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FUTURE OF PROJECT MANAGEMENT - A SUSTAINABLE APPROACH PUT UP FOR DISCUSSION

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Re-Manufacturing and Sustainable Manufacturing requires innovation in Project Management. Delivery in closed systems must be expanded in the direction of sustainable processes. This requires enhanced methodologies for both project managers and business leaders. Strategic decisions in the direction of developing sustainable processes must be developed and implemented organizationally through close cooperation. A strategic-organizational approach is being discussed that is intended to make this possible. This will be discussed on the basis of two case studies for re-manufacturing and sustainable manufacturing for automotive and plant engineering. This project management enables a long-term orientation for the closure of product life cycles under the aspects of the ESG's and the SDG's for resource conservation and reuse. New business models can thus be implemented in the long term. Project Management for the Next7G.

Keywords: sustainable; manufacturing; innovation; Project Management

EL FUTURO DE LA GESTIÓN DE PROYECTOS: UN ENFOQUE SOSTENIBLE A DEBATE

La refabricación y la fabricación sostenible requieren innovación en la gestión de proyectos. La entrega en sistemas cerrados debe ampliarse en la dirección de procesos sostenibles. Esto requiere metodologías mejoradas tanto para los gestores de proyectos como para los líderes empresariales. Las decisiones estratégicas en la dirección del desarrollo de procesos sostenibles deben desarrollarse y aplicarse a nivel organizativo mediante una estrecha cooperación. Se está debatiendo un enfoque estratégico-organizativo que pretende hacer esto posible. Esto se discutirá sobre la base de dos estudios de caso para la remanufactura y la fabricación sostenible para la automoción y la ingeniería de planta. Esta gestión de proyectos permite una orientación a largo plazo para el cierre de los ciclos de vida de los productos bajo los aspectos de los ESG y los SDG para la conservación y reutilización de los recursos. De este modo pueden implantarse nuevos modelos de negocio a largo plazo. Gestión de proyectos para el Next7G.

Palabras clave: fabricación; sostenible; innovación; Gestión de Proyectos

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1 Projectmanagement in the Anthropocene

The age known as the Anthropocene will have a decisive influence on the behavior of organizations. In view of the scarcity of resources and energy, the changing conditions caused by climate change and the associated regulations, projects and thus project managers are facing new challenges in terms of project management. The previous delivery of project results in closed structures is no longer sufficient. The existing methodologies of project management should be extended to have an effect beyond the delivery of project results (Schoper and Glitscher, 2022).

Project management needs an expanded definition of its scope that can be translated into corporate action. Shaping futures sustainably means internalizing that project managers, as shapers of futures, are themselves affected by the results from the realization of their projects. They are part of these futures. They must see themselves as *designers* - and not exclusively as realizers of ideas (Glitscher, 2021; Glitscher, 2022 and Glitscher, 2023).

2 Sustainability and Project Management

Sustainable project management, which is characterized by the conservation of all resources necessary for the realization of a project, were discussed (Schoper, 2018). The necessity of an extension of the project management discussed by us was confirmed by a study, which among other things for Germany a contribution up to 40% for the gross domestic product is generated by projects (Schoper et.al., 2017). Already more than ten years ago, an extension of the magic triangle of project management by adding strategic dimensions was discussed (Tharp, 2012). The accompanying expansion of project management in terms of supporting sustainable developments from project results requires consideration of economic feasibility, social responsibility, and environmental impact.

Thus, the sustainability of project management refers to two different perspectives (Schoper, 2018):

1. the sustainability of the delivered results - i.e., the WHAT? is delivered and
2. the sustainability of the processes in the project and thus the HOW? and thus the management of the project.

Previous approaches discussed models for sustainable project management that should evolve from traditional to more modern to sustainable project management in the direction of considering global aspects for human-made societies (Silvius et.al., 2012). In this publication, in addition to the People, Planet and Profit dimensions, the authors presented another fourteen dimensions for discussion to be included in the methodology.

Obviously, the possible approaches to sustainable project management are still under discussion, as in ICB 4.0, which defines different metrics for the competencies of project managers (ICB 4.0, 2019).

Without top leadership involvement, it is doubtful that companies are capable of a sustainable development, as top leadership plays several critical roles in organizational processes. Corporate leaders have a significant impact on organizational culture and decision-making processes in the company through their commitment and leadership. They provide resources and incentives for employees to promote and organizationally support sustainability initiatives..

