

WHAT DOES A COMMITMENT TO A PLAN MEAN?

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ABSTRACT

A plan in the making should pull from what creates customer value and from the performers' knowledge and understanding of the context. A plan for commitment should represent the customer's intent in a way that calls for action on the intent's behalf. A promise to commit to a plan happens at many levels and in many forms toward execution, and every promise made becomes a push mechanism to keep that promise. Since a plan represents both push and pull around a commitment, knowledge about these mechanisms can help to understand a plan's function. The main contribution is a reflection on how a plan's push for commitment interacts with emergent situations and an analysis of what part of the commitment is within or outside the scope of the promise and the promiser's influence and control. The promise made committing to a workplan as input to a Percent Plan Complete measurement is used as a practical example. The paper's conclusion arguably strengthens many of the existing parts and principles of the Last Planner System but also gives suggestions for improvement.

KEYWORDS

Complexity, Commitment, Promise, Construction, Project-Based Production.

INTRODUCTION

Any plan or drawing, 3D model, contract, etc. is merely an abstraction and simplification of what it wants to achieve. It is impossible to give a “true” replica of a complex thing or phenomenon. Therefore, any plan simplifies the expected process of making an output. A plan has the function of pushing its intent into action but should also consider how the situation is here and now and how this will affect the plan. Before the execution of a task, a promise to commit to the plan and/or the plan's intent is often made by the performer. A worker on a construction site might say: “I will try to do the task according to the plan”, a response from the manager can then be, “No, I want to hear that you say you are going to do the task according to the plan.” The divergence in the use of language has a logical connection to the pull and push mechanism at play that is under scrutiny in this paper. The paper is based on reflection initiated by the first author after measuring workflow reliability with Percent Plan Complete and using the 5 Why methodology on tasks that were not done according to the weekly plan. Deviations from the plan happened even though the activities had been marked as sound. In a sound activity, all prerequisites are evaluated as made ready when the task starts. The 5 Whys often pointed

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toward events outside the worker's influence, responsibility, and scope of work. This raised the fundamental question of what the promisers promised when committing to the plan.

THE METHOD AND APPLIED THEORY

The paper presents a conceptual discussion based on a combination of theoretical reasoning and practical and empirical observations in construction projects. This is done through a pragmatic and critical realistic perspective (Ackroyd & Fleetwood, 2005; Sayer, 2004). We use planning approaches such as the Critical Path Method (CPM), the Last Planner System (LPS), Takt planning, Line of Balance, Scrum and Kanban to exemplify and understand the functions of a plan and how different issues can be handled. We apply the principles underpinning the above-mentioned planning approaches in our reasoning about what a plan is, in which the distinction between pull and push plays a significant role. Complexity is conceived as an attribute of planning and production; in this context, we first discuss what a plan and planning is before we address the issue of making promises in planning. To establish the context of complexity the Cynefin framework (Snowden & Boone, 2007) is central, differentiating between complicated and ordered vs. complex and unordered. In addition, we address uncertainty (Hillson, 2016) and unpredictability (emergent factors) in project execution when analyzing the making of promises in a complex setting (Brady & Davies, 2014). Moreover, we use the principal-agent theory when addressing asymmetric information in the relationship between the parties making and using a plan (Martimort & Laffont, 2009). We place the paper as a contribution to Speech Act Theory and Promise-Based Management (Sull and Spinoza 2007; Cleary et al. 2008)

CONTEXT

A construction project consists of several phases, from the front end with project idea and design to the execution phase with production as the main activity. The front end has more positive iterations (Ballard, 2000) and reciprocal interdependencies (Coyote & Thompson, 1967), and has been characterized as the solution of wicked problems (Churchman, 1967; Spitler & Talbot, 2017). It has been suggested to take different metaphysical views in different phases, a process-view in the front end and a thing-view in the execution phase (Ika & Bredillet, 2016). The main context for this paper is production planning. We do however to some degree also look towards design since this in most projects has a close link to the production phase.

