

How to Keep Advanced Process Controls (APCs) operational longer than 24-months

David Zerr
Industry Consultant

Michael von Grumbkow
Global Solutions Team, Packaging
BTG Americas Inc.



The Promise of Advanced Process Controls

Crunchiness
of Chips



Softness of
Bathroom Tissue



Cost of
Production



Real-time Prediction & Close-loop Control is possible!
(not easy yet, but possible)

Overview

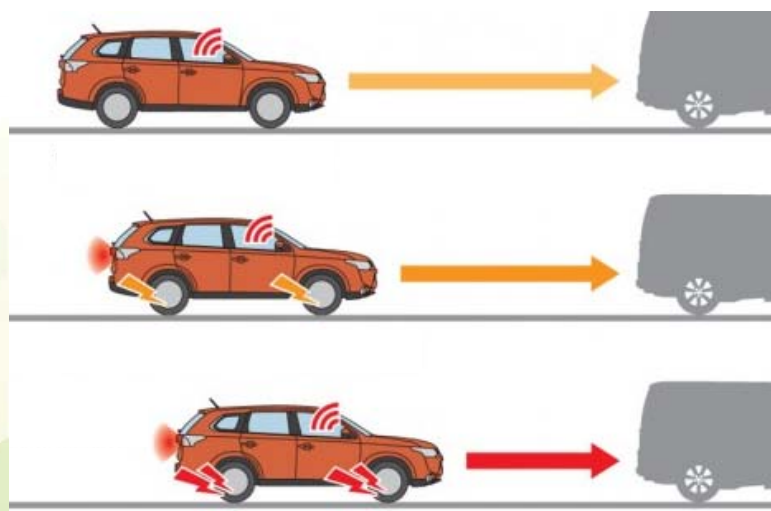
- What are Advanced Process Controls?
- How do the Economics & Market for APCs look like?
- Why do many APCs fail within 24 months?
- What can be done to sustain APC performance long-term?
 - People
 - Organization
 - Budgets
 - Other Tools to sustain APC Value
- Summary and Q&A

What are Advanced Process Controls?

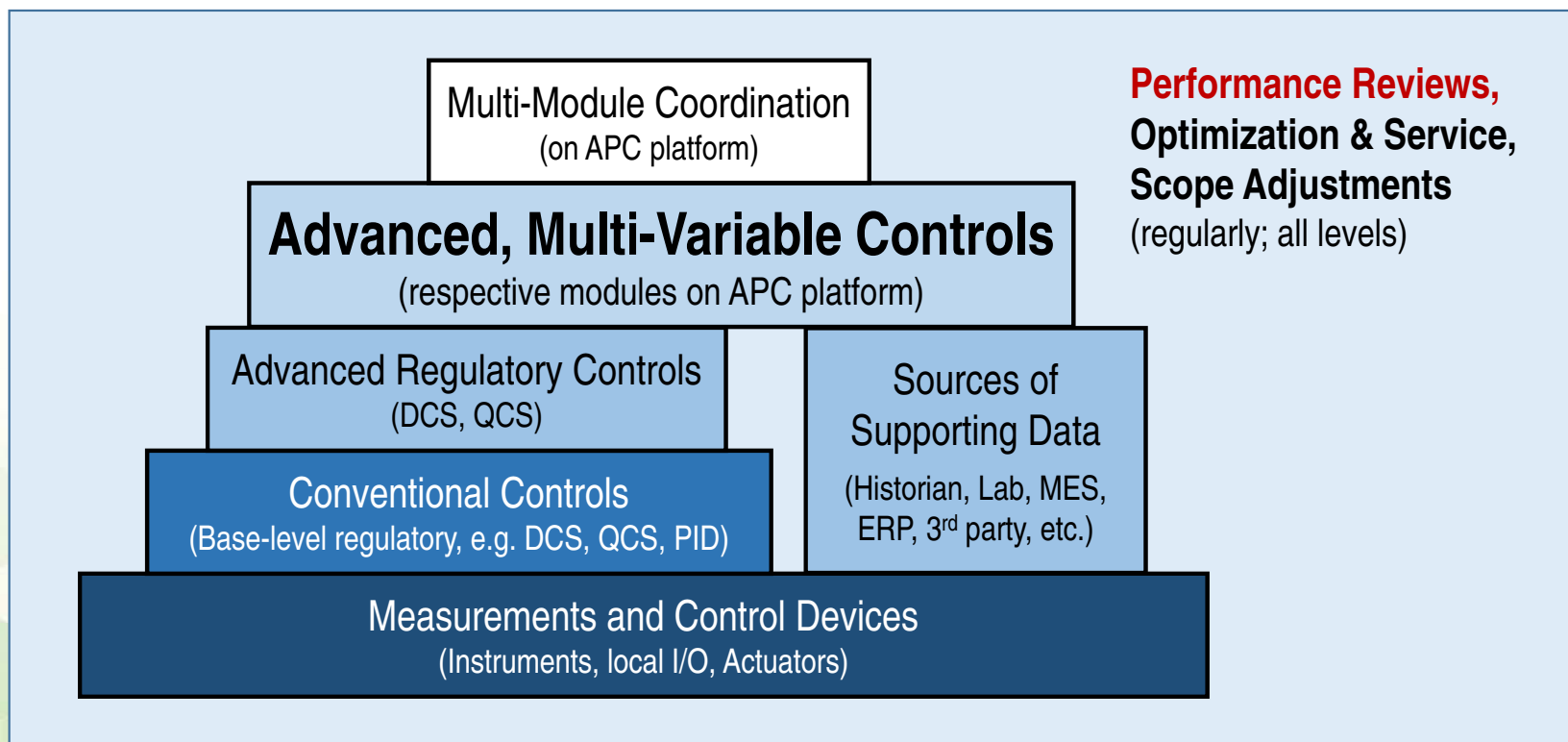
Advanced process control (APC) is an umbrella term that can apply to many different types of control applications in industrial environments.

