



HAL
open science

Introducing a Fast Lane to Multi-Project Environments in Factories to Focus on Digital Transformation

Justin Hook, Lars Nielsen, Peter Nyhuis

► **To cite this version:**

Justin Hook, Lars Nielsen, Peter Nyhuis. Introducing a Fast Lane to Multi-Project Environments in Factories to Focus on Digital Transformation. IFIP International Conference on Advances in Production Management Systems (APMS), Sep 2022, Gyeongju, South Korea. pp.157-164, 10.1007/978-3-031-16411-8_20 . hal-04768964

HAL Id: hal-04768964

<https://inria.hal.science/hal-04768964v1>

Submitted on 6 Nov 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



This document is the original author manuscript of a paper submitted to an IFIP conference proceedings or other IFIP publication by Springer Nature. As such, there may be some differences in the official published version of the paper. Such differences, if any, are usually due to reformatting during preparation for publication or minor corrections made by the author(s) during final proofreading of the publication manuscript.

Introducing a Fast Lane to Multi-Project Environments in Factories to Focus on Digital Transformation

Justin Hook¹, Lars Nielsen², Peter Nyhuis¹

¹ Leibniz University Hannover, Institute of Production Systems and Logistics, 30823 Garbsen,
Germany

² Bahlsen GmbH & Co. KG
hook@ifl.uni-hannover.de

Abstract. In today's highly dynamic and volatile market, the need for change increases steadily in companies induced by megatrends like globalisation or digitalisation. To keep up with current developments and to meet ever higher customer demands ensuring their satisfaction many companies initiate a digital transformation process. Digital Transformation (DT) processes might change products, processes or entire business models in an organisation, to ensure staying competitive. For realising constant adaptation and change, companies are forced to initiate projects in their factories on a regular basis. Multi-project management (MPM) models are used to plan and control projects efficiently. In this article, digital transformation projects are described, an approach for multi-project planning and control (MPPC) in the factory is presented and a way of categorising projects is shown. By combining knowledge from those segments, a fast lane for MPPC is introduced that enables companies to standardise certain tasks in project management to focus on disruptive digital transformation projects.

Keywords: Multi-Project Management, Fast Lane, Factory Planning

1 Introduction

Manufacturing companies are confronted with a constant need for change, which is progressing at an increasingly rapid pace in times of globalisation. This development is reflected in ever shorter product life cycles [1]. In a market, characterised by growing competition and correspondingly higher expectations and requirements, products have to be developed, manufactured and marketed in a shorter time by initiating projects [2]. Megatrends such as digitalisation or urbanisation reinforce the changes that need to be continuously mastered [3]. Digitalisation is not only considered a megatrend but can be also seen as a chance for improving efficiency in internal organisational processes, or for creating opportunities like developing new services to customers [4].

Transforming a company's products, processes or the entire business model regarding their level of digitalisation has become such a major movement that the term digital transformation is commonly used. The basic prerequisite for a successful digital transformation (DT) of a company is a corresponding digitalisation strategy. In addition, the

processes, products and business models must be developed digitally and the transformational skills to initiate the change processes in the company must exist [5]. Change processes usually derive from adaptation needs, which are primarily realised through projects in factories [6–8]. Implementing digital capacities to enable a transformation process of the business model is usually part of a DT project or programme. Throughout the entire organisation existing habits and modes of operation may be questioned regarding processes and resources as well as employees and customers [9].

A project describes an "initiative that is essentially characterised by the uniqueness of the conditions in their entirety" [10]. As examples of such conditions, DIN 69901-5 mentions objectives, limitations, e.g. in terms of time, finances or personnel, the possibility of differentiation from other projects and a project-specific organisation [10]. An increasing project orientation results in a highly complex and dynamic project landscape. Project management at individual project level cannot sufficiently guarantee the application of strategies especially because of interdependencies between projects regarding resources, technical intermediate results and others. A complementary multi-project management (MPM) is needed that enables companies to systematically design and steer the project landscape in line with the strategy [6]. To ensure a company has the capacities needed for major change initiatives like the digital transformation, projects of less disruptive character should be managed as efficiently as possible allowing to focus on the digital transformation. Being able to determine projects of less innovative character gives the chance of standardising certain steps in their planning and control. A concept for this procedure is introduced in this paper, referred to as a fast lane. A fast lane leaves more resources in project management and enables companies to focus on pioneer projects. Pioneer projects can relate to a wide range of topics but definitely include digital transformation. The following chapters give insight to digital transformation projects, planning and controlling of multi-project environments and project categorisation to then propose a fast lane for multi-project environments dealing with projects with high standardisation potential.

