White Paper

Be Ready for Changing Tastes – A New Approach to Plant Software

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What's Inside:

Be Ready for Changing Tastes – A New Approach to Plant Software

1. Overview

This paper will explore one of the most challenging dilemmas in the Food & Beverage and Consumer Packaged Goods (CPG) industries – how to balance the competing demands of flexibility and agility, with the cost and quality improvements inherent in standardization. We'll begin by articulating the challenge in full and will then outline a new way to look at the situation, centered around a platform approach, including a step-by-step process for moving to this new environment. We'll close with some additional considerations that build on the platform concept to allow you to maximize your business performance while fully meeting safety and compliance requirements.

2. Operational Flexibility and Standardization are Not Mutually Exclusive

Success in fast moving industries like Food & Beverage and CPG requires manufacturers to maximize both flexibility and standardization. But oftentimes, these two objectives appear to be at odds in running a profitable and sustainable business.

Need for Flexibility

Competitive differentiation
Diversity of local tastes
Changing preferences
Product variety
Autonomy to innovate
Rapid adaptation

Need for Standardization

Reduced variability
Higher cost efficiency
Scalability
Continuous improvement
Quality
Product safety

Consider the following case for **flexibility**:

- **"Food is local."** On the consumption end of the Food & Beverage value chain, the cornerstone of a successful marketing strategy is based on the fact that there is no concept of a standard worldwide taste (regardless of how global a brand may be).
- **"Cows don't produce 2% milk."** On the farming end of the value chain, factors like seasonality, climate changes, feedstock quality, etc., make it difficult to get nature to function like a highly efficient and consistent factory to feed a planet of over 7 billion people.
- **"Freshness" of product portfolio.** Growing and sustaining brand equity means having to constantly monitor changing preferences and keep the product portfolio refreshed – and aligning the asset portfolio of people, systems, and plant equipment accordingly.

These business drivers require a mindset of creativity and resourcefulness that tends to push back against initiatives for standardization. Yet, in an industry that is constantly under margin pressure, the case for **standardization** is equally compelling:

- **Good vs. bad variety.** Variability drives up cost – whether it is in the form of customer variety (segments), product variety, asset variety, technology variety, etc. Other than what is largely dictated by the external market forces, everything else is a contributor to unnecessary variability, and therefore higher cost.
- **Continuous improvement and agility – at scale.** Standardization is a cornerstone of both the need to continuously improve and quickly adapt business processes as well as roll out these best practices across a globally distributed value chain.
- **Safety and compliance.** This goes beyond the focus on quality and consistency to address the myriad of health and safety regulations and legislation protecting consumers and employees.

3. These Trade-offs between Flexibility and Standardization Create Friction between Functional Departments

These examples help us understand how different departments, tasked with different initiatives (and often conflicting metrics) end up creating tension in executing on critical transformation projects.

4. Operations is Where all Differences Must be Reconciled

Balancing standardization with flexibility requires a truly collaborative effort to come up with innovative solutions based on "integrative thinking," a concept put forward by Roger Martin, the Dean of the University of Toronto's Rotman School of Management:

Martin defines "integrative thinking" as follows:

"The ability to face constructively the tension of opposing ideas and, instead of choosing one at the expense of the other, generate a creative resolution of the tension in the form of a new idea that contains elements of the opposing ideas but is superior to each."

Integrative thinking is about pushing the boundaries and searching for creative resolutions rather than accepting conventional trade-offs. This mindset helps one to take the lead in supporting change, regardless of role and responsibility. After all, which of us wants to be the impediment to market opportunity, first mover advantage, game changing cost reduction, and yes, Wasabi-flavored cola or lime-flavored cupcakes?

We know Enterprise Resource Planning (ERP) systems enable ordering and paying for materials, accepting customer orders, dispatching production orders, and measuring costs, but ERP can't actually make the product. Your plant people, equipment, and systems must do that, and respond in real time to the things that can and will go wrong in day-to-day operations.

At some point, you will likely be on a cross-functional team tasked with finding and selecting a vendor who can meet the seemingly contradictory needs of both IT and Operations. This paper will provide you with a framework of capabilities that you should consider, to ensure that the solutions you pick provide the flexibility and standardization necessary for operational excellence.

5. Background:

IT-driven Standardization or Operations-driven Flexibility and Agility?

We are often faced with a choice on where to compromise on a continuum of options. Complete standardization on one end of the continuum, absolute flexibility on the other. As a multi-plant Food, Beverage, or CPG enterprise, do you standardize your operations management systems from the top-down in every plant? Do you go as far as considering the logic of the controllers that run the automation? Do you instead standardize on ERP and higher level work processes and let each plant specify and manage everything else? The real question is – do you really have to choose one or the other?

Challenges with a Standardization Approach

Corporate IT has a mandate to reduce cost of ownership of all applications and infrastructure. This not only includes the initial acquisition and commissioning costs but the ongoing maintenance, support, and change management costs. The best way to reduce and control cost is to minimize variability and create predictable cost and performance. A top-down rationalization of systems often occurs and results in the replacement of redundant legacy solutions, with one solution intended to meet the needs of all.