Example: Collision Avoidance

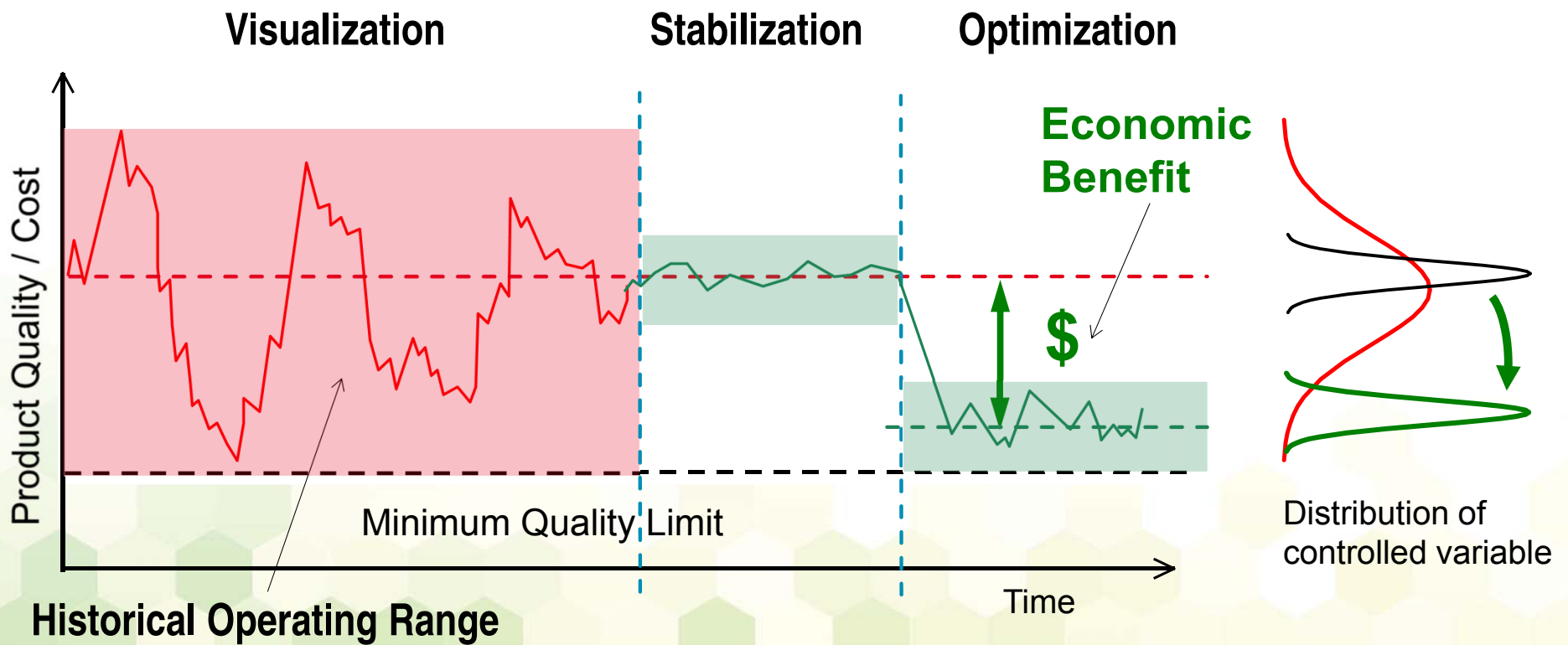
- Multiple inputs
- Customized response
- **Automatically avoids undesired process stage**