2 Need for Research

The following chapter aims at giving a short introduction to the characteristics of digital transformation projects and project management in general. It is then explained why a new approach to implementing digital transformation projects into existing multi-project management approaches is needed.

2.1 Digital Transformation Projects and Programmes

ANSHIN AND BOBYLEVA describe digital transformation as a logical and content wise adjustment of processes [11]. The underlying strategies of a DT process must be in accordance to other strategies already implemented in a company. The demand for a high level of coordination also comes from digital transformation being a cross functional topic regarding several if not all areas of a company [11,12]. Digital transformation must therefore be approached following established rules for implementing new

projects taking into account their potential for being integrated into programmes [11]. MATT ET AL. state that research must provide guidelines for structuring processes enabling companies to align their strategies, set their goals accordingly and manage collaboration throughout the organisation [12]. This collaboration is managed in projects to enable the desired changes in the organisation.

In project management, the term programme stands for the "parallel and sequential networking of individual projects and tasks that in their entirety implement a strategic corporate goal" [2]. A programme can contain part of the entirety of projects or all of them [13]. Implementing a suitable programme organisation serves the purpose of reaching the superordinate target effectively and as efficiently as possible. The foundation of realising such target is set by the outcome of the individual projects [14]. A DT process should therefore be implemented as a programme in order to manage several individual projects with their clearly defined scopes aligned to the direction of objectives formulated in a programme. An adjustment of programmes is sometimes necessary after the first definition, as usually not all measures and individual projects are defined at the same time. This inaccuracy can be counteracted by initiating new projects or tasks [2]. The focus of a DT project can lie on implementing different technologies, e.g. cyber-physical systems, automated robotics, Big Data analytics, and cloud computing [15]. GERTZEN ET AL. state that DT projects aim for changing a company's identity, develop a new business strategy or even restructure the whole idea of value creation [16].

2.2 Planning And Controlling Multi-Project Environments In Factories

Managing multi-project environments is a topic not only relevant for factories but all kinds of companies and business units. Approaches to MPM have therefore been around for a long time. Examples include SEIDL or DIN 69909-2 [17,18]. Managing projects is a process that can be divided into the project management phases 'Initialisation', 'Definition', 'Planning', 'Control' and 'Closure' [19]. The tasks in multi-project management are usually clearly assigned to such phases and are linked semantically. While regarding a factory setting the management of multi-project environments can still be described and managed through models like the above mentioned, special requirements and targets demanded by production environments and their factories are not considered. Previous approaches lacked decision making support regarding the possibility of a conflict of objectives. At the Institute of Production Systems and Logistics (IFA) the combination of insights from the fields of production planning and control (PPC) and MPM has been investigated [20,21]. This approach enables the development of a concept of multi-project planning and control (MPPC) with a focus on factories, which offers a holistic view of relevant tasks and links them via interrelationships [20,21]. Task profiles are part of the MPPC model and have already been created [20]. Currently interrelationships of the model in terms of target fulfilment are being investigated. The main tasks of MPPC are generate project proposal, release project proposals, define project, define portfolio, determine project structure and make or buy shares, plan and assign make or buy shares, appoint project, control and monitor project, control and monitor programme and portfolio, close project [21]. These main tasks are to be taken step after step following the project management phases. The measures

and activities that shall be implemented over the course of a change process in order to achieve the desired change are described as the project design [22]. A suitable project design can help to relieve the workload on organisations. Regarding digital transformation, this represents a great opportunity, as these projects require a great share of attention in the company due to their enormous importance for its success. If intelligent project design is used to reduce the workload in the organisation, more resources are left for the crucial DT projects. Standardised procedural models can help to define the processes, phases, tasks and roles in projects more quickly and with less use of resources by exchanging experience and knowledge across projects. For the use of standardised process models tailoring may sometimes be necessary, which describes the adaptation and individualisation of process models and their elements in the form of additions, changes or reductions. In some cases, process models can also be used without tailoring [22]. An important factor regarding project design and the degree of standardisation is the type of project [22]. It is therefore necessary to categorise the projects.

2.3 Project Categorisation

Projects can be categorised according to various criteria. A differentiation according to the type of project makes it possible to use commonalities in the sense of efficient project management [2]. PATZAK AND RATTAY mention the project content, the client position or the degree of repetition as classification criteria [2]. In addition to this form of classification, there are other criteria to determine the type of project and might also serve as an aid to project organisation. KUSTER ET AL. distinguish between open and closed tasks and high and low complexity [13]. Numerous models can be used to categorise projects accordingly, but they are not fundamentally differentiated according to type of project [23]. WHEELWRIGHT AND CLARK have developed a distinction of project type for development projects, which is based on the changes in processes and products that accompany them [24]. For the context of manufacturing companies and digital transformation this represents an ideal base. The project matrix can be seen in **Fig. 1**.

