PROJECT HALF DOUBLE

Project Half Double

RESULTS OF PHASE 1 AND PHASE 2, JUNE 2019

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EXECUTIVE SUMMARY

Project Half Double (PHD) has a clear mission: to define a project methodology that can increase the success rate of projects while increasing the development speed of new products and services. The overall goal is to deliver *"Projects in half the time with double the impact"* where projects in half the time should be understood as half the time to impact (benefit realization, effect is achieved) and not as half the time for project execution.

Below is an overview of the overall results from the 16 pilot projects implementing the Half Double Methodology (HDM) in phase 1 and phase 2.

- In seven pilot projects the HDM appears to have had a high impact (Lantmännen Unibake, Novo Nordisk, Jabra GN, Velux, LINAK, Terma and Coloplast)
- In two pilot projects the HDM appears to have had a medium impact (FoodService Danmark and Schoeller Plast)
- In four pilot projects the HDM appears to have had a low impact (Siemens Wind Power, Grundfos, SAS Ground Handling and Fiberline Composites)
- Three pilot projects are still in progress or not fully evaluated (Novozymes, Hydratech Industries and LEGO Group)

The results indicate that in the majority of pilot projects the HDM seems to have had a positive effect: the HDM appears to have had a high impact in 54% of the projects and a medium impact in 15% of the projects. However, four pilot projects seem to have had a low impact from using the HDM – related to the overall goal of PHD: to deliver "*Projects in half time with double impact"*. There may be several reasons why the projects fail to live up to the overall goal. This report elaborates on these reasons in two out of the four cases: SAS Ground Handling and Fiberline Composites. The cases of Siemens Wind Power and Grundfos are described in an earlier report (Svejvig, Rode, & Frederiksen, 2017). It is important to emphasize that the evaluation described above is only related to the impact from using HDM related to the overall goal of PHD. This means that the pilot projects may be successful in other ways, for instance, by achieving their success criteria, delivering on time, cost and scope or creating valuable learnings.

Below is an overview of the 16 pilot projects' success criteria fulfilment:

- Nine pilot projects are mostly successful which means they fulfil all or most of their success criteria (Lantmännen Unibake, Coloplast, Novo Nordisk, Velux, SAS Ground Handling, Foodservice Danmark, Terma, Hydratech Industries and LEGO)
- Four pilot projects are partly successful which means they fulfil some of their success criteria (Siemens Wind Power, Jabra GN, Linak and Fiberline Composites)
- Two pilot projects are less successful which means they fulfil only a few of their success criteria (Grundfos and Novozymes)
- One pilot project is still in progress and not fully evaluated (Schoeller Plast)

The overall results are that nine out 13 pilot projects seem to have had high or medium impact from using the HDM and 13 out of 15 pilot projects have fulfilled some or most of their success criteria. These consolidated results are promising regarding the use of HDM, but they also indicate that no methodology is applicable for everything.

INTRODUCTION

About this report: The purpose of this fifth report is to present the final overall results from phase 1 and phase 2 of Project Half Double (PHD) as well as to describe the nine pilot projects from phase 2 in detail.

This report extends results from three earlier reports about PHD (Svejvig et al., 2016; Svejvig, Rode, et al., 2017; Svejvig, Adland, et al., 2017).

In addition a report focusing on the following themes has been published: training practitioners, working with visuals, practice reflections and small and medium-sized enterprises (Rode, Frederiksen, & Svejvig, 2018).

Taken together, the five reports serve as a complete and comprehensive presentation of the data from the research process, which started in June 2015 and finished in June 2019.

This report's target group includes practitioners in the Danish industry and society in general.

The editorial team at Aarhus University began to finalize the report in mid-April 2019, which means that data after this point in time is not included.

The Half Double mission: PHD has a clear mission. We want to find a project methodology that can increase the success rate of projects while increasing the development speed of new products and services. We are convinced that by doing so we can strengthen Denmark's competitiveness and play an important role in the battle for jobs and future welfare. The overall goal is to deliver "*Projects in half the time with double the impact*" where projects in half the time should be understood as half the time to impact (benefit realization, effect is achieved) and not as half the time for project execution.

The Half Double journey: It all began in May 2013 when we asked ourselves: How do we create a new and radical project paradigm that can create successful projects? The formal part of PHD was initiated in June 2015. It is a two-phase project: phase 1 ran from June 2015 to June 2016 with seven pilot projects, and phase 2 from July 2016 to June 2019 with nine pilot projects.

The Half Double consortium: Implement Consulting Group is the project leader establishing the collaboration with the pilot project companies and implementing the Half Double Methodology (HDM). Aarhus University and the Technical University of Denmark evaluate the impact of using the HDM. The Danish Industry Foundation, an independent philanthropic foundation, contributes DKK 13.8m to the project.

The research process: The four Half Double reports present the 16 pilot projects and organizations as well as the results from these cases. Details on the research process and methodology can be found Appendix A.

Along the way, several conference proceedings and journal articles about the Half Double project and methodology have been written and published (Laursen, Svejvig, & Rode, 2017; Svejvig, Geraldi, & Grex, 2019; Svejvig & Grex, 2016; Svejvig & Hedegaard, 2016). These papers present further considerations about the research process, data collection, data analysis and evaluation of the research complementing Appendix A. However, Appendix A should give a sufficiently comprehensive description of the research process and methodology to

ensure that the reader understands the relevant factual conditions of the study.

Limitations and uncertainty: There is always a degree of uncertainty associated with research results. The general limitations of the research results presented in this report are described in Appendix B. Moreover, each case description states the limitations directly associated with the specific project evaluation. We strongly encourage the reader to consider the limitations carefully – both specific and general – in order to understand the results of the study.

Conflict of interest: The authors declare no conflict of interest regarding the funding agency, Implement Consulting Group and other parties involved in PHD.

Structure of report: The next chapter provides an overview of the Half Double material published – including research reports and academic publications. The following chapter presents the HDM at project and portfolio level. This is followed by an overview of the results from all 16 cases in phase 1 and phase 2. Next, nine detailed chapters on the nine pilot projects from phase 2 are presented. The final chapter includes a conclusion of the report. Appendices A and B include a description of the research methodology and its limitations.

PROJECT HALF DOUBLE PUBLICATIONS

RESEARCH REPORTS

Rode, A. L. G., Frederiksen, S. H., & Svejvig, P. (2018). Project Half Double: training practitioners, working with visuals, practice reflections and small and medium-sized enterprises. December 2018. Aarhus: Aarhus University.

Svejvig, P., Adland, K.T., Klein, J. B. Z., Pedersen, S.E., Anker Nissen, N., & Waldemar, R. (2017). Project Half Double: Current Results of Phase 1 and Phase 2, December 2017. Aarhus: Aarhus University.

ACADEMIC PUBLICATIONS

Svejvig, P., Geraldi, J. & Grex, S. (2019). Accelerating Time to Impact: Deconstructing Practices to Achieve Project Value. International Journal of Project Management.

Rode, A. L. G. & Svejvig, P. (2018). Project Evaluation: One Framework – Four Approaches. Paper presented at the Fourth Danish Project Management Research Conference, Copenhagen, Denmark.

Svejvig, P., Geraldi, J. & Grex, S. (2017). Accelerating Time to Benefit: Deconstructing Innovative Organizational Practices in Five Projects. Paper presented at IRNOP 2017 (International Research Network on Organizing by Projects), Boston, MA, USA.

Frederiksen, S.H. & Svejvig, P. (2017). The Collaborative Project Owner in Theory and Practice: Examples from Project Half Double. Paper presented at the Third Danish Project Management Research Conference, Copenhagen, Denmark.

Svejvig, P., Gerstrøm, A., & Frederiksen, S. H. (2017). Project Half Double: Addendum: Current Results for Phase 1, January 2017. Industriens Fond, Aarhus Universitet, Danmarks Tekniske Universitet, Implement Consulting Group.

Svejvig, P., Ehlers, M., Adland, K. T., Grex, S., Frederiksen, S. H., Borch, M. M., Boston, N.E., Erichsen, D.B., Gyldahl, C., Ludwig, C.B. & Pedersen, S.E. (2016). Project Half Double: Preliminary Results for Phase 1, June 2016. Industriens Fond, Aarhus Universitet, Danmarks Tekniske Universitet, Implement Consulting Group.

Laursen, M., Svejvig, P. & Rode, A.L.G. (2017). Four Approaches to Project Evaluation. Paper presented at The 24th Nordic Academy of Management Conference, Bodø, Norway.

Heeager, L.T., Svejvig, P. & Schlichter, B.R. (2016), ”How has Agile Methods Inspired an Industrywide Project Management Initiative?”. Selected Papers of the Information Systems Research Seminar in Scandinavia, Issue No. 7.

Heeager, L. T., Svejvig, P. & Schlichter, B.R. (2016). How Agile Methods Inspire Project Management – The Half Double Initiative. International Research Workshop on IT Project Management 2016. Paper 13, Dublin.

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Svejvig, P. & Hedegaard, F. (2016). The Challenges of Evaluating and Comparing Projects – An Empirical Study of Designing a

Comparison Framework. In J. Pries-Heje & P. Svejvig (Eds.), Project Management for Achieving Change (pp. 107-129). Frederiksberg: Roskilde University Press.

BROCHURE

Rode, A. L. G., & Svejvig, P. (2018). High Level Research Findings from Project Half Double. Aarhus: Aarhus University.

BOOK

Olsson, J. R., Adland, K. T., Ehlers, M. & Ahrengot, N. (2018). Half Double: Projects in Half the Time with Double the Impact. Hellerup: Implement Press.

THE HALF DOUBLE METHODOLOGY: PROJECT AND PORTFOLIO LEVEL

Half Double – at project level

Project Half Double (PHD) was initiated in 2015 with a clear mission. Our aim was to find a project methodology that could increase the success rate of projects while increasing the development speed of new products and services. We were convinced that by doing so we could strengthen Denmark's competitiveness and play an important role in the battle for jobs and future welfare.

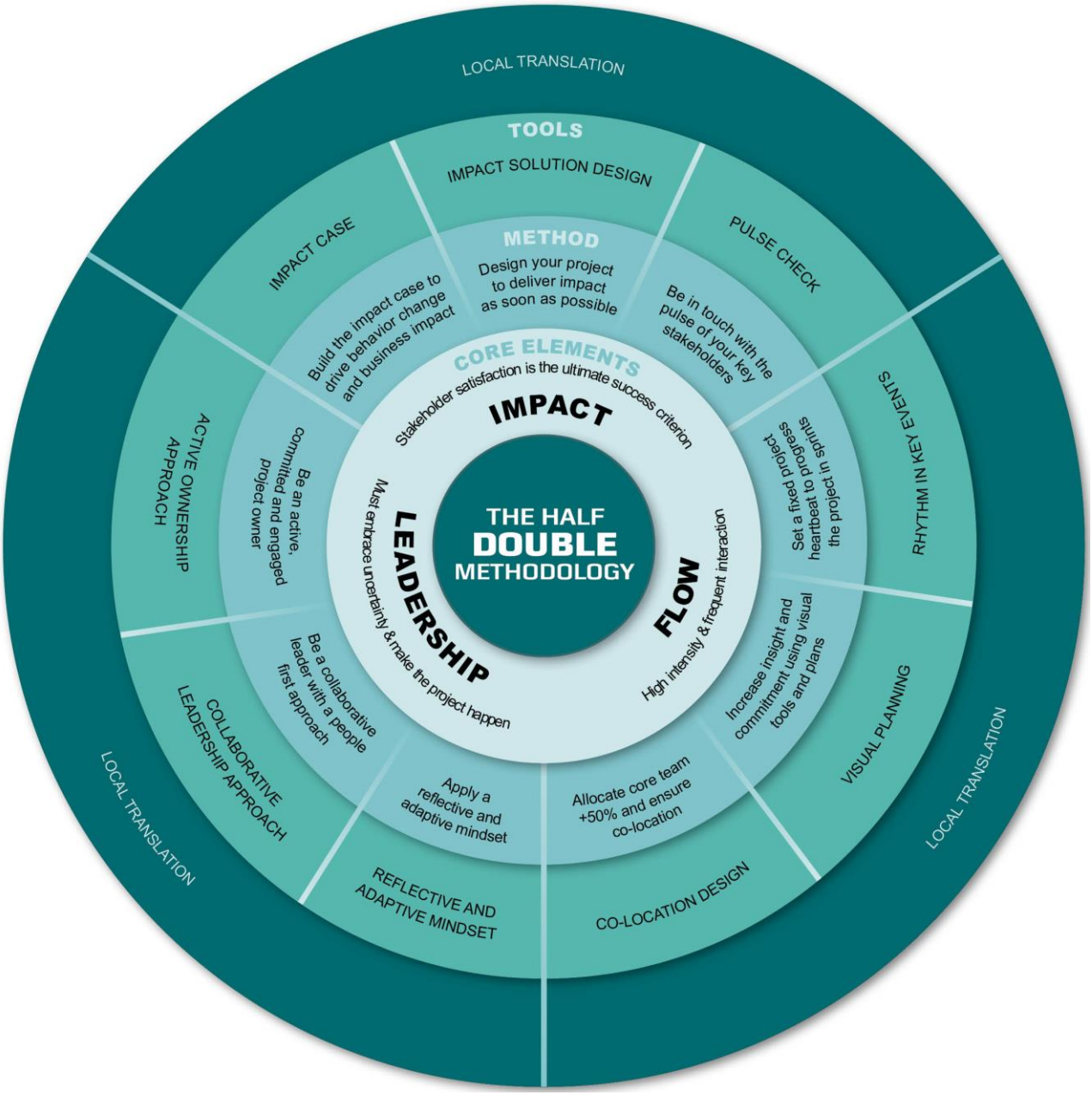
Our challenge was essentially to conceptualize a project management methodology through research and collecting best practice approaches. A project management approach that is based on actual human behaviour, unpredictability and complexity rather than assumptions of rationality and predictability acknowledging that times are changing; that the external environment is becoming more and more turbulent; that performance requirements are rising and that it is becoming increasingly necessary to accept continuous change and chaos as fundamental premises. We did not reject the classic view of project management. Instead, we used it as a steppingstone adapting it where most needed in relation to the situation at hand. We aimed to experiment with new principles and methods in real-world pilot projects and to gather learning from this experience – and get a community of trendsetting professionals to help co-create the methodology process.

The Half Double Methodology (HDM) in its latest "ready to go live" version is presented in Figure 1 on the next page: A methodology demanding a strong focus on three core elements which, combined, reduce time to impact, keep the project in motion and promote the leadership of people rather than the management of technical deliverables. Each core element puts forward a principle – a non-negotiable standard – for how we are to lead our projects. Each principle is directly linked to a method – a proposed approach, procedure or process for bringing the principles to life in practice. Each method is supported by a tool – a specific instrument – aimed at easing implementation. Bear in mind that we emphasize the evolving nature of the concept as the methodology is in continuous development – never set in stone. Rather, it is constantly inspired by – and adapted to – new insights and learning from practice and from our community of engaged project practitioners.

The concept takes us from the core – the non-negotiable standards we bring into all projects – to the localization where we adapt the methods and tools to fit local cultures and practices. The further we move away from the core elements and into the outer circles, the more flexible we become in terms of which approaches and tools to apply. We propose that each project apply an Impact Case to drive business impact and behavioural change but remain open to the idea of applying the organization's own Business Case template if it is the preferred tool; however, it must embrace behavioural change to be applicable. Hence, the actual implementation and adaption require reflection and translation to work in the local context. Each of the three core elements and their associated principles, methods and tools are elaborated on in the next section. A more in-depth understanding of the methodology and examples of how it has been translated

into practice is available in the Half Double Handbook which can be downloaded from the Half Double homepage (www.projecthalfdouble.dk) and in the Half Double Book (Olsson, Adland, Ehlers, & Ahrengot, 2018).

Figure 1: The Half Double Methodology



Core element 1: Impact

Principle: Stakeholder satisfaction is the ultimate success criterion. No project exists for the sake of the project. All projects are initiated to create impact. Identifying and focusing on impact right from the start is the key. Impact changes the dialogue from being centred on technical deliverables to how to ensure stakeholder satisfaction throughout the project's lifecycle. The HDM puts forward the following methods and tools to realize impact in practice:

Impact method 1: Build the impact case to drive behavioural change and business impact. Projects should be driven by impact rather than deliverables. Together with key stakeholders and subject matter experts, we therefore formulate an impact case that lists, prioritizes and visualizes the business and behavioural impact the project is set out to create. These impacts are broken down into selected Key Performance Indicators (KPIs) to steer the project forward. The impact case and KPIs are used to follow up on project progress continuously adapting plans and efforts to enhance stakeholder satisfaction. **Tool**: Impact Case.

Impact method 2: Design your project to deliver impact as quickly as possible. We must move away from the premise that projects only generate value at the very end of their lifespan. We need to create early insights through fast prototyping, generating impact – faster in the process. As soon as objectives and key impacts are identified, the project is ideated and analysed to define the fundamental idea. The fundamental idea summarizes the actual solution design; the approach to realize impact as soon as possible; how to frontload knowledge and involve end users right from the start; and how to capture learning and insights early in the project and throughout its duration. Key insights and learning allow us to adapt the approach to the ever-changing environment and the thoughts and feelings of our key stakeholders. The core idea is the foundation for the impact solution design – an overall map outlining the project's impact realization journey toward its conclusion date, which combines commercial, behavioural and technical deliverables. **Tool:** Impact Solution Design.

I**mpact method 3: Be in touch with the pulse of your key stakeholders.** Acknowledging and working actively with the dynamic nature of projects are key to success. Interests and focus change rapidly, and it is essential to gain insights and facilitate an ongoing dialog among the right people to ensure engagement and continuous focus on the right impact. As part of the effort to gain that insight, we identify the project's key stakeholders, and once a month we distribute an electronic six-item questionnaire set up to measure the stakeholder's "pulse"; e.g. "Are you confident that your current work is creating impact for the project?" The pulse check report provides a snapshot of each stakeholder's experience with the project. This insight functions as the basis for a constructive dialog regarding how to steer the project forward to leverage impact, ensure energizing working conditions and personal development. **Tool:** Pulse Check.

Core element 2: Flow

Principle: *High intensity and frequent interaction to ensure continuous project progression.* We want to create flow in the project. The whole project group should work on the project at the same time – not just a few project team members. However, important project working hours are often lost in coordination, retrospective project reporting and shifting between multiple projects running simultaneously. We can do better. To focus

on the flow of the project, we use simple methods to intensify project work, ensure the project progress every week and deliver results – faster. The HDM puts forward the following methods and tools to enhance flow in practice:

Flow method 1: Allocate team +50 % and ensure co-location. At a portfolio level there is a best practice approach aimed at ensuring "short and fat" projects – meaning fewer projects with a more intense resource allocation. The approach has been proven to reduce lead-time drastically. Together with the project owner, project leader and portfolio management office, we therefore work to ensure that core project team members are +50% allocated to the project. We furthermore know that placing project team members in the same physical (or virtual) location enhances their team performance as it boosts energy and the degree of knowledge sharing among participants. To ensure effective and efficient project work, we therefore aim at establishing an energizing virtual or physical co-location setup to do away with complexity generated by different time schedules and sites. The collaborative setup is designed as a step-by-step process that supports the fixed project heartbeat and the visual tools. **Tool:** Co-location design

Flow method 2: Set a fixed project heartbeat for stakeholder interaction to progress the project in sprints. A fixed project heartbeat creates more energy, higher efficiency, better quality and ultimately faster development. In short, stringent structures free up energy and the focus needed to do creative thinking and solve complex project tasks. Together with the project leader, we develop a stringent rhythm consisting of monthly sprint planning meetings, weekly 30-minute status meetings and weekly solution feedback meetings where deliverables are presented and evaluated by key users and important stakeholders. Based on solution feedback from users, the following week's deliverables are planned in detail using a visual poster. Every two weeks the project owner takes part in the review meetings to get to know the project in its raw and unpolished form. "Corporate theatre meetings" with neat PowerPoint presentations are reduced to a minimum and time spent is optimized and utilized to handle real life project issues and decisions. **Tool:** Rhythm in key events.

Flow method 3: Increase insight and commitment using visual tools and plans. When operating in a project mode with high intensity and many touchpoints with both internal and external stakeholders, it is important to find an efficient way of communicating progress and solutions as well as progress and traction. Powerful visualization is an indispensable communication tool that drives dialogue and project progress. To enhance commitment and alignment, we therefore ensure that the project core team together produces a visual plan for the overall sprint for ongoing reference at daily and weekly planning sessions and weekly solution feedbacks. All plans are kept visual (or virtual) at all times in the co-location setup; they are also used for quick communication of the status of the project to other stakeholders. We furthermore work with visualizing the current solution or process at hand through mock-ups and fast prototyping using simple drawings, simulations with coloured cards and posters. **Tool:** Visual planning.

Core element 3: Leadership

Principle: Leadership embraces uncertainty and makes the project happen.

We aspire to revolutionize how projects should be led. We want less bureaucracy, less formal steering committee meetings and less contractual focus. We need less compliance and more commitment. We need leaders who cope with turbulence, conflicts

and people – leaders who focus on the human aspects; work closely together on a regular basis; handle issues and complexity jointly and know the project inside out.

Laid-back formal steering committees that critically assess the project only once every two months are a thing the past. Project owner involvement, sparring with the project and intensity are the future. Project owners must dare take the lead and must invest and spend real time on the projects –simply because research has proven an active owner to be a critical prerequisite for project success.

Project leaders who view and promote themselves as the most technically savvy and think that structure can save any project are living in the past. Collaborative project leaders with a people-first approach who can embrace a complex human system are the future – because they actually succeed with their projects.

The HDM puts forward the following methods and tools to enhance project leadership in practice:

Leadership method 1: **Be an active, committed and engaged project owner.** Research suggests one common denominator across all successful projects: an active, committed project owner who engages directly with the project on an ongoing basis. We therefore work intensively on ensuring that the right project owner is appointed in close collaboration with the steering committee. The project owner will be working closely together with the project leader and the steering committee to ensure project success. The project owner should focus on eliminating idiosyncrasy at the organizational level to pave the way for the Half Double mindset and to adapt the project to governance or vice versa. Furthermore, the project owner should spend real time on the project – three hours bi-weekly as a rule of thumb – to embrace uncertainty and adapt to changes with on the spot decision-making as the primary tool. Being part of the meetings will ensure continuous focus on impact and guide the overall project to stakeholder satisfaction. **Tool**: Active ownership approach.

Leadership method 2: **Be a collaborative project leader (not manager) with a people-first approach.** It no longer suffices to be a trained technician who can follow detailed procedures and techniques, prescribed by project management methods and tools, if you are to lead a project to impact. Collaborative project leadership is about leading a complex system of human beings, embracing the inevitable uncertainty and making the project happen. A collaborative project leader is capable of using domain knowledge to provide some of the answers and ask the right questions. At the same time, a collaborative project leader is capable of facilitating a people process with high energy in interaction, to apply knowledge from cross-functional subject matter experts and solve complex project problems in the process. In other words, a collaborative project leader “knows what to do when you don’t know what to do”. We therefore coach our project leaders to reflect in practice and act off the cuff in challenging situations. **Tool**: Collaborative leadership approach.

Leadership method 3: Apply a reflective and adaptive mindset. One of the most important leadership skills is adaptive competency: the ability to react swiftly and intelligently to whatever changes he or she might face; having a personal drive and at the same time the ability to keep an eye on what happens when you act. In order to act swiftly and focused, you need to know who you are. You need to be aware of what you do, why you do it and be able to read and learn from the consequences of your actions. At the same time, you have to be able to read other people and their reactions. Enabling you to

adjust your approach tap into their underlying motivational drivers and to make them follow you. The reflective and adaptive mindset pinpoints three states of mind that the active project owner and the collaborative project leader should subscribe to leverage their leadership and to enable the Half Double approach. **Tool**: Reflective and adaptive mindset.

Local translation

Principle: Build a Half Double mindset to initiate the Half Double approach. Current practice will lead to current results and new results require new practices. In other words, implementing Half Double is implementing change. For the change to be a success, we have to establish a Half Double mindset with key stakeholders early in the process. This requires us to assess and rethink our current practice. All too often, the best of intentions are in place going in, but hurdles along the way – in the form of rigid governance structures, misalignment of expectations and lack of real commitment – may result in relapse into old habits and practices.

On the one hand, the organization must adapt to be in alignment with the Half Double mindset. It requires executive level commitment and willingness to think along new lines; abandoning the focus on early predictability in cost and specifications in favour of a focus on impact creation and stakeholder satisfaction; abandoning the idea of placing operational needs and hierarchies before the project instead providing the space and resources needed to ensure high intensity and weekly progression; dismissing contract and quality/time/cost as the only control mechanisms and allow for trust and relationships to be main drivers. And, last but not least, to move away from placing rules and best practice standardized before the needs of the specific project instead allowing for flexibility in governance and execution model to empower people and impact in gate decisions. In sum, the right choices must be made in order to create successful projects.

On the other hand, there is a need for aligning and tailoring the methodology to the situation at hand to organizational structures, cultures and to the local nature of the projects. There is no “one-size-fits-all” and the project, the methods and tools must be designed to fit the conditions of the surroundings.

The HDM puts forward the following methods and tools to ease implementation and ensure a change that sticks in the organization:

Local translation method 1: Build a Half Double mindset to initiate the Half Double approach. A strong coalition that supports the change must be established. Based on our context, we consider who should support the change in order to make it sustainable. It is among these people that we must create a common mindset and vision right from the start. **Tool**: A Half Double mindset.

Local translation method 2: **Customize to governance to ensure flow.** Each project must be customized to the specific governance and local best practice models to succeed. The uniqueness of the project must be handled on a broader organizational level to ensure the freedom to manoeuvre and progress. At the same time, the local governance and project execution standards are assessed to identify whether there is a fit or whether it would be beneficial to deviate from certain standards to ease progression and realize the impact solution design. Having this dialog in advance is crucial to deliver on the project's impact case. **Tool**: Customize to governance.

Local translation method 3: Anchor the Half Double practice to pave the way for new results. Implementation of Half Double is implementation of change. When change is introduced, there will be established habits

that are difficult to alter. We therefore initially reflect on what radical changes are needed. Then, on an ongoing basis, we assess our progress in terms of anchoring the new methods and tools with key stakeholders. **Tool**: The reflective map.

Half Double – at portfolio level

Effective portfolio management creates maximum strategic impact, fast. This calls for an agile approach to strategy and strategy development in which the organization constantly and rapidly adapts to the surrounding conditions. It requires a close link between the strategy, selected must-win-battles and prioritized projects. At the same time, it is a prerequisite that projects are executed with a constant focus on reducing time to impact so that value creation is a constant – and not a vague ambition.

However, along with the desire to double the impact and reduce project lead-time comes certain implications on the portfolio level. To enable flow in execution and focus, high resource allocation and rapid decision-making are needed, resulting in fewer projects with more intensity and stronger leadership. This calls for ownership, tough prioritization of projects and a clear understanding of the desired strategic impact.