Advanced Process Control Architecture



Goal: Variability Reduction & Target Shift



Typical Payback for APCs

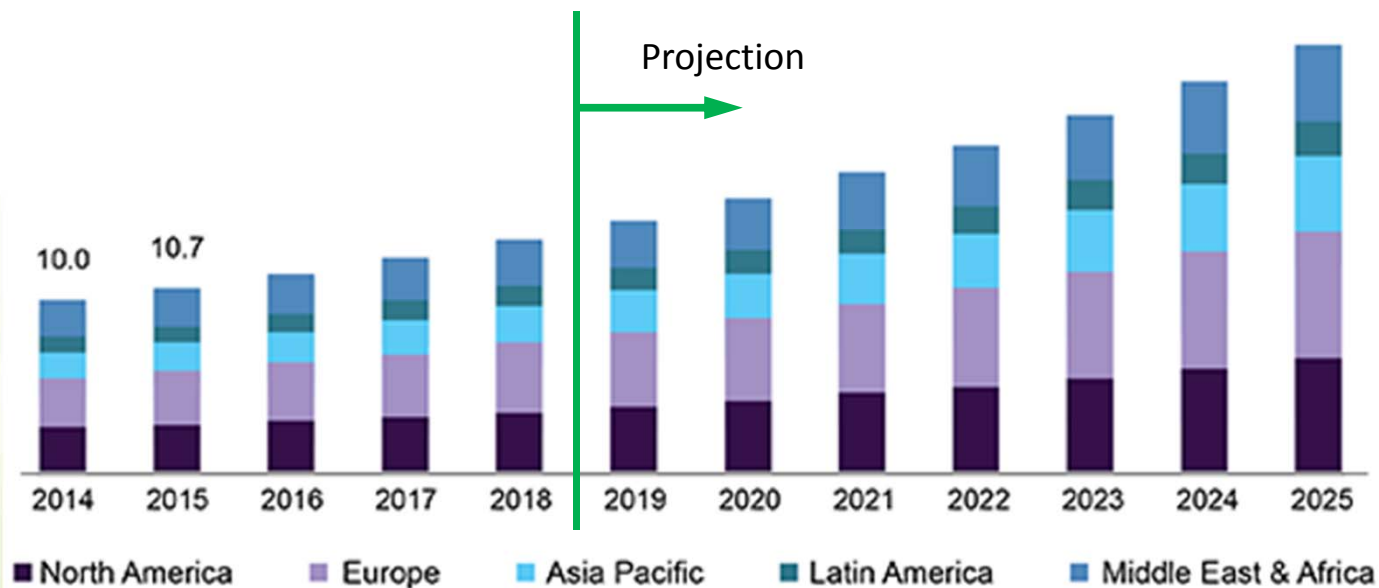
Industry	Typical Payback
Oil & Gas	1 to 2 months
Refining	3 to 6 months
Chemicals	
Petrochemicals	4 to 6 months
Mining/Metals/Minerals	
Pulp & Paper	6 to 8 months
Industrial Power	10 to 12 months

Initial ROI values are very attractive for any industry!

Source: [Benefits from Advanced Process Controls](#), Costin Ene, Honeywell, page 10

APC Market

Global advanced process control market size, by region, 2014 - 2025 (USD Billion)