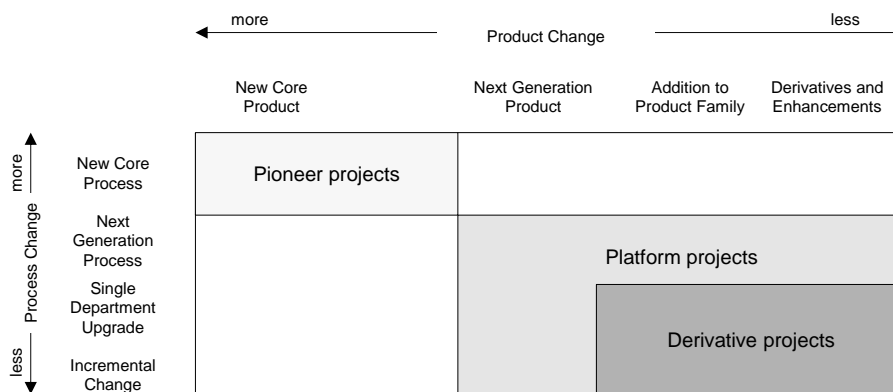


Fig. 1. Project Matrix (according to [24])

A distinction is originally made between 'Breakthrough projects', 'Platform projects' and 'Derivative projects' with decreasing intensity of change [24]. Projects called 'breakthrough projects' use or generate revolutionary and new technologies [24]. For the purpose of this work, regarding the whole factory environment and especially digital transformation as a continuous process, the term 'pioneer project' is introduced as the category with the highest degree of change instead. This includes all projects that have no usable analogies or similarities to past or current projects.

3 Introducing a Fast lane to MPPC

Similarities between project contents can influence the design and scope of individual project management tasks. The platform concept from production can be mentioned here as an analogy. In vehicle construction, this method was developed to build different types of vehicles on the same platform and thus to use synergies [1]. Transferred to projects, a platform concept reveals potentials for the standardisation of documents and processes, e.g. in the determination of project requirements or the development of project structures. These documents and processes are summarised in the following under the term standardised process models. For a project platform concept, referred to as a fast lane in the context of this paper, the project differentiation after WHEELWRIGHT AND CLARK offers a suitable starting point [24]. **Fig. 2** shows the three project types and their potentials along the project management phases in terms of a fast lane.

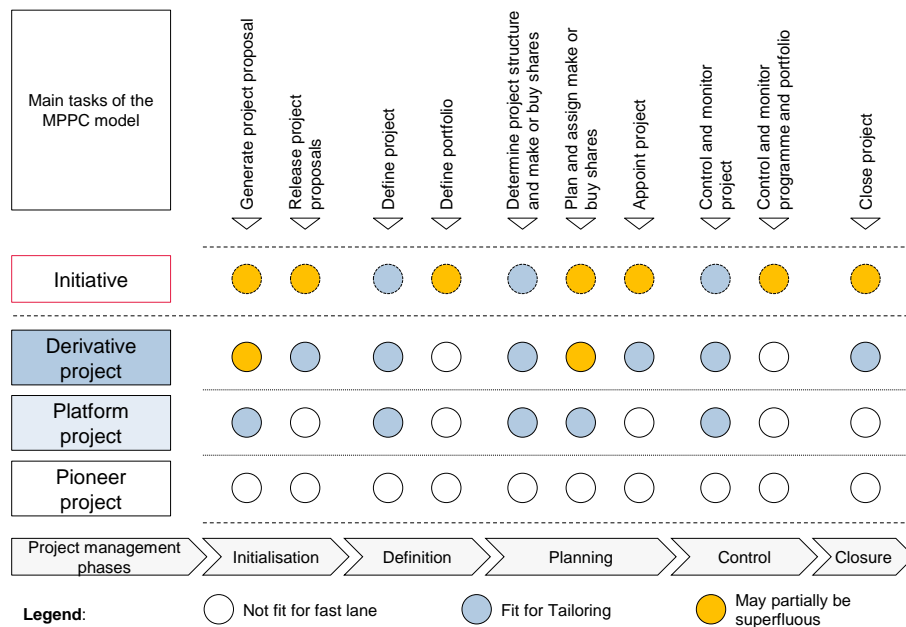


Fig. 2. Fast lane potential of different project types along the main tasks of MPPC (according to [21][24])