Although apparently introducing a complex task to portfolio managers, the methodology also provides parts of the solution. In a Half Double portfolio management setup, the focus is on strategic impact, and projects are prioritized based on how they can reduce the time to strategic impact. And, looking to the core of the methodology, the integration of the elements, impact, flow and leadership generate the commitment and foundation needed to make the right decisions across the portfolio. Targeting the desired impact and building an impact case with ongoing impact tracking and pulse checks build a foundation onto which projects can be prioritized according to their strategic value. The aspiration of creating a flow in project execution presents the straightforward prerequisite of 50% allocation. In addition, the leadership approach encourages an active project owner who provides relevant project insights at the portfolio level and strategic insight at the project level, the latter being crucial, as it requires an in-depth understanding of projects to prioritize appropriately.

In other words, the Half Double portfolio approach subscribes to the overall Half Double philosophy:

- We value impact over scope, cost and time
- We value stakeholder satisfaction over comprehensive specification and contract negotiation
- We value flow and progression over multitasking
- We value leadership over management
- We value adaptation and reflection over rigid structure and long-term predictability
- We value trust over control

This philosophy has been translated into three methods with suggested tools to ease practical application.

Portfolio Impact approach: Making strategy and portfolio fit to create strategic impact. *Principle: Stakeholder satisfaction is the ultimate goal for strategic impact.*

Projects should be prioritized based on short-term, medium-term and long-term value as well as in terms of impact such as business impact, customer impact and environmental impact. However, from a Half Double perspective, stakeholder satisfaction is considered the ultimate goal for strategic impact and the task is to create maximum strategic impact per time unit.

Prioritizing the projects and their potential strategic impact is not only based on generic project key figures but through an informed dialogue in the portfolio leadership team consisting of all project owners and senior management. It is important that this is a dialogue among people with deep insight into the strategy, the projects, their challenges and targeted impact creation. The core idea is that the portfolio team prioritizes the projects generating the highest impact in the shortest time. Only senior management and project owners with deep insight into the projects can make this prioritization, which is a balancing of goals and strategy, the wishes of the organization's various functions and what is practically possible.

In order to prioritize and lead with stakeholder satisfaction as the ultimate goal for strategic impact, the key priority criterion is impact per time and people unit.

The Portfolio Impact approach introduces the tools: The Priority Grid and The Portfolio Impact Map for gathering data - to make valid decisions on the project as well as the portfolio level.

Portfolio Flow approach: Short and fat portfolio with frequent strategic adjustment. *Principle: Fewer projects with high intensity and frequent senior leadership interaction*.

Having chosen the right projects, the next task is to ensure a rapid flow of impact. Many executives initiate more projects than the organization can handle optimally. Too many projects initiated at the same time result in switching costs, prolonged lead-time and organizational fatigue. With Half Double, we value few, completed projects over several initiated, incomplete projects. In other words, we prefer fewer and shorter projects with higher intensity and frequent leadership interaction to many long-term projects.

The way to secure a dynamic portfolio consisting of short and fat projects is to identify the maximum number of projects running in parallel and the length of the intervals in which these projects can be executed. You map your most critical people (project leaders and team members with greatest track record in your current projects) and base your calculations in terms of the number of parallel projects in the portfolio on the assumption that they cannot be allocated to more than two projects at the same time. You also establish fixed lead times of, e.g., four, eight or twelve weeks, in order to allow for ongoing portfolio adjustments on a quarterly basis. The fixed lead times should be determined by the portfolio leadership team depending on the circumstances of the individual organization and the projects concerned.

The Portfolio Flow approach suggests the tools: Rhythm in Key Portfolio Events, High-Calibre People on Priority Projects and Kanban View - to create fewer projects of high intensity.

Portfolio Leadership approach: Portfolio leadership team with ownership. *Principle: Embrace uncertainty with senior leaders close to the projects and agile decision-making.*

In our experience, traditional portfolio management is based on long-term strategic plans and, furthermore, rational project key figures that do not provide an adequate image of the current state of the portfolio. Senior management finds itself far from the real action, and managers base their decisions on key figures describing initial expectations to each project rather than on what is called for in a given situation. As conditions change at the speed of lightning, adjusting the portfolio once a year or every six months is inadequate. In the HDM, we value an agile strategic approach over long-term strategic planning. We value leadership

dialogue instead of generic discussion. Lastly, we value short distance to senior leadership over hierarchy and steering committees.

Meeting the ambition of an agile portfolio approach requires embracing uncertainty, having senior leaders close to the projects on an ongoing basis and adjusting the portfolio when necessary. In practice, this means that we must establish a rhythm in the portfolio and prioritize short and fat projects in quarterly portfolio meetings and monthly reshuffle meetings. To ensure active ownership, we propose a cap of maximum three projects per project owner and a portfolio board consisting of project owners.

The Portfolio Leadership approach promotes the tools: Three Rules of Thumb, Portfolio Board Dialogue Design and Portfolio Leadership Roles - to shape active, team-based portfolio leadership with frequent interaction.

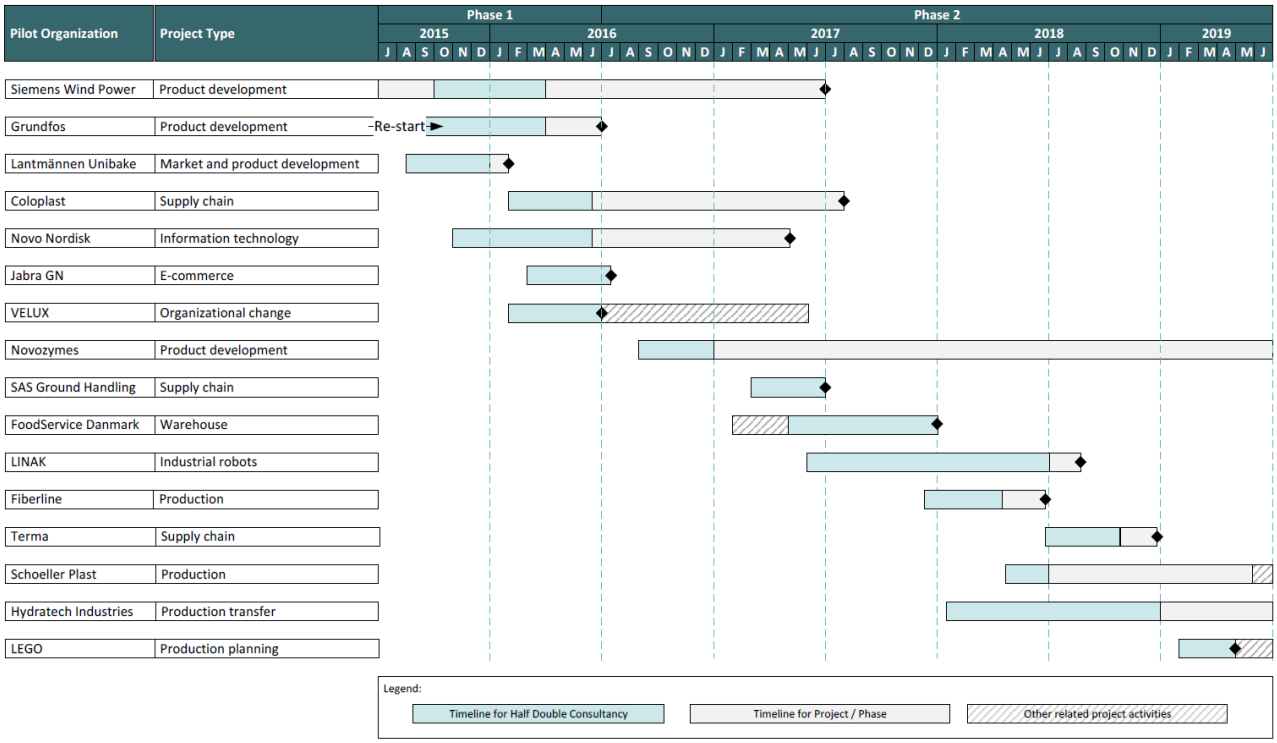
PILOT PROJECTS

Overview of pilot projects

Overview of pilot project timelines

Figure 2 shows the timeline of the seven phase 1 pilot projects (June 2015 to June 2016) and the nine phase 2 pilot projects (July 2016 to June 2019) in Project Half Double (PHD). The various project types are also shown in the figure indicating the diverse application of the Half Double Methodology (HDM).

Figure 2: Overview of pilot projects



The figure shows the timelines for each pilot project. The dark bars indicate the period in which Half Double consultants from Implement Consulting Group supported the pilot projects. The bright bars indicate the period in which pilot project work was done. The shaded bars indicate that pilot project results are being used in other projects. The black diamonds mark the end of a pilot project. Lack of black diamonds indicates that the pilot project is still running. Overall 13 of the 16 organizations have finalized their pilot projects – but in three organizations, pilot projects are still running. These are Novozymes, Schoeller Plast and Hydratech Industries. In these cases, there is not sufficient data to conclude on all aspects of the pilot projects.

Overview of pilot project results

An overview of the current results from all 16 pilot organizations and projects are shown in Figure 3.

The figure summarizes the results for each pilot organization and project type.

Figure 3: Overview of Project Half Double results

PILOT ORGANIZATION	PROJECT TYPE	SUCCES CRITERIA FULFILLMENT	HALF DOUBLE IMPACT
SIEMENS	Product Development	◍	○
GRUNDFOS	Product Development	○	○
Lantmännen Unibake	Market and Product Development	●	●
Coloplast	Supply Chain	●	●
novo nordisk	Information Technology	●	●
Jabra GN	E-commerce Project	◍	●
VELUX	Organizational Change	●	●
novozymes	Product development	○	NA
SAS	Supply chain	●	○
FoodService Danmark	Warehouse	●	◍
LINAK	Industrial robots	◍	●
FIBERLINE COMPOSITES	Production	◍	○
TERMA	Supply chain	●	●
SCHOELLER PLAST	Production	NA	◍
Hydratech	Production transfer	●	NA
LEGO	Production planning	●	NA

● Most fulfilled I High impact
◍ Some fulfilled I Medium impact
○ Few fulfilled I Low impact
NA Not applicable I Not applicable

First, the figure shows the degree to which the pilot projects' success criteria are fulfilled – indicating the absolute success of each project. The success criteria fulfilment evaluation is operationalized into three levels:

- most fulfilled: all or above 67% of the success criteria are fulfilled
- some fulfilled: between 34% and 66% of the success criteria are fulfilled
- few fulfilled: none or less than 33% of the success criteria are fulfilled

We have sufficient data to conclude on 15 out of the 16 cases – only lacking data from one organization (Schoeller Plast).

Overall, the figure shows that in nine out of 15 (60%) organizations most success criteria are fulfilled. Only in two (13%) cases, few success criteria are fulfilled. In one of these cases (Novozymes), the pilot project is still running and therefore this score may change.

Second, the figure shows the degree to which the pilot projects are likely to have benefited from the HDM – indicating the relative success of each project. The findings in the right column are based on a comparison typically of a single pilot project applying the HDM with three comparable reference projects not applying the HDM. The idea is to have as similar projects as possible – except for the HDM. At least all projects have the same host organization – referred to as the pilot organization. The Half Double impact evaluation is operationalized into three levels:

- high impact: the pilot project is completed faster and with higher impact than all the comparable reference projects
- medium impact: the pilot project is completed at approximately the same time and with approximately the same impact compared to the reference projects
- low impact: the pilot project is completed slower and with lower impact than all the comparable reference projects

We have sufficient data to conclude on 13 out of the 16 cases – only lacking data from three organizations (Novozymes, Hydratech Industries and LEGO Group)Overall, the figure shows that in seven out of 13 (54%) organizations the Half Double pilot projects have a relatively high performance, in two (15%) cases, the Half Double pilot projects score medium on relative performance and in four (31%) cases, the Half Double pilot projects have a lower performance compared to the reference projects.

Thus, the last column summarizes results from two comparisons: 1) time and 2) impact – referring to the overall goal of PHD: to deliver "*Projects in half the time with double the impact*" where projects in half the time should be understood as half the time to impact. Hence, we use two impact terms: A) impact from the HDM which is operationalized by B) impact from the Half Double pilot projects. It is important to distinguish between these two impact terms – and to keep in mind that the results do not include causal mechanisms. They only point to the pilot projects' relative performance: are they faster and better than comparable reference projects? In that case, one plausible explanation might be the HDM – operationalized as project practices. The details of specific Half Double practices can be seen in each company chapter. For further details on the methodology and the limitations behind the study, please see Appendices A and B.

Overview of pilot project descriptions

All pilot 16 organizations and projects are described in detail. In some cases, these descriptions are divided into two parts:

- **Part A** introduces the company and outlines the pilot project including application of the HDM, expected or preliminary results with focus on impact and learnings
- **Part B** summarizes key points from part 1 adding status of fulfilment of success criteria and comparison of pilot project with reference projects

The descriptions are published in four reports:

- Project Half Double – preliminary results for phase 1, June 2016 (Svejvig et al., 2016)
- Project Half Double – current results for phase 1, January 2017 (Svejvig, Rode, et al., 2017)
- Project Half Double – current results of phase 1 and phase 2, December 2017 (Svejvig, Adland, et al., 2017)
- Project Half Double – results of phase 1 and phase 2, June 2019 (this report)

Table 1: Half Double reports and case descriptions

Phase	Project	Organization	Part A	Part B
1	1	Siemens Wind Power	Svejvig et al. (2016)	Svejvig, Rode, et al. (2017)
1	2	Grundfos		
1	3	Lantmännen Unibake		
1	4	Coloplast		Svejvig, Adland, et al. (2017)
1	5	Novo Nordisk		Svejvig, Rode, et al. (2017)
1	6	Jabra GN		
1	7	VELUX		
2	8	Novozymes	Svejvig, Adland, et al. (2017)	This report
2	9	SAS Ground Handling		This report
2	10	FoodService Danmark		This report
2	11	LINAK		This report
2	12	Fiberline Composites	This report	
2	13	Terma	This report	
2	14	Schoeller Plast	This report	
2	15	Hydratech Industries	This report	
2	16	LEGO Group	This report	

Table 1 shows which reports include part A and part B of the case descriptions.

As can be seen from the table, the following chapters of this report describe all nine phase 2 cases – including part B of the first four cases and a combination of parts A and B of the last five cases.

Novozymes pilot project

Company and pilot project

Novozymes is the world leader in bio-innovation and produces industrial enzymes and microorganisms. Enzymes are widely used in detergents for laundry and automatic dishwashers. Other enzymes improve the quality of bread, beer and wine or increase the nutritional value of animal feed. Enzymes are also used for the production of biofuels; they convert starch or cellulose from biomass into sugars that can be fermented into ethanol. Novozymes sells enzymes to more than 40 different industries. Novozymes also produces a range of microorganisms for use in agriculture, animal feed, industrial cleaning and wastewater treatment.

Key figures

- Headquartered in Bagsværd, Copenhagen, Denmark
- Plants in Denmark, Argentina, Brazil, Canada, England, India, China and the US
- Subsidiaries and sales offices in more than 30 countries
- Turnover: DKK 14,002m (2015)
- R&D investment 14% of turnover
- Workforce: 6,485 employees

The pilot project; Food Platform, is characterized as an innovation and product development project; it was initiated by the New Business Development, Incubation and Acquisitions (NBD I&A) team.

The NBD I&A team is focused on accelerating execution and growth on innovation projects in new industries and/or technologies in Novozymes by focusing on three core functions: to *explore* growth opportunities and emerging trends, to *acquire* new businesses, and to *build* future divisions and businesses. Through these core functions, NBD I&A work to strengthen and catalyse growth in existing projects, while identifying and developing new businesses and growth opportunities. The team works with a broad diversity of stakeholders both across the company and externally, to identify and integrate the best research, talent and ideas into the product and business development processes.

The Food platform project is a new product development project set into motion to develop new microbial solutions for the food industry. It began in the summer of 2016, as part of a scouting exercise, and has since grown to encompass a fully dedicated core team, while engaging a diversity of stakeholders from across Novozymes. The project core team focused on developing two Minimum Viable Products (MVP's) within two distinct product categories before the end of 2017.

Table 2 provides a brief overview of the project's key activities.

Table 3 shows the overall success criteria and their fulfilment – by May 2019.

Table 2: Overview of the pilot project's key activities

TIMING	DESCRIPTION
September 2016	• Decision to start using the Half Double approach on the ”The Food platform” initiative.
October 2016	• Project leader and project owner chosen. Project organization defined and allocations discussed. • Analysis of the ”The Food platform” initiatives with scorecards. Two promising initiatives selected to focus the Half Double approach.
November 2016	• Impact definition and impact solution design workshops held on the two chosen projects to define impact cases and core idea of reducing the time to impact. • Key stakeholder meeting # 1 on use of methodology to gain commitment.
December 2016	• Workshop on adjustment of governance for working as impact driven and efficiently as possible. • Impact case, resource allocation of core teams and overall approach approved by project owner. • Co-location room created, and core teams set up.
January 2017	• Rhythm in key events initiated in the two projects. • Milestone planning workshops on each project to break down overall hypothesis to activities. • Key stakeholder meeting # 2 on use of methodology to gain commitment.
February 2017	• First technical results reviewed. Positive outlook confirmed.
March 2017	• Project #2: 1 customer committed to trial on product solution.
April 2017	• Project #2: Initiation of contract research organization technical trials
May 2017	• Project #1: 3 innovation partners signed cooperation confidentiality agreement. • Top technical candidates tested in-vivo trials.
June 2017	• Key stakeholder meeting # 3 on use of methodology to gain commitment executed.
July 2017	• Build commercialization scenarios and agreement with partners on performance criteria. • Process validation and Supply agreement in place.
August 2017	• H2 Kick-off with team, sponsor and stakeholders. • Project #1 Partner trials initiated.
September 2017	• Sample products produced and tested.
October 2017	• Confirmation of value proposition hypothesis. • Project #2 Customer trials initiated.
November 2017	• Conclusions of customer trials.
December 2017	• Learnings from project / foundation for decision-making.
January 2018	• Planned Minimum Viable Product (MVP) launch.

TIMING	DESCRIPTION
April 2018	• Project re-scoped in two tracks – a commercial track for first MVP and a partner track with a novel solution.
November 2018	• Partner identified for development track. Expected launch in Q3 2019.

Table 3: Pilot project success criteria and their fulfilment

SUCCESS CRITERIA		
#	TARGET	ACTUAL / EXPECTED
1	Overall impact: Accelerate The Food platform and reduce the time to market and impact	Project was re-scoped in April 2018. One project track was closed (fast) and three new tracks opened.
2	The Food Platform executed with higher impact and shorter time than similar reference projects	Since project was re-scoped, only one track was closed – and four tracks are now running. Project turnaround was faster than similar reference projects.
3	Two minimum viable products for Project 1 and Project 2 used and adapted by customs before 31 December 2017	One MVP was “killed” and the second was redefined into two MVPs, which are still running.
4	1-5 innovation partners on-board before 1 June 2017	• Project #1: 3 innovation partners signed cooperation confidentiality agreement in first half of 2017. This project was later killed due to technical challenges. • Project #2: 6 customers are actively in trial on product solution. New partner track was developed for a completely new solution.
5	”The Food platform” core team engaged and motivated (pulse check of 4.0 in average)	• Average pulse check project #1: Project 2 (weeks 13 to 27 – 2017): Sponsor: 5, Key stakeholders: 3 and Core team: 3.7 • Average pulse check project #2: Project 1 (week 13s to 27 – 2017): Sponsor: 4.7, Key stakeholders: 4.3 and Core team: 3.5

Comparing pilot and reference projects

The standard evaluation in each organization consists of the pilot project and three reference projects, which are used for comparison. The basic idea of the comparison is to evaluate in practical terms to which extent the pilot project performs better (or worse) than the reference projects (see Appendix A or Svejvig and Hedegaard (2016) for further details on the research methodology).

Impact data for the Novozymes pilot project is still not available as the launch is pushed to Q3 2019, and we need the results of the launch to compare the performance of the pilot project with the reference projects.

However, overall Novozymes expresses satisfaction with using the HDM because it has helped reduce the decision process for these early innovation projects. This means that Novozymes could come to the important go/no-go decision whether to continue or discontinue an innovation project faster – also

referred to as “fail faster, succeed sooner” (Khanna, Guler, & Nerkar, 2016) as fast fails save money in the long run.

In fact, many organizations struggle to find a way to learn from failure (Edmondson, 2011) and doing it fast (Khanna et al., 2016). In that respect, the Novozymes case is interesting.

Novozymes emphasizes that having a single project owner is an important element in the HDM, which was a game changer for streamlining the decision process; previously they had various review groups and committees, which was more time consuming.

SAS Ground Handling pilot project

Company and pilot project

SAS Ground Handling (SAS GH) is the largest Scandinavian ground handler, processing more than 9,000 pieces of luggage and 14,000 travellers daily at Copenhagen Airport alone. The company is part of the SAS Group and has an average employee tenure of more than 12 years.

Key figures

- 1,800 employees, with an FTE count of 1,500.
- Head offices: Stockholm and Copenhagen
- Part of SAS Group (Scandinavian Airlines System)

SAS GH handles all operations on the ground ranging from connecting gates to the airplane, unloading and loading airplanes to bringing transferring luggage to aircraft and conveyer belts. The workload intensifies in the summer holidays, June to August, and winter holidays, December to February, where the number of travellers and odd-size luggage increases.

The pilot project; Baggage project 2.0, is categorized as a process optimization project. SAS GH aspires to improve customer experience in the Ground Handling area by increasing the number of on-time bags at Copenhagen Airport.

The organization has already created significant impact by reducing the number of delayed transfer bags from 20 per 1,000 in 2014 to 12 per 1,000 in 2016. The target for 2017 is to reduce the number of delayed transfer bags even more to eight delayed bags per 1,000 transferred bags, which was to be achieved using the HDM, the reason being that the impact must be achieved before the peak season began in June 2017.

The target of eight bags per 1,000 transfer bags was believed to be ambitious, yet realistic, taking the conditions and development of the current infrastructure, working environment and traffic program into consideration. With the decreasing prices of commercial air traffic, resulting in a boom of passengers, SAS GH faced issues of capacity limitations due to the infrastructure of Copenhagen Airport. In addition, SAS GH was challenged by deviations from standard procedure caused by irregularities such as faulty equipment, lack of equipment, and resource volatility. To achieve their objective, SAS GH had to re-think its current operations and find points in its already established processes that could be improved.

Table 4 provides a brief overview of the project's key activities.

Table 5 shows the project's overall success criteria and their fulfilment.

Table 4: Overview of the pilot project's key activities

TIMING	DESCRIPTION
March 2017	• Pilot project initiation. • Designing and defining the impact case: Departing from the goal hierarchy; the impact case was designed along with the KPIs to enable tracking of the project impact. • Half Double impact definition workshop with the core team: The core team was gathered to kick off the Half Double initiative in the pilot project. We brainstormed and prioritized two hypotheses to reach the target of eight bags per 1,000 transfer bags. This step was key in securing stakeholder alignment and ownership and in driving the focus on impact throughout the whole project.

TIMING	DESCRIPTION
	• Co-location design: We planned and prepared for a co-location room which provided the settings for the entire duration of the project. • Pulse checks: Introducing the core team to the pulse checks and the purpose of applying it as part of the HDM. • Identify key participants and plan workshops in details. • Conduct first two impact solution design workshops.
April-May 2017	• Follow up on impact and improve continuously. • Institutionalize changes at managerial level to ensure sustainability. • Add one more hypothesis to work on. • Pulse check.
May-June 2017	• Continuous follow up on impact and improve. • Institutionalize changes at managerial level to ensure sustainability. • Pulse check.

Table 5: Pilot project success criteria and their fulfilment

SUCCESS CRITERIA		
#	TARGET	ACTUAL
1	Cost savings (number removed from public report)	Achieved
2	Reduced delayed bags ratio from 12 per 1,000 passengers to eight per 1,000 passengers	Achieved
3	Reduced transfer bag lead-time from unloading aircraft to conveyer belt from base point 20 minutes	Achieved
4	All employees involved have an “on time” mind-set	Achieved
5	Key employees are trained in effective unloading process	Achieved
6	Key interfaces are prioritised based on “on time” thinking and handled in the right sequence	Achieved
7	Roles & responsibilities during unloading are clear	Achieved

Comparing pilot and reference projects

The standard evaluation in each organization consists of the pilot project and three reference projects, which are used for comparison. The basic idea of the comparison is to evaluate in practical terms to which extent the pilot project performs better (or worse) than the reference projects (see Appendix A or Svejvig and Hedegaard (2016) for further details on the research methodology).

Project scale. Although most projects show unique characteristics, there are similarities across projects. This fact is used in our comparison where we asked for three reference projects, which are as similar to the pilot project as possible.

Table 6 summarizes the projects’ individual scale in terms of size (hours and costs) and characteristics – including novelty, pace, technology (Shenhar & Dvir, 2007) and complexity (Fangel, 2010).

Table 6: Proxies for scale of pilot and reference projects

PROJECT SCALE – SUMMARIZED					
#	PROXY	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
1	Project resources (hours)	0.75 FTE	330 hours	n/a	5.5 FTE
2	Project cost (DKK)	0	0	0	3,000,000
3	Diamond model – incl. project novelty, pace and technology (scale from 0 to 16)	6.79	4.83	5.75	7.33
4	Project complexity – incl. environment, tasks and organization (scale from 0 to 4)	1.79	1.33	1.75	1.83
5	A composite proxy for project scale derived from items 1, 2, 3 and 4 above	3	1	2	4

The last row shows a relative score derived by summarizing and comparing information from all the above proxies. The scorings show that reference project 1 is the largest and most comprehensive project whereas reference project 3 is the smallest and simplest project. The pilot project scores medium (3) compared to the three reference projects.

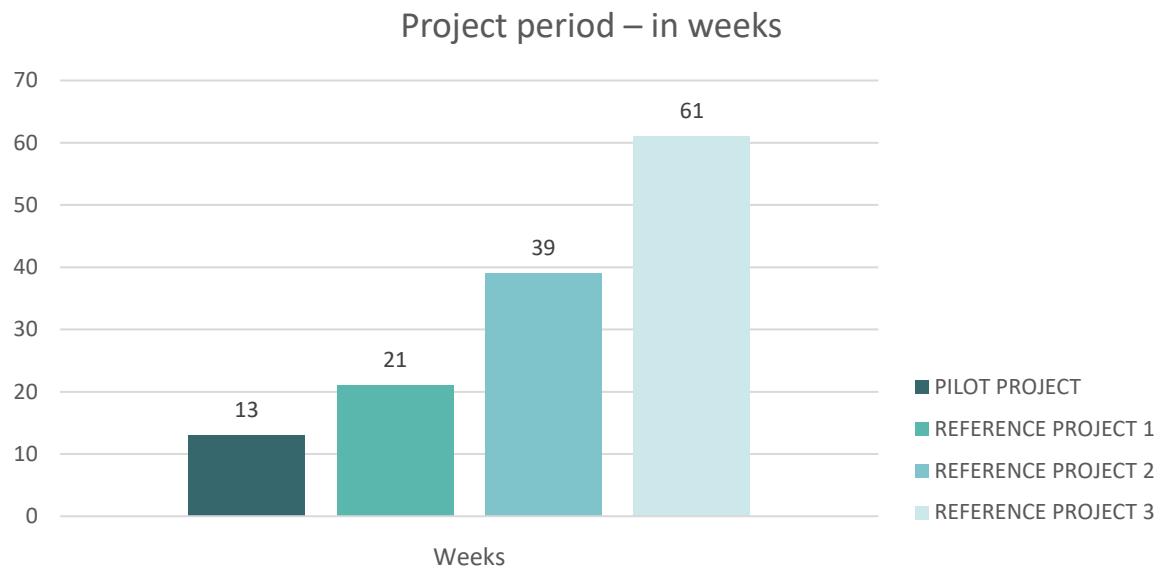
Project time. Considering the overall objective of the HDM, the projects are evaluated in terms of time.