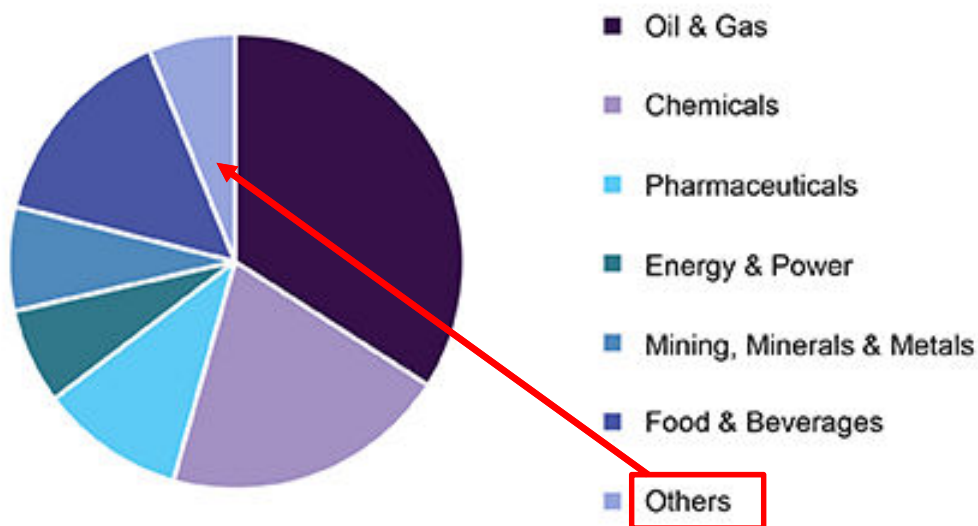


Significant Growth for APCs expected

Source: www.grandviewresearch.com

APC Market by Industry

U.S. advanced process control market share, by end use, 2018 (%)

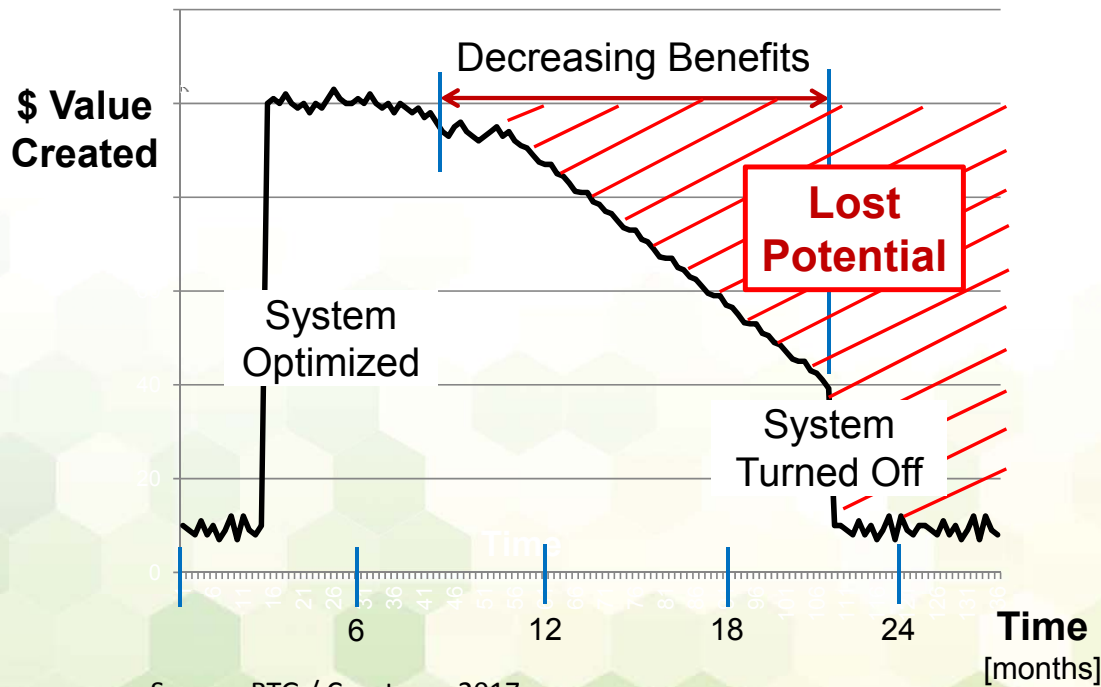


Source: www.grandviewresearch.com

- **Mature APC market in Oil & Gas, Power, and Food**
- **Pulp & Paper is late adopter**
 (listed here under “Others”)
- **P&P applications in pulp mill (“back end”) & power house only so far**

Why do many APCs fail within 24 months?

