



Rice Global E&C Forum
Engineering &
Construction



2017 RICE GLOBAL E&C ANNUAL FORUM



Long Term and Near Term Approaches
on Productivity Improvements –
Where's my Silver Bullet???

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www.forum.rice.edu

wood.

facts...

3

A new global
leader in technical,
engineering and
project services

\$11BN

over \$11bn revenue

WG.100

FTSE 100 listed

60+

Operating in more
than 60 countries

160

Over 160 years
experience

purpose...

4

we deliver performance-driven solutions throughout the asset life cycle, from concept to decommissioning across a broad range of energy and industrial markets

purpose...

5

HOPE AFTER HARVEY



purpose...

6



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purpose...

7

500+



Wood Group
families affected

\$150,000+



Raised via You Caring,
fundraisers and
corporate support

1,000+



Hope After Harvey
t-shirts sold

50+



Work crews mobilized
across the Gulf Coast

200,000+



Calories served
by others

100+



Tools and supplies
collected, donated,
borrowed or used

“Houston, we have a problem...”

8

Long Term and Near Term Approaches on Productivity Improvements –

Where's my Silver Bullet???



“Houston, we have a problem...”

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“Houston, we have a problem...”

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For Mega-Projects*:

- 98% of Projects incur cost overruns or delays
- The average cost increase is 80% of the original value
- The average slippage is 20 months behind original schedule

* From 08Sept17 McKinsey Rice E&C roundtable

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BUT WAIT!!!

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“Houston, we have a Solution...”

12



=

**LONG
TERM**

**NEAR
TERM**

“Houston, we have a Solution...”

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Striving to Improve Productivity...

- Long Term



- Near / Short Term



Productivity – Long Term

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Long Term...



Productivity – Long Term

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Productivity – Long Term

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Productivity – Long Term

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Productivity – Long Term

18



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Productivity – Long Term

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Long Term...



- Data Analytics
- Combination of Incremental Improvements
- Technology
- Contract Structure
 - Collaborative Approaches (Integrated Project Delivery)
 - Upfront Planning
 - ...

Productivity – Near / Short Term

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Near / Short Term...

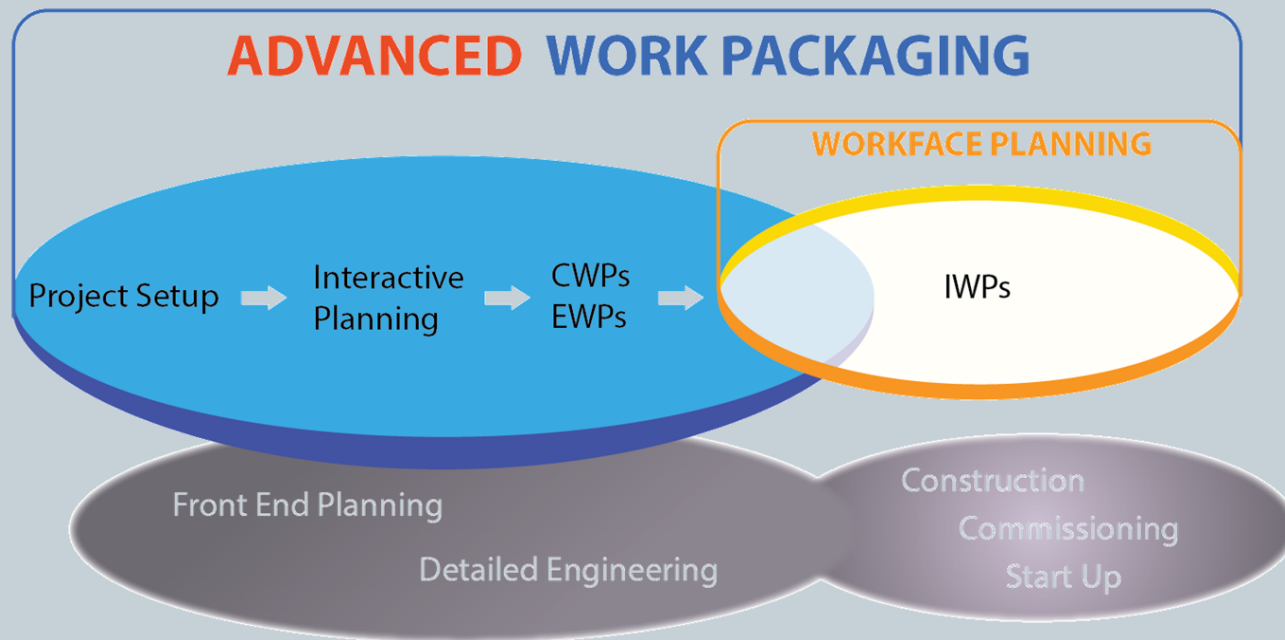
- Advanced Work Packaging
- Contract Structure
 - Collaborative Approaches
 - Upfront Planning
 - ...



