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PLM TRANSFORMATION: THE PROGRAM MANAGEMENT FRAMEWORK

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ENABLING COMPLEX PLM PROGRAMS TO REALIZE BUSINESS BENEFITS

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Product Lifecycle Management (PLM) is a very popular strategy to deliver improved business performance and achieve competitive advantage. Many have embarked onto deploying a range of solutions to eliminate waste, reduce time to market, accelerate New Product Creation, improve collaboration, manage product and process change and open innovation. Few have actually achieved the benefits of 'full PLM' because changing the business end-to-end typically requires complex transformational changes which cannot be achieved in isolation. Key success criteria include robust benefit management methodology and stakeholder governance to support organizational and cultural changes enabled by new processes and technology. This paper presents a program management framework to enable successful PLM transformation initiatives – showcasing how it was implemented at Jaguar Land Rover (JLR), based in Coventry UK, to support their PLM transformation journey.

INFORMED DECISION-MAKING

In broad terms, PLM is about getting access to the right information needed to support process execution and helping people make informed and timely decisions to carry out the lifecycle of the product. PLM is more about discipline, process and culture than software: 'PLM is a discipline for guiding products and product portfolios from ideas through retirement to create the most value for businesses, their partners, and their customers' (definition by Gartner).

> "PLM is about connecting the business to the product and enabling better informed decision-making by using a single source of the truth."

> - John Knight-Gregson, i-PLM Program Lead, JLR

PLM covers the extended Product Creation backbone. It is much more than product engineering and product development. It goes through from design and early inception of the product to service and disposal, and reaching to procurement, the supply base, sales and marketing and finance (end-to-end lifecycle).

PLM TRANSFORMATION

Most PLM implementations are typically reported as being IT-driven initiatives focusing on traditional deployment challenges: 1) selecting the right PLM toolset, 2) implementing the required business rules, and 3) defining phase-wise deployment for minimal disruption of the production operations.

While the above can be considered as minimum requirements to deliver any PLM projects or programs, they may not be sufficient to deliver upon the 'full PLM' promise. Individual PLM initiatives might contribute to series of relevant business improvements and levels of integration, however, their cumulative benefits might not be anywhere near the initial expected end-to-end result. Notwithstanding the fact that it might take years of implementation and deployment efforts before this conclusion can be drawn.

'Full PLM' benefits can be achieved through a business transformation approach as opposed to a tool replacement approach. This is why the focus of any PLM initiative which aims at making a difference should be on delivering critical business objectives and improvements that support the PLM vision. Transformational changes imply:

- Defining process improvements that constitute fundamental changes to the way the business currently operates (with agreed high level business requirements that carry clear recoverable benefit in dollar value).

- Aligning changes related to people, process and technology more closely with its business strategy and PLM vision (with a holistic view to meeting long term objectives).

This can be driven by focusing on making significant improvements to customer service levels and

enhanced customer experiences, by reviewing and the appraisal of what a business should do, by working with partners and by making better use of all types of resources, by improving the way the business works, and embracing new organizational structures, skills, processes and technologies.

BUSINESS BENEFIT-DRIVEN

'Full PLM' transformation is about aligning PLM vision and strategy with business requirements from Product Creation, Manufacturing, Marketing and Sales, Finance and HR functions, in a holistic and integrated manner. This is to drive benefits across all functional areas and include resource efficiencies, Research & Development cost savings, supplier cost savings, material cost savings, reduced assembly hours per vehicle, serviceability efficiency, etc.

Typical measurable business benefits from PLM transformation initiatives include a wide range of business improvements, such as:

- Using a single Bill of Material (BOM) approach that represents a 'single source of the truth' so that master data is created once and consistently used many times (eliminating waste – e.g. multi-BOM synchronization and various related inefficiencies); this should enable engineers to focus on designing new products, rather than spend valuable time maintaining BOMs.