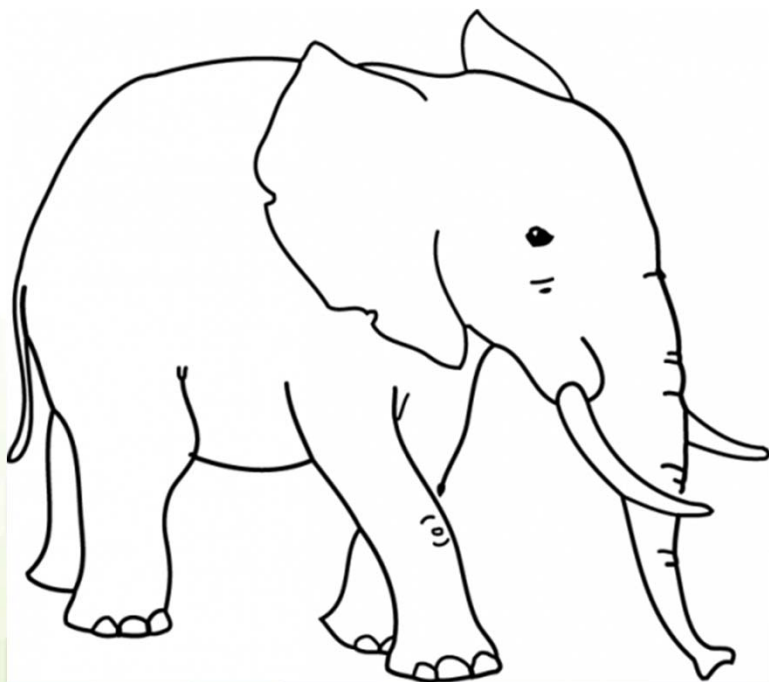
Typical APC Performance Over Time



Source: BTG / Capstone, 2017

According to multiple OEMs as well as paper producers, a rapid decline and deactivation of APCs is very typical

Elephant in the Room



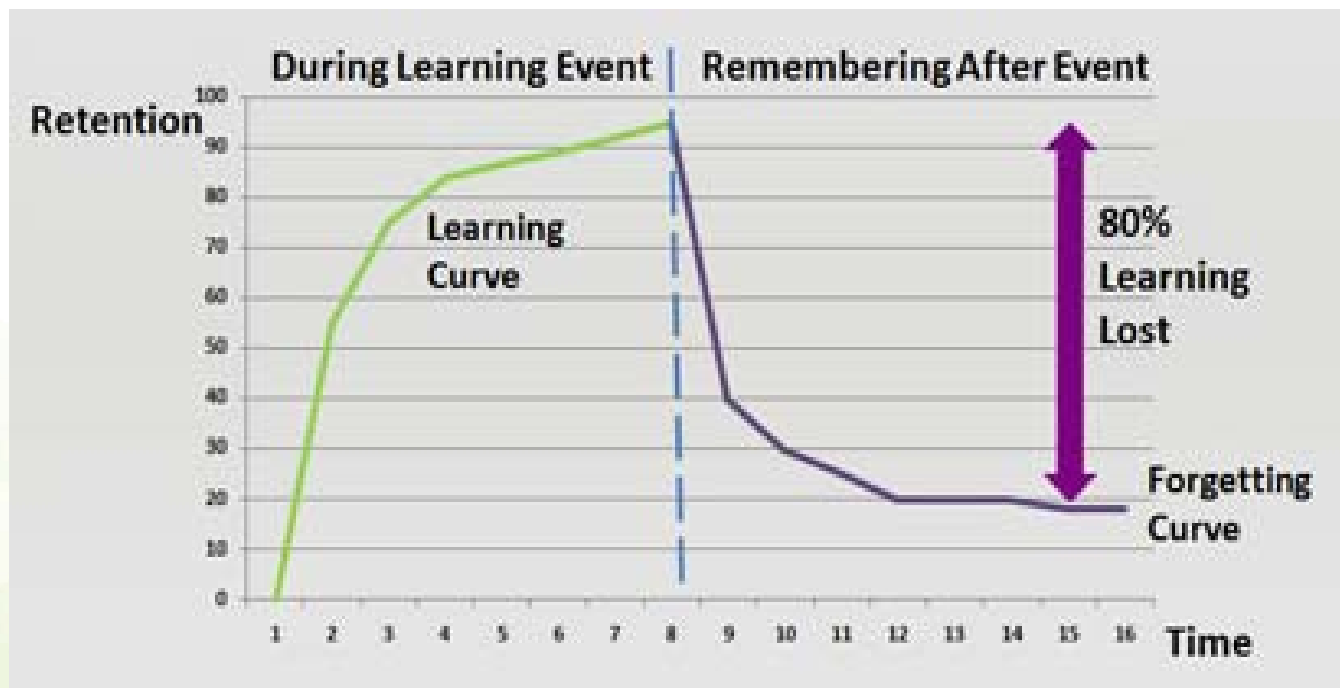
- About half of APCs get turned off within 24 months after start-up.
- Majority of the published data focuses on the initial benefits of APCs.
- People don't like to talk about failures...

Why do APCs often decline – **People**



- Operators might not like it – Insufficient buy-in, lack of training, frustration, work-arounds
- No clear ownership of overall APC systems after start-up – Coordination between different departments lacking
- Personnel Turnover – Global issue, insufficient training, lack of transition management
- Lack of Expert Support – Limited availability after initial start, both mill & supplier

Training – Learning & Forgetting



To maintain Skills, **Refresher Training** is required!

