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Managing a Software Development Project Complying with PRINCE2 Standard

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***Abstract* – Project Management (PM) encompasses activities related to the successful accomplishment of a group of goals. According to SR 13465:2007, PM is all about planning, programming, monitoring and controlling the fulfilment of the activities in the project. In addition, PM is about managing all the resources involved or required for completing the project within established timeframe, budget, scope and quality level. PRINCE2 ("PRojects IN Controlled Environments") is a process-based standard established in 1989 with the goal of managing a successful project with great organizational benefits. Since "excellence is not an act, but a habit" (Aristotle), PRINCE2 is based on a series of guidelines and best practices for each stage of a project. This paper presents the PRINCE2 project management approach for an e-learning Quality Assurance platform, following the recommended application of the principles while going through each stage of the process, as well as tracking the target indicators mentioned above. The platform will present content that is tailored to both beginners and professionals, as well as real-world examples based on the author's work experience.**

Keywords-PRINCE2 standard; Project Management; E-learning platform; Quality Assurance

I. INTRODUCTION

As companies understood the importance of offering professional development solutions to their employees, various methods and channels were devised and implemented. Because of the fast-paced nature of the technological landscape, e-learning immediately gained the spotlight as the best candidate for its educational outcome. The increased flexibility, aided by the exponential growth of knowledge repositories in tech-related fields, consolidated e-learning's spot in the best practices manual.

"PRINCE2 is part of a suite of guidance, developed by the Office of Government Commerce (OGC), aimed at helping organizations and individuals manage their projects, programmes and services. Where appropriate, this guidance is supported by a qualification scheme and accredited training and consultancy services" [1]. The standard is flexible and scalable, making it appropriate for a variety of business and project sizes. This standard is based on seven principles that assure a controlled and organized flow and six variables that must be within permissible deviation: cost, time, quality, scope, risk and benefits.

One of the key challenges faced by organizations around the world is the balancing act of two intertwined imperatives [2]:

- Maintaining "business as usual" – to wit, advancing customer relationships, maintaining brand loyalty, assessing market confidence, evolving service quality and improving productivity.
- Analysing daily operations to cope with changes required for continued competition and survival in the market, as well as deciding how these changes are best introduced for maximum effectiveness.

As the pace of technological, regulatory, social or business change increases and the penalties of falling behind become harsher, management inevitably shifts its focus to this balancing act. Projects are the de facto way of introducing major changes, and while the required skills of the trade still apply, there are significant differences between managing project work and handling daily operations.

The motivation for an e-learning platform was drawn from both a strong business justification and personal insight. Starting work in a new company can be daunting for several reasons. The planned training sessions might be brief, might lack relevant information and answers, available time might be insufficient and there might be an over-reliance upon learning on the job. In these circumstances, the ideal solution is for new employees to have a learning method at their convenience, a method which encompasses the work experience of several colleagues, with real-world examples, suitable techniques and principles, common mistakes and frequently asked questions. An e-learning platform can accomplish this with ease.

PRINCE2 was chosen to fulfil this project due to the fact that it emerged as a project management methodology based on lessons learned from thousands of projects, with input from numerous experienced consultants, academics, trainers, sponsors, project managers and their teams. The method addresses project management with the four integrated elements of principles, themes, processes and the project environment (Fig. 1).

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For an organization to properly implement it, some steps must be undertaken:

1. Backing: initiatives require support from both senior management and those they are responsible for.
2. Method: the needs of the organization and the project requirements must weigh heavily in the selection of an appropriate method.
3. Training: a key step that virtually eliminates miscommunication; staff involved should be trained in the project management method.
4. Certification: though not a strict requirement, it is beneficial to formalize the competence and required skill.
5. Change: quite simply, the application of knowledge during the e-learning project.
6. Evaluation: project performance should be evaluated; adjustments can be made and the gained experience can be utilized in subsequent projects.