Table 7 and Figure 4 show the projects' relative duration counted in days and illustrated in weeks.

Table 7: Project duration – in days

PROJECT TIME – SUMMARIZED				
PROJECT	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
DAYS	92	150	272	427

Figure 4: Project duration – in weeks



The pilot project manager explains how the team worked dedicatedly with the HDM in order to increase project speed. The result is a very short project compared to the reference projects. The pilot project is by far the shortest project. It is almost half the time of reference project 1 (13 weeks compared to 21 weeks), only one third of the time of reference project 2 (three months compared to nine months), and more than four times as fast as reference project 3 (92 days compared to 427 days).

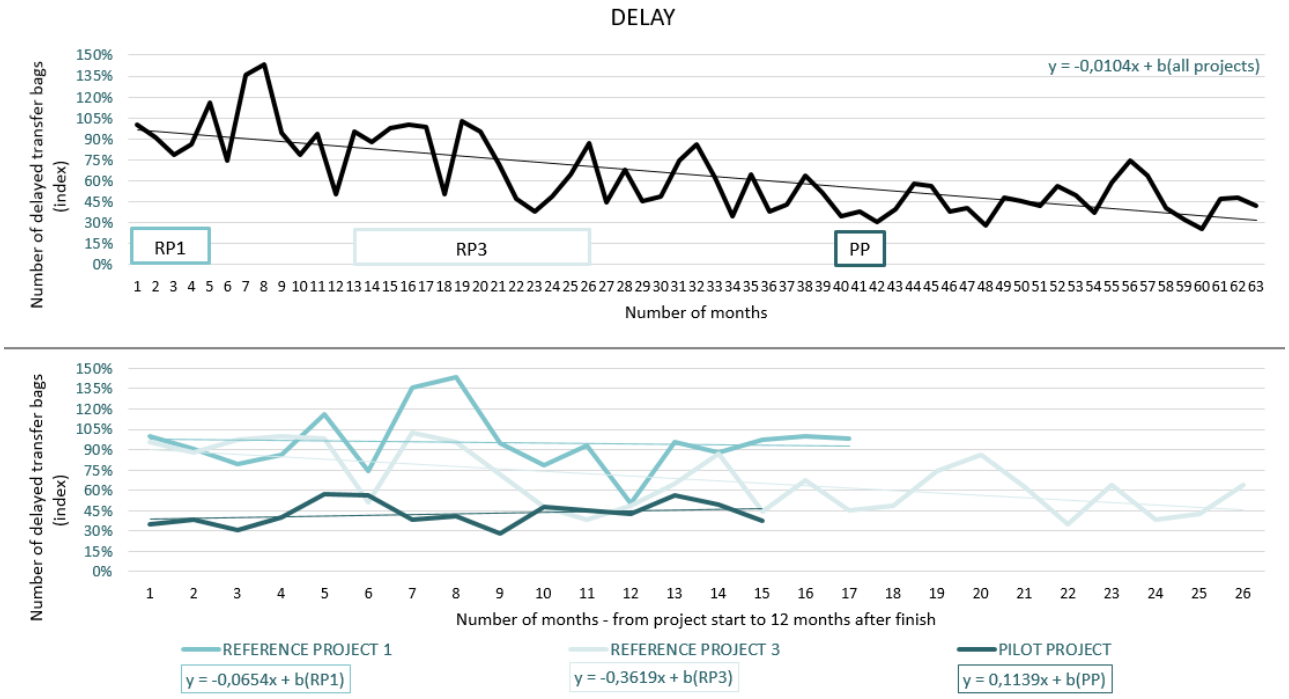
Project impact. Considering the overall objective of the HDM, the projects are also evaluated in terms of their impact.

The pilot project as well as reference projects 1 and 3 focus on baggage handling and aim at reducing the number of delayed transfer bags per 1,000 passengers. Reference project 2 is a cargo project and hence deviates from the other projects in its nature and objective, and it makes no sense to measure this project in terms of delayed bags. Therefore, reference project 2 is not included in the impact section illustrating and describing the projects' relative performance – measured in index numbers.

In Figure 5, the first overall graph shows the development in baggage delay from the first project starts until the last project is closed. The graph illustrates the many fluctuations in baggage handling – which depends on season and weather determining peak periods. The trend line shows an average reduction in the number of delayed transfer bags demonstrating clear quality improvements over the years from the launch of the first reference project 1 (100%) to 12 months after the last pilot project has closed (42%).

The three lines in the second graph of the figure shows the development in delayed bags during and twelve months after each project. As the trend lines and associated slope numbers show, delay is reduced during and after reference projects 1 and 2 but increases during and after the pilot project. Based on these performance measurements, the pilot project is classified as a less successful project.

Figure 5: Project impact – in terms of delay



This less successful classification contrasts with earlier data collection and analyses as well as the subjective perception and experience of the pilot project and the HDM. According to the pilot project manager, who was also the manager of the comparable reference project 3, the HDM has positively influenced the pilot project – resulting in better progress and faster pace.

Project practices. Looking at practices, we find that the pilot project distinguishes itself from the two comparable reference projects 1 and 3 in several ways. First, the pilot project has more focus on impact: the pilot project manager builds an impact case, designs an impact solution and checks the pulse of the stakeholders. The pilot project also stands out on most of the parameters related to flow: the pilot project manager works with visuals and ensures rhythm in key events.

Furthermore, the pilot project members share a project room and work together two whole days per week. When it comes to leadership, the pilot project stands out from the reference projects by having a more active and engaged steering committee. Finally, the pilot project is loyal to the HDM and therefore scores lower than reference projects 1 and 3 on one of the Half Double parameters related to customization of the practices to the uniqueness of the project. Whereas the pilot project was managed in accordance with the Half Double prescriptions, the management of the two reference projects was customized to fit the uniqueness of each project and followed no stringent methodology.

Limitations. When comparing the projects, it should be taken into consideration that reference project 3 is the first project in a series of baggage projects where the pilot project is the second. Consequently, the pilot

project has benefitted from the foundational analyses and initial decisions made in reference project 3 as well as the learning achieved throughout the project, which is assumed to influence the pilot project positively by reducing time and increasing impact. Moreover, the pilot project has benefitted from a managerial decision to increase the number of minimum minutes for a transfer from 30 to 35 minutes. The extra five minutes are assumed to influence the pilot project's KPI positively by decreasing the number of delayed bags. On the other hand, as the number of delayed bags decreases, it becomes more difficult to achieve further reductions. These circumstances should be taken into account when evaluating and comparing the projects' relative performance.

It could furthermore be questioned whether a linear trend line (used in the impact figure) is the right approach, or whether more advanced techniques like moving average would be more appropriate (Anderson, Sweeney, & Williams, 1984).

Conclusion. Overall, it can be concluded that the SAS GH pilot project has a relatively low performance compared to the reference projects when evaluated on the quantifiable measure: delay. However, it should be added that this picture contrasts with earlier data collection and analysis and the achieved success criteria of the pilot project in SAS GH.

FoodService Danmark pilot project

Company and pilot project

FoodService Danmark is one of Denmark's largest foodservice wholesalers, delivering food to professional kitchens throughout Denmark. FoodService Danmark's value chain ranges from Sales, Customer Service, Logistics to Distribution, and the company consists of a large portfolio of wholesale and specialist divisions. In an increasingly competitive environment, FoodService Danmark has its competitive edge in offering its customers a wide product assortment, short lead-times and a high service level. This setup gives the company the opportunity to serve a wide range of professional customers, while adding complexity to the operations.

Key figures

- Approximately 1,250 employees
- Annual sales of DKK 4,500m (2016)
- Head office: Ishøj, Denmark
- More than 100 lorries, 2 storage terminals and 29 Cash and Carry stores at key locations in Denmark enabling the company to deliver fresh products throughout the country

The pilot project; New Eyes, is characterized as a warehouse efficiency project. The project was initiated to re-think the existing warehouse concept including design and implementation of solutions, supporting flexible, robust and efficient processes. Eliminating rework and waste in the processes, as well as a stronger focus on first-time-right, FoodService Danmark can meet its customer demands in a more cost-effective manner.

The project was launched in May 2017. In early 2017, prior to launch, an analysis of FoodService Danmark's value chain was conducted by Implement Consulting Group.

The result of this analysis identified significant potential for further efficiency gains at the Catering Engros warehouses. The warehouse in Middelfart was chosen as a Half Double pilot project, as the terminal had already been working with Lean and wanted to improve further. Due to limited project resources from the customer side, the project team consists of two external consultants, an external subject-matter expert and the head of the terminal. Other stakeholders, such as the operations managers and their teams contributed with valuable insight by co-creating solutions and by being active project ambassadors. The project was divided into three phases: analysis, design, implementation. The first part of the analysis included data collection through *gemba*, IT systems, reports and interviews. From this, it was assessed that the full potential could only be realized by matching capacity to the actual workload, implying reorganizing the warehouse organization. After the project sponsor's acceptance, a more extensive analysis showed a doubling of the initial potential estimate. Consequently, the scope of the project was adjusted, and deliverables were changed accordingly.

In addition to identifying the "right" match between workload and capacity throughout the day, the design phase focused on co-creating a new warehouse concept, focusing on eliminating rework and process waste. Moreover, a major restructuring of the management organization had taken place, reducing the number of roles in the warehouse by 50%. The remaining roles were clearly redefined together with the people in scope. As part of the implementation phase, the new warehouse concept, including operational management tools were rolled out in the entire warehouse, impacting routines of approximately 100 employees and managers.

Table 8 provides a brief overview of the project's key activities.

Table 9 shows the project's overall success criteria and their fulfilment – realized by 1st of November 2017.

Table 8: Overview of the pilot project's key activities

TIMING	DESCRIPTION
February 2017	• Pre-analysis was conducted analysing FoodService Danmark's entire value chain • Substantial potential was identified in the warehouses
May 2017	• Launch of the project "New Eyes", improving warehouse efficiency in Middelfart • Understanding daily operations through *gemba*, interviews and initial data analysis • Creating hypothesis on underlying root-causes to warehouse efficiency in Middelfart
June 2017	• Extensive analysis on customer patterns and working hours • Analysis and design of the new organizational structure
August 2017	• Implementing new organizational structure and roles • Co-creating the new warehouse concept and implementing tools to support the processes • Running first pilots to test and refine the concept
September 2017	• Designing and co-creating additional elements of the new warehouse concept • Running further pilots to test and refine additional elements of the concept • Starting implementation phase, with new working hours and the new concept on all shifts
October / November 2017	• Implementing and refining the last elements of the new warehouse concept • Training and coaching operations managers in the new concept and in their new role
November / December 2017	• Implementation of the last deliverable awaiting the new IT system • Coaching operations managers and their teams in the new concept and prioritizing accordingly • Organization is ready to sustain the operations themselves

Table 9: Pilot project success criteria and their fulfilment

SUCCESS CRITERIA		
#	TARGET	ACTUAL / EXPECTED
1	Cost reduction of DKK 3.5m	Annual cost reduction of DKK 8.7m *(approximation)*
2	Improving warehouse efficiency (measured in pieces / hour), comprising re-work	10% increase from baseline
3	Improving warehouse quality (measured in service level)	60% decrease in short-picks and a stable service level of 99.5%
4	Supporting the reorganization and ensuring that operations managers are on-boarded to their new role	Pulse checks for operations managers at avg. 4.5 out of 5
5	Employee satisfaction (weekly surveys)	10 % increase in employee satisfaction

Comparing pilot and reference projects

The standard evaluation in each organization consists of the pilot project and three reference projects, which are used for comparison. The basic idea of the comparison is to evaluate in practical terms to which extent the pilot project performs better (or worse) than the reference projects (see Appendix A or Svejvig and Hedegaard (2016) for further details on the research methodology).

Project scale. Although most projects show unique characteristics, there are similarities across projects. This fact is used in our comparison where we asked for three reference projects, which are as similar to the pilot project as possible.

Table 10 summarizes the projects' individual scale in terms of size (hours and costs) and characteristics – including novelty, pace, technology (Shenhar & Dvir, 2007) and complexity (Fangel, 2010).

The last row shows a relative score derived by summarizing and comparing information from all the above proxies. The pilot project and reference project 1 are considered to be similar whereas reference project 2 is considered the biggest and most comprehensive project, and reference project 3 is considered the smallest and most simple project.

Project time. Considering the overall objective of the HDM, the projects are evaluated in terms of time.

Table 10: Proxies for scale of pilot and reference projects

PROJECT SCALE – SUMMARIZED					
#	PROXY	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
1	Project resources (hours)	1,000 hours	Not included	4,500 hours	8 people in project team
2	Project cost (DKK)	1,400,000	900,000	300,000,000	0
3	Diamond model – incl. project novelty, pace and technology (scale from 0 to 16)	9.21	6.92	10.67	6.38
4	Project complexity – incl. environment, tasks and organization (scale from 0 to 4)	2.21	1.92	2.67	1.38
5	A composite proxy for project scale derived from items 1, 2, 3 and 4 above	2	3	1	4

Table 11: Project duration – in days

PROJECT TIME – SUMMARIZED				
PROJECT	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
DAYS	333	436	928	117

Figure 6: Project duration – in weeks

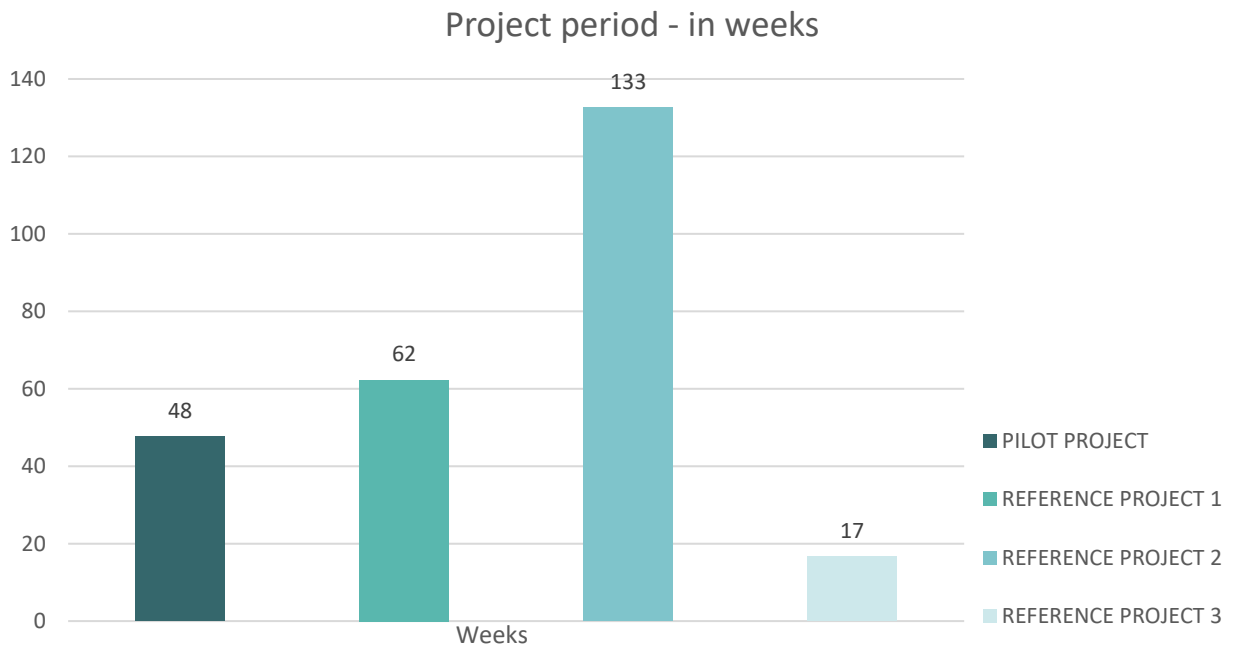


Table 11 and Figure 6 show the projects' relative duration counted in days and illustrated in weeks.

The duration of the pilot project was 333 days (48 weeks), meaning it was shorter than reference project 1 (62 weeks) and reference project 2 (133 weeks) but longer than reference project 3 (17 weeks).

Project impact. Considering the overall objective of the HDM, the projects are also evaluated in terms of their impact.

Impact is in this case measured as service (delivered lines/ordered lines) and effectiveness (lines per hour) per week.

Figure 7: Project impact – in terms of quality

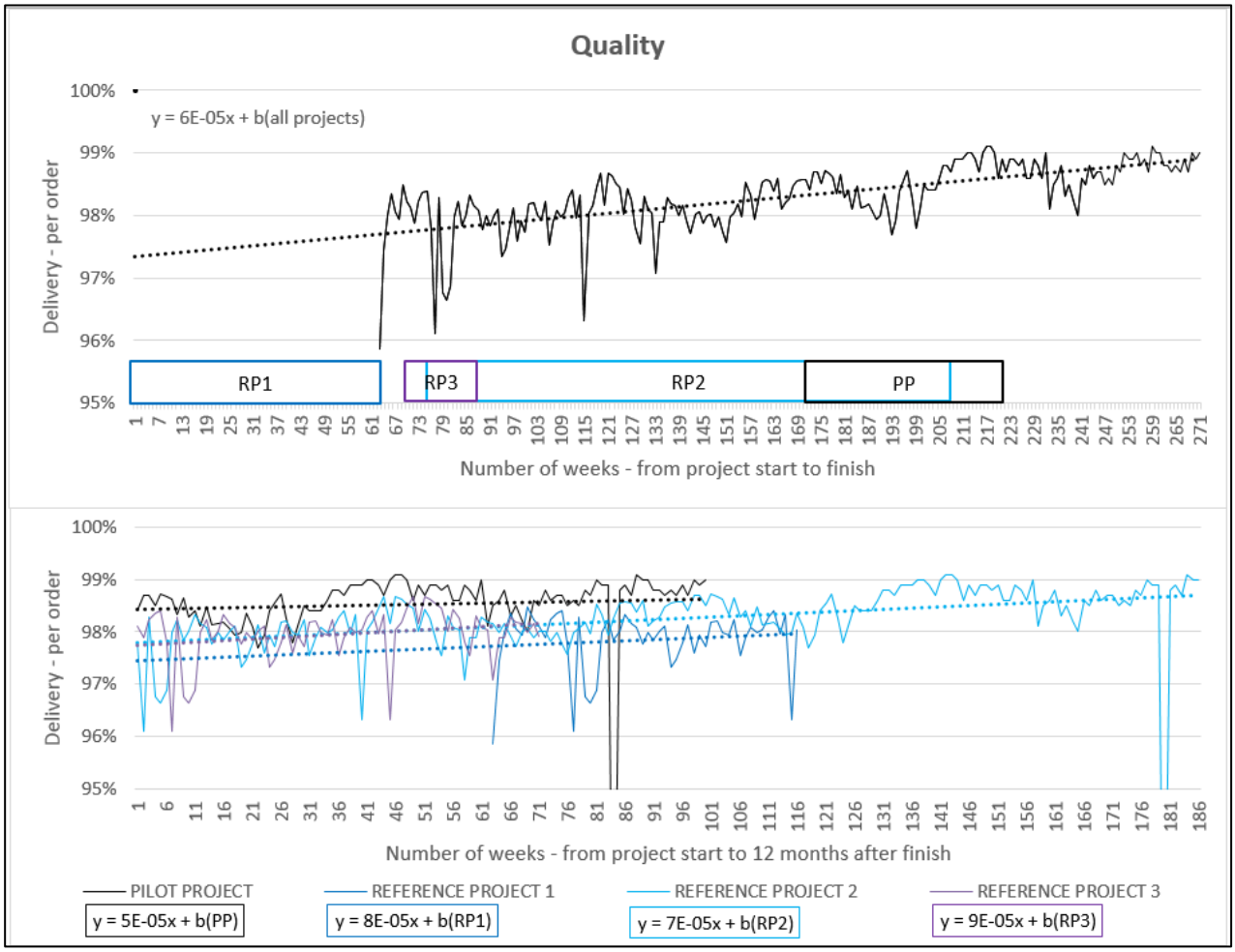


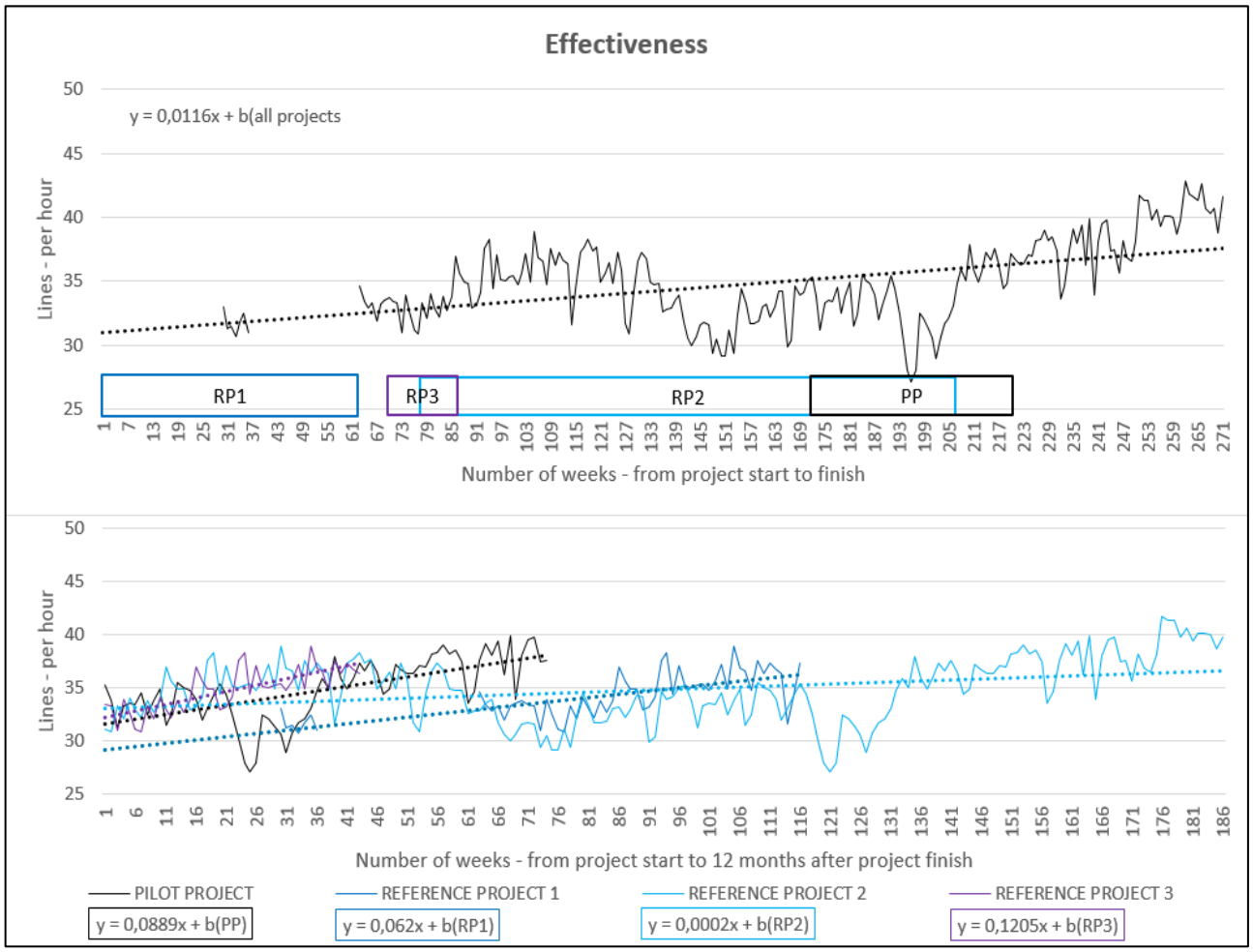
Figure 7 outlines service in terms of quality during and after the four projects. The vertical axis shows the percentage of delivered lines per ordered lines. The horizontal line counts the number of weeks.

The overall line in the first graph shows the development in quality from the first (reference) project starts to the last (pilot) project is closed. As the graph shows, the quality degree fluctuates over the entire period. To get a sense of the overall development, we inserted a trend line – with the slope: +6E-05 showing a slight increase in the quality level over the entire period. Each project is mapped in the graph according to their period.

The four lines in the second graph show the quality during and one year after each project. As can be seen from the positive trend lines, the quality levels are improved during and after all projects. The calculated slopes indicate a small difference in the improvement between the projects – which varies from 5E-05 in the pilot project to 9E-05 in reference project 3. Thus, the lowest improvement happens during and after the pilot project – but the improvements and the differences within them are very low in general, which makes it difficult to conclude a significant performance difference.

Figure 8 shows the effectiveness during and after the four projects. The vertical axis

Figure 8: Project impact – in terms of effectiveness



shows the percentage of lines per hour – relative to an index where 100 = 33.50. The horizontal line counts the number of weeks.

The overall line in the first graph shows the development in effectiveness from the first (reference) project starts to the last (pilot) project is closed. As the graph shows, the effectiveness fluctuates over the entire period. To get a sense of the overall development, we inserted a trend line – with the slope: +0.0116 showing a small but important increase in effectiveness over the entire period. Each project is mapped in the graph according to their period.

The four lines in the second graph show the effectiveness during and one year after each project. As can be seen from the positive trend lines, the effectiveness is improved during and after all projects. The calculated slopes indicate the difference in the improvement between the projects – which varies from 0.0002 in reference project 2 to 0.1205 in reference project 3. The pilot project slope is 0.0889 and indicates the second highest improvement. However, the improvements and the differences within them are low in general, which makes it difficult to conclude a significant performance difference.

Project practices. The pilot project scores markedly higher on the Half Double practices

compared to the three reference projects. It stands out by having more focus on especially impact and flow compared to the reference projects. For example, Foodservice Danmark has built an impact case to drive behaviour change and business impact, designed the pilot project to deliver impact as soon as possible and been in touch with the pulse of key stakeholders. Furthermore, Foodservice Danmark has increased insight in and commitment to the pilot project by using visual tools and plans. Finally, the pilot project scores higher than the reference projects on the tool kill complexity, which was used to handle the very complex nature of the pilot project.

In total, FoodService Danmark has used the Half Double practices to a high degree and experienced a positive effect. Therefore, FoodService Danmark has continued to use some of these practices – including working with visuals. Subsequently, other departments in the organization have adopted Half Double practices as well.