What is Advanced Work Packaging?



Work planning that emphasizes construction requirements



AWP Discussion Points



- Foundational Background
- Benefits
- Implementation Challenges
- AWP Actions

Traditional Work Packaging



- has been done on every project since the pyramids.
- is a formal/informal process of understanding and performing field work.
- is accomplished inconsistently.



CII RT 272/319 Contributions: A Model for Advanced Work Packaging



Contracts

Practice Model

Tools

Example



Productivity & Predictability

Safety, Quality, Alignment, Communication,
Reduced Rework

Model

Level 2: AWP Effectiveness

AWP is seen as part of the business solution - being both an opportunity and a challenge.

Integration of AWP strategies are routinely developed and updated. These often seek to overcome integration and communication issues across project organizational units (silos). AWP is now included in all contracts.

Work processes and deliverables for individual business functions or departments are mostly well defined and standardized.

Integration of these processes are still problematic across functional unit lines. Frustration will be experienced when some functions are progressing towards AWP

Three AWP

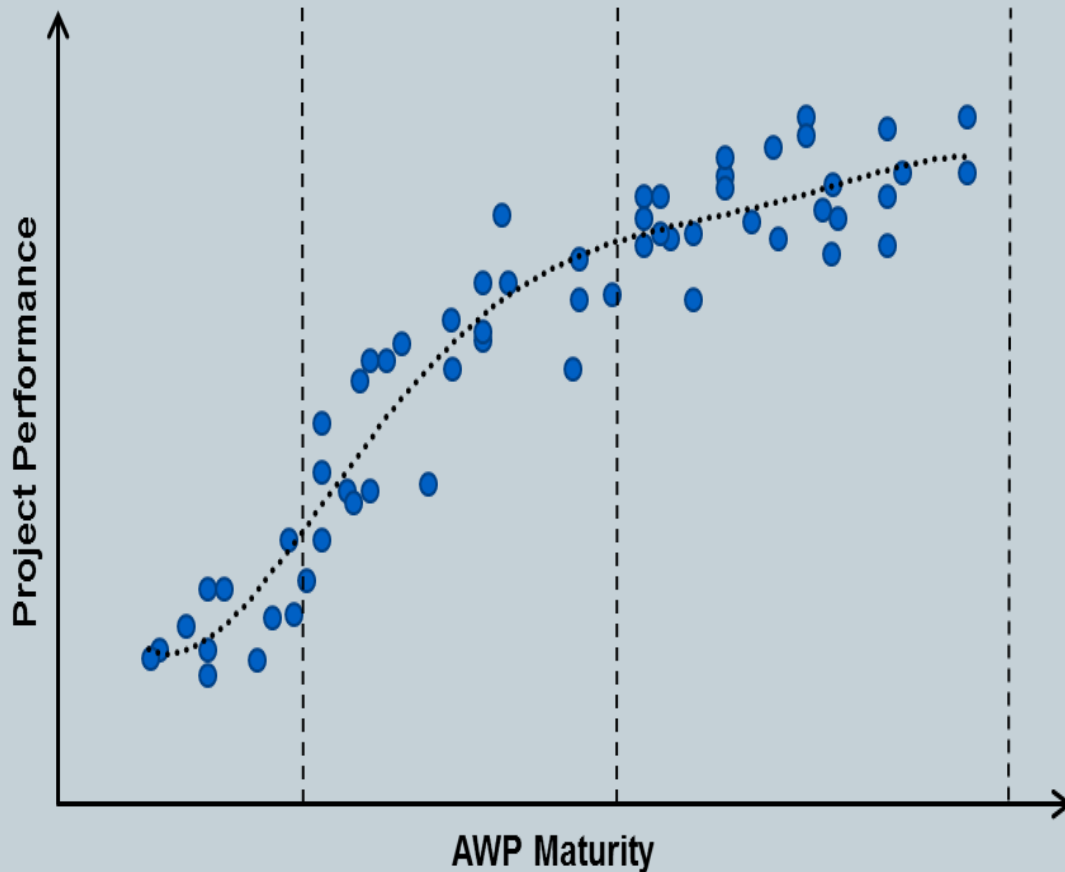
Advanced W	
Level 1: AWP Early Sta	
View of AWP	The potential of the implementa strategy is not understood and h AWP is not a priority within the c
Project AWP Strategy	AWP is developed on an ad hoc driven by customer demands.
Work Processes & Deliverables	Work process and deliverables a ment stage. They are not well de structured for implementation a units (silos). Inputs and outputs stakeholders to support the strat defined and no discipline involv processes support individuals or groups and not fully integrated.
Organization Culture & Performance Metrics	Most work occurs inside function minimal collaboration or integra wall" approaches are common. 1 embraces silos. Performance me silo-oriented. For example engir mance is based on percentage o vs. budget and not focused on tr (EWPs) delivered to meet the Pa
Training & Support	Some training standards are in p descriptions to support AWP. Te take the training but are still not their organization to implement learned.

