Developing Imbrications: A New Lens for Understanding Project Management Practice

Full Paper

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Abstract

As long as project failure rates are high, project management research remains an important research avenue for exploration. After decades of study we may have reached the limits of understanding with our current lenses – while small projects have higher success, larger projects remain extremely vulnerable to failure (Hastie and Wojewoda, 2015). The objective of this paper is to explore a new lens for understanding project management practice: the concept of imbrications as developed in sociomaterial perspective. Re-conceptualizing IT projects as locations for building imbrications allows us to theorize about how imbrications are built during the interplay of social agencies (such as carried out in project tasks and control activities) with material agencies (the developing technology and its features). We hope this theoretical contribution to IT project management research provides richer explanatory mechanisms with which, we can understand how to achieve IT project success.

Keywords

Project Management, Sociomateriality, Imbrication, IT Projects, Social Agency, Material Agency, Processes

Introduction

Established practices of project management have limited success in delivering projects which consistently meet goals. In the Information Technology (IT) industry, Standish Group’s 2015 chaos report states that during the period from 2011 to 2015, only 29% of IT projects were successful and 52% of projects were challenged (Hastie and Wojewoda, 2015). Drawing on decades of research, several recent papers have synthesized various factors that contribute to project success and suggested additional frameworks. For example, Shenhar and Dvir (2007) take a problem driven perspective and propose three views: strategic/business; operational/process; and team/leadership, and suggests corresponding theories to help focus research. Hanisch and Wald (2011) propose a new project management framework consisting of three dimensions of design, context and goals based on a comprehensive review of prior work. While some effort has been made to add more theoretical insight into project management phenomenon, our review suggests that we still lack a unifying perspective on ‘why’ projects behave the way they do and ‘how’ project success emerges from various factors and practices. We conclude from our review that our emphasis on project management has largely been underpinned by the ‘tool’ view (Orlikowski and Iacono, 2001) which suggests project management as a set of largely rational, deterministic management techniques for producing a particular technology tool outcome. The goal of this paper is to propose a more unified theoretical notion to underpin project management practices, one capable of addressing why and how questions. IT project is a complex undertaking with various actors, materials and relations involved. Considering the intensive interplay between humans and technologies in achieving an IT outcome such as an IT solution, it is necessary to understand the dependencies between social and technologies which are used to accomplish developmental activities. Hence, the primary idea driving this conceptual article is to see if IT project processes can be better described and explained by giving importance to both social actions, technology properties and the interplay between the two. If that can be accomplished than better
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Theory, empirical research and practical management practices can result, to aid in improving project outcomes.

The umbrella term of “sociomateriality” is emerging to describe the unification of technical and social systems. While the sociomaterial perspective has not often been employed to describe the process of an IT project management, it was used to explain how an IT boundary object is constructed based on social practices across various groups (Doolin and McLeod, 2012) and how a working IS system is reached among communities based on negotiated practices (Wagner, Newell and Piccoli, 2010). The goal of this paper is to understand how the project of building an IT solution can be viewed from a different lens since these type of projects involves a sequence of activity outcomes at each stage which should be tied together for the project to be successful (PMBOK guide, 2008). As each activity completion involves usage of both technologies and humans, the dynamics between the two can be explored to gain new insights and explain how these type of projects can be managed in a new way.

In the next section, the paper discusses the trend in project management research in general to highlight the direction of the field. Next we discuss an overview of sociomateriality. In particular, the lens of imbrication suggested by Leonardi (2011) is adopted to look into the process of creating a technology based solution by specifically discussing about the importance of materiality and its agency. We then present how socio-material imbrication can allow us to understand the project management practice by viewing the process as building imbrications rather than a particular IT outcome. Our paper concludes with examination of the conceptualization of imbricating in a real facebook project lifecycle based on an excerpt.