Limitations. It should be noted that the nature of the four projects somehow differs – especially reference project 2 which is building a new warehouse. The reference project most similar to the pilot project is reference project 3, which aims at increasing the packing effectiveness in the warehouse. These differences should be kept in mind when comparing the projects.

Another limitation regards the relative order of the projects. One could argue that the pilot project has better odds because it is the last warehouse effectiveness project in a row – therefore being able to draw on learnings from previous projects. On the other hand, one can argue that the reference projects have better odds due to the law of diminishing returns, which means that it will be increasingly difficult to make improvements and harvest the same return on investments in later projects compared to earlier ones characterized by more low hanging fruit.

It could furthermore be questioned whether a linear trend line (used in the two impact figures) is the right approach, or whether more advanced techniques like moving average would be more appropriate (Anderson et al., 1984).

Conclusion. In terms of time, the pilot project is a superior project as it is considerably faster than the comparable reference projects. On the other hand and in terms of impact, the pilot project is a low to medium performing project based on the two impact measures: quality and effectiveness. However, the differences between the impact measures are very small and therefore it is difficult to make a solid conclusion based on these numbers. Taken together, the FoodService Danmark pilot project is classified as a medium performing project when both time and impact are taken into consideration.

LINAK pilot project

Company and pilot project

LINAK is a privately-owned Danish manufacturing company, specialized in linear actuators. The CEO and owner, Bent Jensen, took over the company from his father and has grown the company from seven to more than 2,000 employees.

Key figures

- Family-owned business
- Founded in 1976
- Represented in 35 countries

Given the history of the company, there is a strong culture and great pride in the success that the employees have created. With a large presence and significant production in the small town of Guderup in Southern Jutland, the company represents the best of Danish manufacturing.

LINAK is divided into four divisions, one of which is DESKLINE. DESKLINE specializes in actuators for height adjustable desks. In response to rapidly expanding sales, short supply of labour and limits to the footprint of the factory, the DESKLINE division has initiated a drive toward production automation wherever feasible. The factory processes have been optimized by introducing LEAN principles and operating the production cells in three shifts during peak periods.

The pilot project was initiated in response to the learnings from five earlier automation projects where the production capacity was added to the current semi-automated production cells by including fully automated cells based on robots. These projects were regarded as a success in terms of meeting the production targets and quality required, but the duration of the projects was too long, and the costs rose from project to project due to increased complexity and higher requirements. The scope of the project was defined as the specification, design, sourcing, installation and commissioning of a robot-based automated production cell that could triple the current production capacity. The project was initiated by the head of the DESKLINE division, and the DESKLINE Operations Manager was appointed Project Owner. The project manager was selected because he had completed automation projects before and had experience working with the supplier in question, who had delivered most of recent automation projects, and a key element to working with in the pilot project was the supplier relationship that was rated as good but not necessarily efficient.

Table 12 shows a brief overview of the pilot project's key activities.

Table 13 shows the pilot project's overall success criteria and their fulfilment.

Table 12: Overview of the pilot project's key activities

TIMING	DESCRIPTION
June 2017	Six-hour project initiation workshop with an introduction to the Half Double principles with key staff at LINAK and senior management from the robot automation supplier. Subsequently the two parties evaluated similar projects and consolidated key learnings.
August 2017	Six-hour project planning workshop. The workshop secured that all project participants were aware of PHD and the aim of the project. It was also a kick-off for both LINAK and the supplier at the supplier's facilities. Key ideas for the solution design was explored and a plan for the project using the traditional project approach was presented. First proposal for the project flow was discussed and revised.

TIMING	DESCRIPTION
Early September 2017	Two-day kick-off seminar at LINAK with project owner, key LINAK staff and key supplier staff (6-7 September). The workshop focused on the Solution Design and the requirements for the automated production cell. Based on a few key changes, the project participants revised the project plan to reduce the project plan from 60 to 39 weeks.
Medio September 2017	Project flow was initiated with four-week sprints, weekly solution feedback meeting and daily virtual stand-up meetings. All physical meeting were held at the supplier's site.
Ultimo September 2017	The project owner paid a visit to a sub-supplier whose lead-time on key parts was a critical part of the project. The project owner secured early delivery, which removed the item from the critical path and the full benefit of other optimizations could be realized.
October 2017	Six-hour workshop at the supplier's site to discuss optimizations in the supplier's production process.
Medio November 2017	Final 'go' on the complete project scope and agreement between LINAK and supplier.
October 2017 – January 2018	Detailed design, production of components, assembly of robot cells, and finalization of control software at the supplier' site.
February 2018	Implementation of the automated production cell on the factory floor.
March 2018	Commissioning of the automated production cell and the control software.
Early April 2018	First "production quality unit" produced by the cell.
April 2018	Stabilization and pilot production (first impact created).
June 2018	Site acceptance test (solution ready to deliver full impact).

Table 13: Pilot project success criteria and their fulfilment

SUCCESS CRITERIA		
#	TARGET	ACTUAL
1	Execution time of maximum 9 months (38 weeks) from project start (the kick-off with a supplier) to finish (Site acceptance test at LINAK's factory)	Reduction from an original plan of 60 to 39 weeks – delivered in 40 weeks.
2	25% cost reduction on hours from supplier compared to a similar on-going project	Current expectation is a saving less than 20%, but it is unclear how much is related to reuse of designs from other projects and reuse of control software, and how much is related to the elimination of a factory acceptance test. There is an ongoing discussion about the baseline that the project should be compared up against.
3	LINAK's LEAN office capable of replicating the approach on other projects after completion of the pilot	Challenged due to change of staff in the LEAN office. Management contracts introduced to drive leadership behaviour on new projects.
4	The supplier adopts the methodology and is willing to execute projects the same way again	Above expectations, as the supplier is rolling out visual plans across the whole project organization and is convincing their other customers to adopt a similar methodology.

Comparing pilot and reference projects

The standard evaluation in each organization consists of the pilot project and three reference projects, which are used for comparison. The basic idea of the comparison is to evaluate in practical terms to which extent the pilot project performs better (or worse) than the reference projects (see Appendix A or Svejvig and Hedegaard (2016) for further details on the research methodology).

Project scale. Although most projects show unique characteristics, there are similarities across projects. This fact is used in our comparison where we asked for three reference projects, which are as similar to the pilot project as possible.

Table 14 summarizes the projects' individual scale in terms of size (hours and costs) and characteristics – including novelty, pace, technology (Shenhar & Dvir, 2007) and complexity (Fangel, 2010).

The last row shows a relative score derived by summarizing and comparing information from all the above proxies. The scorings shows that reference project 1 is the biggest and most comprehensive project whereas reference project 2 is the smallest and most simple project. The pilot project scores medium (3) compared to the three reference projects.

Project time. Considering the overall objective of the HDM, the projects are evaluated in terms of time.

Table 14: Proxies for scale of pilot and reference projects

PROJECT SCALE – SUMMARIZED					
NO.	PROXY	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
1	Project resources (hours)	1,600	3,200	1,750	3,200
2	Project cost (DKK)	16,600,000	22,000,000	8,000,000	12,000,000
3	Diamond model – incl. project novelty, pace and technology (scale from 0 to 16)	9.44	9.91	6.70	11.50
4	Project complexity – incl. environment, tasks and organization (scale from 0 to 4)	2.44	2.41	1.70	2.50
5	A composite proxy for project scale derived from items 1, 2, 3 and 4 above	3	1	4	2

Figure 9: Project duration – in days

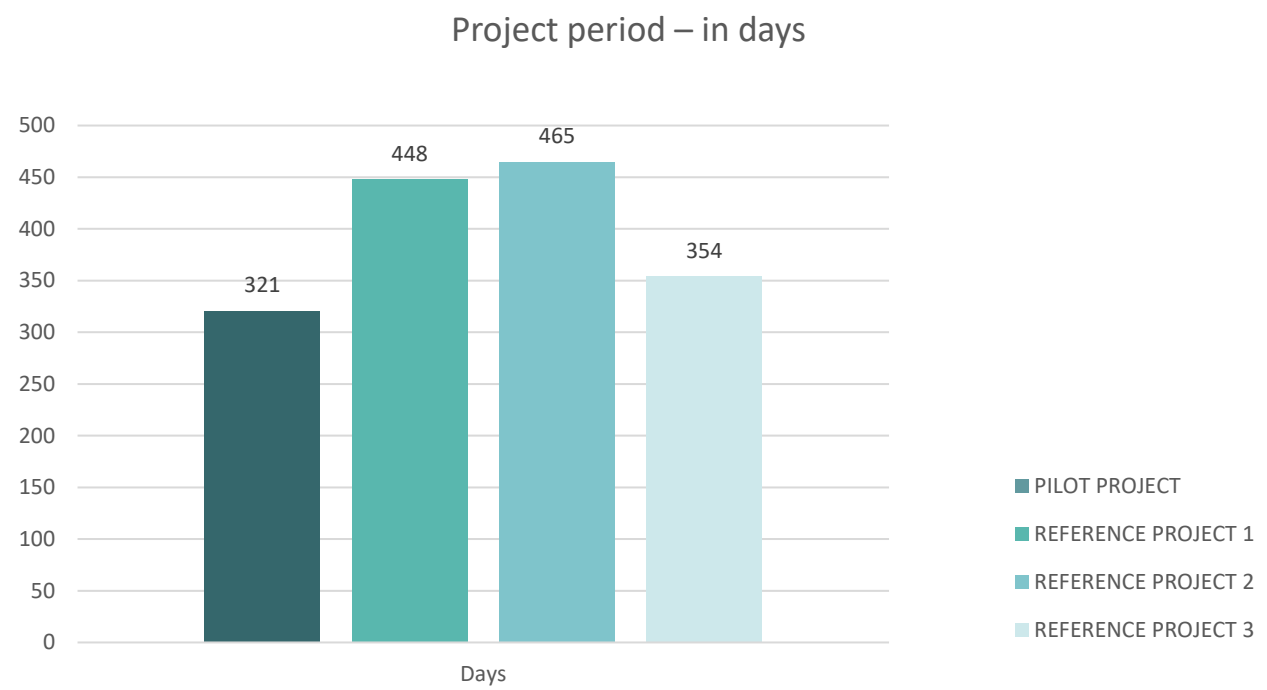


Figure 9 shows the project periods and illustrates that the pilot project is the fastest of the four projects.

Project impact. Considering the overall objective of the HDM, the projects are also evaluated in terms of their impact.

In this case, it was not possible to define one or more common impact measures on which we can evaluate and compare the different projects. Therefore, we operationalized impact into a set of dimensions derived from a discussion of the projects' success criteria. Based on this discussion, we operationalized a net list of nine dimensions into nine questions and asked the project manager and owner to score the four projects on a scale from one to five – where one is low performance and five is high performance. Based on these scores, we calculated a proxy for the projects' overall performance.

Table 15 and Figure 10 compare the pilot and reference projects' performance scores on these nine impact dimensions.

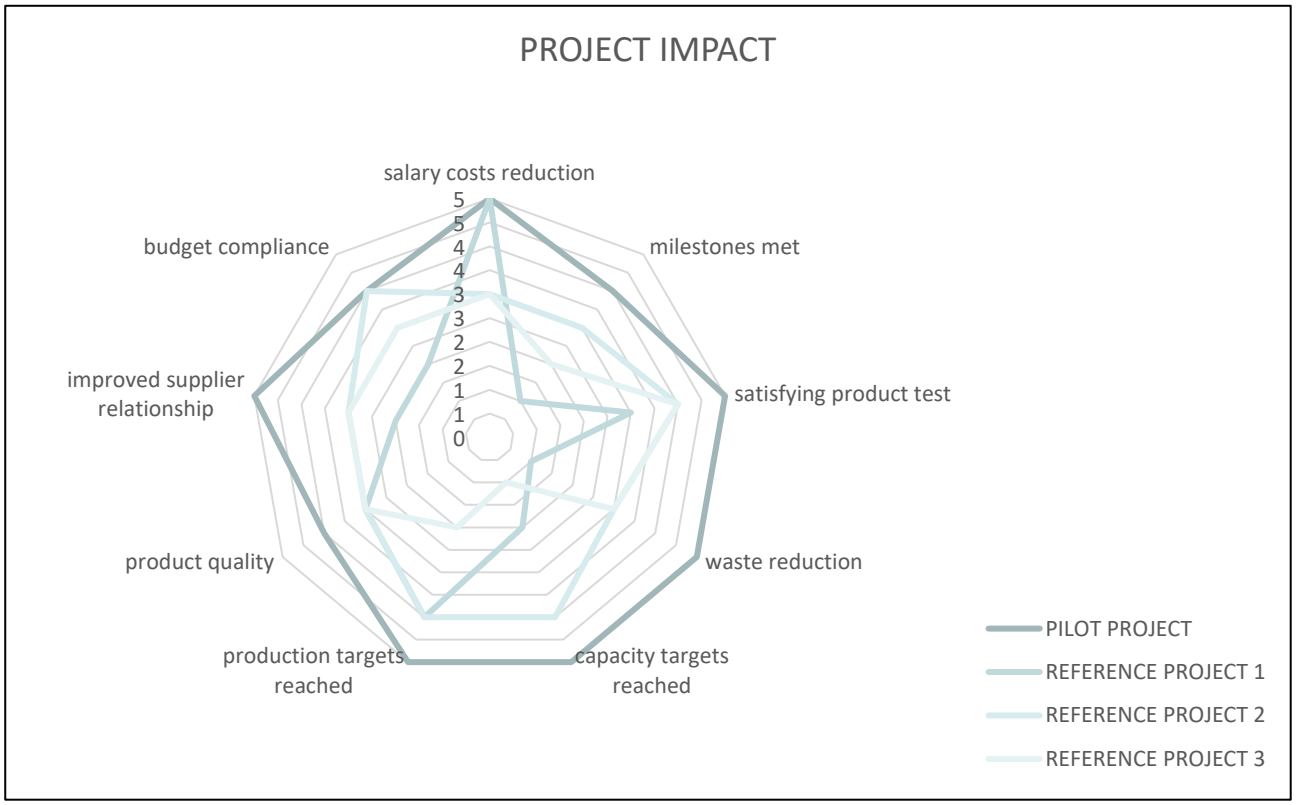
Table 15: Project impact – based on perceived performance

PROJECT IMPACT - COMPARISON					
DIMENSION	QUESTION	PP	RP1	RP2	RP3
salary costs reduction	To what extent did the project reduce salary costs?	5	5	3	3
milestones met	To what extent did the project meet the milestones in the project plan?	4	1	3	2
satisfying product test	To what extent is the end test of the products in the production that the project improved satisfying?	5	3	4	4
waste reduction	To what extent did the project reduce the amount of products used until impact?	5	1	3	3

reached capacity targets	To what extent has the project increased the production capacity compared to the target?	5	2	4	1
reached production targets	To what extent did the project improve the percentage of achieved production targets?	5	4	4	2
product quality	To what extent did the project improve the quality of the produced items?	4	3	3	3
improved supplier relationship	To what extent did the project improve the supplier relationships?	5	2	3	3
budget compliance	To what extent did the project comply with the budget in terms of hours and costs?	4	2	4	3
Total		42	23	31	24

PP	Pilot project
RP1	Reference project 1
RP2	Reference project 2
RP3	Reference project 3

Figure 10: Project impact – based on perceived performance



The table shows that the pilot project has a remarkably higher total score of 42 compared to the three reference projects scoring between 23 and 31.

The figure shows how the pilot project outperforms the three reference projects on almost all parameters. The pilot project has the highest possible score on six out of nine parameters. Only on two parameters does a reference project score as high as the pilot project: budget compliance (reference project 2 scores 3) and salary cost reduction (reference project 1 scores 5).

Based on these subjective performance scores, we conclude that the pilot project is a high-performing project compared to the three reference projects.

Project practices. In the quest for reasons for the relative success of the pilot project compared to the reference projects, we examined the projects' practices.

We find that the pilot project is different from the reference projects as regards several Half Double practices.

First, in terms of the Impact principle, the pilot project has more focus on the impact solution design meaning designing the project to deliver impact as soon as possible, and pulse check, meaning being in touch with key stakeholders.

Furthermore, in terms of the Flow principle, the pilot project has more focus on rhythm in key events, meaning setting a fixed heartbeat to progress the project in sprints, and visual planning, meaning working with visuals to increase insight and commitment.

Finally, in terms of the Leadership principle, the pilot project has more focus on a collaborative leadership approach, meaning taking a people-first approach.

In total, the pilot project stands out on five Half Double practices – which may be the reason for the success and superior performance of the pilot project.

Limitations. It should be noted that in this case the evaluation is based on subjective perceptions of project performance and not objective measures as is the case in most of the impact comparisons.

Moreover, the relative order of the projects should be noted. One can argue that the pilot project has better odds because it is the last one in a series of automation projects – therefore being able to draw on learnings from previous projects. On the other hand, one can argue that the reference projects have better odds due to the law of diminishing returns, which means that it will be increasingly difficult to make improvements and harvest the same return on investments in later projects compared to earlier ones characterized by more low hanging fruit.

Conclusion. In summary, it seems likely that the HDM has had a positive impact in LINAK – where the pilot project is considered a high-performing project being both faster and better when evaluated against the three comparable reference projects.

Fiberline Composites pilot project

Company and pilot project

Fiberline Composites (Fiberline) is an innovative producer of glass and carbon-fibre profiles with current applications in three areas: Wind Turbines, Windows & Facade and Structural Profiles. Fiberline's value proposition is primarily built around a specific production technique: pultrusion. In this pultrusion technique, dry fibres are drawn continuously through a closed die in which they are impregnated with a matrix. The resulting product has very distinct properties that can be tailored to the needs of the individual customer. Accordingly, many of the products are developed in partnership with the customer and are specific for that customer.

Key figures

- Founded in 1979
- Family-owned business by generations of the Thorning family
- Headquartered in Middelfart, Denmark
- Production plants in Denmark and China
- Turnover: DKK 519m (2017)
- +300 employees
- Double-digit annual revenue growth

The pilot project; Industrialization of the Carbon Fibre production, is a production optimization project aiming to increase the quality level and throughput of carbon fibre profiles in the factory in Middelfart. The project was initiated as a building block to keep pace with increased market demands, i.e. the sales budget for the product. The production of carbon fibre profiles ran 24/7, spread over five shifts and a total of about 60 operators. The task was to identify root-causes behind quality deviations as well as countermeasures that address these root-causes and to mobilize the organization to implement the countermeasures.

Local implementation

The HDM was applied in the pilot project with respect to the specific case and context of Fiberline. Each of the three core elements was adapted to the manufacturing environment in scope.

An *Impact Case* was created specifically for the project at an early stage where the overall target was broken down to business and behavioural impact elements. The overall target was to "create a foundation for increased throughput that will secure profitable and competitive growth". The business impact was focused around volume and quality levels in the production that corresponded with the overall target. The behavioural impact was that standardized work in the production would bring the quality level up and increase volume. While the business impact was broken down from the sales budget and mathematically translated into volume and quality, the behavioural impact was based on hypotheses from other cases and best practice. The latter implied that as more knowledge was gained about the root-causes behind Fiberline's problems, the hypotheses were confirmed or disproved. Standardized work among the operators seemed to make less of a difference compared to technical improvements or the two combined.

To align stakeholder expectations, a *pulse check* was distributed to about 10 people at Fiberline every two weeks. The pulse check was a short survey focused on stakeholder satisfaction and impact creation in the specific project. As the respondents represented all organizational levels, the survey both covered satisfaction on impact (senior management) and process (core team and participants). The result of the survey and general status were discussed in a 1½-hour bi-weekly pulse meeting between the core team and the project owner. Decisions about approach, scope and communication

were typical outcomes from these meetings. The pulse check made sure that all expectations on impact and process were aligned among the core team and project owner as well as enabling agility regarding the deliverables.

The improvement process was designed around hypotheses that were scoped at an early stage. These were validated and prioritized by the entire carbon fibre organization (approximately 70 people) in a half-day kick-off meeting as the official start of the project. The prioritized ~10 hypotheses were then elaborated into improvement initiatives that were formalized in A3 format (Lean methodology). The *impact solution design* approach was to distinguish "quick wins" from initiatives. By doing this, some of the impact came earlier (from the quick wins) while the initiatives needed more time to create impact. This approach sent a strong signal to the organization, that the project could create impact early. After 2½ months, a "challenge day" was conducted with the intention of proving the concept of implemented initiatives during a 24-hour session in production.

To ensure flow in the project, *co-location (1), visual plans (2)* and *rhythm in key events (3)* were used as methods.

First, Fiberline allocated one project manager (50%), four operators (20-40% each) and one project owner (at least one hour per day) to the project. Together with two consultants from Implement Consulting Group (40-80%), the core team was defined. It was communicated to the entire Fiberline organization that this project had top priority. This attention was sometimes challenging, as it required prioritization in the daily work for all staff involved in the deliverables. It was challenging that initiatives were identified in the project weeks soon after launch, the implication being that some deliverables depended on people that were not officially allocated to the project from the start. This really tested the organization's prioritization agility. Some front-loading could have been done to identify possible contributors earlier in the project. On the other hand, a lot of the knowledge on the root-causes was gained after the project started.

Second, as the project's goal was to improve production, the plans had to be visual for the people working in that area. Accordingly, it was decided to use a "project wall" that was located between the production area and the break room, locker rooms and the exit. This meant that all the operators passed the wall every day. The wall was made of glass and consisted of a project plan poster that showed the current week's activities (open and closed), last week's performance and other findings that could be of interest. Furthermore, the project "war room" was located on the other side of the glass wall. When the operators passed the wall, they could look straight into the project room. Consequently, transparency was established between the project team and the operators, inviting them into the process.

Third, deliverables were aligned twice a day in a sprint meeting in front of the project wall. The meeting participants were core team, project owner and ad-hoc stakeholders that were relevant for the on-going activities. Early in the project, the daily sprint meeting was received with mixed enthusiasm. The core team and project owner early recognized the benefits of coordinating. However, some of the supporting departments did not see the value of meeting twice a day to coordinate their activities with other departments. Agility and a structured daily cross-functional collaboration were new ways of working at Fiberline. Later in the project, the technical departments played a key role in creating impact and as that became clearer, their commitment to the sprint meeting increased. On top of the daily sprint meeting, the already mentioned bi-weekly pulse meeting was

conducted. In addition, monthly steering group meetings were conducted and used as a means for critical decision-making. These decisions could have been made in the pulse meeting, given the presence of the sponsor and relevant management group members.

Leadership of the project was divided between project ownership and project management. The project owner was the Vice President of Production who had an active role in ensuring impact from the project. As he owned the KPIs that the project would improve, he had a big stake in succeeding with the project. One of the greatest successes of this project was actually the project owner's commitment and his presence in the daily project work. It was manifested by participation in the sprint meetings twice a day, ownership of resource needs and conflict handling on a daily basis. He also took some of the project management tasks that the project manager was unable to handle. That also showed his adaptive mindset as a key stakeholder in the project.

The project management was initially a joint responsibility between Fiberline and Implement Consulting Group. The idea was that Implement Consulting Group was leading their engagement in the project while the client project leader had the general responsibility for the progress and outcome of the project. The purpose of this setup was that Fiberline should be able to continue the project also without external support. The complexity and cross-functional nature of the project often required Implement Consulting Group to step in as general project leaders of the project. This collaboration was enabled due to Fiberline's active project ownership.

Learnings were reflected upon both via the bi-weekly pulse meetings and continuously in the process enabled by the presence of the project owner and other stakeholders. Often stakeholders stopped by the war room on their way out to reflect and discuss successes and concerns together with the core team. These conversations enforced a change journey as people expressed how they felt about the project.

Table 16: Overview of the pilot project's key activities

TIMING	DESCRIPTION
December 2017	• Scoping: Impact Case creation and Interviews with stakeholders. Core team establishment.
January 2018	• Kick-off with the entire carbon fibre organization and democratic prioritization of initiatives. • Initiation of sprint meetings twice a day, visual plans and co-location (from day one). • First pulse check sent out after two weeks, followed by first pulse meeting one week later. • Current State analysis (data and field studies) was done and presented to steering group. • Elaboration of prioritized improvement initiatives and activation of quick wins.
February 2018	• Work on improvement initiatives. • Alignment on impact creation via Pulse Meeting – acceleration of quick wins to show impact. Implementation obstacles addressed. • Midway status presented to steering group – decision on cyclic planning for tools.
March 2018	• Continued work on improvement initiatives including prototyping and testing. • Quality Impact acknowledged in Pulse meeting. • Challenge Day to give proof-of-concept from implemented initiatives – impact not as high as expected. • Steering group decision on closing production lines to do technical improvements.
April 2018	• Development and anchoring of tactical implementation plan for continued work.
May 2018	• Considerable impact from technical improvements.

Table 16 provides a brief overview of the pilot project's key activities.

A couple of stories from the pilot project at Fiberline

Using Impact as an argument for prioritization: A critical improvement initiative was dependent on an ERP system change. To carry this change through, we needed help from Fiberline's IT department. However, the IT organization was busy with another project and therefore declined the meeting invitations and did not respond to phone calls. Our countermeasure was to address this to the project owner and in specific the consequences of this problem on Impact. He took a stern view as he saw how this obstacle would affect his KPIs. He took the issue up with the CEO who talked with the Head of IT, convinced him that the improvement we were working on had more impact than the IT project. This shows that by referring to impact creation, the right priorities mere made.

Aligning expectations via Pulse Check: As Half Double is designed around early impact, so are expectations. This is challenging when dealing with complex problems as some weeks of analysis might be needed before improvement initiatives with impact can be achieved. At Fiberline, we faced this situation four or five weeks into the project where our second Pulse Check showed that we had a decline in belief in impact creation from the project. Basically, people expected some positive trends on the KPIs as an effect of the project, which now had been running for a month. The truth was that we had spent three weeks on current state analyses and were now in a design stage, i.e. we were not ready

to go ahead with implementation. We then choose some mitigating actions: (1) alignment of expectations via a weekly newsletter, and (2) changing focus to follow up progress on "quick wins" rather starting up new initiatives. Key learning is that the Pulse Check can be used to align expectations of impact creation. It also provides a feedback loop to the project to change focus, in order to satisfy stakeholders. Moreover, it can hint at how change communication is going.

Results and key learnings

Early on the project identified several improvement initiatives that would have a positive business impact on quality and/or throughput. Most of these improvement ideas were generated by operators in production and had different characteristics. Some of them were technical and others were related to the way of working on the production line. The technical improvements initiated by R&D first ran in parallel, but as time went by, they were integrated more into this project. The key learning here is that we can always define what impact we want from a project but the changes required to reach that impact must be explored along the way as knowledge is gained. Since it became apparent that technical improvements played a key role to create impact in this case, the focus on the project had to change from being a sole manufacturing project to a cross-functional one. The target fulfilment of quality and throughput was 56% and 74%, respectively. However, without the relentless focus on impact in Half Double, fulfilment would have been lower. In other words, the HDM indicated and facilitated the needed change of path to create impact for Fiberline.

Table 17 shows the project's overall success criteria and their fulfilment.

Table 18 summarizes key learnings from the project.