Leadership quality can be defined as formulating corporate philosophical principles and primarily convincing employees and customers of these principles. Managers - and project managers are included in this - must also understand that they are not only exclusively responsible for the continued existence of their companies and all the stakeholders connected with them. The stakeholder circle must be expanded to include the necessary global

dimensions. Leaders are required to recognize and reflect on the impact of their actions with their organization and to involve all stakeholders in this process (Epstein, 2008 and Kiesnere and Baumgartner, 2022).

For top management, the following tasks can be defined in this context:

- Establish the sustainability goals and the strategies to achieve them.
- To understand the current sustainability initiatives and their impact on the organization, the projects and their environment.
- Implement sustainability guidelines for project management that support the business plans and objectives and the sustainability strategies.
- Continuously evaluate and adapt this strategy process to changing situations in the sense of metabolic systems thinking.
- Define, implement, control and further develop methods that systemically support and robustly safeguard these management processes in both breadth and depth.

From our point of view, the GPM P5 standards, which have been defined in the meantime and are referred to as Green Project Management, do not meet these requirements either (GPM P5, 2023).

3 An Advanced Methodology: The Next7G Project Management

The extended methodology of project management for sustainable developments for resource conservation and thus the preservation of human living conditions presented here for discussion was developed on the basis of the Knowledge-Practice-Belief complex described already in 1999 by the ecologist Fikret Berkes on the basis of field studies of indigenous peoples who developed technologies that enable them to survive in difficult habitats (Berkes, 2008). This body of knowledge, called Traditional Ecologic Knowledge (TEK), has been taken up and studied and described in depth by Australian architect Julia Watson (Watson, 2019).

A Next7G Project Management is based on a principle from Iroquois lore that considers the impact of actions on subsequent seven generations, as described by Watson. Thus, a consideration of feasible and visionary further developments of project results towards sustainable project management becomes necessary, as it also applies to a circular economy.

On this basis as well as extensive own experiences from more than 20 years in project, program and portfolio management this methodical approach for project management has been developed. It seeks to coordinate the integration of the knowledge of project managers regarding feasibility, risks and the associated possible and necessary developments beyond the delivery of project results with the strategic aspects of management.

We present here a model developed by the consulting firm McKinsey in 2009 (McKinsey; 2009) that we have further developed in the direction of Next7G Project Management. This model was originally published as a framework for growth strategies. Here it is transformed to Next7G Project Management. It provides a classification of projects in organizations under the aspects of profitability, sustainable development, and social responsibility. This model is further developed for sustainable project management in robotics and automotive industry.

This 3-horizon approach can be described as follows:

Horizon 1 Projects: Run the Business.

Maintaining competitive position – project management rather conservative or static (“waterfall model”). Project managers identify possible further development potential with the processes and project results under sustainability criteria. Documentation required (knowledge management). Risk potential: low; Barriers: Low

Horizon 2 Projects: Re-Invent the Business.

Project leave the familiar environments of the company. Project management integrates hybride methods (e.g. Agile, SCRUM) as required. Processes and results are defined and delivered in manageable and clearly defined steps. Enhancement of competitive position, no “greenwashing”! Risk potential: Increased; Barriers: Increased.

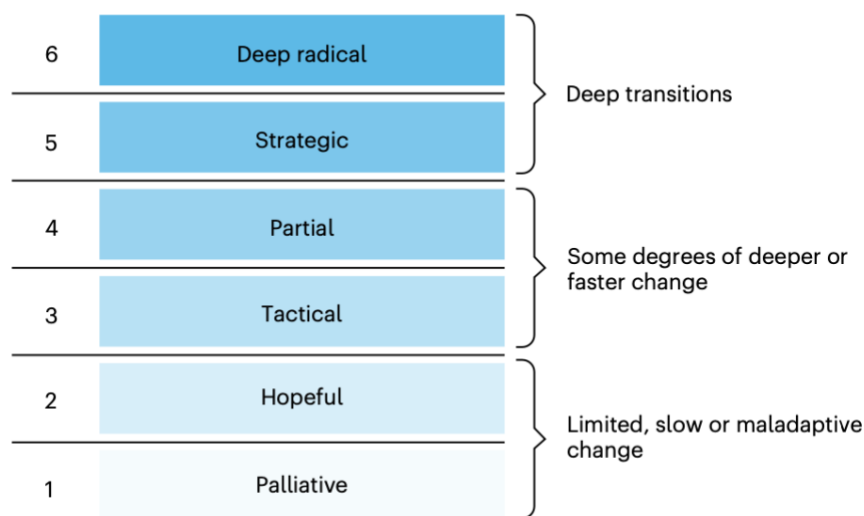
Horizon 3 Projects: Transform the Business.