COMPLEXITY AS A POINT OF DEPARTURE

We use the definition and differentiation of complexity vs complicated from The Cynefin Framework (Snowden & Boone, 2007). In short, in the complex domain, we cannot forecast cause and effects, and they can only truly be perceived in hindsight. In the complex domain deviations from a plan should be expected to occur, so dynamic and proactive preparations and an agile and flexible way of planning should be used. In the complicated domain, we can identify causes and effects and predictions can be made. If we treat a project as a fundamentally complicated matter, deviations from the plan need not happen. If a deviation still happens, it is an abnormality caused by a fault, lack of planning or underperformance. The Cynefin framework is a sense-making framework, to be used to constantly sense and reflect on the situation you are in. Although a project will contain situations or elements of all domains (simple, complicated, complex and chaotic), we in this paper focus only on the complex (where cause and effect only can be deduced in retrospect) and complicated (where expertise and analysis are needed to find and understand cause and effect.).

THE PRODUCT AND THE PRODUCTION IN CONSTRUCTION

If we use the possibility of prediction as the main distinction between something complex and something only complicated, we position the phenomenon of design as something unpredictable and therefore complex. A design process can result in infinite solutions to the design problem. The final design is often an artifact comprising a complicated network of tasks and interdependencies. When the design has been decided the sequence and way of production can be decided before the actual production starts. A plan can then be made, and if everything is predefined in a logical sequence, the plan is often in its structure on the ordered side of the Cynefin Framework (Snowden & Boone, 2007). The process of putting the artifact together is a social endeavour in a complex context. It also depends on many prerequisites that are not defined to be within the project members' control. The production process then becomes a complex undertaking, but with many elements that are only complicated. The fact that many projects overlap the design process with the production process adds to the complexity of the production process, but we want to stress that this choice does not make the actual product more complex.

THE ACTIVITY

Many plans are made with only a deterministic view of the duration of the activities. This is a simplification of reality with a more stochastic variability since the activity is a process in a complex context. It is difficult to make a promise on ambitious deadline when dealing with an activity with large inherent stochastic variation on its duration, in theory, any promise to be shorter than the worst case cannot be guaranteed. Reduction of internal variability is hence an important task that must be dealt with before a certain duration can be forecasted with accuracy (Spear & Bowen, 1999), but shifting context, a unique product, and a fragmented building sector (Ballard & Howell, 1998) become issues adding complexity. A traditional view of a finished plan before execution can be claimed to be the best way to produce the product. Using Cynefin analogy again, best ways only exist in the clear (simple/obvious) domain (Snowden & Rancati, n.d.). In the complicated domain, you can identify good practices, but they can always be challenged to be better. A point here is that not only the design details but also the production methods used within the activities might be challenged and be under development; this adds to the complexity of reducing variability. If you improve more than one independent variable, the effect of improvement initiatives is hard to single out with small amounts of data. An ambitious promise on duration is difficult to make, even if all prerequisites for the activity are considered sound.

THE PLAN AND THE PLANNING

Using a push/pull analogy, we argue that there are two main functions of a plan; the first is to convey and represent the project's intention to be achieved (pushed from the plan), the second is to learn from the context and adapt accordingly (pulled to the plan). This is described by (Howell, 1999) through the terms planning and control. Howell sees planning as defining criteria for success and producing strategies for achieving objectives, while control is seen as causing events to conform to plan and triggering learning and replanning. Plans are tools made and used by people to plan and control production, that is to both pull and push. Also, a plan made by pull-based planning will when used have a push function. This push is expressed through demand to follow the plan and requests to make reliable promises. The aim of this paper is to zoom in on this push and pull functions, mainly seeing it from the perspective of the people making and using the plan, both pushing and pulling others.

A plan can be seen as an attempt to predict the possible outcome of multiple events. A project is divided into smaller manageable pieces, that is the tasks (activities) we must do to

carry out the project. We search for probable causes and effects, recognize patterns, map interdependencies, and try to forecast how the interactions between tasks will play out in the future. However, “*all plans are forecasts, and all forecasts are wrong. Forecast error varies with forecast length and level of detail*”(Ballard & Tommelein, 2021). A plan is normally set up to be ambitious (a stretch goal), a probable outcome or a minimum acceptable outcome. Using principal-agent theory we can see those making the plan as principals and those using it as agents. There will always be some sort of information asymmetry between the principal and the agent. The principal's intentions with the plan might (consciously or unconsciously) not be communicated to the agent. Any plan will be based on presumptions, assumptions, and simplifications that can be interpreted differently by the principal and the agent. How the principal and the agent see and use the plan affects how they relate to and execute the push-and-pull functionality of the plan. As an example, an opportunistic principal might make a plan with stretch goals but communicate it as a probable outcome.