Table 17: Pilot project success criteria and their fulfilment

SUCCESS CRITERIA		
#	TARGET	ACTUAL
1	Increasing quality level in production – 27% relative increase	7% relative increase from baseline (non-technical) Q1 2018 8% relative increase from baseline (technical) Q2 2018
2	Increasing throughput in production – 38% relative increase	28% relative increase from baseline (non-technical) Q1 2018
3	Involvement of operators to generate improvements	+25 improvement ideas from operators
4	Create foundation for future profitable growth	Besides improvement initiatives, the project established daily operations management, identified critical-to-quality standards, mapped a standard for tool changeover and gave recommendations to cyclic planning of tools – all with the purpose of stabilizing production

Table 18: Learnings from the pilot project

LEARNINGS	
1	Early involvement is a strong message that the project is important: the project's first official day was a Kick-Off meeting with over 70 participants. In this way all that were affected in the area that was about to be improved got involved at an early stage. It sent a strong signal that this project was critical. The kick-off day included some sessions that became important metaphors, and that people could relate to.
2	Being visual about what you plan to do increases creditability of the project: using visual plans with twice-a-day stand-up meetings close to the area in scope for improvement serves several purposes: (1) creates physical presence and shorter distance between the project and operations, (2) reminds the people affected about the project and its participants, (3) increases transparency about findings continuously and in an open way. All this increased the credibility of the project.
3	Stakeholder satisfaction in projects is about aligning expectations on impact and being flexible with deliverables: by using the pulse check and having an active and observant project owner, the project was able to sense continuously how the stakeholders were receiving the outcomes of the project, i.e. the deliverables and the impact. Along the way it was clear that impact was more important than the deliverables. This meant that the approach on deliverables was changed to reach the expected impact and not vice versa.
4	An active project owner enables flow and change: the project experienced a project owner that participated in 99% of the daily sprint meetings, took ownership in removing obstacles that disrupted the flow and allocated all resources needed to create impact – this defines the active project owner.
5	Half Double creates a lot of energy in the core team: a lot of the way-of-working in Half Double: daily focus on impact, stand-ups, prototyping, involvement, etc., create a lot of energy since feedback from results is present all the time.
6	Half Double requires agility: It requires a flexible organization that is good at cross-functional collaboration to run a project where the deliverables are generated along the way and not pre-defined. Some departments became bottlenecks since they were not identified early and allocated to the project.

Comparing pilot and reference projects

The standard evaluation in each organization consists of the pilot project and three reference projects, which are used for comparison. The basic idea of the comparison is to evaluate in practical terms to which extent the pilot project performs better (or worse) than the reference projects (see Appendix A or Svejvig and Hedegaard (2016) for further details on the research methodology).

Project scale. Although most projects show unique characteristics, there are similarities across projects. This fact is used in our comparison where we asked for three reference projects, which are as similar to the pilot project as possible.

Table 19 summarizes the projects' individual scale in terms of size (hours and costs) and characteristics – including novelty, pace, technology (Shenhar & Dvir, 2007) and complexity (Fangel, 2010).

Table 19: Proxies for scale of pilot and reference projects

PROJECT SCALE – SUMMARIZED					
#	PROXY	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
1	Project resources (hours)	6,264	120	1,500	1,110
2	Project cost (DKK)	2,500,000	120,000	500,000	650,000
3	Diamond model – incl. project novelty, pace and technology (scale from 0 to 16)	10.92	9.67	8.46	8.46
4	Project complexity – incl. environment, tasks and organization (scale from 0 to 4)	2.92	2.17	2.46	2.46
5	A composite proxy for project scale derived from items 1, 2, 3 and 4 above	1	4	2	3

The last row shows a relative score derived by summarizing and comparing information from all the above proxies. The scorings show that the projects increase in size and scale from reference project 1 being the smallest and most simple project to reference projects 2 and 3 and finally the pilot project being the largest and most comprehensive project.

Project time. Considering the overall objective of the HDM, the projects are evaluated in terms of time.

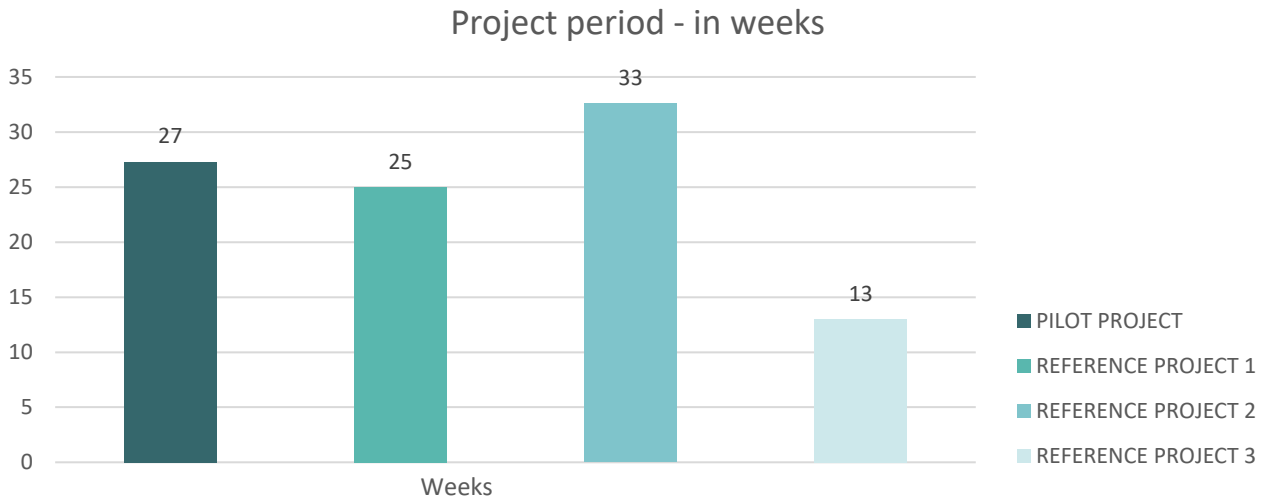
Table 20 and Figure 11 show the projects' relative duration counted in days and illustrated in weeks.

The table and figure show that the pilot project is a medium project taking almost the same time as reference project 1, whereas reference project 2 is the longest project and reference 3 is significantly shorter.

Table 20: Project duration – in days

PROJECT TIME – SUMMARIZED				
PROJECT	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
DAYS	191	175	228	91

Figure 11: Project duration – in weeks



Project impact. Considering the overall objective of the HDM, the projects are also evaluated in terms of their impact.

All projects are scored on the same impact parameters: productivity (quantity), complaints (quality) and waste (scrap). However, it should be noted that the projects differ in their focus area.

Table 21 operationalizes three KPIs for the pilot and reference projects and shows the focus areas of each project. For instance, the first reference project only focuses on quantity, and not quality and scrap, while the pilot project focuses on all three KPIs: quantity, quality and scrap.

Figure 12, Figure 13 and Figure 14 show the projects' relative performance – measured in productivity, complaints and waste per month.

All figures consist of two graphs where the first overall graph shows the development in impact from the first project starts to the last project is closed, while the four lines in the second graph illustrate the impact during and six months after each project has finished.

Table 21: Project focus – across three key performance indicators

PROJECT FOCUS – COMPARISON					
IMPACT	OPERATIONALIZATION	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
Productivity	output (metres) per line (machine)	included	included	included	included
Complaints	complaints (number) per output (100,000 metres)	Included		included	included
Waste	scrap (metres) per output (metres)	included			included

Figure 12: Project impact – in terms of productivity

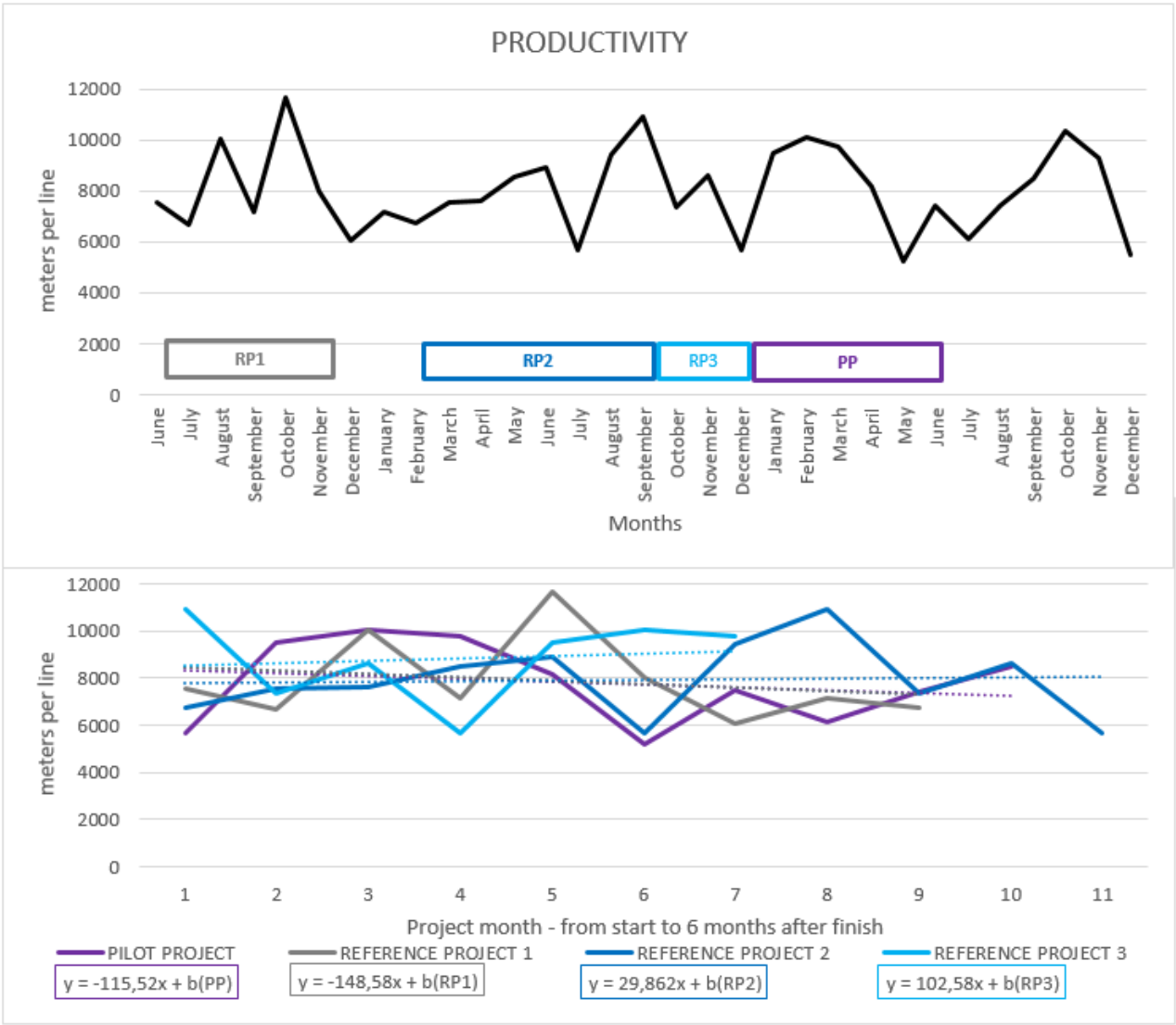


Figure 13: Project impact – in terms of complaints

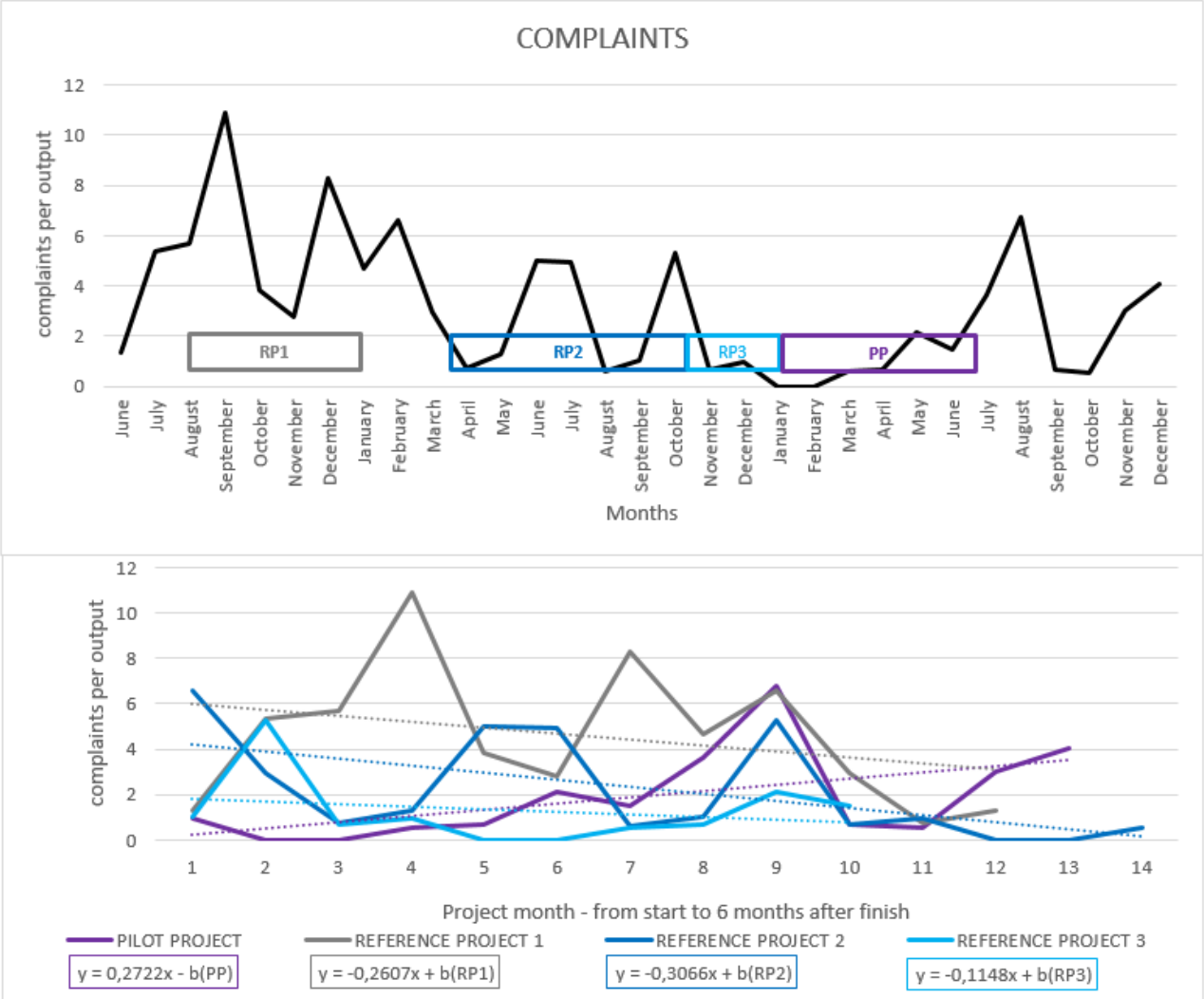


Figure 14: Project impact – in terms of waste

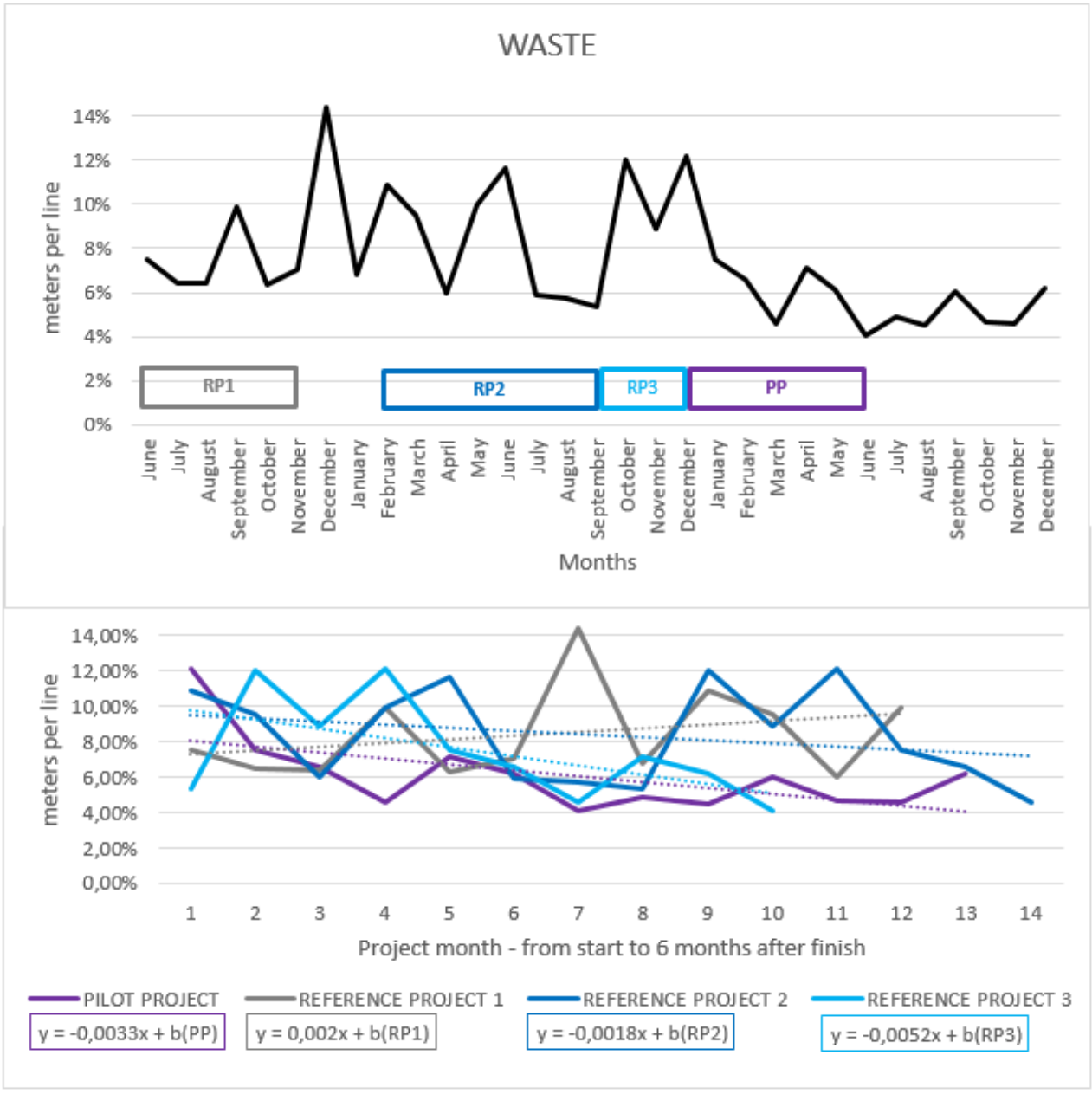


Table 22: Project impact – comparison

PROJECT IMPACT – COMPARISON					
IMPACT	OPERATIONALIZATION	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
Productivity	output (metres) per line (machine)	medium	lowest	medium	highest
Complaints	complaints (number) per output (100,000 metres)	lowest		highest	medium
Waste	scrap (metres) per output (metres)	lowest			highest

Table 22 summarizes the relative performance of the four projects on the three KPIs.

Looking at the table and graphs above, it is difficult to make a solid conclusion on the performance of the pilot project compared to the three reference projects. The pilot project performs on par with the reference projects in terms of productivity but unsatisfactorily in terms of complaints. In terms of waste, it is a medium performing project if all projects are taken into account but a lower performing project if we only compare it to the other reference project (3) focusing on this KPI. Therefore, on an overall level the pilot project is considered a lower performing project based on these KPIs.

It should be added that the unsatisfactory results of the pilot project contrast with the great enthusiasm and positive experience expressed by the project manager running the pilot project and most of the reference projects. He explains that the reason for the unsatisfactory scores of the pilot project are due to warehouse rules and supplier mistakes, which have nothing to do with the pilot project or the methodology. He claims that the pilot project has delivered positive results and that the methodology is perceived as a success in the company.

Summarizing from the quantifiable and objective measures in the figures above as well as the subjective and qualitative explanations and expressions, pointing in opposite directions, it is difficult to make a precise and unambiguous conclusion on the performance of the pilot project.

Projects practices. Looking at practices, we find that the pilot project stands out from the comparable reference projects. In total, the pilot project scores are markedly higher on the Half Double practices scoring on average 3.17 (out of 4) compared to the three reference projects scoring 1.67, 1.83 and 2.44 respectively. The biggest difference across the pilot project and the three reference projects is the pulse check practice, which has not been used in any of the reference projects.

Limitations. When comparing the projects, their relative order is important to keep in mind. All four projects are production optimization projects scheduled in a sequential order – starting with reference project 1 focusing on one KPI (quantity), proceeding with reference project 2 focusing on another KPI (quality) and reference project 3 focusing on a third KPI (waste) and finally ending with the pilot project focusing on all three KPIs. Thus, the pilot project is more ambitious and has a greater scope as it focusses on all three KPIs. Moreover, it could be argued that the pilot project has better odds because it is the last optimization project in a row – therefore being able to

draw on learnings from previous projects. On the other hand, one can argue that the reference projects have better odds due to the law of diminishing returns, which means that it will be increasingly difficult to make improvements and harvest the same return on investments in later projects compared to earlier projects characterized by more low hanging fruit.

It could furthermore be questioned whether a linear trend line (used in the three impact figures) is the right approach or more advanced techniques like moving average would be more appropriate (Anderson et al., 1984).

Conclusion. Overall, it can be concluded that the pilot project is a relatively low performing project compared to the reference projects when evaluated on the quantifiable impact measures: productivity, complaints and waste. However, it should be added that this picture stands in contrast to the great enthusiasm and positive experience of the pilot project in Fiberline. HDM is perceived a success in the company and applied in a new large project.

Terma pilot project

Company and pilot project

Terma is a global company which provides mission critical solutions for the defence and aerospace industries. Terma is guided by one overall purpose: to deliver security for countries, alliances, and individuals. Terma operates in a variety of areas, but security is always key. Terma delivers advanced technologies to keep people safe, both in times of peace and in times of conflict. The company provides security for people on land, at sea, and in the air. In space, Terma is engaged in reaching new frontiers and enabling our planet to deal with new and future challenges.

Key figures

- More than 1,400 employees worldwide
- Established in 1949
- Head office: Lystrup, Denmark
- Total revenue of DKK 1,728 m (2017/2018)

The pilot project; End-to-end, is characterized as a supply chain program. The key drivers behind the program are to create one coherent end-to-end solution to handle increased complexity and growth. The focus of the program is to increase transparency and alignment across all business areas - including Finance, Production and Supply Chain. Further, to increase transparency in the activity level for optimized prioritization, fast decision-making and financial engineering.
The end-to-end supply chain program is divided into four main groups, which together constitute the core project team:

- Sales pipeline
- Procurement and inventory management
- Master planning and production scheduling
- Transportation and warehouse

These four groups have focused on identifying and implementing potential improvement initiatives within their given field to achieve the overall goal of the project.

As part of the program, Terma has launched several projects. Some of these projects are selected for investigation in this report.

Local implementation

The three core elements of the HDM: Impact, Flow and Leadership were specifically tailored to fit the project and the Terma organization and came to life in practice through the following initiatives.

Impact case and impact solution design: In the first phase focus improvement initiatives were chosen. Terma had a list of approx. 70 ideas related to improving the supply chain process. A selection process was initiated to choose only five ideas per group in order to reduce the time to impact and to focus intensively on each of the ideas. In the project, an impact case for each of the prioritized improvement initiatives was created. The impact cases were mainly used to identify and clarify the deliverables which were required to obtain the desired impact. The main part of the initiatives was focused on process optimization, and therefore the core team found it difficult to identify quantifiable measures. Instead, the behavioural impact was emphasized. The main learning through the work with impact cases was to define and emphasize the importance of defining KPIs in the impact case and being structured about applying impact tracking. The impact case was visualized and embedded in the entire process.

Further, in the impact solution design, much emphasis was put on engaging the key stakeholders from management. For instance, this was accomplished by hosting a

board game session where all the key stakeholders participated. The actual board game represented the supply chain process, and as the participants moved forward on the board, they were presented with what-if game cards representing the challenges experienced in the supply chain process. This session worked well as a way of communicating the process and challenges which the core team had experienced. This enabled the key stakeholders to understand and discuss important aspects of the project.

*Pulse check*s: The pulse check was applied to gain insight into the thoughts of the core team members and to create a platform to freely express frustrations, issues or good stories encountered in the project. The pulse check was performed on a monthly basis with a follow-up meeting discussing the feedback. The main learning was that the pulse check should have been applied more frequently, thereby giving the core team a better opportunity to address all the issues occurring in the project.

Co-location design to support intensity: The core team consisted of 18 people, who were allocated 40% of their time to work intensively on the project. During the project, the core team had a dedicated project room available to create the appropriate working conditions for high-intensity work. The co-location allowed problems to be solved faster and more efficiently by working across the four groups and utilizing the competences of all the core team members.

Rhythm in key events: A fixed project heartbeat and rhythm were created in the project by always having a report-in and a report-out every week of the project. During the report-in session, by applying visual planning the core team and project leader would present the upcoming week's tasks. The report-out session included the core team, project leader, project owner, key stakeholders and parts of the management team. The report-out sessions were used as a platform to communicate the progress of the project but also to state the challenges encountered in the project where help from the management was required.

Visual planning and project visuals: Visual plans were created and updated throughout the project, which allowed the project team and other stakeholders to monitor the progress continuously. Furthermore, the visual plan allowed the project participants and project leader to identify bottlenecks and take corrective actions.

Active ownership and collaborative leadership behaviour: The owner of the project participated in the weekly report-out sessions. During these report-out sessions, the owner questioned and helped guide the core team in the right direction. The project leader was present and allocated to the project for the same period of time as the core team. The project leader collaborated with the core team in the different workshops, helping guide the team in the right direction but also challenging the team members when needed. Furthermore, the project leader took responsibility or offered help when the core team experienced resistance from certain parts of the organization.

Reflective and adaptive behaviour: The reflective and adaptive mindset was also in focus during the project. The reflective mindset was especially employed during the report-in and report-out sessions where the project leader, core team and key stakeholders discussed the project progress and challenges. Both the project leader and the core team were good at accepting input from the stakeholders and seeing it as an opportunity to make the project even better.

Table 23: Overview of the pilot project's key activities

TIMING	DESCRIPTION
June 2018	• Pilot project initiation. • Kick-off workshop with the goal of communicating the given information to the core team: • Purpose & success criteria • Roles and responsibility • Project plan
August 2018	• Introduction to the HDM. • High-level process mapping and data collection. In this step, the SIPOC approach was used (SIPOC is short for Supplier, Input, Process, Output & Customer – a tool that helps map and summarise the input and output of a process). • Mapping of the main challenges. • Impact/effort identification workshop resulting in initial impact potential. • Creation of initial board game that was used to facilitate a workshop focusing on involving different key stakeholders in the project. • Pulse check conducted and feedback discussed.
September 2018	• Board game workshop with the participation of key stakeholders from the management team. • Prioritization of identified improvement initiatives and impact case creation together with initial solution design. • Compilation of an improvement catalogue, documenting the expected impact of the improvement initiatives chosen. • Roadmap for implementation for fast and early impact. • Pulse check conducted.
October 2018	• Initiation and completion of the first sprint. • Project handover – Implement Consulting Group withdraws from the project and the project leader is thus solely responsible for driving the project forward.
November 2018	• Initiation and completion of the second sprint.