Projects pursue visionary goals, taking into account the experience gained from Horizon 1 and 2 projects (use of knowledge management). Project management leaves familiar methods and takes risks. Keeping groundbreaking developments in focus, developing potential for previously unknown and new markets. Focus on closing product cycles. Risk potential: High; Barriers: High.

For the approach to be discussed here, project results are to be understood as intermediate products for which further use is intended. First approaches to be discussed and their possible impacts can be found in the classification of possible interventions of human actions on climate development and resource consumption (Morrison et.al.; 2022).

In this publication, a six-stage model has been proposed regarding the influencing variables and their effectiveness in changing the behavior of societies with respect to resource use and thus their direct effectiveness towards sustainable developments, as shown in Figure 1.

Fig 1: Different types of radical interventions. This different interpretations as a typology. In this case each type reflects the extent to which the interventions might disrupt the current statuses. This model was integrated in the Next7G-Model for sustainable project management (Source: Morrison et.al. 2022)



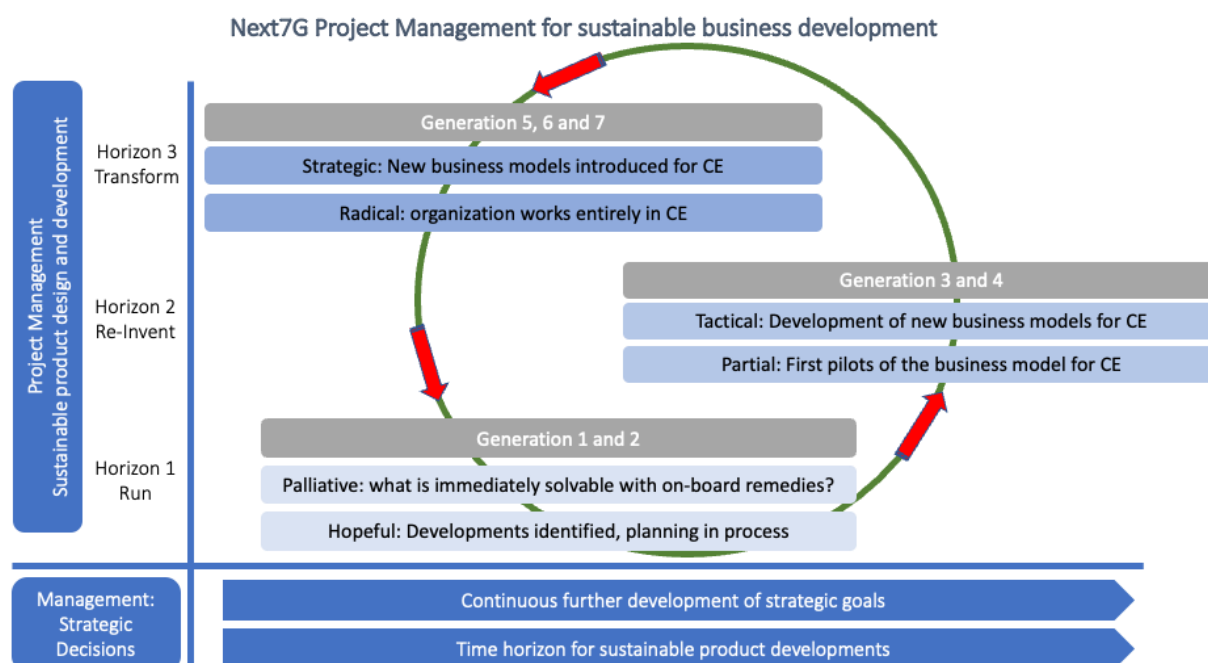
The 3-horizons approach in combination with the six-step intervention model as described above allows to combine the operational approaches of project management with the strategic tasks of management.