Project Management Research

We carried out a literature review of project management research over the past decades, in order to understand the growth and direction in the field. Because the field is large, we present our main conclusions from our review. During 80’s and early 90’s, project management research was primarily focused on understanding the process of project management and providing insights that could contribute to improving techniques in different areas of interest such as planning, procurement, human resources, and risk management to name a few. However, the focus was not on formulating any theoretical frameworks. Also, among topics chosen, the emphasis was placed on the execution process of a project and related business topics of cost and sales associated with the project (Betts and Lansley, 1995; Themistocleous and Wearne, 2000). From the 90’s to early 2000’s, project management research witnessed changes in areas of focus. The period saw growth in research areas focusing on evaluation of projects and how they contributed to firms overall strategies. During this time period, earlier topics were revisited and approached with different objectives by researchers (Crawford, Pollack and England, 2006). Since projects were now undertaken to align with firm’s strategies, research topics of planning and controlling further gained attention from early 2000’s to 2011 (Ramadan and Tu, 2012). As project success is the ultimate aim of any project, the earlier research has also focused on identifying specific factors that contributed to project success (Soderlund, 2004). The trend in project management research over last couple of decades shows minimal success in developing an over-arching theory of project management even though many practices have become institutionalized (Minerat and Rivard, 2012), further indicating that the field is still viewed as practice oriented and as a method to solve organizational problems (Soderlund, 2004).

Views to Study Project Management

A common approach to studying projects is to establish and expand a set of success factors. Several studies have identified critical success factors (e.g., Baker, Murphy, and Fisher, 2008; Cleland and King, 1988). Studies also indicate that as project goes through a life cycle, the success factors for each phase may vary (Pinto and Prescott, 1990; Morris, 1983) and could depend on type of project (Dvir, Lipovetsky, Shenhar and Tishler, 1998). Another major theme of research is to assess specific project practices. Most of the project practices followed in project management are similar across various industries and hence are applicable to IS/IT industry as well (Hartman and Ashrafi, 2002; Duncan, 1995; Mignerat and Rivard, 2012). The PMBoK guide by Project Management Institute plays an important role in the IS project management profession since most of the individuals in PMI are IS
professionals (Mignerat and Rivard, 2012).

Other researchers suggest that both project success and project management success should be considered. Gemino, Reich and Sauer (2008) in their determination of project performance measures, mention that besides considering process variance metrics of time, budget and scope, project performance should also include measures of the IT solution’s success determined by the benefits it has to offer. A project therefore should be undertaken to add value to the firm and if the actual outcomes are not aligned with business goals, a careful evaluation of the purpose of project should be undertaken. Munns and Bjerimi (1996) distinguishes between project management and project success and emphasizes that understanding differences between the two helps to learn more about their relationship which could lead to better outcome of projects. The researchers also mention that project management success definitely contributes to project success but in the end, it is the project success that should be aimed for. The focus on satisfying the specific metrics related to time, cost and schedule that primarily forms the basis of project management, deems project management practice as a deterministic field. The set of processes encompassing the project management discipline mentions how task activities and management control activities should be handled, with little regard to the context in which these processes are usually performed. Additionally, coming up with a concrete framework that helps achieve project success is again a predicament indicating that most of the research itself has become repetitive, focusing only on suggesting new practice oriented factors/perspectives. Many of the studies are also positivist in their approach in that the primary goal is to determine factors that contribute to improving project success with little emphasis given to contextual unfolding of events. While positivist notion helps in defining a well-defined structured framework to project management, it nevertheless falls short in accounting for any situational variations during project lifecycle. Although agile methodologies (for ex-scrum) help in dealing with uncertainties in project lifecycle through their incremental and iterative developmental processes, nevertheless, these approaches are still made up of established practices (for ex – sprint planning, daily scrum, sprint review and retrospection). Further, these practices only focus on the completion of current iteration tasks and on improvement opportunities for next iteration rather than explaining in detail, on how such practices can contribute in betterment of developmental approaches (for ex- by allowing variations) and how different unanticipated challenges can be efficiently addressed (for ex – technology tool upgrade might afford or constrain the ongoing activities). Various theoretical underpinnings used to study project management signify that the field is approached with the intention of suggesting set rules and practices. Table 1 presents the articles which performed a sort of meta-analysis on various theories that has been underpinning the project management research over past few decades along with suggestion of some new perspectives.