zed within CII IR 272-2, Volume II

Objectives:

- Provide empirical evidence of the three stages.
- Investigate the relationship between AWP maturity and project performance.
- Deliver practical recommendations to obtain higher levels of AWP maturity.

Maturity Model – Case Study Evaluations



Results:

- 60 ratings on 15 different projects.
- Independent ratings (RT319 experts).
- Two dimensions of analysis:

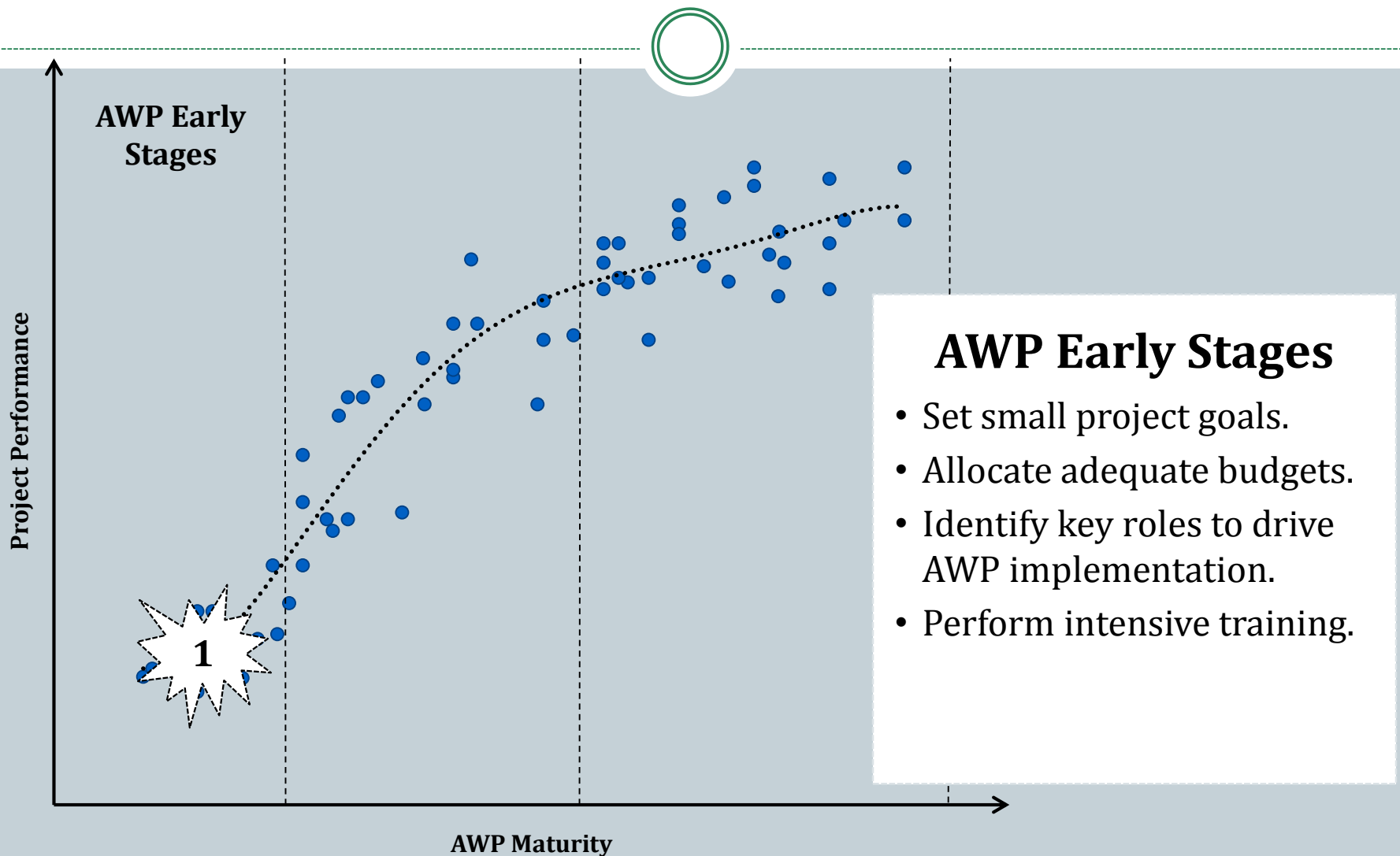
AWP Maturity

- A. Process Adherence
- B. Organizational Alignment
- C. Contract Integration

Project Performance

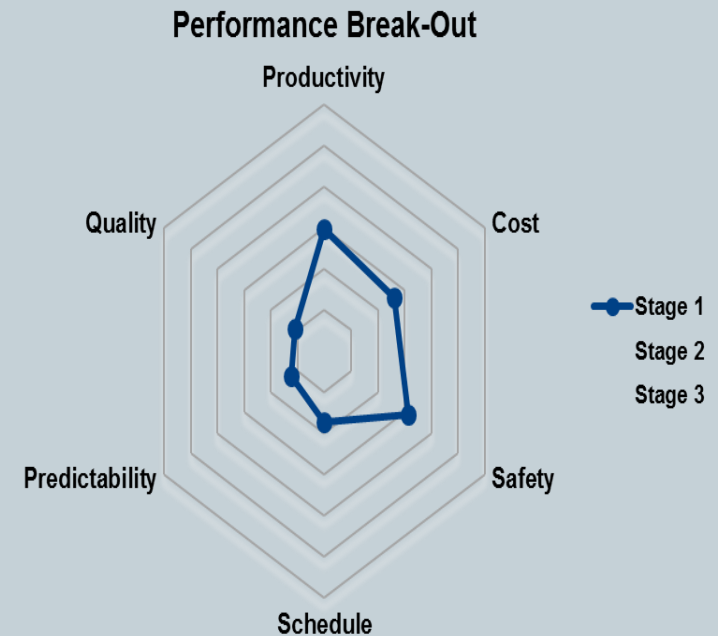
- A. Productivity
- B. Cost
- C. Safety
- D. Schedule
- E. Quality
- F. Predictability