Source: "Success in Advanced Process Control requires a Change in Culture"; McClain, Cliff; DES Global; Tissue 2018; Appleton; October 3rd 2018

Why do APCs often decline – Budgets



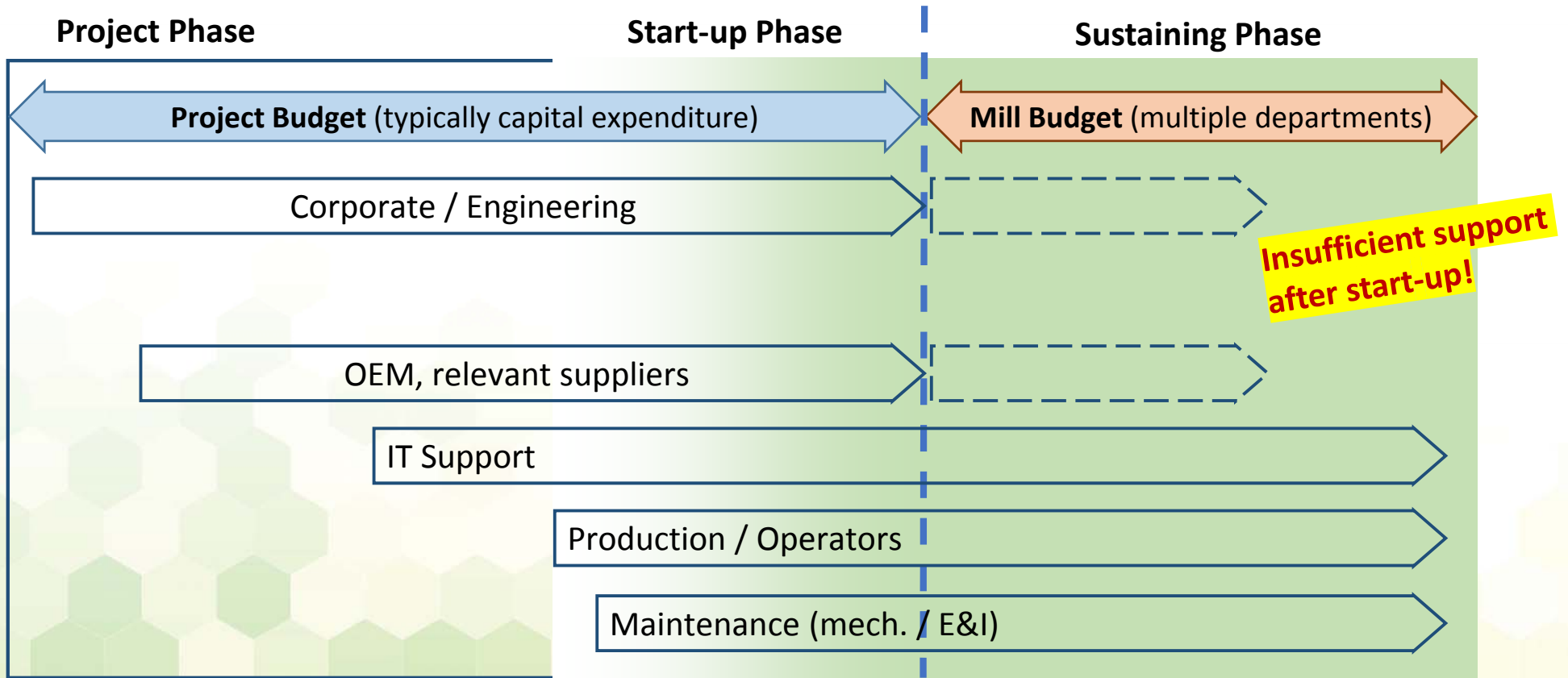
- No clear Ownership of overall APC systems after start-up – Support expenses are “hot potatoes” for different departments
- Maintenance – APC-related work orders don’t get sufficient priority, due to limited resources, separate budgets, etc.
- Lack of Service Contracts – APC-related components are not properly serviced, separate budgets.
- “Penny-wise and Dollar-foolish” – Department cost reduction versus overall performance value

Why do APCs often decline – **Technical**



- Relevant Components – Drifting, Availability, Calibration, etc.
- Process Changes occur and the APC is not adjusted properly.
- Conventional Control Loops in APC area not operating properly
- Drive Controls – Insufficiently tuned and/or not coordinated with APC

Typical APC Implementation



Quick APC Checklist at Your Plant

- **Who is the responsible contact (“champion”) for APCs at the mill?**
 - What is the inventory of all APC which are supposed to be operating?
 - Are they operating now? When, why, and how often are they turned off?
 - What were the benefits stream expected for each? What were the KPIs?
 - **Is the process performance gain slipping back to pre-APC conditions** (per original KPI targets such as \$/ton, yield, product quality)?
 - Are there issues with underlying conventional controls? (check work order system)
 - What is required to re-activate defunct APCs?
- **Are service arrangements for critical APC components in place?** (instrumentation, data sources, software, etc.)