<table>
<thead>
<tr>
<th>Article</th>
<th>Perspectives / Dimensions</th>
<th>Underlying Theories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolltveit, Karlsen and Gronhaug (2007) present various perspectives used in approaching project management research</td>
<td>Task</td>
<td>Scientific Management; Rational Choice;</td>
</tr>
<tr>
<td>Leadership</td>
<td>Team Organization; Communication Theory; Process; Leadership Theory; Change;</td>
<td></td>
</tr>
<tr>
<td>Systems</td>
<td>Systems; Interrelations;</td>
<td></td>
</tr>
<tr>
<td>Stakeholder</td>
<td>Agency; Power; Network and Relations;</td>
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<td>Transaction Cost</td>
<td>Incentive; Transaction Cost; Contracting; Innovation;</td>
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<tr>
<td>Business</td>
<td>Accounting; Financial; Strategy; Portfolio;</td>
<td></td>
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<tr>
<td>Project</td>
<td>Transformation; Flow; Value Generation;</td>
<td></td>
</tr>
<tr>
<td>Koskela and Howell (2002) present underlying relevant theories of project management</td>
<td>Management</td>
<td>Planning Dimension: Management-as-planning; Management-as-organizing; Execution Dimension: Classical communicative theory; Language/action perspective; Control Dimension: Thermostat model; Scientific experimentation model;</td>
</tr>
</tbody>
</table>

The efforts made in earlier research highlight the presence of uncertainties, interdependencies within projects and temporality, thereby indicating the need to approach the field with a new lens. Also, earlier studies have addressed the field from the perspective of humans and their actions, without giving importance to the technologies that are used to build a technology-based solution. In other words, materiality and material agency has largely been downplayed with people being the dominant force. This reduces the existing frameworks as being deterministic where IT artifact is treated as a tool (Orlikowski and Iacono, 2001). Further, as Orlikowski and Iacono describe, what matters most in such studies is how the dependent variable is affected, altered or transformed by the tool, with little theoretical attention paid to the technology. We propose here that the emerging lens of sociomateriality, which gives equal importance to human entities and technological entities, will allow us a new way to explore the field of project management with the goal of ensuring project success. Additionally, the use of such ontological view also emphasizes the contextual unfolding of the project and its supporting practices, based on the interplay between project team members and various technologies. Such sociomaterial perspective also moves away from the deterministic perspective dominating the discipline.

**Sociomateriality’s Imbrication and Project Management**

* Sociomateriality and Imbricating

The concept of sociomateriality in information systems research gives prominence to the relationship between social and technical systems. The sociomateriality view in IS research, developed by Leonardi (2008, 2011, 2013) and Leonardi and Barley (2008) has theoretical foundations in critical realism, where social and material exist as distinct phenomena but are fundamentally interdependent. Leonardi (2011) further elaborates that social and material become sociomaterial through imbrication of social and material agencies. While Leonardi explains the process of imbrication in terms of changing