The experience gained from project management with regard to the possibility of further developments, the existing knowledge and resources within the organization, the definition of a possible R&D requirement for further sustainable developments, e.g. of products, flows into the strategic decisions of the management. This ensures that the practical findings from the projects are incorporated into the strategic options and decisions. The three-horizon methodology can be directly combined with the classification of each horizon in terms of feasibility and possible further developments. For horizon 1, it can first be analyzed and

decided which processes in the direction of sustainability can be solved by simple means or realized by projects in the short term. In horizon 2, further developments are then considered and it is decided when and with which means these can be realized in projects. In horizon 3, far-sighted further developments in the direction of sustainable processes and products can then be defined. The respective time horizons depend on the respective experiences and the knowledge and skills of the organizations available to date. On this basis, development horizons can be planned with all the necessary resources.

In Figure 2 below, this model is shown as a circular generic approach in the form of a "Big Picture".

Fig. 2: A generic “big picture” for project management and management (Source: Authors)



The model proposed here requires a review in terms of its feasibility and user-friendliness. The following questions need to be addressed:

1. does this model meet the general requirements of organizations in terms of meeting their own and external sustainability criteria?
2. can legal requirements be mapped with this model for organizations?
3. how can this model be successfully introduced into organizations? What resources are required for this?
4. is the development of KPI's (Key Competence Indicators) helpful?
5. is it necessary to train the persons responsible for the implementation? How can this training be implemented, if necessary?

4 A first approach for a proof of concept for remanufacturing processes

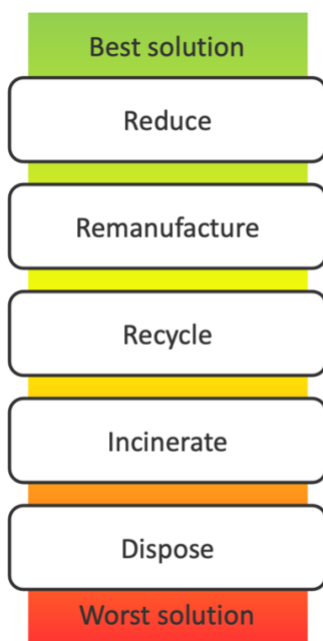
For production processes, re-manufacturing has been discussed from its fundamentals for more than ten years (Allwood and McCullen, 2012). The Circular Economy Initiative in Germany discusses approaches to sustainable product development and remanufacturing processes very broadly for all industrial sectors within the framework of the acatech Initiative (Circular Business Model, 2020).

Up to now, approaches for project management, how this can be implemented and carried out with focus at sustainability, have not been discussed. Product life cycles must be planned and closed sustainably in order to conserve resources and take environmental impact into account. This requires innovations in new technologies and operating models. Sustainable innovations in production processes, their biological impact and the resulting development, organization, distribution, utilization and recycling models are necessary (Schoper and Glitscher, 2022). We try to fill this gap with a practical approach. Using two examples of re-manufacturing processes, we have discussed the approach we have developed and how it can contribute sustainably and in the long term to the introduction of extended processes for project management.

We have chosen remanufacturing processes because the EU Directive 2008/98/EC of November 2008 defines remanufacturing as one of the most effective processes to positively improve the environmental impact of human activities in terms of resource conservation and emission avoidance. It provides for the introduction of responsibility for manufacturers of products towards design for the efficient use of resources throughout the product life cycle, including repair, reuse, dismantling and recycling, without impeding the free movement of goods in the internal market

It must be considered that re-manufacturing is the best solution to reduce waste and is always preferable to recycling (see Figure 3). After the reduction of all resources necessary for production, the processes of remanufacturing are defined as those that make important contributions here. Thus, from our point of view, they directly concern project management and its executors as well as the management of companies.

Fig. 3: Remanufacturing in the overall context of resource conservation and waste avoidance according to the EU Directive



The methodical Next7G Project Management approach discussed by us is currently being investigated in two case studies with regard to its applicability and, in particular, its possible contributions to the further development of already existing processes of re-manufacturing.

The results will be available in September 2023. At this point, therefore, only interim results that are already available can be discussed.

A deretse methodological orientation is based on the Maturity Model based on ISO 15504 (Goolinskaa, 2014) as well as on the Rem-Pro-Matrix for Remanufacturing (Sundin, 2002). One case study is oriented to an automotive supplier for hydraulic and electric racks and the second case study to a robotics manufacturer. Both companies have already integrated remanufacturing processes into their production and sales processes and it is investigated to what extent sustainable project management in the sense of the Next7G methodology could contribute to further development.