- Using product visualization capability to review key 'building data' attributes, such as cost, weight, material, special relationships, both static and dynamic, etc. and reconnect the management to making decision with the product in sight (rather than looking at spreadsheets in isolation); this assumes accessing the right information at the right time through shared knowledge resources supported by a well-integrated and holistic Building Information Model (BIM) – e.g. to enable manufacturing tooling change cost impact analysis while making design change proposals.

- Accessing visualization data and relevant PLM dashboards from mobile devices to connect the teams back to the product – e.g. visualizing material, weight, cost or other ERP attributes onto the product Digital Mock-Up (DMU) on portable devices with light and accessible data.

- Integrating the extended enterprise into using common processes, including offshore / low cost delivery centers, suppliers and partners (e.g. Joint Ventures), and supporting Product Creation growth globally (operational scalability).

- Enabling effective management of product data includes the entire value chain – the entirety of all the processes, both inside and outside the company, touching product data from at any and every stage of the product lifecycle.

- Enabling seamless PLM-ERP integration – e.g. to allow new parts in PLM to be published to ERP, configuration engine supporting for PLM and ERP critical processes, or cost management driven from ERP to be reflected into PLM.

- Supporting increasing product business requirements, including electronic software system and system engineering requirements which are growing fast.

- Prioritizing business improvements based on expected recoverable benefits across the entire product lifecycle – while removing hidden factories (non-value-added activities hided or

embedded in any process operation) in organizations, reducing the number and complexity of interfaces, and simplifying the supporting IT landscape and architecture.

- Managing PLM deployment in waves – of various sizes and duration depending on the business case which need to encompass for business and cultural readiness, business growth priorities and pain points.

ORGANIZATIONAL AND CULTURAL CHANGES

PLM as a business transformation will obviously be IT-enabled, but people related issues are likely to constitute the most significant challenge in implementing and deploying the solution. It will potentially require significant cultural changes which will be enabled by various factors:

- Finding compromises in defining new processes to avoid 'reinventing the wheel' or heavily customizing the tool to match users' expectations.

- Defining new organizational structures to support new processes and new ways of working.

- Implementing robust risk management approaches to support complex PLM deployment and mitigate any resistance to changes (e.g. redundant roles following process improvements, transition to using better working processes while delivering existing products which will be at various stages of their lifecycle).

- Aligning HR policies to support business operations related to new PLM processes.

Typical business transformation initiatives imply implementing positive disruptive changes to realize 'full PLM' benefits – 'disruptive' in terms of being a major step-change or a more radical game changing opportunity; and 'positive' in terms of being better than previously.

Integrated people and process considerations as well as data model dependencies are critical to drive these changes. It is also necessary to assess transition disruption from legacy landscape to new solution and derive a transition strategy that the business can buy into. The deployment plan should not solely follow an Information Technology (IT) system implementation decision-driven approach, but a business-driven one that can encompass for complex changes to be deployed with minimal and controlled operational disruption. Temporary technical bridges are sometimes required to support the transition period.

PLM solutions must take into consideration software integration and evolution capabilities. It is also important to note that PLM initiatives are not software development but deployment projects. From an IT implementation perspective, PLM solutions should be based on out-of-the-box vendor software that is configured to be fit for purpose, with minimal and controlled levels of customization with possible temporary interfaces to legacy environments to support the transition period. Choosing which interfaces to keep long term is to be carefully considered to reduce cost of ownership. Applying these principles and using a robust benefit-driven control framework to monitor PLM implementation sometimes constitute a cultural and mindset shift for the IT departments responsible for the technical build.

PROGRAM MANAGEMENT FRAMEWORK

Effective PLM business transformation initiatives are typically structured in programs following a multi-wave implementation and deployment framework. Managing PLM transformation initiatives as programs allows focusing on benefit realization and aligning consistently complex interdependent projects to deliver against a common set of objectives and vision. A program is commonly defined as a group of related projects managed together to obtain specific business benefits and controls that would likely not occur if these projects were managed individually.