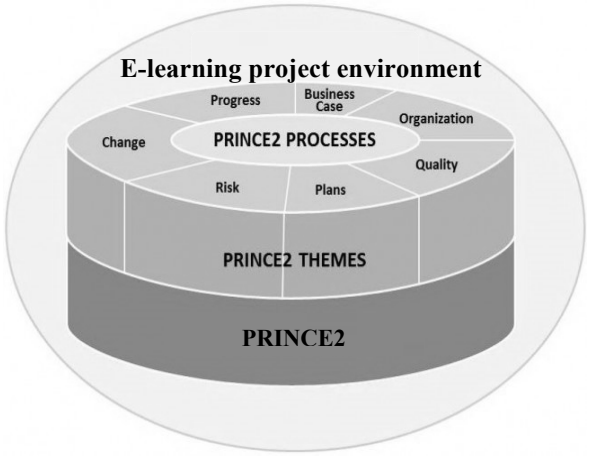

Figure 1. The core of the PRINCE2 approach for a QA platform

II. Methodological Structure of the E-Learning Project

In any project, the variables for which targets and tolerances (affordable deviation) are defined, and therefore the performance aspects to be managed, are:

- Benefit – those involved, and the Project Manager specifically, need a clear understanding of the goal of the project and are responsible for ensuring that deliverables (ultimately, the product) are consistent with the desired return on investment. After careful analysis, it was determined that the business value of developing an e-learning platform during bursts of company growth remains constant while experiencing a plateau phase.
- Risk – a comprehensive risk analysis is required for large-scale enterprises, while "educated guesses" may be reliable enough for smaller projects.
- Cost – despite an initially allocated budget, projects are influenced by factors which can lead to overspending or offer opportunities to cut costs.
- Timescale – one of the crucial estimates in preparing a Project Initiative.
- Quality – completion on time and under budget is insufficient in deeming a project successful.
- Scope – must be understood and agreed upon by all parties involved.

PRINCE2 is based on seven principles, seven processes and seven themes. The seven principles supply the ground rules, while the processes and themes develop the instruments required for planning, advancing and controlling a project. Technical routines and processes related to QA and e-learning do not feature, since the method is product-agnostic. The way in which these processes and themes help further the planning and execution of any project is shown in Fig. 2.

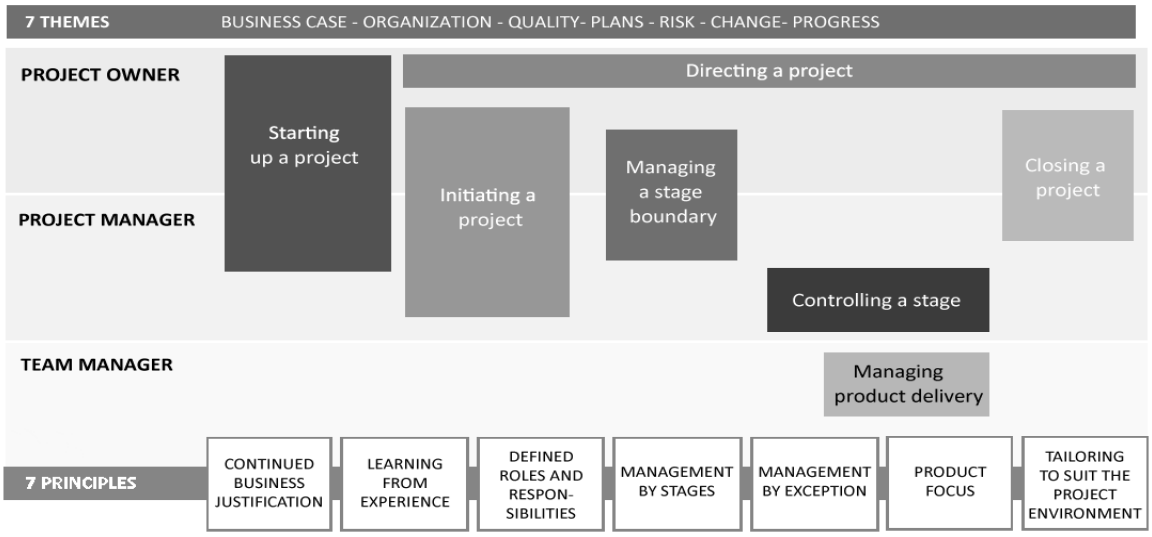

Figure 2. PRINCE2 overview [3]