What can be done to sustain APC performance long-term?

How to Keep APCs operational longer than 24-months

- **Establish Mill Champion for APCs**
- **Involve the Operators!**
- Conventional Process Controls need to be optimized
- Develop APC-specific Knowledge with Operators and Support Staff
- Treat APCs as **critical assets** with preventative maintenance program. *'An ounce of prevention is worth a pound of cure'*.
- Adjust organizational setup to cross-departmental support of APCs
- Understand the tell-tale signs of APCs in trouble and establish respective alerts; regular performance reviews and adjustments

Establish APC Mill Champion

- Should have **overall performance responsibility** of APCs at the mill
- Works with all relevant mill departments, including operators
- Has the authority to expedite work orders related to APC performance (instruments, DCS, IT, etc.)
- Dedicated APC maintenance budget is highly recommended
- Coordinates training efforts to maintain APC-related knowledge and operation skills of mill personnel
- Works with Subject Matter Experts (SME) of key suppliers; coordinate service contracts

Involve the Operators!

- **APCs should be designed to make the operator's life easier!**
- Involve dedicated operators before finalizing design
- Invest in training, both initially and refreshers on a regular basis
- Actively seek operator input throughout the implementation and for performance reviews after start-up
- Operators are the Subject Matter Experts for real-life behavior of the process as well as troubleshooting options

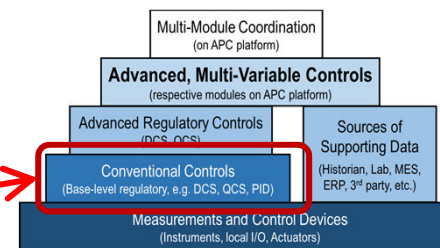
Training towards APC Knowledge

- Initial thorough training program for all stakeholders, including **all operators**
- As much as possible hands-on and/or interactive
- Refresher and update trainings on a regular basis (every 6 to 12 months)
- Utilize OEMs and/or Consultants for training, seminars, and as partners for optimization & performance reviews

Optimize Conventional Controls



Source: [How Advanced Process Control Lowers Cost and Enhances Industrial Production Efficiency](#); Ritesh Agarwal; Schneider Electric; 2014



Only about 1/3 of industrial process control loops are performing at an “acceptable” or better level!

=> Need to be optimized before APC start-up

Additional Tools to Support APC Performance

- **Remote Monitoring** of critical APC components
- **Alarms & Alerts** – in control room, text messages, e-mails to stakeholders, etc.
- **Establish APC Event Log** for all starts, stops, changes, etc.
- **Expedite APC-relevant Work Orders** – less than 1 week where possible
- **Pro-active Maintenance & Asset Management**, including **Criticality Assignments** (level 2 recommended)
- **Cooperation with Key Suppliers** – Service contracts, consulting, or leasing (APCs run by supplier tend to provide value more reliably)
- **Regular Performance Reviews** (monthly) with mill stakeholders and support team (internal and external)
- Real-time **Display of \$\$ lost** to operators and stakeholders

Visualize \$\$ of Lost Opportunities

Industry Example:
 Power Plant

	IDEAL Kpph	ACTUAL Kpph	ADVICE
	469	469	CB BARK : PERFECT
CB Gas	22	47	CB GAS : DECREASE
PFI Gas	110	111	PFI GAS : PERFECT
TIE MW	20.4	18.4	TIE LINE MW : BUY MORE
RB1 Gas	0	0	RB1 GAS : PERFECT
RB2 Gas	0	0	RB2 GAS : PERFECT
TG1 Cond	247	273	TG1 COND : DECREASE
80# Vent	0	0	80# VENT : PERFECT
165# Vent	0	0	165# VENT : PERFECT
	IDEAL	ACTUAL	Opportunity
Costs	\$3,018	\$3,229	\$211
Details	\$ / Hr	\$ / Hr	\$ / Hr
Totals	\$51.3 K	\$104.4 K	\$4.4 K
	Lost MTD	Lost YTD	Beginning June 1, 2010 Yesterday