Program management is focused on achieving the strategic objectives and benefits of a number of integrated PLM projects. An effective Program Office framework "Accelerate-PLM" was specifically created to support PLM transformation programs which require robust attention to benefit realization and governance. This framework is based on 15 core pillars as described below.

1. STAKEHOLDER MANAGEMENT

Key customers and other stakeholders must be clearly identified – e.g. from c-level executives to business champions, current functional process owners, Subject Matter Experts (SMEs) and technical experts. Stakeholder mapping is necessary to identify influencers, supporters, level of interest and power in the organization at various levels and roles. This will need constant monitoring and will derive into concrete actions to align and communicate to the business community, across various business functions, internally and externally.

Stakeholder management plays a critical role in delivering successful PLM programs, from a people and process point of view. PLM programs are typically aligned to address specific critical 'pain points' in the business. The delivery structure of the program is organized in business-driven workstreams which constitute a matrix structure across PLM technical domains.

2. GOVERNANCE

Robust governance is a critical success factor to implementing changes, especially in complex PLM programs – however, it is consider as 'best practice' to implement a strong governance structure to support any business transformation initiatives to ensure people and process alignment. A typical PLM governance structure includes the following key forums:

- Strategic executive steering committee, which regroups the ultimate program sponsors at the apex of the business to align strategic goals inter and intra-programs.

- Program board, which focuses on strategic decisions related to the PLM program.

- Change Advisory Board (CAB), which sanctions the change control process overall.

- Business Change Authority (BCA), which is to capture business requirements, coordinate process definition activities, identify organizational impacts, define new ways of working, and focus on benefit realization; the BCA also typically owns the communication and deployment strategy.

- Solution Definition Authority (SDA), which focuses on the technical solution 'fit for purpose'; the SDA owns the transition strategy.

- Business workstream champion and team forums, which focus on both change management and delivery following a matrix structure across business change and technical teams.

The program governance model is contextually based in any organization and is to be adjusted to various cultural factors and the change vision that supports the PLM program.

3. REQUIREMENT MANAGEMENT

Business requirements must come from the business. Significant effort is typically required to defined and document them consistently. They are based on high level assumptions that must be shared and validated across the business. Various dependencies might also emerge from these assumptions and business requirements. They then cascade into detailed functional and non-functional requirements that will need to be translated into design specifications and tested accordingly in a structured manner (typical V-system approach).

Business requirements must be attached to specific projects or groups of projects for implementation.

4. SCOPE MANAGEMENT

The high level business case of the PLM program constitutes the high level scope at inception. Business requirements and benefit rationalization are then to drive the scope of the program (top-down analysis at start-up and bottom-up analysis at initiation). The core of the solution, or 'PLM backbone', is typically technology dependent and constitutes the foundation of the new technical architecture.

Every business requirement and their expected benefits constitute the scope the PLM program which derives into its respective sub-projects for implementation. Quick-win projects might be identified to demonstrate early adoption by the business and facilitate business transformation preparation. These projects are also to be managed holistically in terms of scope to avoid any deviation from the overarching strategic intent.

5. PLANNING

Program and project-level plan cascade (milestone) and roll up (progress) into each other in a structured approach. A typical planning framework includes:

- Level 0 program plan (or roadmap) – with high level timing, phases and gates across single or multiple delivery waves.

- Level 1 program plan – with high level tasks and workstream milestones which govern a specific delivery wave, including high level intra and inter-dependencies (across strategic projects and programs – e.g. PLM and ERP program dependencies).

- Level 2 program plan – with detailed deliverable tracking activities and millstones, showing detailed dependencies and overall critical path across sub-project portfolio.

- Level 3 project plans – with detailed resourced activities, dependencies, and deliverables which align to the level 2 program plan.

Program planning includes:

- Weekly planning cycle

- Key delivery and communication milestones

- Core resource pool management

- Project interdependency and critical path monitoring

- Planning standards and templates

- Program gateway artifact readiness and countdown process.