A Takt plan (Dlouhy et al., 2018) pushes a parallelism in the flow of trades or set of activities. The Takt planning method constraints the plan actively by “shaping”(Binninger et al., 2017) the work into equal timeboxes (Birkeland, 2010). Takt can be seen as a cooperative approach with the Last Planner System (Binninger et al., 2017), so Takt can be used within the Last Planner System. A Takt plan pushes towards a demand to stay within timeboxes, and a commitment to the timebox must be done early in the project. The reasoning behind allowing this hard commitment to a timebox, is its ability to align the flow of trades and hence reduce waste and prioritize the production's overall process flow. Critical Path Method also pushes commitment early, but without a demand for parallelism in the trades flow as Takt Planning does. Line of Balance also seeks parallelism but does not push it the same way as takt planning and does it with more involvement and hence also choice of the participants. Parallelism of flowlines is the goal but not always the result from Line of Balance planning, this might be an indication of the power of pushing coherence in Takt planning.

A plan in a construction project is not only an explicit and written plan but also contains elements of tacit knowledge (Nonaka et al., 2000) that project members hold. In the limitations of collecting tacit knowledge also lies the notion that explicit plans are not comprehensive. A plan is a simplification of both the intent of the project but also the context. With simplification, the amount of data needed is reduced, but it also reduces the possibility to grasp the situation.

THE PROCESS OF MAKING READY

The Last Planner System has a systemized approach not to let an initially planned activity be equal to a made-ready activity, it goes through a SHOULD-CAN-WILL process that enables an alignment to the context. An underlying principle of the Last Planner System is both about the quality of assignments and a principle that you only do activities that should and can be done. Pulling the tasks from the context makes the push from the plan much more linked to the maturity and readiness of the task. An assignment of good quality should also be specific and clear in the language of the performer; this means that the assignment must contain what's to be done, where, when, who, and with what. Many projects still have a lot of improvement to make in just following the preparation of the activities. The Last Planner system waits with the final promise for a commitment from the performers until the (weekly) workplan. When a promise is made according to and on elements within the trade's control, the commitment is higher. When the performers finally commit to the workplan, a push also happens here, and this is where we want to reflect on its implication using the Last Planner System as a reference. However, first, we look into some other plan and control systems and methods. Our claim is that none of the planning systems mentioned below has the same level of built-in proactive mechanism towards systematically making tasks ready, though the Takt plan creates an even

higher need for this proactive thinking and can therefore have benefits to using the Last Planner Systems logic.

A Takt plans early and high demand for making tasks ready is pushing a proactive attitude and sets a high focus on reducing variability in the tasks; this might force a high need for standardization both on product and process in order to try to push the process of production into the complicated domain. The downside of this can be that value in the product is lost or that the design process is pushed into an even more complex situation to cope with the constraints of standardization.

In the Scrum system, a prioritization and check of readiness is done from the product backlog and into a sprint backlog, but Scrum is positioned for doing this in a shorter timeframe and is for this and other reasons, positioned for an even more complex situation than The Last Planner System. In the Last Planner System, the selection, sequencing, and sizing of activities starts after the phase scheduling, normally at least 6 weeks prior to execution of any task, and continues all the way down to the weekly work plans. The work plan is often at a weekly timespan, but this might differ from the planning context. When put on the work plan the activities should be classified as sound, so the making ready process does in a systematic way stop here, and a promise to commit to the plan is done. Scrum makes a similar commitment to the content and goal of a sprint, and by having sprints in the original length of 2-4 weeks (Sutherland, 2014) this system places a promise on the content entering the sprint.