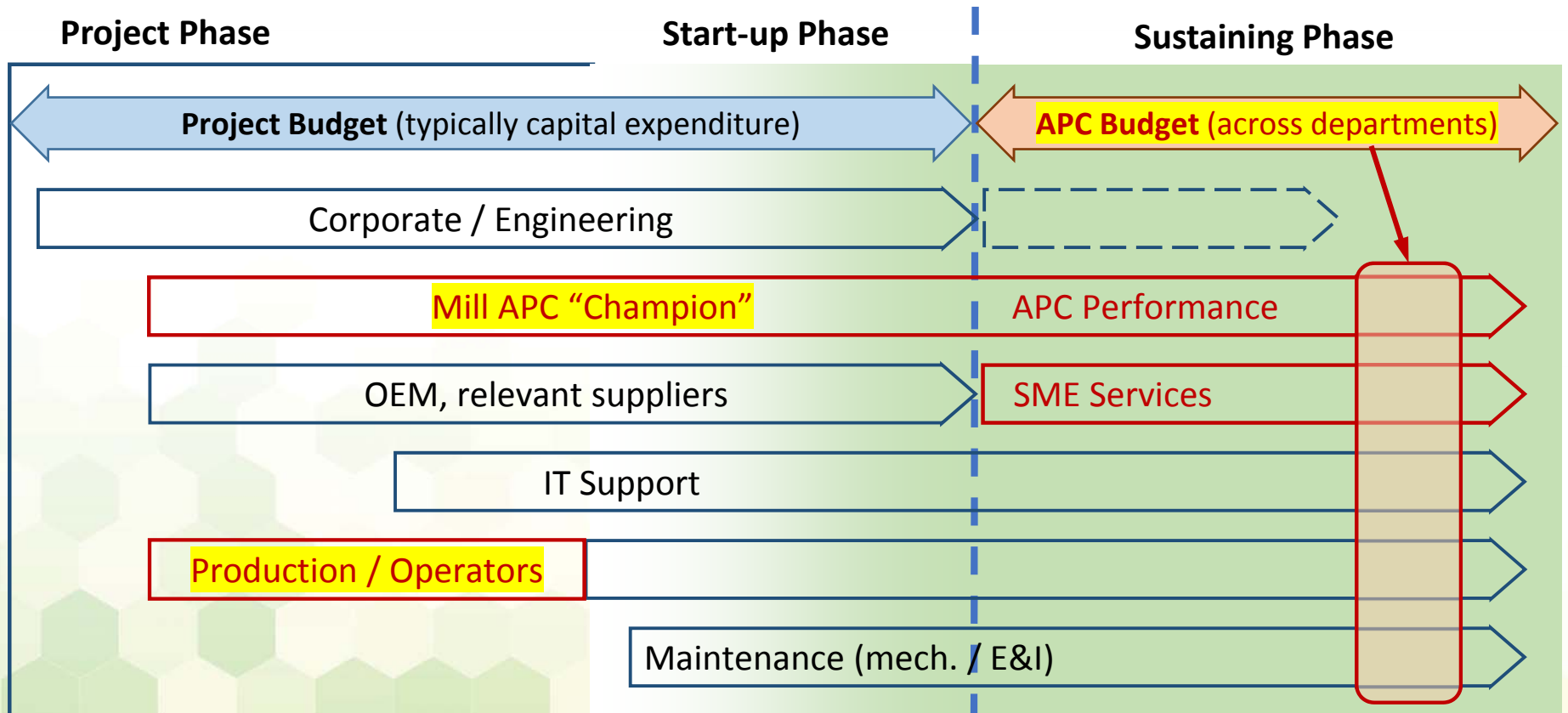
Transparency fosters
 buy-in of operators!

Suggestions for
 Corrective Action

Display of \$\$
 (Lost & Target)

Source: Success in Advanced Process Control requires a Change in Culture; McClain, Cliff; DES Global; Tissue 2018; Appleton; October 3rd 2018

Recommended APC Implementation



Summary – Support your APC

- Establish **APC Champion** at Plant, with Authority / Budget
- Involve **Operators** as early as possible
- Proper **Training** for all Personnel involved (initial and refreshers)
- Be as **transparent** as possible about the real-time APC Value to all Personnel involved, especially Operators
- Verify Performance Suitability of underlying **Conventional Controls** before APC Installation
- Secure **long-term Support** for key APC Components from Suppliers

Thank you for your attention!

Any Questions?

Contacts

David Zerr
Paper Industry Professional
dzerr@pulmac.com

Michael von Grumbkow
Global Solutions Team, Packaging
BTG Americas Inc.
michael.vongrumbkow@btg.com



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