Including a task in the fast lane does not mean that it is completely autonomous or standardised. Instead, synergies with similar projects might increase efficiency through standardised process models or template use [2]. Templates provide guidelines for realisation or set necessary framework conditions and come from the database of a holistic knowledge management. Templates are not meant to solely copy past project data. For this paper a distinction is made between two degrees of standardisation. The first degree is projects being able to use standardised process models after being tailored. Templates might be used in a modified way, standardised process models might be slightly reduced or added to. The second kind of project is able to make use of standardised process models without the need for tailoring. This requires greater similarities to other projects. The term 'fit for fast lane' sums up the potential use of standardised process models either with or without the need for tailoring in the sense of the fast lane so projects can generate an increase in efficiency at a certain main task of MPPC. The term initiative serves to clarify that a complete use of standardised process models does not lead to an ideal fast lane, but instead prevents a classification as a project. This fact can be attributed to the unique character of a project (see section 1). If an initiative can be supported in every aspect with templates, this contradicts the definition of a project. The pioneer project cannot be supported in any of the main tasks through the use of standardised process models. This means that highly innovative projects like those pursuing digital transformation cannot be managed using a fast lane. The benefit of the fast lane for those projects lies in designing less innovative projects in such a way that resources and capacities can be concentrated on digital transformation. An example of a pioneer project is the development of an application for integrating big data from different sources within the company, since technical problems are still often encountered in such process [15]. Platform projects have potential for standardisation in the tasks generate project proposal', 'define project', determine project structure and make or buy shares', plan and assign make or buy shares' as well as 'control and monitor project'. All of these tasks are fit for fast lane with the constraint that tailoring is needed first. An example of a platform project is the execution of an audit. As an essential part of any internal quality management, audits can be standardised to a certain extent [25]. Still, audits are to be characterised as projects and do not fall under day-to-day business. Standardised process models and templates can be used at various points of initialisation and planning, as well as control. As an example, controlling and monitoring at project level is explained below. An audit can be monitored during its implementation based on existing data and experience from past audits by including templates. Compared to platform concepts, derivative projects may also be supported by templates to a certain degree. While all of the potentials of platform projects also exist for derivative projects, there is even potential for standardisation in other main tasks. For example the release of project proposals might be standardised to a certain degree. A framework contract with a supplier could for example set the base for cooperation in similar projects which only need tailoring. Same goes for appointing and closing projects of the category derivative project. There is also greater potential in the main tasks 'generate project proposal' and 'plan and assign make or buy shares' compared to platform projects. These tasks may have the potential of being standardised without the need for tailoring regarding derivative projects. An example is the setup of a new machine in

production where a high number of identical or similar machines have already been installed. That experience can be expected to support generating the project proposal and assigning make or buy shares to commission a contractor. The chosen examples show how much the fitness for fast lane increases from pioneer projects over platform projects to derivative projects. Depending on the level of innovativeness projects might not be fit for fast lane, fit for tailoring or might even be partially superfluous. Minimising the capacities for setting up a machine or executing an audit could therefore improve the situation for the pioneer project on big data by releasing more staff capacity.

4 Conclusion and Outlook

In the last chapters of this paper it could be shown that MPPC offers a chance of supporting the digital transformation in organisations. Since projects dealing with digital transformation are usually highly innovative and complex, a high degree of attention, focus and resources is needed. Due to these high requirements for the organisation, every action that enables project management to focus more on such projects should be taken. Defining project types with regard to their innovativeness allows for a distinction between pioneer projects, platform projects and derivative projects. Based on this categorisation the project design can be chosen, giving options to include standardised process models along the project management phases to enable projects for a so called fast lane. In future research criteria for defining project types could be established and further investigation regarding the impact on resources and capacities resulting from implementing a fast lane could be carried out.

Acknowledgements. The authors kindly thank the German Research Foundation (DFG) for the financial support to accomplish the research project "Entwicklung eines Prozessmodells der Multiprojektplanung und -steuerung in der Fabrik (MPPS-Fabrik)" (project number NY 4/72-1).