Table 23 provides a brief overview of the pilot project's key activities.

A couple of stories from the pilot project at Terma

Keeping an eye on the impact and deliverables: The four project team groups tended to focus on their ongoing tasks on a weekly basis – they were good at using the sprint method and at keeping track of their individual activities, although the focus on the actual impact and the tracking of the impact were not always kept in mind. Therefore, the project leader had an important role in following up on and tracking the impact and deliverables and insisting that the team spend time on this, even though they might feel that they were being "interrupted" in implementing the solution and getting on with the actual work.

The missing pulse check: The pulse check was conducted on a monthly basis, always at the end of a project phase. First, the intent was that the pulse check should not interrupt the core team too much, not realizing that the core team wanted to do the pulse check. It was their opportunity to let the project manager, and the other participants, know about their point of view regarding the progression of the project. The pulse check should not be down-prioritized. Secondly, the reason why the pulse check was conducted

at the end of a project phase was because the project leader wanted the output of the pulse check to represent the overall pulse of the project, rather than a pulse of the core teams' frustrations when they were in the middle of a process and experiencing all the obstacles. This resulted in the pulse check becoming more about achieving a high score than catching and acting on all the frustrations and problems that the core team was experiencing. At the end of the project, when the core team reflected on the process, the application of how the pulse check had been used was criticized. The main learning was that the pulse check should be a platform for expressing frustrations rather than focusing on the score of the pulse check.

Results and key learnings

The pilot project's overall success criteria are shown in Table 24.

Table 25 summarizes the pilot project's key learnings.

Table 24: Pilot project success criteria and their fulfilment

SUCCESS CRITERIA		
#	TARGET	ACTUAL / EXPECTED
1	Shorter execution through stakeholder involvement: Key stakeholders experience a higher degree of transparency in the project process and risk handling. This contributes to a shorter execution phase.	The core team concluded that through the application of the weekly report-out sessions with the key stakeholders, the transparency of the project progress and direction were increased. Further, key stakeholder involvement contributed to shorten the execution phase by making key stakeholders aware if actions from their side were required.
2	Improvement of the sales pipeline: The goal of the sprint was to create buy-in from management and sales, to start working with the behaviour around the sales process. Further, the goal was to introduce a new method for calculating forecast accuracy and measuring the sales process accordingly.	Achieved buy-in to: • Move toward a more uniform way of working • Investigate the governance structure for a supply chain gatekeeper model • Work with a new forecast approach As a result, the group can now start mapping the missing processes and work towards creating a uniform process.
3	Inventory optimization:	• A segmentation model was defined and introduced in the company. • Inventory value expected to decrease by 6% as first three segments are updated with SS, EOQ and ROP. • Review of the mathematic calculations with the responsible colleagues (not directly involved in the project) has increased general awareness and "why" this sprint is in focus. Additionally, it has become clear that change management needs further attention to change the buying process and gain the full benefit of the investigation. • The goal of the sprint is to define and introduce an inventory segmentation model, where each segment is assigned an inventory planning principle. • A reduction in excess and surplus stock is expected once the segmentation is implemented. Further, a reduction in holding cost of the active stock is expected.

SUCCESS CRITERIA		
4	Customer order module implementation: • The expected benefit of this sprint is a significant increase in shipping capacity and a decrease of manual work.	The expected benefit of the sprint is: • A 50 % increase in shipping capacity • A 25 % reduction in manual work The implementation has led to: • Increased transparency and avoidance of multiple manual registrations. • Increased transparency of items on stock. • Increased transparency on required delivery dates towards customers. • Increased transparency of packaging capacity requirement.
5	Centralization of stock picking:	• Increased accuracy in the current inventory and planned picking times. • Increased efficiency in the picking process by introducing a dedicated picking team with a high level of routine and discipline. • An increase in direct time registered to production orders. • The time spent on picking an order has currently decreased by 6%. • The direct time registered for picking has increased from 33%-69%, which gives a much better overview and opportunity to plan resources better.

Table 25: Learnings from the pilot project

LEARNINGS	
1	Creating impact cases was a great way of defining the deliverables required in the project to reach the desired impact – although the core team found it challenging to identify the level of detail that the impact cases should contain. A main learning is, therefore, to be very clearly aligned in terms of expectations for the output of the impact cases. Further defining quantifiable measures were found difficult resulting in impact tracking not being prioritised in sprint 1. After sprint 1, impact tracking was identified as crucial and will be a corrective action for the second sprint. Therefore, the main learning was to emphasize the definition of KPIs to track the impact by.
2	Conducting pulse checks regularly provides important insight into the core group's perspective on the project. It helps you understand what works and what does not and enables taking corrective action accordingly. It is important that the tool is used to capture the frustrations and problems experienced in the core group rather than focusing on achieving a high pulse check score. The core team expressed that the pulse checks should have been applied more frequently than on a monthly basis.
3	At the end of the project, the core team expresses that HDM is a good way of working. A reflection was made in terms of the importance of thoroughly explaining the link between the different parts of the HDM, thereby creating an overview of the big picture instead of it being downgraded to individual tools and templates.
4	Having a defined heartbeat worked very well. It helped to create an overview in terms of where to be and when to be there. Further, it also ensured that the core team was working with the project simultaneously creating the platform for the core team members to utilise each other's competences better.
5	Involving the project owner and key stakeholder on a regular basis has resulted in deadlines being met. Focus on main deliverables at the end of each week has kept a high project pace. It is important that project owner and key stakeholder participation continues through the entire project and does not fade out once the implementation of the sprint begins.
6	Having a visual plan with main milestones on a poster for the team and owner enabled visualizing dependencies on other projects, major milestones and risks. Furthermore, it worked as a great tool for communicating project progress to the management team and project owner during the weekly report-out session.

Comparing pilot and reference projects

The standard evaluation in each organization consists of the pilot project and three reference projects, which are used for comparison. The basic idea of the comparison is to evaluate in practical terms to which extent the pilot project performs better (or worse) than the reference projects (see Appendix A or Svejvig and Hedegaard (2016) for further details on the research methodology).

Project scale. Although most projects show unique characteristics, there are similarities across projects. This fact is used in our comparison where we asked for three reference projects, which are as similar to the pilot project as possible.

In this case, two pilot projects were picked out of the overall end-to-end program. Each pilot project is evaluated and benchmarked against a comparable reference project..

Table 26 summarizes the projects' individual scale in terms of size (hours and costs) and characteristics – including novelty, pace, technology (Shenhar & Dvir, 2007) and complexity (Fangel, 2010).

The last row shows a relative score derived by summarizing and comparing information from all the above proxies. The scoring shows that the two reference projects (scoring 1 and 2) were the most comprehensive projects and that the two pilot projects (scoring 3 and 4) were less comprehensive. Thus, in both comparisons the pilot project is the smallest and simplest projects. However, it should be noted that the two pilot projects are following two almost identical projects – the only difference being that the pilot and reference projects are implemented at two different locations. Thus, the solution was developed and implemented at one location in the reference projects and implemented at another location in the pilot projects. This also explains the differences in duration between the pilot and reference projects - considered in the next section.

Project time. Considering the overall objective of the HDM, the projects are evaluated in terms of time.

Table 26: Proxies for scale of pilot and reference projects

PROJECT SCALE – SUMMARIZED					
#	PROXY	REFERENCE PROJECT 1	PILOT PROJECT 1	REFERENCE PROJECT 2	PILOT PROJECT 2
1	Project resources (hours)	1,500-2,000 (internal)	200 (internal)	1,980	56
2	Project cost (DKK)	0	0	1,520	400,000 (external)
3	Diamond model – incl. project novelty, pace and technology (scale from 0 to 16)	6.42	5.79	6.54	4.29
4	Project complexity – incl. environment, tasks and organization (scale from 0 to 4)	1.92	1.79	1.54	1.29
5	A composite proxy for project scale derived from items 1, 2, 3 and 4 above	2	3	1	4

Table 27: Project duration – in days

PROJECT TIME – SUMMARIZED				
PROJECT	REFERENCE PROJECT 1	PILOT PROJECT 1	REFERENCE PROJECT 2	PILOT PROJECT 2
DAYS	248	28	667	85

Figure 15: Project duration – in weeks

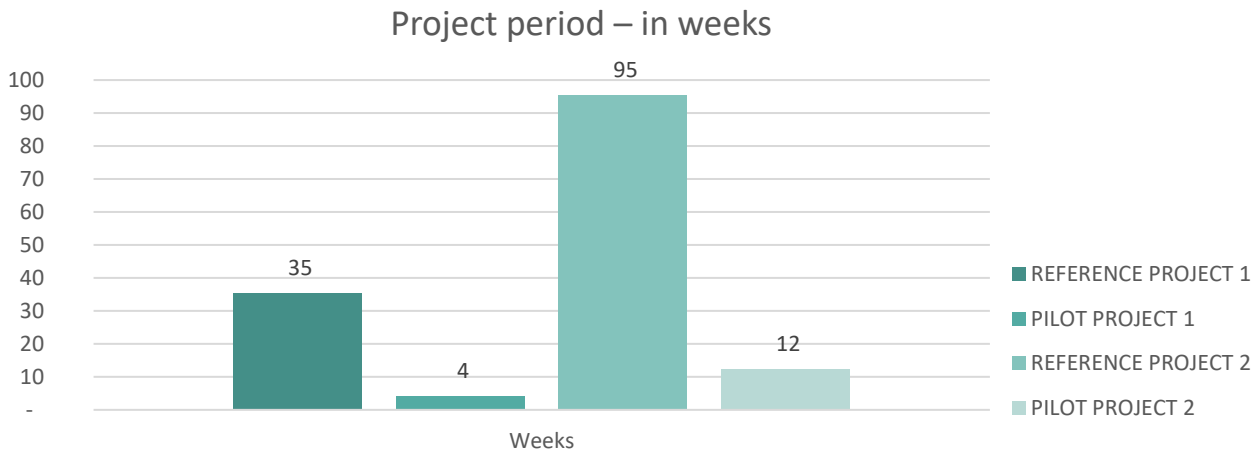


Table 27 and Figure 15 show the projects' relative duration counted in days and illustrated in weeks.

As the figure shows, the two reference projects are the most time-consuming projects whereas the two pilot projects are the shortest projects in terms of time.

Project impact. Considering the overall objective of the HDM, the projects are also evaluated in terms of their impact.

Due to time constraints and lack of possible impact data at the time of writing, the impact of reference project 1 and pilot project 1 cannot be evaluated in this report.

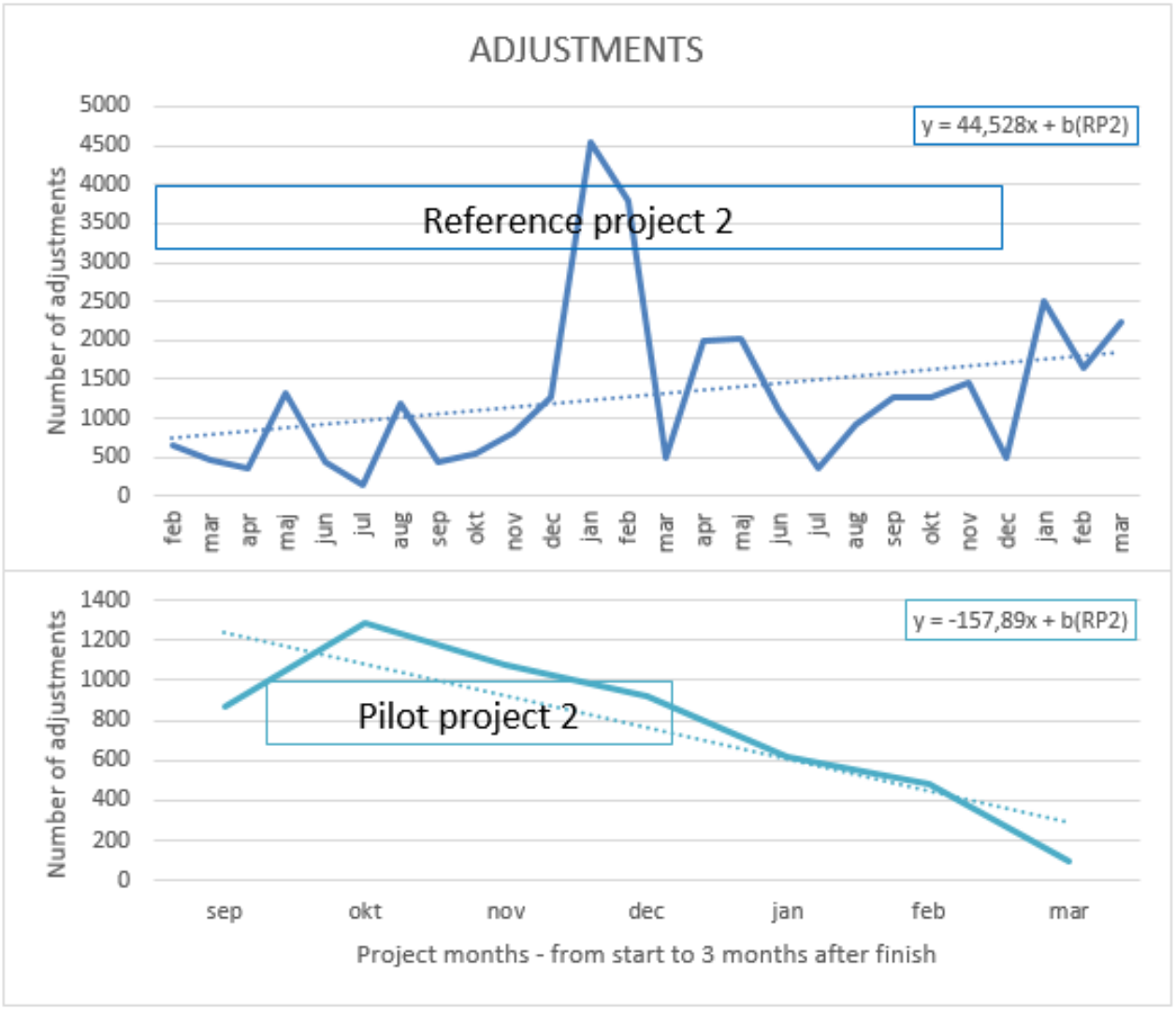
Figure 16 shows the relative performance of pilot project 2 and reference project 2 – measured in number of stock adjustments per month from project start to three months after closure.

When comparing reference project 2 and pilot project 2, we see that the number of registered adjustments in stock is characterized by fluctuations and a slight increase during and after reference project 2. The increase in adjustments and the fluctuations were expected and may be due to the lack of a structured procedure for registering adjustments in the stock at this location. Even though the data shows that the amount of adjustments increased in reference project 2, the warehouse manager

experiences a higher degree of control of adjustments now compared to what it used to be. This is due to a higher degree of detail registered. Furthermore, Terma expects the number of adjustments to decrease in the nearest future.

The number of adjustments during and after pilot project 2 decreased by 89.47% indicating that the pilot project 2 was a success, as it delivers a high and important reduction in the amount of adjustments. Based on the graphs above, the pilot project is considered a high-performing project.

Figure 16: Project impact – in terms of adjustments



Project practices. In the quest for reasons for the relative success of pilot project 2 compared to reference project 2, we examined the projects' practices.

One might argue that the difference in project performance is due to the practices used in the project execution phase, because reference project 2 scores relatively low (8.50) on the Half Double practices, whereas pilot project 2 scores relatively high (25.50). Compared to reference project 2, pilot project 2 had more focus on impact in terms of building an impact case and designing the project to deliver impact faster as well as flow in terms of co-location and use of visuals.

Limitations. The two pilot projects are essentially the same as the two reference projects – the only main difference being that the projects focus on different locations and are run not in parallel but in a sequence – where the reference projects are run first and before the pilot projects. Therefore, the reference projects are longer in terms of time than the pilot projects – which benefitted from the foundational analysis and initial decisions made in the reference projects.

Moreover, the evaluation of the projects was limited due to lack of data on pilot and reference project 1 at the time of writing.

It could furthermore be questioned whether a linear trend line (used in figure 16) is the right approach or more advanced techniques like moving average would be more appropriate (Anderson et al., 1984).

Conclusion. Summarizing on the above findings, it seems plausible that the HDM has had a positive impact in Terma – both in terms of project time and impact. Both pilot projects were done faster than their comparable reference projects, and in the one case where impact data is available, the pilot project outperforms the reference project in terms of reducing the number of registered stock adjustments.

Schoeller Plast pilot project

Company and pilot project

Schoeller Plast is Denmark's largest and most experienced manufacturer of plastic transport boxes, beer/bottle crates and other technical plastic products. In 2017, the company launched a new strategic process aiming to detail the future journey in two areas: new products and markets, and production improvements. The reason why these two areas were chosen was a significant drop in turnover, requiring immediate action to find new core markets and to boost the competitiveness of the company.

Historically the company has been successful due to its ability to transform explicit customer needs from the era of wooden crates to supplying a technically superior product made of plastic that resolved significant pain points for the customers. However, due in part to acquisitions, the product portfolio in early 2017 was characterized by products without a superior value proposition, and with the primary beer/bottle market shifting away from traditional crates it was necessary to find new products and markets. Sub-utilization of the production line along with doubts about the validity of the company's calculation models triggered the need to launch a Half Double project with the specific aim of improving Schoeller Plast's competitiveness.

Key figures

- Family-owned business
- Established: 1966
- Employees: 50
- Sales in more than 40 countries

The pilot project was an overarching project covering the two major tracks: 1) enabling sales and development to calculate true costs and evaluate fair market prices as well as 2) establishing a baseline in production in order to start building true performance management capabilities.

On the sales side, the project aimed at refining pricing models to go from cost plus pricing to value-based pricing, as well as refining the understanding of the cost base to evaluate more precisely the investment cases of new products and profitability of existing products.

On the production side, the aim was to establish the grounds for a more efficient production with higher Overall Equipment Efficiency (OEE) across products and machines. In order to measure and improve OEE, a crucial part of the project became buying and installing an IT system called Visiolog. The objective of Visiolog was to improve the productivity by enabling better communication across the company, between sales and production planning as well as internally in the production team. Several issues between sales and production planning were of concern, as sales orders kept being delayed due to a wide range of problems - including misalignment of available capacity, allocation of machines and operators, and raw material supply.

Local implementation

Impact case: To achieve the highest potential impact, the project was kicked off with an impact case workshop where four key deliverables were selected from a wide selection of potential areas of interest. The four deliverables were selected based on the on-hand issues of productivity and lack of clarity regarding product portfolio profitability. The final target was aimed at laying the foundation for a continuous improvement culture in the organization to allow the short-term impacts to be integrated into the day-to-day work and to ensure future improvements.

Impact Solution Design: The project took the most critical issues and sought to resolve them as early as possible in the project. Starting with pricing and cost calculation models, clarifying the processes between sales and production planning as well as starting data collection on particular machines and working on Supplier, Input, Process, Output and Customer (SMED) for the most critical product.

Pulse Check: To keep the project on track and have the key stakeholders on board, extensive workshops were planned every two weeks. Here the key stakeholders were updated on the result of the previous sprints. Also the workshop was used as a workday to initiate the next two-week sprint.

Allocate core team +50%, assure co-location with visual plans and heartbeat: Due to resource constraints, the core team was not available +50%; however, on days that could be cleared in the schedule, the project team was co-located and worked together from the same room, bringing the project members into a shared space from their usual offices. The project plan was updated for each meeting and printed on large posters to track progress. The heartbeat of the project was the two weeks between the workshops.

Active project owner: The project owner was actively involved from project launch and the key resource in half of the project focusing on cost calculations and pricing. Being key responsible for the overall project, potential issues would be presented to the project owner for swift resolution, and to keep the project moving forward.

Local translation of ownership: To get the Half Double approach to kick in, the project owner was actively engaged in the project and the local team owned the responsibility for the project – including decision-making and executing the joint decisions made by the management team at the bi-weekly workshops.

Table 28 provides a brief overview of the pilot project's key activities.

Table 28: Overview of the pilot project's key activities.

TIMING	DESCRIPTION
07/03/2018	• Kick off Half Double workshop with development of impact case
15/03/2018	• Info meeting with employees
22/03/2018	• Workshop on calculation models & pricing towards customer
10/04/2018	• Workshop on process mapping of Order-to-Production
24/04/2018	• OEE Data collection initiated on all machines in "Blæsehallen", Initiating SMED exercise
02/05/2018	• SMED workshops with employees
07/05/2018	• Review of OEE Data and initial SMED findings
16/05/2018	• Half Double status meeting with leadership team – Agreement on establishing dedicated performance management room in production with whiteboards to track KPIs
25/05/2018	• First productivity report released tracking OEE of all machines in "Blæsehallen"
29/05/2018	• Updated performance management board with dedicated responsibilities • New version of calculation model released, now covering materials as well as extra service offerings
14/06/2018	• Workshop – Development of Performance Management KPI whiteboards with employees

TIMING	DESCRIPTION
18/06/2018	• Half Double status meeting with leadership team – first use of new Performance Management KPI whiteboards in the production area
25/06/2018	• OEE measurements are expanded to cover entire factory while waiting for Visiolog to be installed
03/07/2018	• Half Double status meeting with leadership team – Handover of final calculation models and performance management KPI whiteboards

A couple of stories from the pilot project at Schoeller Plast

The value of bringing together all relevant knowledge in one room to propel the project forward was experienced on several occasions during the project, where the operators and management team were able to discuss potential solutions openly.

As part of the project, it was decided to move the performance management boards to the production area and clear out a room that should function as KPI room. Being able to have the boards in the production and only measuring a few key metrics are key to start the journey towards higher productivity and a continuous improvement culture.

Preliminary results and key learnings

The pilot project's overall success criteria are shown in Table 29.

Table 30 summarizes key learnings from the pilot project.

The preliminary results of the project have been the initial OEE measurements to allow fact-based decision-making in the leadership team along with the supportive calculation and pricing models.

A key learning is to have the project team available for +50% allocation to ensure even higher impact.

Table 29: Pilot project success criteria and their fulfilment

SUCCESS CRITERIA		
#	TARGET	EXPECTED
1	Optimize production processes for existing and new products	Total productivity improvement of 20%
2	Create efficiency and flexibility along with flow in the factory for existing and new products	OEE Target 85-95% existing products OEE Target 65-75% new products
3	Improved granularity in the allocation of production costs	Clear and easily understandable costs allocated per product and per machine (divided between existing and new products)
4	Create an improvement culture through method and knowledge sharing and performance management	Visualise KPIs e.g. through performance management white boards Communication between and involvement of employees

Table 30: Learnings from the pilot project

LEARNINGS	
1	Facts and data move the discussion in the right direction and allow for quicker progress
2	Higher dedication of team members and more allocation of time would have improved the pace of the project
3	Bringing together key knowledge from the production floor and management teams allows better solution designs
4	A frequent heartbeat helps keep the project on track
5	A committed and active project owner is key to ensure impact and commitment from the organization
6	The “one team – one direction” feel is easier to establish when bringing together key stakeholders across the organization and co-locating the work into a common work room

Comparing pilot and reference projects

The standard evaluation in each organization consists of the pilot project and three reference projects, which are used for comparison. The basic idea of the comparison is to evaluate in practical terms to which extent the pilot project performs better (or worse) than the reference projects (see Appendix A or Svejvig and Hedegaard (2016) for further details on the research methodology).

Project scale. Although most projects show unique characteristics, there are similarities across projects. This fact is used in our comparison where we asked for three reference projects, which are as similar to the pilot project as possible.

In this case, it is only possible to identify one reference project to which the pilot project can be compared. This reference project is an earlier attempt to reach the same target as the pilot project. As the reference project was closed down before it reached its success criteria, it left an argument for starting the pilot project.

Table 31 summarizes the projects’ individual scale in terms of size (hours and costs) and characteristics – including novelty, pace, technology (Shenhar & Dvir, 2007) and complexity (Fangel, 2010).

Table 31: Proxies for scale of pilot and reference projects

PROJECT SCALE – SUMMARIZED			
#	PROXY	PILOT PROJECT	REFERENCE PROJECT 1
1	Project resources (hours)	480	208
2	Project cost (DKK)	300,000	275,000
3	Diamond model – incl. project novelty, pace and technology (scale from 0 to 16)	7.38	7.38
4	Project complexity – incl. environment, tasks and organization (scale from 0 to 4)	1.88	1.58
5	A composite proxy for project scale derived from items 1, 2, 3 and 4 above	1	2

As the pilot project is still running and not yet finished, the total resources and costs spent in and on the project are based on estimates.

The last row shows a relative score derived by summarizing and comparing information from all the above proxies. The scoring shows that the pilot project is the most comprehensive and largest project whereas the reference project being an earlier and failed attempt at reaching a similar target is simpler and smaller.

Project time. Considering the overall objective of the HDM, the projects are evaluated in terms of time.

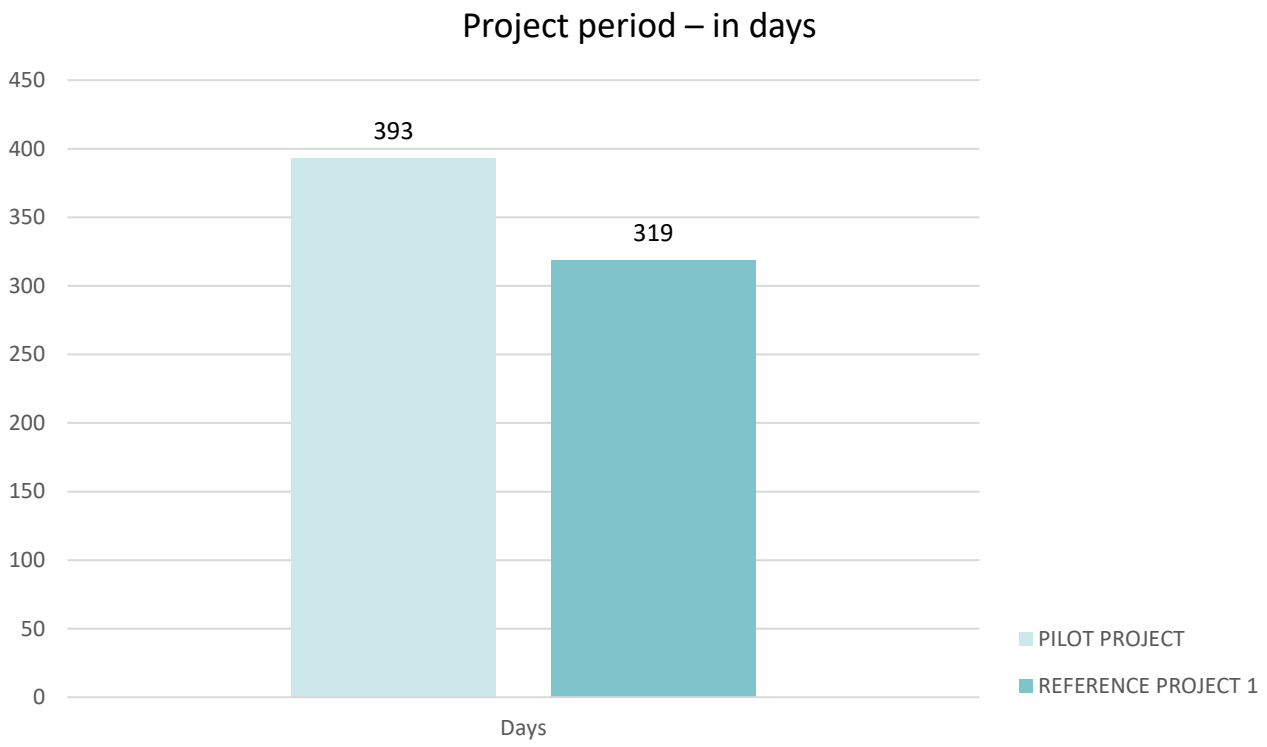
Figure 16 shows the projects' relative duration counted in days.