(1) Recommendation in AWP Early Stages

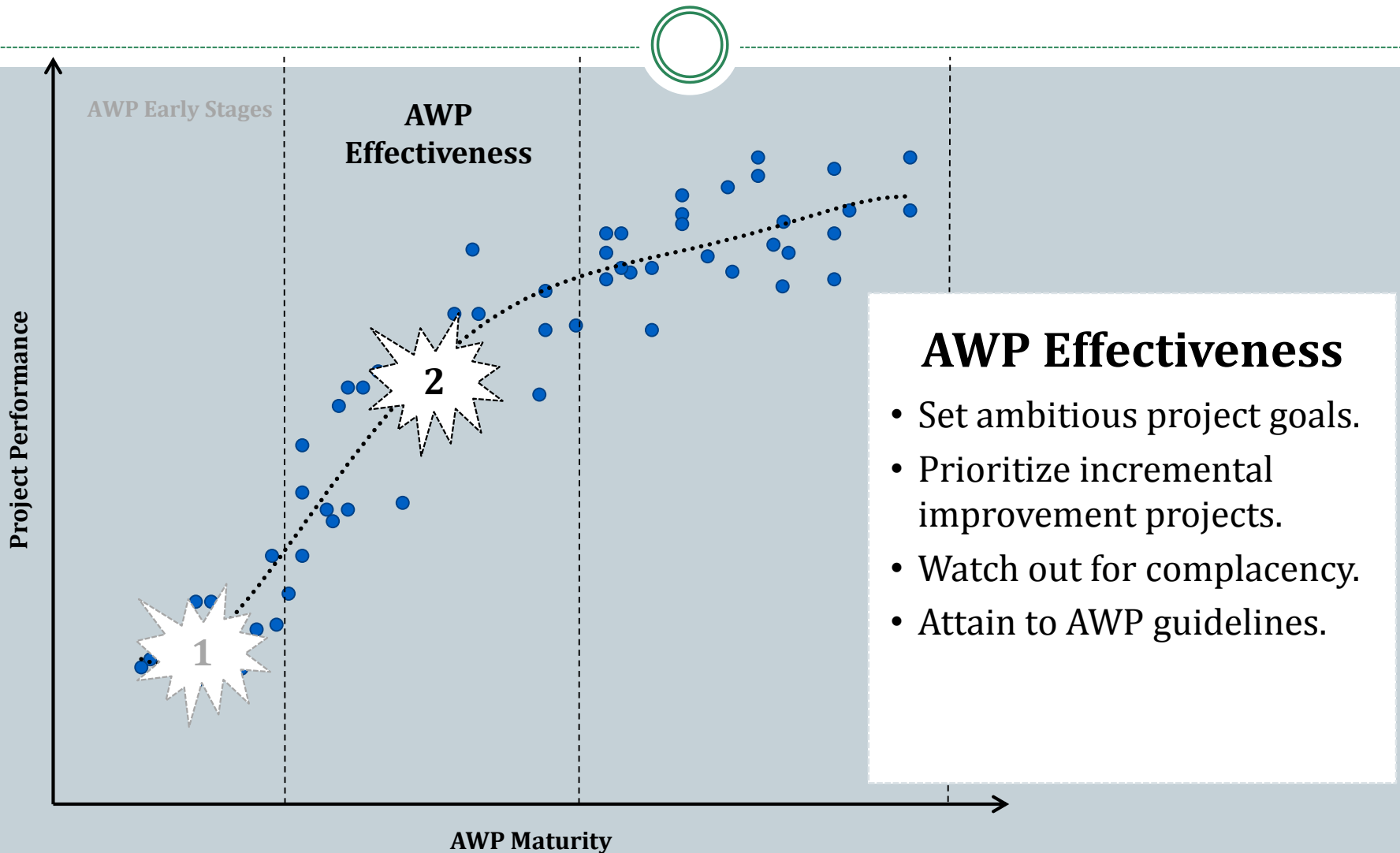


(1) Performance in AWP Early Stages







Performance Dimension	Maturity Stage	
	1 – AWP Early Stage	
Productivity ↑	Around 10% improvement	
Cost ↑	Project on budget	
Safety ↑	0 lost-time accident (TRIR below company average)	
Schedule →	Project experienced minor delays	
Predictability →	Significant deviation from baseline estimates	
Quality →	Rework in line with previous quality performance	