This seemingly conflicts with market forces. Can a single IT solution meet the business needs for speed, localization of product and packaging, material supply cost, available labor, and energy? More specifically, can a system used to make shampoo also be as effective to make beverages, baked goods or dog food?

IT Challenges with an Ultimate-flexibility Approach

To be ultimately flexible, each plant must be an island, a snapshot of near-term needs, and the result of annual CAPEX allocations. The people, equipment, and systems are optimized to respond to weekly or daily changes to demand for both quantity and product mix. Like a highly tuned automobile, the plant is optimized for its intended use; just like a road-track car is tuned quite differently from a drag racer.

Unfortunately, this ultimately-flexible plant limits options from the corporate or business unit perspective in terms of short and long-term planning. For example, can the plant efficiently produce long-run, low margin products if called upon? The plant is also highly dependent on individuals and specialists to run and maintain the finely tuned machine. If one key person leaves, the operation may be at risk. If the plant is part of a multi-plant business unit, managers and functional leads cannot be easily transferred without extensive on-the-job training and mentoring.

So, there are definitely costs and risks to running the ultimately-flexible plant. On the other hand, it enables the organization to meets certain market demands.

6. Bridging the Gap – A Platform approach

Is there a middle ground that doesn't compromise the benefits of either standardization or flexibility? Does your organization really want, or need, to compromise? The answer is yes, where the solution lies in one of the major technology themes that has emerged – the "Platform."

Platform is a well-proven concept. A smart phone or tablet is purchased with standard functions (mail, calendar, camera, speaker, Wi-Fi and cellular communications, etc.) that are practical and needed by most users.

The device is then adapted by each person for their needs using modular applications, or "apps." Many apps are available for travel, hobby, work, finance, health, or just plain fun. The personality of the smart device can easily change as an individual's needs and life changes. Buy new apps for new needs, get rid of old ones. The device platform supplier enables this personalization while maintaining the standard functions and technology.

You should consider software that offers that same level of "platform" support. Software that meets standard operations and execution functions, yet allows the addition of specific "apps" to meet the "personality" needs of a plant operation.

7. Personalization Means Start Anywhere, Go Anywhere

Just as a person's life and interests evolve, corporate and plant initiatives evolve. The market forces some of these changes; proactive planning drives others. Software that offers an underlying Platform allows a "jumping point" to add extended functionality for Operations – for example, applications that manage the transformation of products from raw materials through finished goods; that provide cross-functional collaboration of systems, people, and equipment; and that manage your mobile workforce.

Initiative	Platform + App
Food Safety	Manufacturing Execution Systems (MES) software, Mobile Solutions, Workflow
Lean	MES software, Workflow
New Product Introduction	Batch Recipe Management software, MES software, and Workflow
Standardize level 3 processes	MES software and Workflow
TPM/OEE	Enterprise Manufacturing Intelligence (EMI), MES software
Quality	MES software, Workflow
Sustainability	EMI, Energy Management software

8. Platform Basics

Like a smart device, the Platform must have the basic functions needed by any app to run in a plant environment, connected to peer and corporate systems:

- Plant floor automation connectivity
- Process data historization
- Collaborative workflow
- Advanced analytics
- Real-time visualization
- Web reporting portal
- Mobility with smart phones and tablets

Of course, the Platform should possess the attributes required to run in 24/7 industrial operations:

- Robust and reliable
- Massively scalable and distributed
- Centrally configured and managed
- Highly secure
- Enterprise connected

A Platform would provide the basis for "advanced" software applications ("apps"), such as MES, Workflow, Batch Recipe Management, Mobility, or Energy Management. These applications focus on a specific area of Operations – whether it is product track and trace, or worker collaboration, or recipe execution, or even energy monitoring.

9. How Do I Start?

It has traditionally been a daunting task to create or revise an Operations architecture, but the platform concept coupled with an open technology approach provides a more agile and flexible path to improved performance.

You'll want to start with a solid inventory of where you stand and the major gaps:

- **Your critical "must haves" for Operations –** Are you losing productivity because your workers have to return to a kiosk or hard-wired PC to input end of shift summaries or comments on production?
- **Your unfilled needs –** A dashboard showing all production? Reducing energy costs by analyzing different resources? Better workflow management of quarantine processes?
- **Your existing applications –** Do they work for you? Are they current from a technology and ease of use perspective? Are they truly "integrated", so that you can access critical data from one system into the other, such as material consumption into ERP, or product quality into Operations?

Next, or in parallel, you need to build a complete understanding of the technologies and applications available in the marketplace. Some suggested areas of focus and attention include:

- **Platform technologies.** Look for proven, flexible, standards based options.
- **"Open." –** Look to see if your current providers are taking an open approach that allows their applications to be easily integrated and aligned with offerings from other providers.
- **Disruptive technologies –** Take a look at key areas like the cloud, ubiquitous reporting, and virtualization. Your organization may not be ready to embrace these yet, but you need to understand the potential they offer and ensure that the application providers you are using or considering are integrating these technologies in their future plans.

