIN AND PILOT

The fastest way to start is to train a focused team and pilot a project

- Identify a pilot team and project
- Get hands-on MAHD training
- Execute MAHD w/facilitation
- Learn, improve and repeat

3 — ASSESS AND PLAN

This is a great option if you know MAHD is right for your whole organization

- Establish clear NPD goals
- Identify areas for improvement
- Develop a roadmap w/milestones
- Pilot, learn, expand

Contact: **info@mahdframework.com** to get started or visit **www.mahdframework.com** to set up your complimentary consultation.

A Brief History of MAHD

Agile Manifesto
17 "independent-minded" SW leaders develop 12 Agile principles

Scrum Alliance Founded
Leads to rapid adoption in SW communities

MAHD Initiated
With industry input the MAHD Framework is defined and piloted

MAHD Framework Published
Tools, methods and principles shared broadly

Complete MAHD
Scalable MAHD Framework launched to manage the entire NPD lifecycle

2001   2006   2014   2017   2020

Certified MAHD Providers

Find a Certified MAHD Service Provider at:

www.mahdframework.com

Or contact us at:

E: info@mahdframework.com

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