(2) Recommendation in AWP Effectiveness

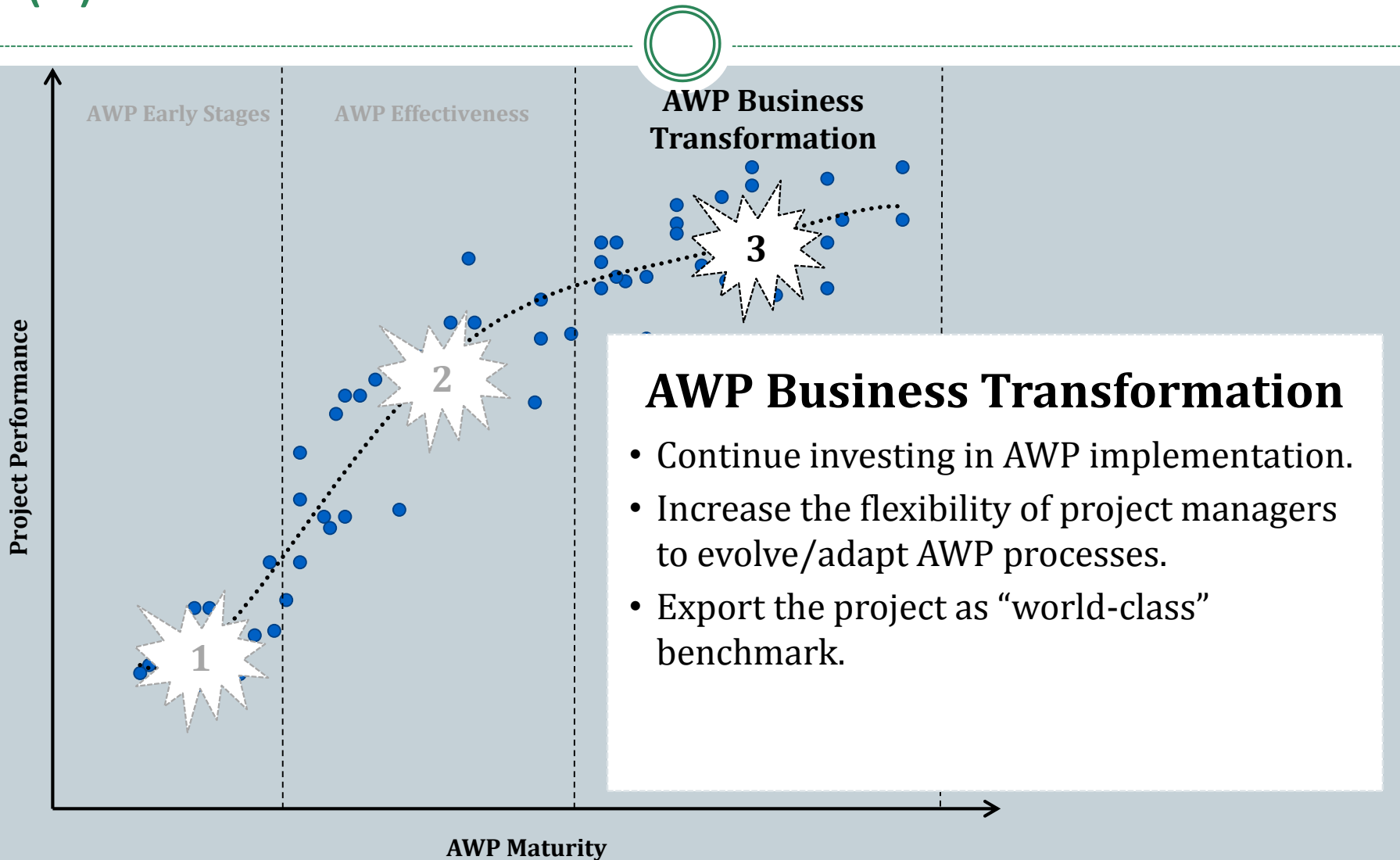


(2) Performance in AWP Effectiveness

Performance Dimension	Maturity Stage	
	1 – AWP Early Stage	2 – AWP Effectiveness
Productivity	Around 10% improvement	 Around 25% improvement
Cost	Project on budget	 TIC 10% below estimates
Safety	0 lost-time accident (TRIR below company average)	 0 lost-time accident (TRIR improves with sporadic first-aids / near misses)
Schedule	Project experienced minor delays	 Project slightly ahead of schedule during execution
Predictability	Significant deviation from baseline estimates	 Minor changes to execution schedule
Quality	Rework in line with previous quality performance	 Rework slightly below company's average