### Table 1: Underlying Project Management Theoretical Foundations

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Foundations</th>
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<tbody>
<tr>
<td>Strategy and Structure</td>
<td>Management Science; Organization Theory; Strategic Management; Project Management; Project Organization Theory</td>
</tr>
<tr>
<td>Context</td>
<td>Complexity Theory; Contingency Theory; System Theory; Dynamics; Uncertainty Theory; Game Theory;</td>
</tr>
<tr>
<td>Goal</td>
<td>Value Added Management; Management Science; Adaptability Management; Management Science;</td>
</tr>
<tr>
<td>Nature of the Project</td>
<td>Derives a set of corollaries and lemmas following mathematical logic based on premises rooted in project management practice.</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Design</th>
<th>Strategy and Structure Dimension: Management Science; Organization Theory; Strategic Management; Project Management &amp; Project Organization Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>Complexity Dimension: Chaos Theory; Contingency Theory; System Theory; Dynamics Dimension: Contingency Theory; System Dynamics; Uncertainty Dimension: Contingency Theory; Game Theory;</td>
</tr>
<tr>
<td>Goal</td>
<td>Value Added Dimension: Innovation Management; Management Science; Adaptability Dimension: Innovation Management; Management Science;</td>
</tr>
</tbody>
</table>
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the composition of routines and technologies post implementation of an IT solution, we contribute here at a layer below, by demonstrating the formation and change of imbrications during early stages of project management which involves design and build phases. Sociomateriality has been adopted in IS research and has been used to study different contexts through empirical studies (e.g., Jones, 2014; Osterlie et al, 2012; Panourgias et al, 2014; Orlikowski and Scott, 2013; Cecez-Kecmanovic et al, 2014a). In the context of IT/IS projects, the sociomateriality perspective is relatable since this setting involves a constant interplay of people and technologies resulting in intermediate outcomes for each project activity, which later forms the basis for next activity in a timely and sequential manner. The next few subsections depict our imbrication lens in IT project management, by recasting the phenomenon as a successful creation of an imbricated IT solution and theoretically anchoring on the imbrication lens proposed by Leonardi (2011).

**Imbrications in Projects**

A project involving development of an IT solution typically consists of working with different sort of technologies (or materials), combining them to create subsystems and assembling a set of subsystems to build the actual system. At the core, a project is typically made up of different project tasks or activities (PMBOK guide, 2008). In adopting Leonardi’s view of imbrications, the material agency and human agency interact and the resulting imbricated outcome results in a particular routine/practice and an overlapped technology infrastructure. The imbrication, however, is mutable since it continues to evolve through time responding to the on-going change of material and human agencies that form imbrications of routines and technologies in a sequence. It is important to understand this sequential arrangement of human and material agencies and the organizing process of imbrications. Such understanding can be strengthened, only by realizing that the imbrication process of routines and/or technologies begins with system developers, technologies and project management practices that break down the work and later reassembles them, much earlier than Leonardi himself explores.

In examining the project of creating an IT solution, a typical project involves the phases of initiation, planning, design and development (execution), monitoring and controlling and closing of the project. Post closing, the next phase would involve implementation of the solution in an organization followed by regular maintenance phase. The phases also indicate the evolution of user involvement in a project, with earlier phases being developer centric and later phases such as implementation, being user centric. Looking closely at these phases, we can observe the constant interplay between developers/users and the technology used. Upon considering the initial phases and more specifically the design and development phase, we can notice that since a project is comprised of multiple activities having a particular objective, a developer often uses judgement when carrying out an activity using a technology. Based on the perception of technology properties, the corresponding material agency of the technology is enacted which could either help or restrict the completion of the activity. From this perspective, it becomes important for the developer to ensure that the material agency is rightly perceived in accordance with the activity goals. Since many firms usually have fixed set of technologies to work with, the perception of material properties by a developer becomes significant. Additionally, the practices or routines employed becomes important during the assemblage of human and material agency although, such practices or routines could later undergo changes.

Since any project is a temporary endeavor (PMBOK guide, 2008), it is always driven by a particular timeline and budget for completion. As a consequence, constantly revisiting the completed activities is not always possible due to schedule and budget constraints. For instance, if a developer uses a particular software functionality in accomplishing a task that is time consuming, it may not be cost efficient to redo the task when the outcome does not meet quality standards. Hence, the imbrication of human and technology (or material) agencies in a particular format is key for successful project completion. The notion of perception of material properties by a human would then have a significant contribution in the whole project life cycle, since a technology has many properties that can shape its agency. Further, as human agency is driven by the activity goal, correct interpretation of the goal becomes equally important by considering various project environmental factors. As the goals represent users future intended use of the IT system, the interpretations of each activity by a developer
will also be influenced by how materiality and material agency will assist in accomplishing the task activity. Although the development activities form an intricate part of any project, it is the organizing process that becomes important for a project manager to ensure project success. A project manager depending on technologies (for ex-MS Project) for planning, tracking and coordinating can perceive various features offered by such technologies (for ex - customization of reports, color coding for tracking, visual snapshot of the project status) to initiate necessary changes in management processes. As each project is context dependent and idiosyncratic, efficiencies in processes achieved due to adjustments around technology artifacts can contribute further towards successful outcome. For instance, if the project management software possess chat features and document sharing, the communication practices among team can be altered to accommodate timely interactions rather than having regular team meetings, thereby easing the monitoring and controlling process. Additionally, approaching development outcomes as imbrications allows a project manager to focus on ensuring that proper affordances (Gibson, 1977) of technologies are perceived by team rather than controlling for meeting deadlines which can also turn out to be detrimental in achieving project purpose and quality outcome.