The following schema illustrates the delegation and escalation routines across the four management levels in PRINCE2 projects, as well as their areas of oversight:

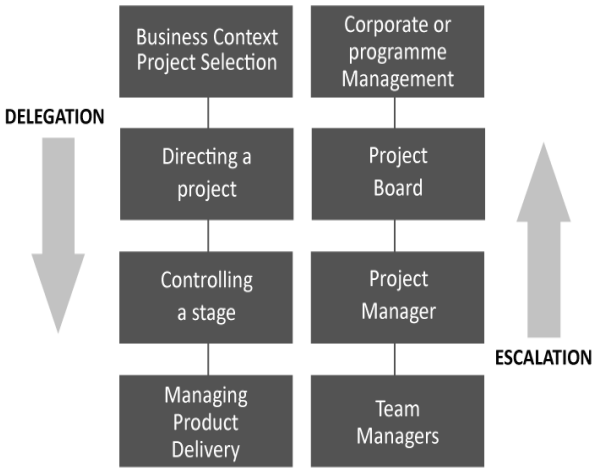

Figure 3. PRINCE2 management levels

- Corporate or programme management – responsible for project start-up and defining tolerances.
- The Project Board – makes informed decisions proceeding with, continuing or closing the project.
- The Project Manager – handles daily planning and control efforts, follows up on the team's work. Also, outlines and groups tasks and assigns them to the appropriate Team Managers.
- Team Managers – aside from their assigned tasks, assess whether the work is up to the established quality expectations.

A. Applied principles

It was established that the e-learning platform development must adhere to all seven PRINCE2 principles:

Continued business justification – a Business Case which describes the justification must first be approved. Any project should have a valid reason to commence and said reason should remain valid throughout the project lifetime. In case the project becomes unjustifiable, it should be stopped.

Learning from experience – lessons from prior projects are identified by and shared with everyone involved and applied in key stages, seeking to increase the success chance of the project.

Roles and responsibilities – the following stakeholders must be represented within the project's team structure:

- Business: elaborate and validate the business case;
- Suppliers: contribute any resources required for the project;
- Users: will utilize the final product(s) in achieving the anticipated benefits.

Management stages – The Project Board decides whether to proceed with the following stage based on the next Stage Plan and the performance of the previous phase. Senior management is thus afforded the opportunity to offer authorization to the project manager at each interstitial control point.

Management by exception – PRINCE2 establishes accountability by defining tolerances against six criteria: cost, time (e.g. +/- X days), scope, risk, quality and benefit (e.g. cost reduction). Management decides how to proceed should tolerances become susceptible to being exceeded. However, if the tolerances remain within limits, the next management level will not become involved, thus using management time effectively by delegating responsibility [4].

Product focus – the agreed set of products designates the project's scope and outlines the basis for planning and control. Product Descriptions are used to describe the e-learning platform, the quality criteria and the Quality Assurance (QA) method.

Tailoring to the project environment – As a framework, PRINCE2 must be adapted to suit the needs of the environment, its importance, size, capability, complexity and risk factors. Processes, management stages and the organization must be considered when deciding how to apply the model.

B. Outlined processes

The PRINCE2 method covers one directing process and six management processes. Catering to the needs of the individual project is required for successful application of the PRINCE2 method:

- To increase the chance of success for a complex, innovative and high-risk endeavor, pursue all aspects of PRINCE2.
- In a simple, upfront effort, the focus will be on execution, so undertake as few project management tasks as possible.
- Irrespective of the project type, it will always be helpful to follow the PRINCE2 method.