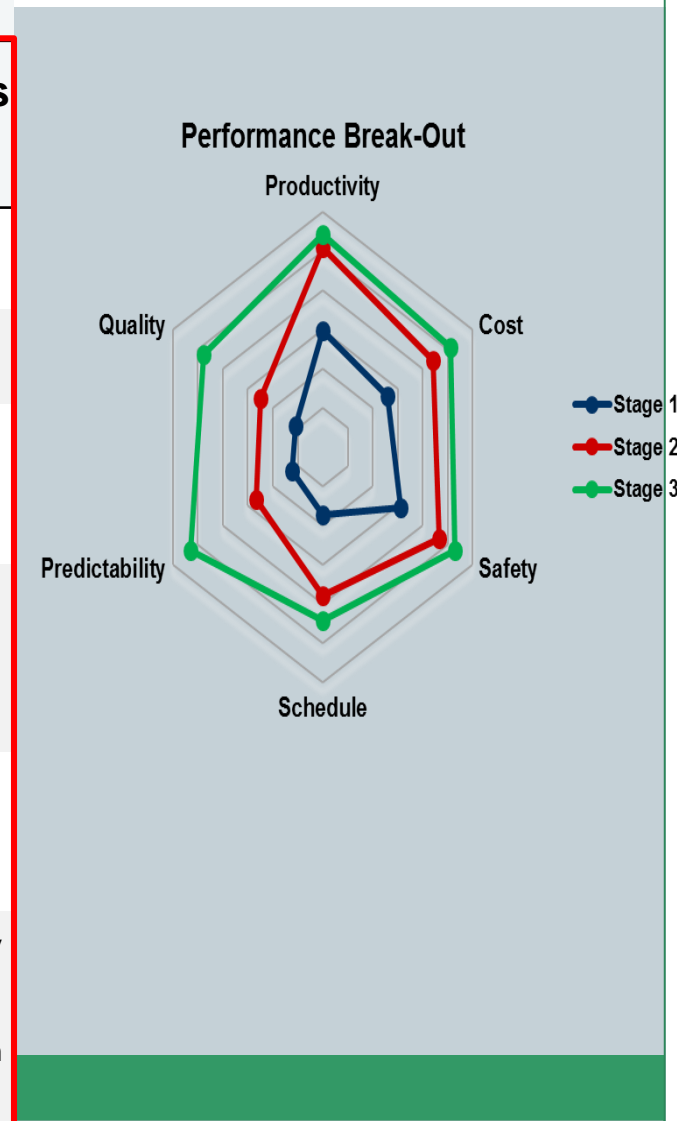


(3) Recommendation in AWP Biz. Transformation



(3) Performance in AWP Business Transformation

Performance Dimension	Maturity Stage		
	1 – AWP Early Stage	2 – AWP Effectiveness	3 – AWP Business Transformation
Productivity	Around 10% improvement	Around 25% improvement	➡ Around 25% improvement
Cost	Project on budget	Around 10% below TIC	➡ Around 10% below TIC
Safety	0 lost-time accident (TRIR below company average)	0 lost-time accident (sporadic first-aids and near misses)	➡ 0 lost-time accident (sporadic first-aids and near misses)
Schedule	Project experienced minor delays	Project slightly ahead of schedule during execution	➡ Project slightly ahead of schedule during both planning and execution
Predictability	Not very satisfying (major changes to estimates)	Moderately positive (minor changes to estimates)	⬆ Execution schedule to plan
Quality	In line with previous quality performance	Reworks slightly below company's average	⬆ Rework substantially below company average + substantial reduction in RFIs