The imbrication lens allows a researcher to give importance to technologies used in the development of an IT based solution, helping him/her to gather new insights which could lead to new project management theoretical frameworks. This approach allows a researcher to understand the ways in which technology artifacts results in project lifecycle changes and how various practices are modified to accommodate technology properties. Using the socio-material imbrication perspective, project management can be viewed as development of imbrications rather than viewing it as development of a tool thereby fundamentally changing the way project management is understood. Further, imbrication lens allows to give importance to situational aspects of a project thereby providing a nuanced way to explain project management, rather than restricting the field to a set of established practices.

Examining the Conceptualization of Imbrications in a Project Life Cycle – An Example

While searching for examples to demonstrate our conceptualization of project management using imbrication lens, we came across an excerpt online that helps to explain our perspective. In particular, we came across a blog post maintained by engineers at the company, facebook, where project and other development details are shared. In order to fully illustrate our conceptualization, we present details from a real development project at facebook and analyze it from an imbrication lens. The intention of the excerpt analysis is to explain how human and material agencies can come together to accomplish an objective and how such imbrications can result in altering established processes while achieving the required outcome. This particular example considers an excerpt¹ from the facebook code blog maintained by engineers (Greenia, Maher and Nay, 2015). A small project was undertaken to deal with an optimization problem in android devices. The below Table 2 provides the background information on the current scenario, and the new objective. The columns shows the exact excerpt from the blog identifying the problems (lack of processing power among android devices and slower upgrade cycles of devices in developing areas) and the new objective of improving the optimization process.

<table>
<thead>
<tr>
<th>Background</th>
<th>New Objective</th>
</tr>
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<tbody>
<tr>
<td>&quot;As more and more people around the world start logging on to Facebook, we have an increasingly large responsibility to keep things fast. This is especially true in developing areas, where devices stay in the market longer and people have longer upgrade cycles for new devices. We want to make sure we look into possible opportunities for performance improvements across all of our major mobile platforms. Android is one of our biggest platforms, and it's also the mobile&quot;</td>
<td>&quot;Today, we wanted to share some of our efforts to optimize Java bytecode for Android through a project we call Redex. Redex is a pipeline for optimizing Android .dex files. By applying a series of customizable&quot;</td>
</tr>
</tbody>
</table>

Date Accessed: August 24th, 2016.
platform with the greatest diversity of devices. Any performance or efficiency improvements on these devices could better the experience for millions of people around the world."