As the pilot project is not yet finished, the calculation of time is based on the estimated end time of the pilot project. The figure shows that the pilot project estimated at 393 days takes longer than the reference project lasting 319 days. However, it should be mentioned that the reference project was closed without reaching its success criteria. The pilot project being the second attempt to reach the same target is closer than the reference project to reaching its success criteria.

Project impact. Considering the overall objective of the HDM, the projects are also evaluated in terms of their impact.

In this case, it was not possible to define one or more common KPIs based on which we can evaluate and compare the two projects. Therefore, we operationalized impact into a set of dimensions derived from a discussion of the projects' success criteria. Based on this discussion, we operationalized a net list of eight dimensions into eight questions and asked the project manager and owner to

Figure 16: Project duration – in days

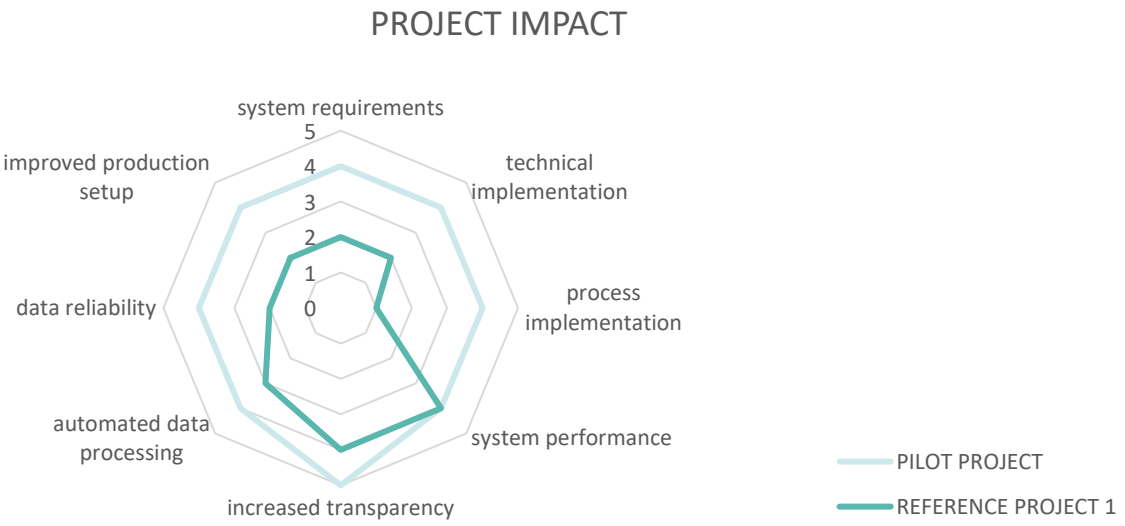


score the two projects on a scale from one to five – where one is low performance and five is high performance. Based on these scores, we calculated a proxy for the projects' overall performance. Table 32 and Figure 17 compare the pilot and reference projects' performance score on these eight impact dimensions.

Table 32: Project impact – based on perceived performance

PROJECT IMPACT - COMPARISON			
DIMENSION	QUESTION	PP	RP1
system requirements	To what extent has the project identified appropriate IT system requirements?	4	2
technical implementation	To what extent is the project's technical solution implementation satisfying?	4	2
process implementation	To what extent is the project's process solutions used?	4	1
system performance	To what extent has the project made it possible to collect the required data?	4	4
increased transparency	To what extent has the project increased transparency?	5	4
automated data processing	To what extent has the project automated data processing?	4	3
data reliability	To what extent does the project deliver reliable data?	4	2
improved production setup	To what extent has the project contributed to the overall competitive advantage of the production setup?	4	2
total		33	20
PP	Pilot project		
RP1	Reference project 1		

Figure 17: Project impact – based on percieved performance



The table and figure show how the pilot project outperforms the reference project on almost all parameters. The pilot project has the highest score on seven out of eight parameters. Only on one parameter, the reference project has a high a score as the pilot project: system performance.

Based on these subjective performance scores, we conclude that the pilot project is a higher performing project compared to the reference project.

Project practices. In the quest for reasons for the relative success of the pilot project compared to the reference project, we examined the projects' practices.

We find that the pilot project is different from the reference project considering especially two Half Double practices – related to the Impact principle. The pilot project has more focus on the impact case and the impact solution design, meaning building an impact case to drive behavioural change and business impact as well as designing the project to deliver impact quickly.

Limitations. It should be noted that the impact measures in this case are based on subjective perceptions of project performance and not objective measures as is the case in most of the impact comparisons.

Moreover, the relative order of the projects should be noted. It could be argued that the pilot project has better odds because it is the second attempt to install a crucial IT system whereas the reference project is the first and failed attempt – and therefore the pilot project can draw on learnings from the previous reference project.

Conclusion. Summarizing on the above findings, it seems plausible that the HDM has had a positive impact at Schoeller Plast. The duration of the pilot project is a little longer than the reference project but in terms of impact, the pilot project scores considerably higher than the reference project. Taken together, the pilot project is considered a medium performing project.

Hydratech Industries pilot project

Company and pilot project

Hydratech Industries is a global company comprised of three divisions – which are strong players within each of their respective industries.

The first division covers The Fluid Power division, which is a leading supplier of high-end customised hydraulic cylinders to Offshore, Marine, and Industrial applications with manufacturing facilities in Denmark and China. The second division is the Service & Repair division with facilities in Denmark, China, USA, Singapore and Norway, which enables worldwide customer service. The third division, Wind Power, located in Silkeborg, is a leading global supplier of hydraulic components for the wind turbine industry. The pilot project takes place within this third division: Hydratech Industries – Wind Power.

Key figures

- More than 400 employees worldwide
- Established in 1978
- Total revenue of DKK 422 m (2017)

The pilot project is characterised as an assembly production transfer project. The purpose of the project was to move the assembly facility from Silkeborg to a new site in the Czech Republic (CZ) thereby reducing costs in the assembly production.

The core challenge was identified as ensuring that operational performance control was retained while transferring the complete assembly operations from Silkeborg to a new manufacturing site in CZ as quickly as possible.

The project was initiated in March 2018 when the new manufacturing site was found in CZ and the initial contract was under way.

Local implementation

The three core elements of the HDM: Impact, Flow and Leadership were specifically tailored to fit the project and the Hydratech Industries organisation and was executed through the following initiatives.

Impact case: The impact case was refined through an initial workshop with the core project team and the project sponsor. The targets from the project's business case were integrated into the impact case as success criteria in the objective hierarchy.

Impact solution design: The tool was modified slightly to include an introduction to the required analysis of the as-is state of the assembly facility followed by a three-week work period to gather data and create a documented analysis of the facility. The remaining workshops were kept and used for in-depth discussions about possible transfer scenarios. The conclusion of the workshops was a core idea focused on identifying which modules should be transferred first and how the transfer could be approached in steps to create value while retaining a high quality level in production.

Pulse checks: Pulse checks were only used after the initial workshops as a mini pulse check done with post-its on a poster. The mini pulse checks reflected a strong belief in the approach and high engagement in the project.

Co-location: The idea of collocating the core team was introduced during the Impact solution design process. The team decided not to setup a co-location room for the project as most of the work took place on the production floor and at the new location,

which was constructed in the course of the project.

Fixed rhythm in key events: The fixed key meetings included a two-hour Sprint Planning meeting once per sprint, bi-weekly 45-minute Plan Next meetings, a monthly one-hour Project Owner meeting as well as a monthly one-hour Demo Session and a 30-minute Sprint Retrospective meeting.

The project owner participated in the Project Owner Meeting and the Demo Session. At the Demo Session, relevant key stakeholders could be invited depending on the topic of the sprint.

Visualisation and visual planning: We used the principles of visual planning in the meetings, and Sprint plans were co-created on a poster using post-its written by the core team; they were placed in the corresponding weeks. The whole plan was discussed and agreed upon at the end of the meeting in order to assure cross-team collaboration and understanding. Due to the flexible co-location space, the Sprint plan was positioned in the project manager's office during the week and brought into meeting rooms when the whole team convened for the key events.

Collaborative project leadership: The project was led by the Danish factory floor manager as he had the relevant knowledge about which processes and modules were crucial for making a successful transfer. The project leader actively engaged stakeholders and experts in the project to ensure buy in and detailed coordination of the transfer. The core team quickly engaged with Half Double tools and incorporated them into the weekly/bi-weekly project flow.

Active ownership: The Chief Operating Officer (COO) took active ownership of the project from the start and engaged strongly in the formulation of the impact case, the impact solution design and the plan. However, he left the company during project execution, so the project leader and the core team took over the project aligning it with the CFO along the way.

Table 33 and Table 34 provides a brief overview of the pilot project's key work streams and activities.

Table 33: Overview of the pilot project's key work streams

DESCRIPTION	
• Business setup	• IT-setup hardware
• Organisation setup	• Training
• Construction of building	• Master data setup
• Documentation	• Quality, Environmental, Health, and Safety Policy (QEHS) setup
• Production layout	• Technical production tasks (PTA in Danish)
• Warehouse setup	• Logistics
• Administrative office setup	• Sourcing

Table 34: Overview of the pilot project's key activities in start-up phase and transfer plan

TIMING	DESCRIPTION
Week 5, 2018	• Impact definition workshop (01.02.2018)
Week 8, 2018	• Current level starts up – work meeting (22.02.2018)
Week 11, 2018	• Current level assessment meeting and Impact Solution Design 1 (13.03.2018)
Week 12, 2018	• Impact solution design 2 and concluding start-up (20.03.2018)
Week 47, 2018	• Construction of new site in CZ done
Week 49, 2018	• Obtaining factory approval
Week 51, 2018	• Transfer of 6.0 Cooling
Week 2, 2019	• Transfer of 6.0 Pitch Units
Week 6, 2019	• Transfer of 6.0 Power Pack
Week 7, 2019	• Transfer of G114 Pitch Units
Week 10, 2019	• Transfer of G114 Power Pack

The listed assembly lines were transferred individually in a seven-step process, which included 1) training of the new CZ employees in Denmark, 2) transfer of tools and parts, 3) first order and kit pack, 4) production cell setup in CZ, 5) on-site training in CZ, 6) product approval, and 7) finally the first delivery from CZ.

The project was kicked off in early February 2018 and the first eight weeks were spent on the steps included in the modified impact solution design process. Hydratech Industries experienced some delays in access to the CZ site, which extended the original timeline. As of now, not all transfers have been completed, as there have been more delays.

A story from the pilot project at Hydratech Industries

Early on, the project was faced with two other "projects" which posed a problem in the form of resource constraints in the transfer project. The two projects were:

1) New product introduction

2) Outstanding quality in customer audit

Both the above projects took up critical resources needed in the transfer project. By using the weekly sprint plan approach, the project manager and the sponsors could easily "navigate" through the resource constraint and execute a good mitigation plan to support the transfer project.

Preliminary results and key learnings

Table 35 shows the pilot project's overall success criteria and their fulfilment.

Table 36 summarizes key learnings from the pilot project.

Table 35: Pilot project success criteria and their fulfilment

SUCCESS CRITERIA		
	TARGET	ACTUAL / EXPECTED
Business impact		
1	Blue collar cost reduction	25% of target achieved late Q1 2019
2	100% Capacity running (all prod. % modules) in CZ by late Q4 2018	Target expected achieved late Q2 2019
3	No orders or customers lost in transfer until Q1 2019	Achieved
4	Quality retained at current level based on clams and OTD	Achieved
Behavioural impact		
5	40 employees hired & trained to operate production within 3-4 months	Achieved
6	Six supervisors identified and trained to be role models	Achieved
7	Culture, control and local motivation approach defined	Achieved
9	Strong governance on one off-cost established and running	Achieved
10	CZ employees capable of operating at DK performance level	Achieved
11	Risk of "people calling in sick" reduced/addressed	Achieved
12	Local management	Achieved
12	Control mechanisms installed	Achieved
13	DK employees stay and finish their job until closure	Not relevant
14	Quality validation of new factory performed with customer	Achieved
15	Service level agreement with commercial parts defined internally	Not achieved

Table 36: Learnings from the pilot project

LEARNINGS	
1	When resource constraints needed to be discussed, the weekly sprint planning session allowed facilitating very specific constraints *e.g.* free time; thus the quality of decisions could be improved in order to mitigate action.
2	Due to the structure of the weekly planning meetings using the sprint plan format, it is very easy for a sponsor to make decisions.
3	Easy to adopt the Half Double approach due to the visual aspect of the methodology. The templates are simple and easy to use.

Hydratech Industries has never before run a production transfer project, meaning there is no reference project to compare the performance of the reference project with. Therefore, the impact of the pilot project is considered based on the ability to live up to the success criteria for the project.

Hydratech Industries have achieved 12 of the 15 relevant success criteria so far and expect to meet another two during 2019, meaning 80% of the success criteria has been achieved at the time of writing this report. This is considered satisfactory.

The positive result may be due to the practices used in the project, where the pilot project had an exceptional high focus on customer value and hard-core trust in the project leadership.

Comparing pilot and reference projects

The standard evaluation in each organization consists of the pilot project and three reference projects, which are used for comparison. The basic idea of the comparison is to evaluate in practical terms to which extent the pilot project performs better (or worse) than the reference projects (see Appendix A or Svejvig and Hedegaard (2016) for further details on the research methodology).

In this case, it was not possible to identify any reference projects at Hydratech Industries to which the pilot project could be compared. Moreover, as the pilot project is still running and not yet finished, data on this project is incomplete.

LEGO Group pilot project

Company and pilot project

LEGO Group (LEGO) is a family-owned company based in Billund, Denmark and best known for the manufacture of LEGO-brand toys. The company was founded in 1932 by Ole Kirk Christiansen and is based on the iconic LEGO® brick. Today, LEGO is one of the world's leading manufacturers of play materials for children – committed to children's creative development and learning.

Key figures

- 17,385 employees worldwide (2018)
- Established in 1932 by the Kirk Christiansen family
- Head office: Billund, Denmark
- Total revenue of DKK 36,4 b (2018)

The pilot project is characterized as a planning assessment project. LEGO Elements & Moulds (E&M) is looking to assess their current capacity planning capabilities, processes and applied technologies, while getting inspired through sparring and an outside-in perspective based on best practice for planning principles. Based on a planning assessment, E&M wants to develop a roadmap, bridging the gap between current and best-in-class capabilities, while mitigating ongoing challenges, which in the end will lead to better planning and thus delivery service of new moulds to production.

This project purpose defines the core project deliverables as:

- Assessment of current E&M supply chain planning capabilities, processes and applied technologies.
- Catalogue of improvement areas in the E&M supply chain planning processes and tools.
- Prioritisation of initiatives based on impact and implementation ease, leading to a high-level roadmap of initiatives to improve planning capability building competencies, processes and technologies/IT tools.

Local implementation

The three core elements of the HDM: Impact, Flow and Leadership were specifically tailored to fit the project and the E&M organization and came to life in practice through the following initiatives.

Impact case and impact solution design: The first phase of the project was used for defining improvement initiatives, and further ranking these initiatives based on the impact/effort scale to identify quick wins. Furthermore, a high emphasis on engaging the key stakeholders was prioritized in the impact solution design. This was, for example, accomplished by hosting a solution hypothesis workshop where all the key stakeholders participated. This session worked well as a way of communicating the process and challenges which the core team had identified in the process. This enabled the key stakeholders to understand and discuss important aspects of the project.

*Pulse check*s: The pulse check was applied to gain insight into the thoughts of the core team members and gain insight for further improvements. The pulse check was performed after a workshop with a follow-up meeting discussing the feedback. The main learning was that the pulse check should have been applied more frequently, thereby giving the core team a better opportunity to address all the challenges occurring in the project.

Co-location design to support intensity: The core team consisted of five people who had 40% of their time allocated to work on the project. During the project, the core team had a dedicated project room available to create

the appropriate working conditions for high intensity work. The co-location allowed problems to be solved faster and more efficiently.

Rhythm in key events: A fixed project heartbeat and rhythm was created by having a report-in and a report-out every week of the project. In the report-in sessions, the core team would discuss the week's tasks applying visual planning. The report-out sessions were used as a platform to communicate the progress of the project and to discuss the upcoming weeks' tasks.

Visual planning and project visuals: A visual plan was created and updated throughout the project allowing the project team and other stakeholders to monitor the progress continuously. Furthermore, the visual plan allowed the project participants and project leader to identify bottlenecks and take corrective action.

Active ownership and collaborative leadership behaviour: The project owner participated in all the key workshops and was involved throughout the project. A reflection made by both the core team and the project owner was that the project owner should be involved proactively even further from the beginning of the project, especially during the workdays. It is believed that this would have benefitted the project further.

Reflective and adaptive behaviour: The reflective and adaptive mindset was also in focus during the project. The reflective mindset was especially employed during review sessions with key stakeholders where the solution initiatives identified were iscussed. The core team was focused on adopting the mindset of accepting the input from the stakeholders and seeing it as an opportunity to make the project even better. This concept helped the core team tailor the solutions to tackle the challenges experienced in E&M.

Table 37 provides a brief overview of the pilot project's key activities.

Table 37: Overview of the pilot project's key activities

TIMING	DESCRIPTION
February 2019	• Kick-off workshop with the goal of informing the core team and key stakeholders of: • Purpose & success criteria • Introduction to PHD • Project Approach • Introduction to E&M • Visual planning • Project sprint planning • Interviews - planning process • Development • Manufacturing • Qualification • Capacity management • Initial definition of 24 improvement initiatives – compiling the improvement catalogue
March 2019	• Workshop – planning transparency: solution design workshop • Issue tree (challenge breakdown) • Planning principles • Planning decisions and horizons • Solution hypothesis work • Impact case/Issue tree

TIMING	DESCRIPTION
	• Prototyping/Mock-ups • Capacity input prototype • Forecast bias prototype • Dynamic lead-time simulation prototype • Co-creating planning assessment + review with key stakeholders • Co-creating capacity model concept +review with key stakeholders • Interview – planning process • Visitation
April 2019	• Impact/effort definition of improvement initiatives • Finalization of improvement catalogue • Report-out presentation with key stakeholders

A story from the pilot project at LEGO

Workshops with key stakeholders: The project team expressed that the various workshops facilitated with key stakeholders were insightful and an important part of the success of the project. The purpose of the workshops was to involve the key stakeholders continuously but also to utilise their key knowledge within the area of planning. The workshops were organized in an interactive manner with a focus on visualisation by means of posters. For instance, an issue tree was created using cardboard cards that were stuck on the wall.

Preliminary results and key learnings

Table 38 shows the pilot project's overall success criteria and their fulfilment.

Table 39 summarizes key learnings from the pilot project.

Table 38: Overall success criteria and their fulfilment

SUCCESS CRITERIA		
#	TARGET	ACTUAL
1	Planning assessment	Achieved
2	Technology assessment	Achieved
3	Improvement catalogue	Achieved: an improvement catalogue containing 24 improvement initiatives was delivered
4	New capacity model concept suggestions	Achieved: three prototypes supporting the capacity concept were produced
5	Impact/effort definitions (quick wins identified)	Achieved: the 24 improvement initiatives were all ranked based on impact/effort by the core team
6	Roadmap	Achieved: a roadmap spanning the next 12 months including six sprints was developed

Table 39: Learnings from the pilot project

LEARNINGS	
1	The visual plan must always be updated as this provides an essential overview of the key deliverables and duration of key events and gives the project team a quick and joint understanding of the process and the bottlenecks. The project team should have been firmer on fixed sessions for going through the project plan every week.
2	Active project ownership: This could be improved by the project team using its mandate more proactively. For instance, involving the management team for a fixed 1½ hours every week.
3	Having a defined heartbeat worked very well. It helped to create an overview in terms of where to be and when to be there. Further, it also ensured that the core team was working with the project simultaneously creating the platform for the core team to utilise each other's competences better.
4	Having a project room allows clear visualization of the project's progress and solutions. Moreover, people know where to find you and can come by if they have a good idea, questions or other issues they want to share.
5	Some workshops were concluded with a pulse check as well as a discussion of what could be improved and how these improvements could be implemented. This created good value for the project and should have been initiated after each workshop.
6	A key learning is that technology will not solve all challenges, but it is rather the process which should be focused on and improved. Furthermore, the concept of creating a functional and simpler solution to begin with rather than starting with the full-blown advanced system project was an important learning.
7	Tailoring the HDM to fit with the requirements of this specific project (local translation) worked well. This meant that some parts of HDM were used frequently in the project whereas others were not in focus.

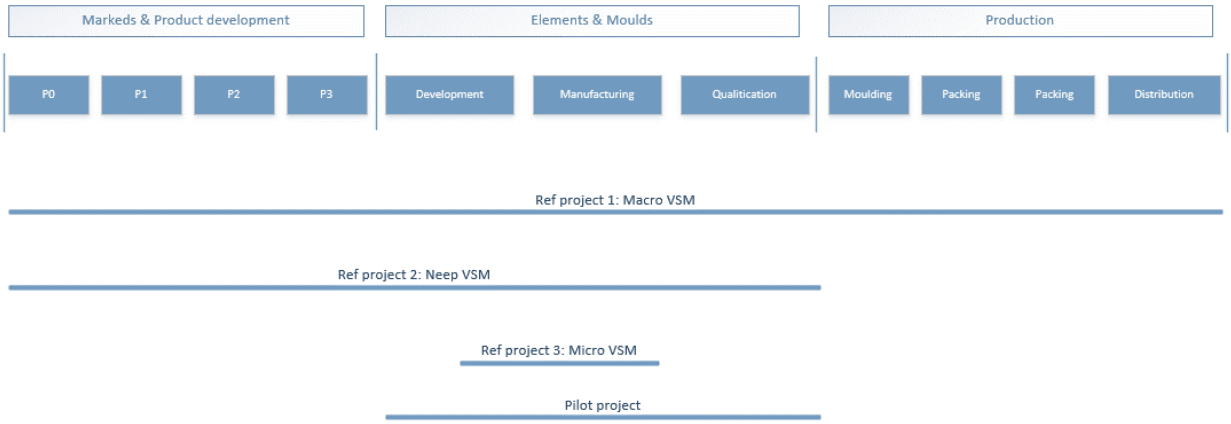
Comparing pilot and reference projects

The standard evaluation in each organization consists of the pilot project and three reference projects, which are used for comparison. The basic idea of the comparison is to evaluate in practical terms to which extent the pilot project performs better (or worse) than the reference projects (see Appendix A or Svejvig and Hedegaard (2016) for further details on the research methodology).

Project scale. Although most projects show unique characteristics, there are similarities across projects. This fact is used in our comparison where we asked for three reference projects, which are as similar to the pilot project as possible.

Figure 18 shows the supply chain in LEGO and illustrates where the pilot project and the three comparable reference projects had their focus.

Figure 18: Overview of projects in the supply chain



As can be seen from the figure, all four projects are Value Stream Mapping (VSM) projects with different scope – ranging from a macro VSM (reference 1) project covering all three value streams, and a NEEP (meso) VSM (reference 2) project covering two value streams to a micro VSM (reference 3) project covering only a part of a value stream and the pilot project covering one value stream.

Table 40 summarizes the projects' individual scale in terms of size (hours and costs) and characteristics – including novelty, pace, technology (Shenhar & Dvir, 2007) and complexity (Fangel, 2010).

Table 40: Proxies for scale of pilot and reference projects

PROJECT SCALE – SUMMARIZED					
#	PROXY	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
1	Project resources (hours)	592	1,184	2,340	444
2	Project cost (DKK)	Medium	Lower	Higher	Lower
3	Diamond model – incl. project novelty, pace and technology (scale from 0 to 16)	5.75	8.58	8.92	6.83
4	Project complexity – incl. environment, tasks and organization (scale from 0 to 4)	1.75	2.58	2.92	1.83
5	A composite proxy for project scale derived from items 1, 2, 3 and 4 above	3	2	1	4

The last row shows a relative score derived by summarizing and comparing information from all the above proxies. The scorings shows that reference project 2 is the most comprehensive project and reference project 3 is the least comprehensive one, whereas the pilot project scoring 3 is considered a medium project somewhere in between these two.

However, it should be noted that reference project 2 covers both the development of an improvement catalogue and the implementation of the improvement points, which was done simultaneously. The pilot project covers only the development of the improvement catalogue and not the implementation of the improvement points.

Project time. Considering the overall objective of the HDM, the projects are evaluated in terms of time.

Table 41 and Figure 19 show the projects' relative duration counted in days and illustrated in weeks.

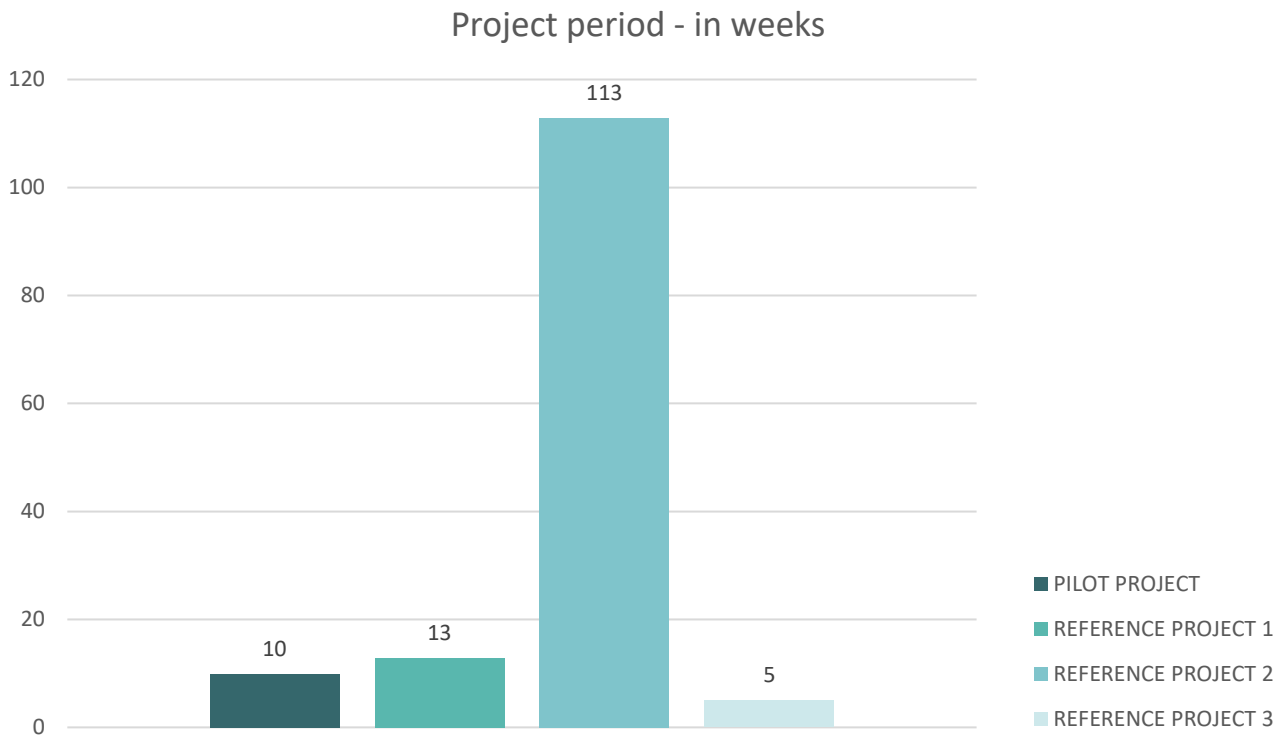
The figure shows that reference project 3 has the shortest project period accumulating to five weeks, whereas the second shortest project is the pilot project accumulating to 10 weeks. Reference project 2 took 113 weeks, meaning it was supremely the longest project.