Armed with the above, you'll be ready to have a meaningful and productive discussion between IT and Operations around the path forward, including the flexible, incremental approach enabled by the platform concept and technology.

10. Other New Ideas and Enablers

Haven't looked at plant floor software recently? The same trends we see in consumer technology and business are changing the way people want to use plant floor software and we are evolving to meet this need.

Workflow in the Cloud

Accessing workflow tasks through a mobile device allows workers to remotely be notified of pending actions, without having to be in front of a computer, or even in the plant.

Multisource Analytics

A self-service view that combines multiple sources of data into meaningful and actionable information. Answer questions like "what product was running on Line 2 when the electrical demand exceeded our contracted maximum?"

Flexible Deployment and Ownership Options

What once took a rack full of servers to run, now runs on virtual machines spread across fewer servers. You might consider options for remotely managed, on-premise, software-as-a-service as an alternative to CAPEX.

11. Conclusion: There is a Path to Get There

The dual and oftentimes conflicting needs for operational Flexibility and IT Standardization can be resolved with a new approach to plant software. Using a true industrial software platform and applying focused "apps" to meet your current and future initiatives is a powerful way to meet these operational goals. Extending the Platform with complementary apps such as MES, Workflow, Energy Management or Batch Recipe Management allows you to leverage that infrastructure, and apply a standardized, homogeneous approach throughout your enterprise.

Invensys has a broad set of solutions to increase productivity, quality, asset utilization, and energy management for Food & Beverage and CPG industry providers. Find out more on our website at http://iom.invensys.com/EN/Pages/FoodandBeverageIndustry.aspx.

12. Glossary of Terms

Batch Recipe Management

Batch Recipe Management software is used in the most complex batching processes that require a high level of flexibility. Look for batch software consistent with the ISA S88 flexible batching standard; this provides you with Batch software that offers comprehensive batch execution and equipment history, as well as material genealogy, stringent security, Web-based reporting and the ability to facilitate the design and implementation of systems that are compliant with FDA 21 CFR Part 11 regulations.

Energy Management Software

Energy Management software allows plant personnel to monitor real-time energy use, automatically notifying operators, supervisors and cost accountants of energy inefficiencies and waste. It connects directly to meters on a network, through industrial controllers or though building automation systems. The application is layered on top of the Platform, enabling integration with a wide range of industrial controllers, peer applications and I/O data sources.

Energy Management software enables direct integration with the process to add essential context to energy usage, such as asset state, production results and operating parameters. Application functionality includes recording consumption and demand at main and sub-meters for a wide range of energy types, including power, water, chill, gas, air and steam. The current price for each energy type can be updated in real time to reflect the emerging wholesale markets for energy or the cost of site generation.

Enterprise Manufacturing Intelligence

Enterprise Manufacturing Intelligence software, or EMI, takes data from your plant sources – such as a data historian, MES system, quality system, or even ERP system, and enables you to gather, store, and report on this historical and real-time operational data. Using a dashboard, it presents Key Performance Indicators and other analytics that can be used to visualize, tune and maximize your Operations.

Manufacturing Execution Systems

MES software provides oversight for Operations, from raw materials through finished goods. It has capabilities for the execution of operational activities, from product track, trace and genealogy (the "as built" phase of material transformation) through enterprise integration, for "top floor to shop floor" visibility and data exchange, such as materials consumed, order status, product quality, and delivery.

MES software normally manages three phases of Operations: the overall efficiency of equipment/products/assets, known as Overall Equipment Effectiveness; the Quality Management aspect, with integration into LIMS (Laboratory Information Management Systems) and on-line, off-line or in-line testing procedures; and Operations Management, for work order execution, including track/trace and genealogy information; labor and materials utilization; and a complete record of product results.

Mobile Solutions

Solutions combining software and mobile hardware provide workforces with a decision support system. These solutions include configurable software and ruggedized mobile hardware to enable workflow, data collection and general task management for plant operations, maintenance management, production tracking and compliance.

Using a mobile solutions application, you can connect all of your assets, whether they are "wired" or "stranded" to enable broader visibility into asset performance, enabling and supporting a Reliability-centered Maintenance initiative.

Workflow

Workflow Software uses sophisticated Business Process Management (BPM) to enable companies to Model, Execute, Analyze and Improve processes inside and outside of their organization, driving higher levels of collaboration, productivity and innovation.

With Workflow, companies can "institutionalize" or standardize work processes that manage normal, unscheduled or disruptive events within their Operations environment – providing the Right People with the Right Information at the Right Time. Workflow can be used for such operations as HACCP; CIP; Corrective Action; Quarantine; or other operations that require the synchronization of people, equipment, and systems for execution.

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Rel. 09/12 PN IN-0233