Table 2: Background Details on Project

Table 3 below explains our analysis showing how imbrications can unfold in a project during the process of addressing the above objective of achieving better optimization. Although the process described is based on limited details available, it nevertheless demonstrates a unique way of viewing a project development lifecycle as a sequence of imbrications. In this particular Facebook project, earlier optimization of the Facebook application for Android is carried out by performing source code optimizations at a local class level. This goal (social agency) is supported by compiler’s capability of transforming class level bytecode into target Android package file (material agency). However, as this optimization process was inefficient, a new goal is constructed to achieve better optimization by allowing multiple optimizing transformations on the lower level bytecodes by multiple engineers (new social agency) simultaneously. This new goal appeared possible since the compiler possessed additional capability of handling multiple bytecode conversion steps, before finally converting the final optimized bytecode into target package file. This resulted in expanding the compilation process to include many optimizing steps between class level bytecode and target package file leading to a new optimization process. The new efficient optimization process can be viewed as imbrication of new material and social agencies. Also noticeable is the change in practice by engineers which involved simply following an established optimization process, towards a practice where engineers could create their own transformation plugins according to their abilities, and insert it into the optimization process. Further, the imbrication view of this particular project lifecycle also recognizes many situational variables related to engineers and their coding techniques. Although this excerpt relates mainly to design and development phase of the project management and explains how a technology materiality (compiler) can lead to realization of new goals, nevertheless, such imbrications can also occur in other phases of project management. Such new perspective suggests that project management can be viewed as building imbrications rather than only technologies, as is the case with traditional project management. Further, this perspective also suggests that the team members can embody project management responsibilities as they are imbricating, along with a project manager.

Discussion

The paper started with the discussion of the challenges faced in the field of project management in general and the complexity involved. Earlier studies in this field have addressed efficient ways to handle a project from a practice perspective but fell short in proposing a theoretical perspective to approach project management with the exception of few studies. The perspective advanced in this paper takes the lens of socio-materialism and tries to address several of the challenges mentioned earlier. By adopting the concept of imbrication proposed by Leonardi (2011), the paper tries to present a new way to look into the IT projects by giving importance to materiality, material properties and material agency besides social agency. Equally important in this conceptualization is that, we can re-cast the different phases of a project as a sequence of constructing imbrications through temporal phases of development. Human agency determines what technology artifacts will fit a project activity and what type of material properties will help, resulting in an imbrication outcome that will influence the social structure prevalent before (Leonardi, 2009) which, in this case, could involve an established project management routine. Such imbrications can then lead to a successful project outcome.

The implications of adopting this perspective is that it allows to identify the material agency in project practices usually dominated by human agency. Further, using the lens of imbrication, both agencies establish working relationship rather than one aiming to impact the other (Leonardi, 2011). Additionally, this perspective allows organizational researchers to consider materiality and give prominence to it when formulating theories about organizational routines (Leonardi and Barley, 2008).
At the beginning of our optimization project, we decided that the best place to do our optimizations was after the .dex files were created and before assembling the .dex files into an APK. The advantage of doing our optimizations at the bytecode level (as opposed to, say, on the source code directly) is that it gives us the maximum ability to do global, interclass optimizations across the entire binary, rather than just doing local class-level optimizations. We opted to perform the transform on dex bytecodes rather than Java bytecodes because certain transforms can only be done post-DXing. This would be analogous to the post-linking stage in a C-style compilation process, where you can make global optimizations across your entire binary.

We realized that engineers would likely continue to come up with new and creative bytecode optimizations over time. Facebook engineers tend to move fast, so we wanted to architect something that would benefit from multiple engineers working on lots of optimizations. We organized our optimization pipeline as a series of stages, with the “original” .dex entering at the beginning of the pipeline and the “transformed” .dex exiting at the end. Each stage in the pipeline can be thought of as a stand-alone “optimization plugin” that snaps into place behind the previous stage, allowing us to chain multiple different, potentially unrelated transforms behind one another. This makes it really flexible from an engineering perspective, as multiple engineers can experiment with different optimizations in parallel and then plug them into the final pipeline only when they are ready. The Redex pipeline is generalized to allow any kind of .dex transformation.