In the following, first approaches are presented, which will be further investigated with regard to their effectiveness and influence. It should be emphasized once again that these are only initial interim results as of May 2023.

4.1 Automotive Supplier

The 3-horizon approach applied here allows the following presented approaches as a possibility: Horizon 1: Improving efficiency and minimizing waste

The focus is on improving the efficiency of manufacturing processes and minimizing waste through the use of materials from sustainable production processes, the use of energy-efficient technologies and the introduction of lean production processes. The following steps can be followed to achieve this:

Step 1: Assess the current sustainability level of manufacturing processes using the sustainability assessment maturity model.

Step 2: Identify areas for improvement in manufacturing processes and materials used using Life Cycle Assessment (LCA).

Step 3: Implement lean manufacturing processes to reduce waste and improve efficiency.

Step 4: Apply Design for Manufacturing principles to optimize manufacturing processes and reduce waste.

Step 5: Implement Design for Energy Efficiency to reduce energy consumption during manufacturing processes.

Horizon 2: Design for Re-Manufacturing. The focus here is on designing products for remanufacturing to extend the product life cycle and reduce waste. This would include the use of design guidelines for remanufacturing, modular design, and sustainable material selection. The following steps can be followed to achieve the goals of this horizon:

Step 1: Using the RemPro-Matrix to guide the design for reprocessing. The RemPro-Matrix helps to understand the relationship between desirable product properties and the steps of remanufacturing. For example, in inspection phase of remanufacturing it is important that the product is designed for ease of identification, ease of verification and ease of access. In the cleaning phase, the product should be easily accessible and have wear resistance. One product property can be desired in two or more steps of remanufacturing.

Step 2: Apply design for remanufacture guidelines to ensure products can be easily disassembled and reused.

Step 3: Use material selection for remanufacturing to identify materials that can be easily remanufactured.

Step 4: Implement Design for Durability to ensure products can survive multiple product cycles.

Horizon 3: Closing the loop. Here, the focus is on closing the loop and creating a circular economy for the automotive industry. This includes implementing remanufacturing programs, developing end-of-life strategies, and using sustainable materials. The following steps will be followed to achieve the goals for this horizon.

Step 1: Develop end-of-life strategies that facilitate product recycling and core collection.

Step 2: Introduce extended producer responsibility to hold manufacturers accountable for the end-of-life phase of their products.

Step 3: Use market-based initiatives such as incentives and taxes to encourage the use of sustainable materials and implement remanufacturing programs.

Step 4: Implement sustainable material selection strategies to identify materials that can be reused and recycled.

Step 5: Implement remanufacturing programs to extend product life and reduce waste.

4.2 Robotics

Again, we use the three-horizon approach, which divides processes into three different horizons.

Horizon 1: Improve process efficiency. Improve the efficiency of remanufacturing processes in the current business model by optimizing current operations to improve the efficiency of remanufacturing processes. This may include the use of automation and robotics to streamline the disassembly, reprocessing and reassembly of parts and components. In this way, the company can reduce the time and costs associated with remanufacturing while maintaining quality standards.

Horizon 2: Expand Re-Manufacturing. Expanding the remanufacturing business model to new markets and customers. This may involve exploring new opportunities to expand the remanufacturing business model by targeting new markets and customers, e.g., government agencies, non-profit organizations, or commercial customers who value sustainability and environmental responsibility. This provides the opportunity to develop new revenue streams, e.g. by offering remanufacturing services for third-party products.

Horizon 3: Develop new technologies and business models for remanufacturing. The third horizon involves exploring new technologies and business models that transform the remanufacturing industry. This could include developing new robotic technologies for disassembly and remanufacturing or exploring circular economy business models that prioritize remanufacturing over traditional manufacturing. By investing in these emerging areas, the company can position itself as a leader in the remanufacturing industry and develop new revenue streams for the future.

Personal note

On April 22, 2023, I received the shocking news that my colleague and highly esteemed discussion partner, Prof. Dr. Yvonne Schoper, responsible for all topics in the field of project management, died of a heart attack at the IPMA Research Congress in China. With this, I not only lose a valuable person but also a constructive counterpart for me. We had joint publications, workshops and presentations at congresses. We had also begun to address the topic of sustainability in project management between us. The entire project management community has suffered a great loss.

This work serves her memory through me.

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This Work has Relation to the SDG's 9 and 12
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