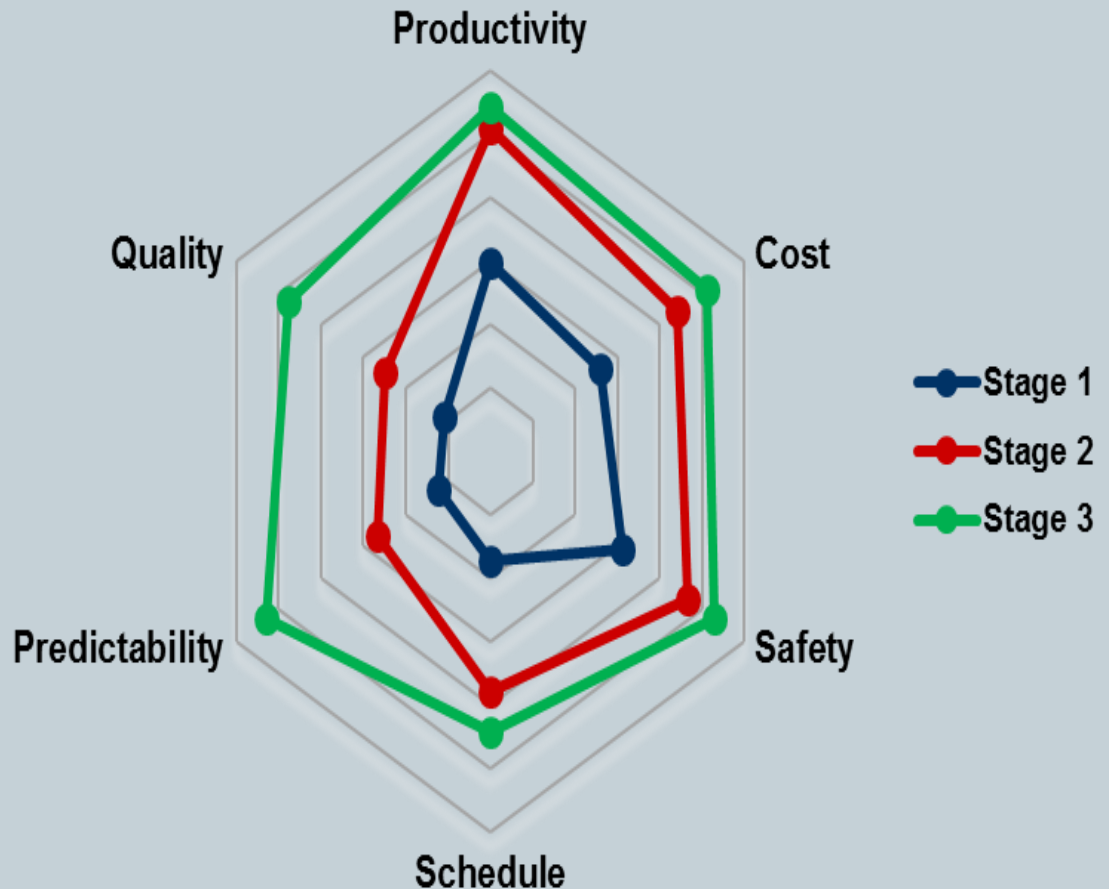


Project Performance with AWP

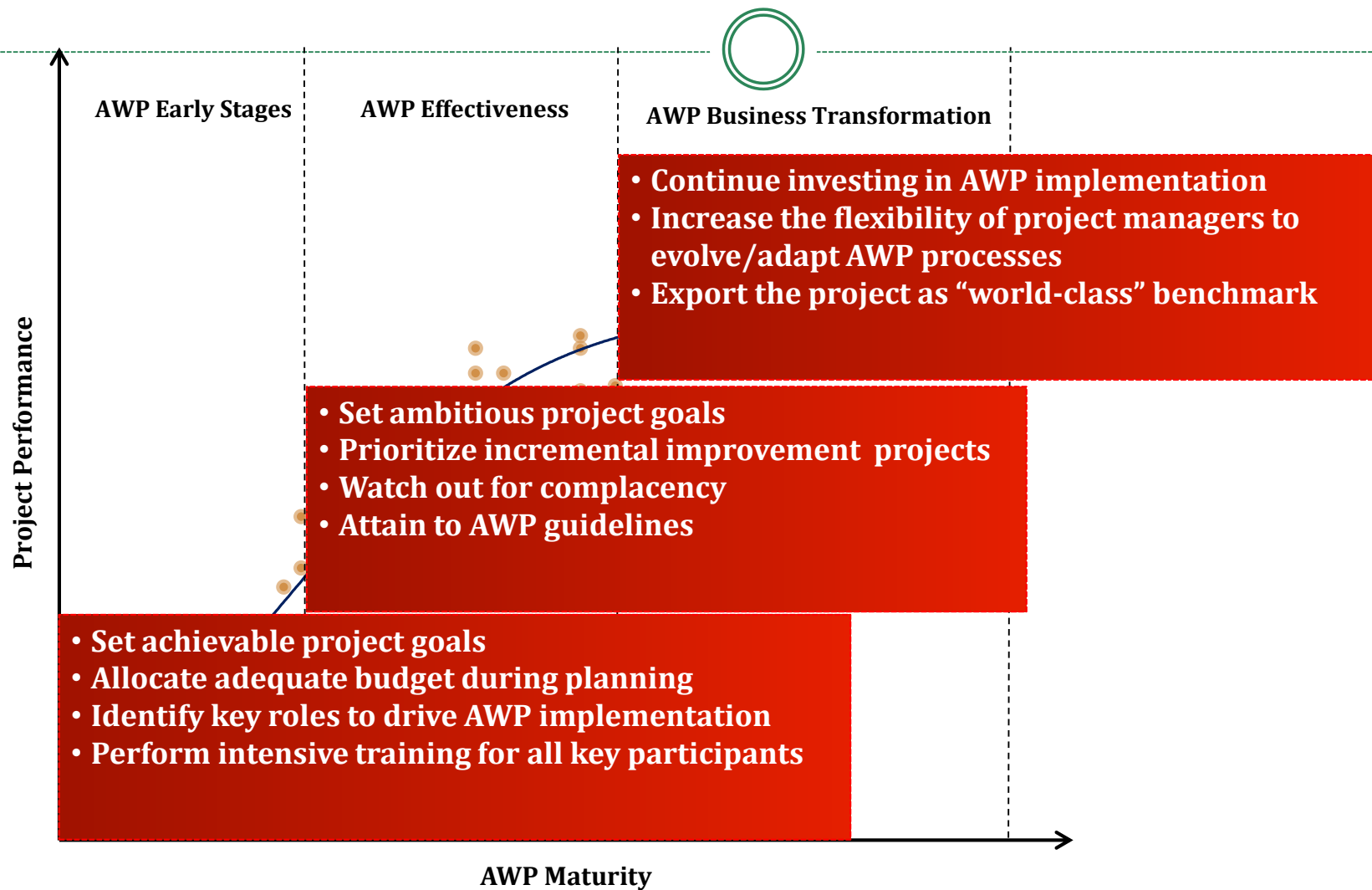


Performance Break-Out

Productivity	↑
Cost	↑
Safety	↑
Schedule	↑
Predictability	↑
Quality	↑



Managerial Implications



AWP Implementation Challenges



- Qualified Companies
- Qualified Individuals
 - UH Students
 - Train Current EE's
 - ✦ “only thing worse than training your employees and loosing them...
...is not training them and keeping them!”
- Keeping the Momentum

AWP Actions



- Call to Action
- Name a Champion
- Share your Wins
- Engage Others

Path Forward



- Continue Long Term Research
- Continue Near Term Implementations
- Celebrate Successes
- Engage Others