6. CSF-KPI

Concise and regular reporting is critical to delivering successful PLM projects. Dashboards must be created to enable informed decision-making and effective communication. This will also be critical to sustain executive engagement on the program.

Defining the right metrics and reporting cadence and format must be linked to the program governance and structure. Clear metrics are defined against each KPIs and CSFs and monitored weekly or monthly:

- Critical Success Factors (CSFs) – which define success.

- Key Performance Indicators (KPIs) – which define how to measure success for each CSF.

7. BENEFIT REALIZATION

Top-down benefit estimation is typically done at program inception, in a top-down manner for budget preparation purposes. Then, benefits are assessed in more detailed during the program initiation. Bottom-up benefit analysis is done for all individual projects and at the program level while rolling up all sub-project benefits in a bottom-up manner.

It is mandatory to monitor expected benefit realization by workstream on an ongoing basis, and following the change control process. Program benefit and scope are closely related; a robust risk and issue management is required to control and manage stakeholder expectations as the program matures. Benefit change impact assessment is an integrated component of the change control process.

8. BUDGET / COST

It is expected that, for strategic PLM initiatives, budget will be granted for delivery of a specific program wave rather than on a project-by-project basis. As the matter of fact, this will be the most efficient way to ensure that the PLM transformation is led by benefit realization rather than solely technology change.

On a typical PLM program, cost will be managed at sub-project and program levels, across the lifecycle of a specific wave and also on an annual basis (for year on year budgeting tracking purposes).

9. CHANGE CONTROL

Every projects and programs require a Change Request (CR) process to manage changes in scope (deliverables), benefit, cost, and delivery timings – components which are obviously closely interrelated.

Changes are to be assessed for 'fit for purpose' by both BCA and SDA, and then ratified by the program CAB, such as:

- Is this change aligned with the program strategy?

- Is additional information required? (e.g. damage statement / impact analysis)

- Are all CAB stakeholders supporting the CR?

- Have impacts on business requirement been identified?

- Have impacts on other technical domain and project dependencies been analyzed?

- Have cost and benefit impacts been identified?

- Have impacts on the program plan been identified?

- Has a plan or specific action been agreed for the CR to be implemented?

10. SUPPLIER MANAGEMENT

Specific suppliers / partners might be identified to support PLM transformation programs and help with risk mitigation and quality assurance. Contract and relationship management is at the core of successful delivery of complex and/or large PLM initiatives. This typically implies Memorandum of Understanding, Master Services Agreement, Statement of Work, and other contractual arrangements to support delivery services. For System Integrator (SI) suppliers, detailed Service Level Agreements must be defined and managed throughout the execution of each program phases. The management and coordination of specific skills and resources is typically monitored as the program matures to ensure continuity of service, knowledge transfer and support as the solution get deployed and handed over to Business as Usual (BaU) functions.

11. METHODOLOGY AND ARTIFACT MANAGEMENT

Program artifacts must be consistently defined and managed. Effective communication and positive leadership of the management team is critical to keep sight of the program vision and roadmap. Middle management leadership is also critical to cascade the information downstream to the delivery teams.

A program artifact library must be created to ensure that templates, methodology documentation and PLM deliverables are consistently and efficiently captured, and stored centrally in a common and accessible repository – e.g. typically stored on structured SharePoint sites.

Various methodologies are required to deliver effectively and efficiently, such as:

- PLM technical functional and non-functional requirement documentation templates (blueprint)

- Assessment and monitoring tools

- Benefit trackers

- Process forms, lists and templates

- Process mapping templates and tools

- User Acceptance Testing (UAT) methodology

- On/off-shore delivery and 'software factory' framework

- Web site templates

- Etc.

12. RESOURCES AND FACILITIES

Efficient resource ramp-up is critical to enable complex program delivery. Recruitment and on/off-boarding processes are to support this ramp-up, manage the different enabling assets, and ensure that new team members are quickly integrated, knowledge from leavers is transferred to the teams and each program resource is able to deliver as per expectations. The implementation of these processes depends on the supplier engagement model and team location.