However, it should be noted that the duration of reference project 2 covers both the development of an improvement catalogue and the implementation of the improvement points, whereas the duration of the other projects covers only the development of the improvement catalogue and not the implementation of the improvement points.

Table 41: Project duration – in days

PROJECT TIME – SUMMARIZED				
PROJECT	PILOT PROJECT	REFERENCE PROJECT 1	REFERENCE PROJECT 2	REFERENCE PROJECT 3
DAYS	69	90	790	35

Figure 19: Project duration – in weeks



Project impact. Considering the overall objective of the HDM, the projects are also evaluated in terms of their impact.

In this case, it was not possible to evaluate the projects' relative performance, as the pilot

project was finished mid-April 2019, which was too close to the release of this report.

Project practices. Considering the practices used in the four projects, it is interesting that LEGO already before the pilot project introducing the HDM used several of the Half Double practices. In fact, although the pilot project scores high enough to be characterized as a Half Double project, it has the lowest average score compared to the three reference projects. This finding indicates that LEGO already uses the HDM without necessarily being aware of it.

Limitations. All the projects were improvement catalogue projects, i.e., all the projects developed a catalogue with improvement points. The pilot project ended with the catalogue, but the reference projects also included the implementation of improvement points. It was not possible to separate the development and implementation in reference project 2, meaning the duration of reference project 2 covers both parts. Also, it was not possible to distinguish cost and resources and therefore the comparison data for all three reference projects covers both development and implementation of the catalogues whereas the pilot project solely covers the development of the catalogue.

Another limitation regards the relative order of the projects. All the reference projects are interlinked at different organizational levels, whereas the pilot project was related to the

output of reference project 2. One could argue that the projects that are part of another project has better odds because they are not the pioneering project – and therefore they can draw on learnings from a previous project. On the other hand, one can argue that reference project 1 (the first project covering the entire supply chain) has better odds due to the law of diminishing returns, which means that it will be increasingly difficult to make improvements and harvest the same return on investments in later projects compared to earlier projects characterized by more low hanging fruit.

Conclusion. Due to the timing of the pilot project, it was not possible to collect data on the relative performance of the projects for this report.

However, an interesting finding is that LEGO already uses several of the Half Double practices. In fact, all of the reference projects score high enough on these Half Double practices to be classified as Half Double projects. This finding points to the foundation of the HDM which is heavily inspired by best practice. Therefore, it is plausible to find examples of Half Double practices in professional and high performing organizations with a high project maturity level.

CONCLUSION

Four years have passed by since the formal launch of Project Half Double (PHD) in June 2015, and it is time to make up the accounts.

The mission of the Half Double project is clear: to define a project methodology that can increase the success rate of projects while increasing the development speed of new products and services. The overall goal is to deliver *"Projects in half the time with double the impact"* where projects in half the time should be understood as half the time to impact (benefit realization, effect is achieved) and not as half the time for project execution.

The overall results from the 16 pilot projects implementing the Half Double Methodology (HDM) are presented in this report and summarized below.

- In seven pilot projects the HDM appears to have had a high impact (Lantmännen Unibake, Novo Nordisk, Jabra GN, Velux, LINAK, Terma and Coloplast)
- In two pilot projects the HDM appears to have had a medium impact (FoodService Danmark and Schoeller Plast)
- In four pilot projects the HDM appears to have had a low impact (Siemens Wind Power, Grundfos, SAS Ground Handling and Fiberline Composites)
- Three pilot projects are still in progress or not fully evaluated (Novozymes, Hydratech Industries and LEGO Group)

The results indicate that in the majority of pilot projects the HDM seems to have had a positive effect: the HDM appears to have had a high impact in 54% of the projects and a medium impact in 15% of the projects. However, 31% of the projects seem to have had a low impact from using the HDM – related to the overall goal of PHD. There may be several reasons for not living up to the overall goal. This report elaborates on these reasons in two out of the four cases: SAS Ground Handling and Fiberline Composites. The cases of Siemens Wind Power and Grundfos are described in an earlier report (Svejvig, Rode, et al., 2017). It is important to emphasize that the evaluation described above is only related to the impact from using HDM related to the overall goal of PHD. This means that the pilot projects can be successful in other ways, for instance, by achieving their success criteria, delivering on time, cost and scope or creating valuable learnings.

Evaluation and comparison of projects are generally a "dangerous endeavour" (Svejvig & Hedegaard, 2016), and there is a complex relationship between using a project methodology and the resulting project performance (success) which is influenced by the project environment (Joslin & Müller, 2016b). We certainly acknowledge the complex relations between context, methodology and project performance (see also Befani, Ledermann, & Sager, 2007) and refer to Appendix B for a further discussion of the limitations of our study. Based on the findings presented in this report, our claim is confined to the following proposition:

Applying the Half Double Methodology can lead to an apparently higher impact from the pilot projects compared to comparable reference projects in the same organization.

APPENDIX A: RESEARCH METHODOLOGY

The purpose of the research in Project Half Double (PHD) is to evaluate the impact of the Half Double Methodology (HDM) and the degree to which this new project paradigm may increase the success rate of projects. The research process was carried out in parallel with the pilot projects in order to learn from them and with the purpose of comparing these pilot projects with other projects using traditional methods. However, it is challenging to compare projects as they are distinctive and contingent as indicated by the classic definition of projects as "A temporary endeavor to create a unique product, service, or result" (Project Management Institute, 2004, p. 368). Consequently, a clear definition of the evaluation criteria and rules for comparison are required. Therefore, we designed a comparison framework to evaluate and compare the pilot projects with other projects labelled as reference projects in the same organization. This was done to assess the degree to which the HDM is successful and more effective than traditional approaches (Svejvig & Hedegaard, 2016). In this section, we briefly introduce the design of the evaluation and comparison framework and the process of data collection and analysis.

Action design research

Overall this research can be labelled as engaged scholarship where we co-produce knowledge with practitioners and engage in intervention (Van de Ven, 2007). Particularly, we frame the research approach in PHD as action design research (ADR) adapted from the information systems domain. *"ADR is a research method for generating prescriptive design knowledge through building and evaluating… artifacts in an organizational setting*" (Sein, Henfridsson, Purao, Rossi, & Lindgren, 2011, p. 40). ADR consists of four interleaved stages: (1) problem formulation; (2) building, intervention, and evaluation; (3) reflection and learning; and (4) formalization of learning. ADR also involves seven principles shown together with the four stages in Table 42 (inspired by Gregor, Imran, & Turner, 2014). It is an iterative process moving back and forth between the different stages as stipulated in the ADR method (Sein et al., 2011). As shown in the table, the ADR process entails a problem-solving cycle and a research cycle (Mathiassen, Chiasson, & Germonprez, 2012). These two cycles are intertwined (Svejvig & Hedegaard, 2016).

The research cycle designed a comparison framework. This artifact works at two operationalization levels (Pries-Heje & Baskerville, 2008) as a general comparison framework and as a specific comparison framework for each of the organizations involved in PHD.

Table 42: The action design research process related to Project Half Double

STAGES AND PRINCIPLES	APPLICATION OF ADR IN PHD (PROBLEM-SOLVING CYCLE)	APPLICATION OF ADR IN RESEARCH ON PH(RESEARCH CYCLE)
STAGE 1: Problem formulation		
• Principle 1: Practice inspired research	PHD is driven from practice with the overall objective to develop a new and radical project paradigm in order to increase the competitiveness of Danish industry.	A "comparison framework" is developed to evaluate the intervention process (especially practices and impact) in order to assess the degree to which the HDM is more successful than traditional approaches.
• Principle 2: Theory-ingrained artifact	The HDM artifact is derived from lean and agile thinking (Axelos, 2015; Womack & Jones, 2003) and is related to the rethinking project management research stream (Svejvig & Andersen, 2015; Winter, Smith, Morris, & Cicmil, 2006).	The artifact "comparison framework" is based on open systems theory (Andersen, 2010; Chen, 2015), evaluation theory (Pawson & Tilley, 1997; Stufflebeam & Shinkfield, 2007), an the Diamond model for project characteristics (Shenhar & Dvir, 2007) including project complexity (Fangel, 2010).
STAGE 2: Building, intervention, and evaluation		
• Principle 3: Reciprocal shaping	The HDM is applied to the pilot projects, and experience from the pilot projects is used to revise and enhance the method.	The comparison framework was first developed as a general framework and later applied to each pilot project and re-shaped in each organization through an iterative process.
• Principle 4: Mutually influential roles	There is mutual learning between practitioners, consultants and researchers both within and across organizations, e.g. through knowledge sharing workshops – this learning process also overlaps the problem solving and research cycles.	
• Principle 5: Authentic and concurrent evaluation	The comparison framework is used within each organization to evaluate the pilot project and compare it with the reference projects.	The comparison framework is continuously discussed in interviews and workshops as part of the evaluation. A more structured review of the specific comparison framework was also carried out in each organization.
STAGE 3: Reflection and learning		
• Principle 6: Guided emergence	Guided emergence reflects that the initial design of the artifacts (HDM and comparison framework) is shaped by its ongoing use and the participants who use the artifacts (Sein et al., 2011, p. 44). This happens as a natural part of using the artifacts although it becomes more knowing and doing in practice (Orlikowski, 2002), which only to some extent is codified and explicated.	
STAGE 4: Formalization of learning		
• Principle 7: Generalized outcomes	The HDM as artifact is a generalized outcome which reflects the learning that takes place in PHD.	The comparison framework is a generalized outcome that can also be applied in other settings.

The table is adapted from Svejvig and Hedegaard (2016).

The general comparison framework

The general comparison framework (GCF) is based on evaluation theory, models and applications (Patton, 1997; Stufflebeam & Shinkfield, 2007) and realistic evaluation (Pawson, 2002). To this is added Shenhar and Dvir's Diamond model (2007) as well as project complexity models (Fangel, 2010). The evaluation and comparison process thus builds on a mixed method approach, where we combine quantitative and qualitative data (Biesta, 2010; Tashakkori & Teddlie, 1998).The GCF reflects an open systems view on projects (Bertalanffy, 1956; Chen,

2015), but is adapted from the realistic evaluation method consisting of three elements: Context (C) + Mechanism (M) => Outcome (O) referred to as the CMO model (Pawson, 2002; Pawson & Tilley, 1997), which basically describes that the context and the mechanism (practices) used in a project lead to the outcome (Svejvig & Hedegaard, 2016). We acknowledge the complex causation between C, M and O (Befani et al., 2007) and employ it conceptually to illustrate relationships between these elements, also known as a structural or interpretative explanation (Neuman, 2014, pp. 77-84). The basic CMO model is then merged with core concepts from project value creation consisting of project -> output -> outcome/change/impact (Laursen & Svejvig, 2016).

Figure 20: Project evaluation template

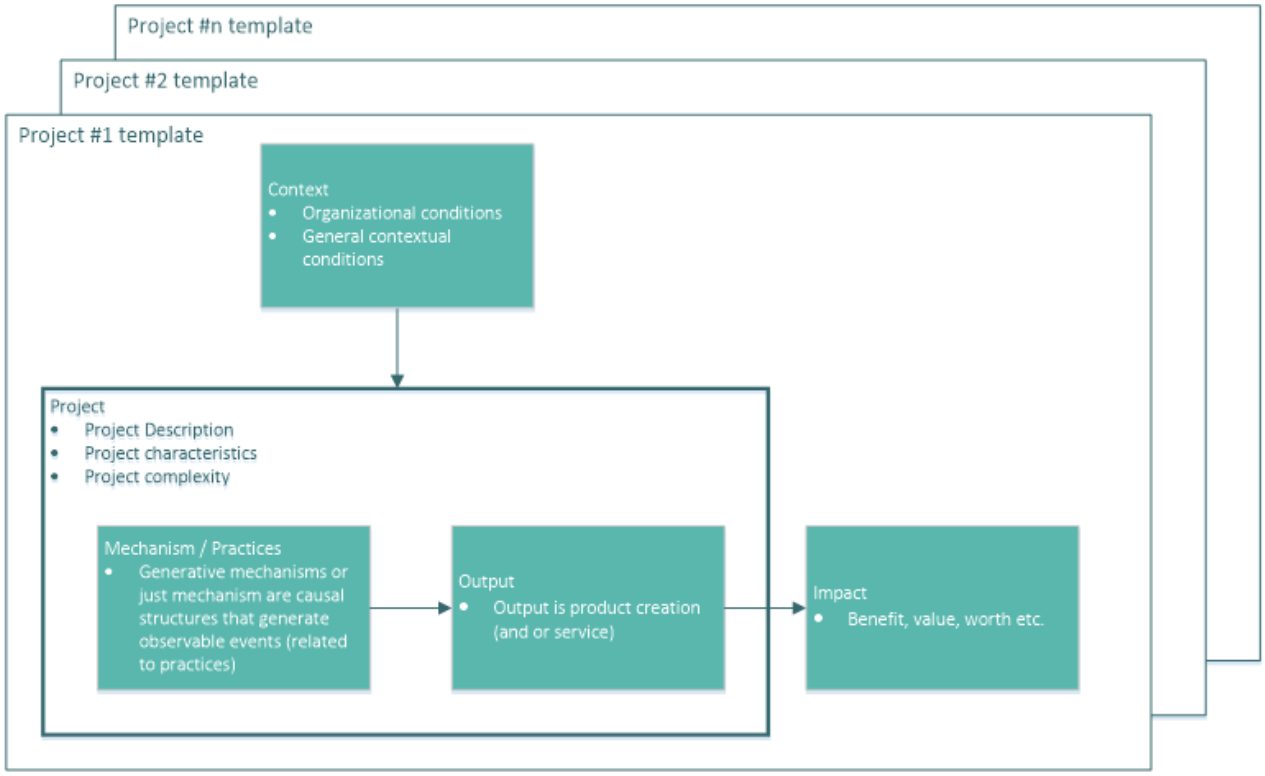


Figure 20 shows the evaluation areas in the template – including the five elements: context, project, mechanism/practices, output and impact. Context refers to organizational conditions like management style and project management maturity as well as general contextual conditions such as market conditions, which shape the project. The project itself can be described and categorized according to it's characteristics including novelty, pace, technology and

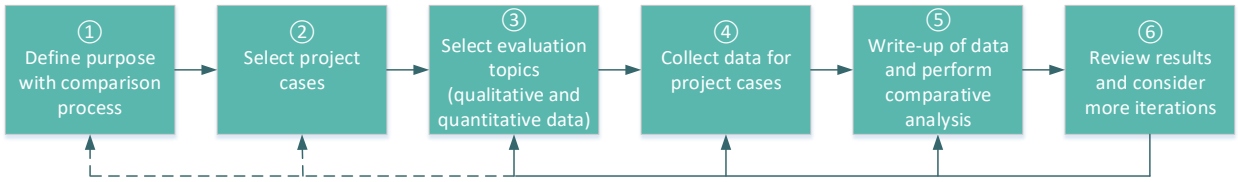
complexity. In the project, people execute practices which are expected to lead to tangible and/or intangible output (product and/or service creation), finally having some impact in the short, medium and/or longer term (Laursen & Svejvig, 2016; Serra & Kunc, 2015).

This GCF was adapted specifically in every organization and operationalized in relation to each pilot project through an iterative process (for further details, see Svejvig and Hedegaard 2016).

In all pilot organizations, data was collected on the pilot project as well as a set of comparable projects selected by the pilot organization and labelled “reference projects”. The research team met with each organization between five and 16 times to collect and verify data and analyses. Interviews were supplemented by other relevant project documentation (Myers, 2009).

Figure 21 outlines the general research process and the various activities at different stages in every pilot organization. The process was iterative - especially between stage three and stage six.

Figure 21: Research Process in pilot organizations



The figure is adapted from Svejvig and Hedegaard (2016).

Data collection

The pilot project and reference project managers participated in interviews lasting approximately two hours. The purpose of these interviews was to clarify the project characteristics and complexities. An adaptation of the Diamond model introduced by Shenhar and Dvir (2007) was used for this purpose. It provides an overall indication of the similarities and differences between the selected projects. It includes the standard elements: complexity, novelty, technology, and pace. To decide on the project complexity, measures from the Danish Project Management Association (Fangel, 2005, 2010; Fangel & Bach, 2002) was used. This evaluation template was applied to all projects in order to facilitate comparison. Moreover, cost and resources were treated as size proxies. Notions of impact were related to the individual projects’ KPIs.

Moreover, the interviews were used to clarify “mechanisms” such as the practices employed in the various projects as well as the project managers’ experience and learning. Project practices were compared to the notions of impact, leadership and flow, proposed by the HDM. Attention to project practices provides understanding of what (actually) happens in projects and how this might or might not affect the impact of the project. Projects as practice (Blomquist, Hällgren, Nilsson, & Söderholm, 2010) refer to understanding what practitioners do and the tools they use, their interaction and intention and their joint episodes of activities. In order to compare pilot project practices to

reference project practices, we asked the project managers in the reference projects to consider their project practices and compare them with the HDM principles. On a scale from one to four, we asked them to score to what extent they had practiced these principles. Whenever possible, we made sure that an “alignment profile”, e.g., head of project management, PMO manager, line manager etc. was present at the interviews to support comparison between the project scorings. All interviews were recorded to secure rich documentation.

Data analysis

The research process has resulted in a large amount of quantitative and qualitative data, which was analysed within and across each organization (Miles & Huberman, 1994; Patton, 2002).

For each organization, the research team compared the pilot project to the reference projects based on various forms of data in accordance with the specific comparison framework, for example, project budget, cost, resources, characteristics, practices, etc. as well as the degree to which selected KPIs were achieved. Moreover, a crisp set qualitative comparative analysis (Rihoux & Ragin, 2009) was carried out on the project practice scorings in order to find patterns in the data suggesting that some practices may have impacted on the pilot project in contrast to the reference projects. This analysis was carried out in order to understand whether HDM represents something different from the way project practices are normally executed in each organization and how HDM may have impacted the results of the pilot project. Certainly, we are wary with emphasizing any causality but treat the outcomes of the analysis as indications of a possible impact.

The project data and analysis for each organization was summarized in a confidential word document with an accompanying excel appendix. Review processes was then run in order to amend possible errors and ensure respondent validation (Silverman, 2000). From these reports the most significant data and analyses was extracted and re-written into a condensed external chapter that is presented in this and three previous Half Double reports (Svejvig et al., 2016; Svejvig, Rode, et al., 2017; Svejvig, Adland, et al., 2017). A review process was also run on these chapters in order to ensure that no confidential data is published.

Data analysis has been ongoing through the data collection process and is still not completed. As we want to follow the projects until and beyond their closure to track their long-term impact, both data generation and data analysis are expected to continue in a longitudinal study.

APPENDIX B: LIMITATIONS

The aim of this report is to document results from Project Half Double (PHD) and to find indicators of the practical implications of applying the Half Double Methodology (HDM) across 16 pilot organizations.

The report tries to answer the question regarding the impact of the HDM by comparing the performance of a number of pilot projects applying the new HDM with comparable reference projects relying on established methodologies.

There are limitations to the findings presented in this report – and these should be taken into account when considering the conclusions.

This chapter gives an overview of some of the limitations of this study.

***First** of all,* the report is a comparative study in which a vital part of the evaluation includes systematic comparison (Bryman, 2008, pp. 58-61; Chen, 2015; Stufflebeam & Shinkfield, 2007, pp. 7-18) of Half Double-inspired pilot projects with reference projects. It is difficult to compare projects as all projects are unique and no projects are identical.

Although we try to take a holistic view of the projects by evaluating them in different conceptual frameworks and on a large number of dimensions, we cannot measure and control for everything. For instance, we analyse all projects in terms of complexity, pace and novelty based on Shenhar and Dvir (2007) Diamond model as well as size in terms of hours and cost inspired by the classical iron triangle (Atkinson 1999). However, these dimensions are of a rather "hard" and technical nature whereas more personal and "soft" aspects pertaining to the people involved receive less focus. Although, for instance, the project approach as well as the participants' competences and backgrounds are included as part of the complexity scoring (Fangel, 2010), further research that takes a broader view of the project practitioners could be done. For instance, practitioners' experience, training, certificates, orientations and identity as well as project managers' leadership skills plus members' interaction and teamwork have not been substantially scrutinized.

In addition, aspects of the organizational context that influence the performance of the pilot and reference projects might have been overlooked. Although the pilot project is juxtaposed to a number of reference projects from the same organization, the organizational context is never the same. Instead, the organization is always in flux and can be seen as an organizing process in constant movement (De Cock & Sharp, 2007; Hernes & Weik, 2007). Hence, there can be changes in the organizational culture or structure which circumstantiates the pilot and reference projects with varying chances of success. Moreover, learnings from prior experience are not taken into account. Nor are differences in project participants' competences and capabilities or maturity levels in terms of project management processes.

In addition, the Hawthorne effect (Baritz, 1960; Roethlisberger & Dickson, 1939) might be at play, namely the fact that the pilot project practitioners know that they are being studied probably has an impact on their behaviour and might increase the performance of the pilot project.

Moreover, possibly results may be affected by the increased attention and special treatment given to the pilot projects because of the new methodology in terms of extra resources from Implement Consulting Group assisting with training and coaching as well

as reflective talks and interviews with the research team. It is also possible that the pilot projects being part of an optimization experiment and development process have been paid more and positive attention from top management compared to earlier reference projects. Following these lines, the halo effect (Neuman, 2014, p. 4) might play a role in the positive performance of some of the pilot projects. It is plausible that many of the authors contributing to this report are biased towards the HDM.

In general, one should be cautious of the positivist understanding of the researcher as a neutral and detached observer (Bryman & Buchanan, 2009). This report is based on a pragmatic and engaged scholarship study relying on a subjective ontology (Van de Ven, 2007). Following a postmodern paradigm, it is hard to distinguish between the observed and the observer – between the subject and the object of study (Heidegger, 1992 in Rendtorff, 2014). According to Bourdieu's reflective sociology, scientists are always embedded in and part of the context and phenomenon they study and therefore their position has implications for the knowledge they produce (Mathiesen & Højbjerg, 2013).

Second**,** the report is an evaluative study in which the projects are classified as more or less successful. Project success is a multidimensional and contested concept (Jugdev & Müller, 2005) that lies in the eyes of the beholder (Joslin & Müller, 2016a). Therefore, the projects analysed in this report might be perceived as more successful by one stakeholder and less successful by another. Although we have tried to circumvent these issues by ensuring the pilot project evaluations are based on a set of broadly agreed upon success criteria established from the beginning of the project life cycle (Jugdev & Müller, 2005), criteria or their relevance might change as the context and/or project changes (Christensen & Kreiner 1991). Learning arises as the project develops and new insight might change the project and its success criteria. Hence, success criteria and perceptions might change over time. In order to get a broader understanding of the projects' value creation, project performance should be evaluated in a long-term perspective (Laursen & Svejvig, 2016) stretching beyond the timeframe of the first and second phases of PHD. Consequently, the success evaluation and classification of the projects documented in this report might change and the projects' performance might be different if viewed in another light at a later point in time. Such circumstances are, however, a natural part of doing this kind of action design research (Sein et al., 2011; Svejvig & Hedegaard, 2016) and should not be seen as a scientific error.

Third**,** as the HDM framework is an artefactual design in development, meaning that the HDM is adjusted and improved as it is applied and knowledge and learnings are obtained, the HDM changes over the course of the study. This means that not all projects are evaluated against the same practices. Such differences are not to be regarded as a rigorous error. Rather, these changes should be seen as a methodological precondition for an experimental process and a natural part of an action design research (Sein et al., 2011; Svejvig & Hedegaard, 2016) study in which practical change and knowledge production go hand in hand (Nielsen, 2013).

Fourth, the same preconditions pertain to the comparative evaluation method that also develops through the learning process. For example, an implication of the improvement of the analytical framework is that the selection of reference projects has developed from an ad hoc process to a more structured and scientifically supported procedure in which the project practitioners in charge are assisted by the research team.

***Fifth*,** it should be noted that although there is reason to believe that there is a positive relationship between project methodologies in general and project performance (Joslin & Müller, 2016a), it is not possible in this report to document a causal relationship between the positive performance of some pilot projects and the HDM. We cannot determine that any superior pilot project performance is caused by the HDM – but only state that when we find indications that there might be a positive relationship, the pilot outperforms the reference projects which are similar or at least comparable on a large number of dimensions but different when it comes to practices. Hence, the explanation of the superior performance might lie in the Half Double practices.

Sixth, although data availability has increased substantially in this report compared to earlier reports (Svejvig et al., 2016; Svejvig, Rode, et al., 2017; Svejvig, Adland, et al., 2017), in some cases collection of the necessary data has not been possible. In other cases, data availability and access are vast. In these cases, possibilities of further analysis that would strengthen the results exist. Such analyses include triangulating the quantitative and qualitative data. In addition, a deeper analysis exploring some of the intriguing specifics of a given pilot project or organization could yield new knowledge and interesting insights.

***Seventh*,** this report is not a critical review of the HDM, and we do not pertain to questions regarding how radical the methodology is and to what degree projects can be delivered in half the time with double the impact. These statements are "consultancy jargon" and from a research perspective most likely exaggerated and overly optimistic. A comparative study based on a review of other project methodologies could highlight what the HDM offers compared to other methodologies.

Finally, the generalizability also referred to as PHD's "sweet spot" is still under debate. While earlier publications have touched on project type and size (Rode & Svejvig, 2018) and speculated about the specifics of small and medium-sized enterprises and how they fit the HDM (Rode et al., 2018), further research could explore this area even more – for instance, in relation to project characteristics including project complexity where an extensive amount of data is already collected.

All these limitations should be taken into account when considering the results of this report.

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