References

- [1] Wiendahl, H.-P., Reichardt, J., Nyhuis, P., 2014. Handbuch Fabrikplanung: Konzept, Gestaltung und Umsetzung wandlungsfähiger Produktionsstätten, 2., überarb. und erw. Aufl. ed. Carl Hanser Verlag, München Wien, 35469 pp.
- [2] Patzak, G., Rattay, G., 2018. Projektmanagement: Projekte, Projektportfolios, Programme und projektorientierte Unternehmen, 7., aktualisierte Auflage ed. Linde Verlag Ges.m.b.H, Wien, 791 pp.
- [3] Hingst, L., Wecken, L., Brunotte, E., Nyhuis, P., 2022. Einordnung der Robustheit und Resilienz in die Veränderungsfähigkeit.
- [4] Parviainen, P., Tihinen, M., Kääriäinen, J., Teppola, S., 2017. Tackling the digitalization challenge: how to benefit from digitalization in practice. *IJISPM* 5 (1), 63–77.
- [5] Obermaier, R., 2019. Handbuch Industrie 4.0 und Digitale Transformation. Springer Fachmedien Wiesbaden, Wiesbaden, 766 pp.

- [6] Aurich, J.C., Barbian, P., Naab, C., 2005. Multiprojektmanagement in der projektorientierten Produktion: Gestaltung und Lenkung der Projektlandschaft in der Produktion. *wt Werkstattstechnik online* 95 (1/2), 19–24.
- [7] VDI, 2011. *Fabrikplanung Planungsvorgehen*. Beuth Verlag, Berlin.
- [8] Wiendahl, H.-P., 2019. *Betriebsorganisation für Ingenieure*. Carl Hanser Verlag GmbH & Co. KG, München.
- [9] Henriette, E., Feki, M., Boughzala, I. *The Shape of Digital Transformation: A Systematic Literature Review*.
- [10] DIN, 2009. *Projektmanagement – Projektmanagementsysteme - Teil 5: Begriffe*. Beuth Verlag, Berlin.
- [11] Anshin, V., Bobileva, A., 2021. The digital transformation program management in medium-sized businesses: A network approach. *Serb J Management* 16 (1), 147–159.
- [12] Matt, C., Hess, T., Benlian, A., 2015. Digital Transformation Strategies. *Bus Inf Syst Eng* 57 (5), 339–343.
- [13] Kuster, J., Huber, E., Lippmann, R., Schmid, A., Schneider, E., Witschi, U., Wüst, R., 2011. *Handbuch Projektmanagement*, 3. Auflage ed. Springer-Verlag Berlin Heidelberg, Heidelberg, Dordrecht, London, New York, 460 pp.
- [14] DIN, 2013. *Multiprojektmanagement – Management von Projektportfolios, Programmen und Projekten - Teil 1: Grundlagen*. Beuth Verlag, Berlin.
- [15] Xu, L.D., Xu, E.L., Li, L., 2018. Industry 4.0: state of the art and future trends. *International Journal of Production Research* 56 (8), 2941–2962.
- [16] Gertzen, W.M., van der Lingen, E., Steyn, H., 2022. Goals and benefits of digital transformation projects: Insights into project selection criteria. *SAJEMS* 25 (1).
- [17] DIN, 2013. *Multiprojektmanagement – Management von Projektportfolios, Programmen und Projekten - Teil 2: Prozesse, Prozessmodell*. Beuth Verlag, Berlin.
- [18] Seidl, J., 2011. *Multiprojektmanagement: Übergreifende Steuerung von Mehrprojektsituationen durch Projektportfolio- und Programmmanagement*. Springer-Verlag, Berlin, Heidelberg.
- [19] DIN, 2009. *Projektmanagement – Projektmanagementsysteme - Teil 2: Prozesse, Prozessmodell*. Beuth Verlag, Berlin.
- [20] Hook, J., Nielsen, L., Nyhuis, P., 2021. *Introduction Of A Concept For Planning And Controlling Multi-Project Environments In Factories*.
- [21] Nielsen, L., 2020. *Prozessmodell für Multiprojektmanagement in der Fabrik*. Dissertation, 231 pp.
- [22] V., G.D.G.f.P.e.M., 2019. *Kompetenzbasiertes Projektmanagement (PM4): Handbuch für Praxis und Weiterbildung im Projektmanagement*, 1st ed. ed. Buch & media, München, 11701 pp.
- [23] Kunz, C., 2007. *Strategisches Multiprojektmanagement: Konzeption, Methoden und Strukturen*, 2nd ed. Deutscher Universitäts-Verlag GWV Fachverlage GmbH, Wiesbaden, 312 pp.
- [24] Wheelwright, S., Clark, K., 2003. Creating Project Plans to Focus Product Development. *Harvard Business Review*, 1–14.
- [25] Foster, S.T., 2013. *Managing quality: Integrating the supply chain*, 5th ed. ed. Pearson, Boston, xxiv, 453.