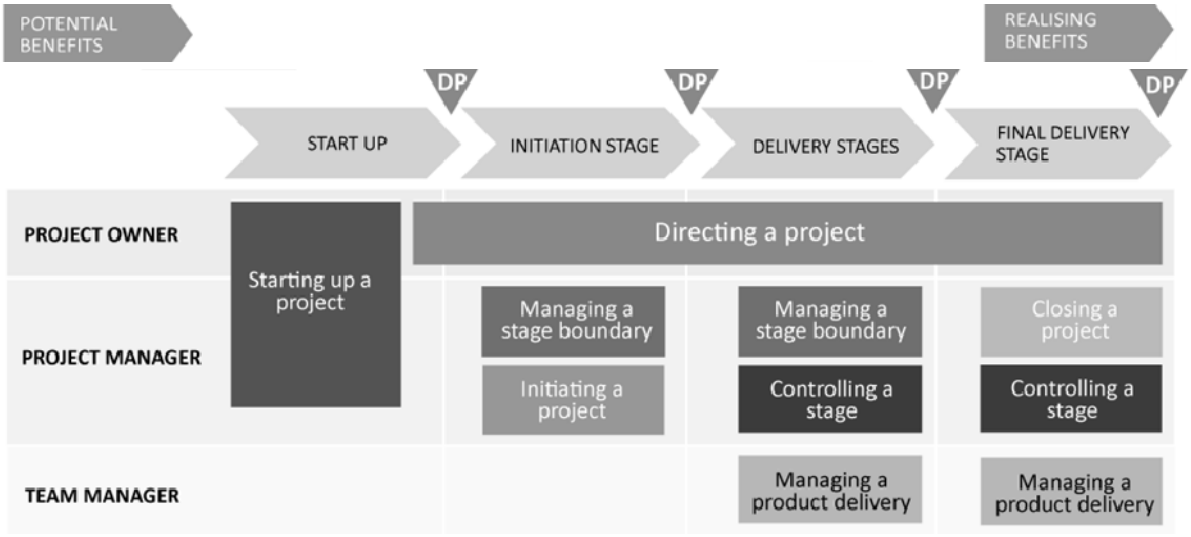

Figure 4. The PRINCE2 processes [1]

III. Business Case – QA E-Learning Platform

The scope of this project is a Quality Assurance E-learning Platform, encompassing courses, guidelines for trainee QA Engineers, specific examples for certain programming languages, training tests and instructions for popular industry-specific tools. New hire training is never homogenous and often fails to have the same positive impact upon multiple employees or groups. Live training sessions, while facilitating two-way communication, require the trainer to repeat and show the same information many times over, which is readily achieved through a video of the same material. Additionally, the trainer can sometimes have a separate role within the company, and a pre-recorded presentation can be employed without further taking up valuable staff time.

In this endeavor, PRINCE2 was chosen for its comprehensiveness and because it is a balanced model which can be applied regardless of project complexity and product type. Since this software product will be used for internal training, the users will be new employees, while the business and *supplier* stakeholders are an existing group of employees.

A. Starting up the Project (SU)

Commencing the QA e-learning platform delivery creates the information needed to make a good decision on whether to proceed to the first project stage – the initiation stage.

This start-up process was a short phase, triggered when the QA Lead issued a Project Mandate. Its main purpose was to clarify whether the prerequisites for the project are in place. Effectively, this implies assessing if there is a sound business justification, that clear information is used to define and validate the scope, that an evaluation into viable methodology was done and a suitable strategy selected and that individuals have been appointed into appropriate roles. The following documents were initiated in this phase: Project Brief, outline Business Case, Product Description, Daily Log and the Stage Plan for the Initiation phase [5].