13. ASSURANCE AND LEARNING

On complex PLM initiatives, quality assurance is a key component to get internal and external feedback. These might be in the form of:

- Regular program health-checks

- Quality standards, checks and balances

- Risk assessment and mitigation / roll-back plans

- Knowledge sharing database and collaboration / learning tools

14. COMMUNICATION

Business transformation initiatives require a robust communication strategy to encompass for the various stakeholders' expectations. It is meant to facilitate cultural changes and the implementation of new processes.

The communication strategy articulates, explains and promotes a vision and a set of well-defined goals; it creates a consistent, unified "voice" that links diverse activities and goals in a way that appeals to a specific stakeholders. Various activities will derive from the communication strategy and will be managed as part of the communication plan. It typically includes:

- Stakeholder mapping-driven and audience-centered communication, including risk management and in a constructive way that follows the program governance structure.

- Communication processes for business requirement gathering, adoption, validation, sign-off and benefit realization.

- Business impact assessment (internal and external communication).

- Event sequence, template and planning for requirement delivery review with business stakeholders (at various levels – e.g. champion, key users and SMEs, etc.).

- Early adoption and deployment messages.

- Education or change agents and ramp-up to entire business communities.

- Cultural change measurement.

- Organizational change and risk assessment.

- Clear, concise, consistent, convincing and compelling PLM transformation branding.

Various media and approaches are to be used as part of the communication plan to implement the required strategy; in no particular order: various events, from Share Fair to surveys, internal and internal web sites, videos, use cases, process workflows, mobile dashboards, newsletters, etc.

RISK AND ISSUE MANAGEMENT

The consistent, systematic and continuous management of risks and issues is critical for the successful delivery of any business initiatives. It is even more relevant for complex PLM programs with various dependencies and which involve number of stakeholders across many business function. They need to be managed centrally and follow clear monitoring and escalation processes with touch points at different levels in the program governance structure. Typical management of mitigation and resolution plans are in place to deliver deployment activities and organizational changes.

LESSONS LEARNED FROM THE I-PLM PROGRAM AT JLR

This Program Management framework was implemented at JLR to support their PLM business transformation journey.

> "Tata Technologies was instrumental in defining and delivering the i-PLM Program Office which plays a critical role as part of the program management team."

> - John Knight-Gregson, i-PLM Program Lead, JLR

Robust governance and adherence to terms of reference has proven to be critical in cascading and escalating consistent communication and making informed decisions at various levels on a program of this complexity and size.

Tangible benefits from implementing this program management framework to the i-PLM program at JLR include:

- Controlled and stabilized business requirement and scope for wave 1.

- Visibility of senior stakeholder engagement and ability to address issues in a timely manner.

- Cultural shift from issue to risk management initiated (implying a more robust forward planning approach).

- Robust program planning methodology and change control processes.

- Capturing of lessons learned from wave 1 to define improvements to be made to future program waves.

- Smooth passing of program 'Planning and Consolidation' gateway for wave 1 in July 2012.

PricewaterhouseCoopers (PwC), which was appointed as program assurance partner for i-PLM, also noted in their health-check report that:

> "Overall, we view the i-PLM program as being very well led and managed, following a sound execution strategy in line with the best performing programs we review across sectors. There are examples of best-in-class program management practices in a number of areas (...)"

> - Stephen Baker, Director, PwC (extract from i-PLM Program health-check, second report, July 2012)

SUMMARY

This paper demonstrates that addressing cultural problems may be as important, or more important, than technical solutions when implementing a new PLM solution; this actually applies to any PLM initiatives, but is even more relevant when implementing complex (and often large) PLM business transformation projects or programs. Realizing the potential of the PLM promise implies aiming at a clear and robust long term PLM vision that might include the implementation of disruptive changes.

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