Table 3: Transition from Existing Imbrication to New Imbrication during Project Life Cycle

<table>
<thead>
<tr>
<th>REDEX project</th>
<th>Old Social Agency</th>
<th>Old Material Agency</th>
<th>Old Compilation Process</th>
<th>Old Imbrication</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;At the beginning of our optimization project, we decided that the best place to do our optimizations was after the .dex files were created and before assembling the .dex files into an APK. The advantage of doing our optimizations at the bytecode level (as opposed to, say, on the source code directly) is that it gives us the maximum ability to do global, interclass optimizations across the entire binary, rather than just doing local class-level optimizations. We opted to perform the transform on dex bytecodes rather than Java bytecodes because certain transforms can only be done post-DXing. This would be analogous to the post-linking stage in a C-style compilation process, where you can make global optimizations across your entire binary. We realized that engineers would likely continue to come up with new and creative bytecode optimizations over time. Facebook engineers tend to move fast, so we wanted to architect something that would benefit from multiple engineers working on lots of optimizations. We organized our optimization pipeline as a series of stages, with the “original” .dex entering at the beginning of the pipeline and the “transformed” .dex exiting at the end. Each stage in the pipeline can be thought of as a stand-alone “optimization plugin” that snaps into place behind the previous stage, allowing us to chain multiple different, potentially unrelated transforms behind one another. This makes it really flexible from an engineering perspective, as multiple engineers can experiment with different optimizations in parallel and then plug them into the final pipeline only when they are ready. The Redex pipeline is generalized to allow any kind of .dex transformation.&quot;</td>
<td></td>
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</tr>
</tbody>
</table>
| "To achieve the goal of converting class files to apk files, the optimization is performed at a local class level. The optimization goal is a result of agency involving few engineers."

**New Social Agency**

**New Material Agency**

**New Compilation Process**

**New Imbrication**

| Problem: The optimization process is not efficient. |
| New Goal: To improve the optimization process by allowing optimizing transformations on the lower level bytecode |
| New Social Agency: Allow multiple engineers to simultaneously perform optimizing transformations on .dex bytecode. |
| Build on compiler’s ability to handle multiple bytecode conversion steps by allowing multiple transformations on .dex bytecode. |
| New Material Agency: Compiler performs multiple transformations simultaneously. |
| Multi-step conversion of .dex bytecode into target .apk file by compiler through transformation of .dex byte code. |
| Class level bytecode (.class) -> Lower level bytecode (.dex) -> Target android package file (.apk) |
| The new social agency encompassing the goal of performing optimization at the lower level bytecode, with that of new material agency of multi-step transformation of dex files into apk files, results in a new imbrication outcome that achieves improved optimized compilation process. |
Further, an organization can also realize various undiscovered aspects of technology and other artifacts and recognize that such artifacts form key organizational factors (Pozzi, Pigni and Vitari, 2014) which can contribute to new ways of organizational change, be it in terms of innovation or new practices. For example, from the Facebook project details described above, the practice of focusing on optimization at the source code level is a normal practice across many technology firms’ software teams. However, by giving prominence to the technology itself i.e., the compiler and its capabilities, the practice was modified to include multiple transformations at the bytecode level along with the inclusion of many engineers simultaneously. Although the empirical illustration presented gives an insight of how project unfolding can be observed from an imbrication lens, nevertheless, a more thorough research design is required to obtain more insights on the imbrication process of project management. As such, a qualitative approach consisting of an in-depth field study is recommended using either an ethnography or grounded theory methodology. The conceptualization advanced in this paper also diverges from the dominant perspective of positivism which is embedded in the project management field to a more dynamic approach that attempts to understand the interplay between material and social agencies. The new conceptualization of imbricating is not proposed to substitute the established project management practices but to complement them by providing more nuances into how exactly these practices differ in reality. Such insights can help to revisit the challenges faced by project teams and could contribute to improving overall project success rate.

Conclusion

The sociomateriality perspective and specifically the imbrication perspective allows each project team member (including project manager) to carefully exercise human agency by giving importance to material agency. During integration stage of various activities, the imbricated outcomes will assist the team in their decision making since each imbrication outcome will have a particular set of properties that advises its usage. As a result, the existing project management principles can be practiced in a new way to support various imbrications. Imbrication lens helps in devising a balanced conceptualization of project management by giving importance to socio-material which could assist in designing better practices leading to better outcomes. Additionally, researchers can adopt imbrication lens to understand how such imbrications evolve over the course of project life cycle and see in what ways, the socio-material can be untangled in different phases of project management.

References


Additional References Provided Upon Request