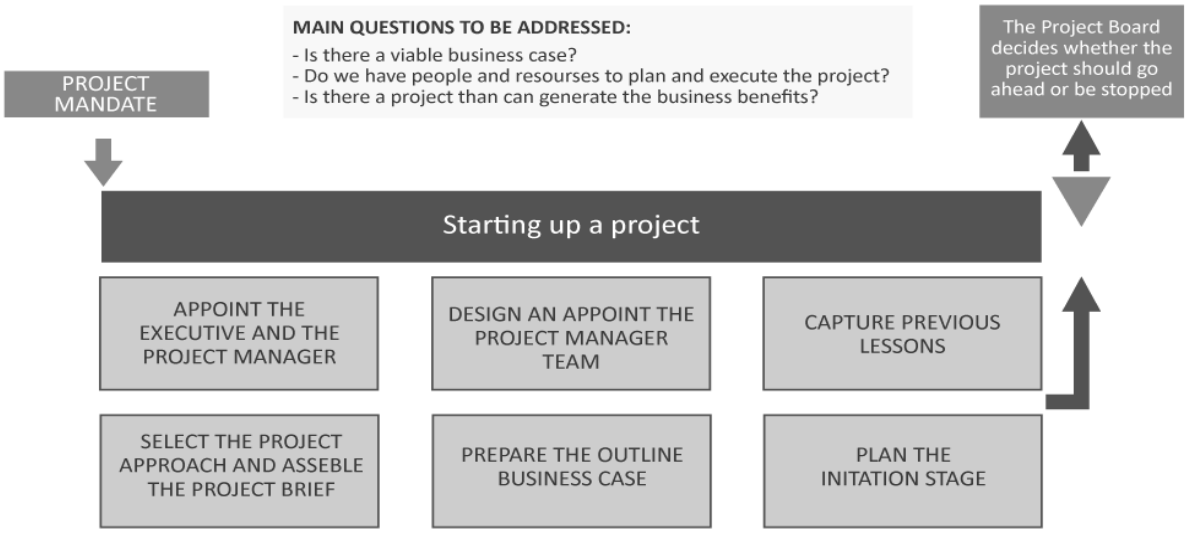

Figure 5. Starting up a Project

Once the project was triggered by the Project Mandate, in order to proceed with work, the available positions were filled. The project management team had to revise expectations and requirements to ensure that the project is still worthwhile. Prior to further planning, decisions on how the work would be approached were taken. All staff involved in this project have done so on a voluntary basis. Finally, the proposal for the Initiation Stage was conceived.

B. Directing the Project (DP)

The DP process is owned by the Project Board – in this case, the QA Lead – and runs from the completion of the SU phase until e-learning platform completion. It follows that the Lead is accountable for the project's success due to their decision-making responsibility. DP warrants that guidance and control are offered throughout the e-learning platform development life cycle, that the project is authorized to end should it no longer be viable and that the benefits are forecast and reviewed.

C. Initiating the Project (IP)

The Project Brief, derived from the Project Mandate, supplied the firm basis for initiation. In the IP phase, the Project Brief was detailed and refined into the Project Initiation Documentation, after which it was no longer maintained.

For instance, since the sole product is a Web Application, one of the major concerns is its security, because it can provide potential for an unauthorized party to obtain access to critical or proprietary data, misuse system resources or obstruct business flow. Security-minded planning saves time, money and resources in the long term. Lessons learned, as well as influence from external works on this topic, are to be included in the e-learning material [6].

The objectives of this phase were, primarily, to prepare the Risk Management Strategy, relying on input from team members and the available guidelines, as well as the Quality Management Strategy, as it was particularly important for the department who originally signaled this deficiency in training procedure [7].

Overall, the important points of this phase's management process were the expected benefits, the timeline and cost of the platform, a way to monitor and control progress, as well as the optimal way of disseminating information to the work group.

During this stage, the Project Initiation Documentation (PID) is elaborated. Its three primary uses are:

- Ensuring the e-learning platform is well defined before proceeding with any major commitments;
- Acting as the definitive documentation against which progress can be assessed and where issues and ongoing design uncertainties can be tracked;
- Serving as a unique point of reference for anyone looking to join the project or inquiring on it.

Thus, the PID encompasses the following:

- Management strategy documents:
  - Configuration Management Strategy;
  - Quality Management Strategy;
  - Risk Management Strategy;
  - Communication Management Strategy.
- An updated Business Case;
- A revised Project Plan;
- An updated Risk Log;
- An updated Lessons Learned Log.

D. Controlling a Stage (CS)

This process is performed by Project Manager (QA Lead) and describes the daily management duties and activities dedicated to assigning tasks, verifying the progress of the current stage and responding to any contingencies. Primary objectives are the delivery of the e-learning Web application within constraints, while controlling risks and any emerging problems.

The QA Lead has no one to report to, in this case, but still monitors the status and reviews the Business Case, in order to comply with the specified tolerances. All issues must be managed, since they must take action if any of them appear to threaten the specified tolerances.

E. Managing Product Delivery (MP)

A designated team leader – a different person than the QA Lead – is acting as the interface between the team and the acting Project Manager. During a stage, he is responsible for [8]:

- Handling the details of the workload;
- Verifying that expectations are still being met and tolerances are not exceeded;
- Reporting progress and forecasts to the QA Lead;
- Ensuring that the e-learning platform meets the quality criteria.

F. Managing a Stage Boundary (SB)

Every SB serves as a buffer that allows the Project Board to decide whether the platform is on track and should continue based on the supplied information. The objectives are to:

- Assure the Project Board that current milestones are completed and approved;
- Update the Business Case, Project Plan and Risk Register to enable the Board to determine the project's viability;
- Construct the next Stage Plan;

- Offer data for approving the completion of the current stage and the start of the next stage;
- Record any lessons learned that may prove useful in the future;
- Ask for authorization to start the next stage.

Once a stage is near completion, the SB process commences.

G. Closing a Project (CP)

A controlled closing of the project is necessary either prematurely or upon finalization. This especially concerns the Project Manager, who must gain permission for the project's closure. The phase will include:

- Assessing the extent that the objectives have been met as per the PID;
- Verifying that operational and maintenance procedures are in place; of note, this pertains to adding and updating the e-learning content, maintaining the quality standards, as well as reviewing and sharing test results.
- Ensuring that the newly available training opportunity is properly publicized;
- Performing and sharing a review of the gained experience.

H. Summarized results

The SU process, initially estimated to 1-2 days, lasted 4.5, and the DP process suffered due to work-related tasks and low manpower, setting the tone for future delays. Company management appreciated the project brief and, later on, the rest of the documentation was heavily utilized by team members.

One of the critical stages was the IP phase, since elaborating the Risk Management Strategy placed emphasis on negotiating common software development and cybersecurity pitfalls, which factored heavily in delaying work. Subsequently, the Project Plan was updated accordingly. However, the resulting Lessons Learned Log made the effort worthwhile, particularly since it featured in a Knowledge Sharing event for a majority of the company's Research and Development department.

Product delivery management has been significantly impaired so far. Given that this endeavor was a side project with no projected capital gain and little time allowance, setbacks were expected to be commonplace and the project was put on hold during its second SB phase.

Realistically, the results accumulated thus far were obtained after thorough research and firmly set in existing work experience and lessons learned while tackling real world challenges. Regardless of the project's ultimate outcome, efforts will be made to maintain adherence to the framework, measure and verify the relevant metrics and provide ample guidance to both existing and future team members.

IV. Conclusions

Constant accessibility, enhanced reach and collaboration, cost-effectiveness, improved results, all featured heavily in the decision to employ an e-learning medium, such as a Web Platform. Its benefits over a traditional, classroom-style learning environment are well publicized and understood, with special consideration given to its suitability as a human resource tool for employee retention. As personnel are enabled to retain more of the material through innovative presentation, testing and feedback, this provides advantages over those who do not have access to continuous learning methods.

Due to being widely adopted, debated and understood, PRINCE2 provides common ground for all project participants, with respect to terminology, decision-making and structure. Since it is a framework, it can be implemented with ease alongside more specialized, industry-specific models or methodologies. Finally, its adoption allows it to become embedded in company culture, providing ample opportunity for a degree of refinement which can only be achieved through sustained, long-term work in the same environment and with the same staff, granting one of the sharpest competitive edges around.

Though the e-learning platform development process is not finalized, important lessons have already emerged, such as that time constraints can easily be overrun, even on small scale projects. Communication was greatly aided by the small team size and the structured processes, yet it became apparent that unforeseen issues can arise when steps are skipped without the proper checks and full understanding of the underlying methodology by all those involved. The benefit of offering specialized training in project management at all levels cannot be understated.

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