Some key initiators of agile in the software business created The Agile Manifesto (Fowler & Highsmith, 2001) where one of the principles is “Deliver working software, from a couple of weeks to a couple of months, with a preference to the shorter timescale”. The preference for a shorter time has later been challenged down to a 5-day length of a sprint (Knapp et al., 2016), and even hours depending on the definition. A sprint is a defined time with a defined goal and testable output; there is often an explicit zero tolerance for not meeting these goals within the timebox, when made explicit, this functions as a hard push from the plan to the team in the sprint. The Last Planner System lacks Scrum's defined roles of “The Product Owner” and “The Scrum Master”. The Scrum Master is accountable for the Team's performance, removing impediments, and a facilitator for the team to meet their commitment. The Product Owner is the role of one person that is accountable for backlog management and is the only one with authority to cancel an ongoing sprint if it is found to be obsolete (Schwaber & Sutherland, 2021).

The Agile software community calls a system for “Kanban” which is an alternative to Scrum. The Kanban system is less defined as a common system and has many different versions, more or less based on the principle of Kanban signals or logic related to that (Lage Junior & Godinho Filho, 2010). Kanban systems do not have clearly defined roles and sprints as in Scrum, but there the activities from the backlog are pulled into a Todo board to create a constant flow of activities in the pipeline. The Kanban system is normally more flexible, with longer and shorter pipeline activities pulled from the backlog than Scrum. In defence of Scrum and Kanban, long making-ready processes might hinder the wanted agility of the system.

The Critical Path Method (CPM) is often developed with great detail over a long time span and knowingly or unknowingly then oversimplifies the plan. It is often made static and communicated with a strong signal that this is the “optimal” way of conducting the project. If we go back to the claimed push and pull function of a plan, the strong signal and rigidity of the plan create a strong push to the whole organization.

DISCUSSION

We claim the plan references the project's complicated building blocks, leaving out the complex project creation process. A strong push is sometimes maintained even though it meets a context that, for practical reasons, should be learned and give input for a rescheduling. Practitioners should commit to the plan and the context, but if the gap creates a paradox, the plan might lose

commitment, and the risk of total failure of the plan might be the consequence. In many projects, the planning that does not consider the production process can be aligned with driving by looking in the rear-view mirror (Ballard & Tommelein, 2021). If a plan is not aligned with the current state of production, a large amount of the planning capacity might be needed to update the plan. The function of pushing any new signal out to production might be futile. If this happens, the plan has no actual push/pull function toward production, and the functions only work as a benchmark function upward toward project goals. A strong push for an early detailed plan meets challenges when met with emergent situations.

EMERGENCY VS UNCERTAINTY

“Only what has already happened may be used for forward-looking decision-making” (Schwaber & Sutherland, 2021).

By only starting tasks that should and can be done, there is an expectation in The Last Planner System that the task is sound before it is put into the (weekly) workplan. But even though a task is qualified as sound, many uncertainties and their potential consequences might have been identified to matter (Hillson & Murray-Webster, 2007). By matter we mean “that, if it occurs, will affect the achievement of objectives” (Hillson, 2016). The identified potential consequences are recommended to become a part of the clarification and negotiation process suggested in the Last Planner System (Ballard & Tommelein, 2021) they can be dealt with beforehand and increase the reliability of conducting the task. But identified uncertainties will for practical reasons only be treated superficially and a promise that is made must have some presumptions and remaining assumptions that the promise cannot have the time to be explicit about. If the uncertainty for getting materials is considered low, there is still some possibility that they will not arrive or be destroyed at the site. There is always a possibility that you for practical reasons leave them out because you consider them low even if they are identified, so even the identified uncertainties can turn into an emergent situation because it happens even with a low probability. The challenge with a complex context is that the unidentified variables can come from a lot of “sleeping” mechanisms and past experience provides only limited assurance for future events. When the event happens, we can go into a retrospect determinism and go into the fallacy of believing that if we only do something to that emerging event nothing more will happen. Since production is often sensed in or close to a complex problem new events will emerge but maybe from a different uncertainty and variables. This might force a promise to be broken or make a re-promise (Macomber et al., 2005).

The Last Planner System follows the principle of learning from breakdowns (Ballard et al., 2009; Ballard & Tommelein, 2021), do we then mean that this is a futile principle since we get emerging events? No, but because we acknowledge emergent situations, we mean that how we learn might differ from believing that the cause is something we can find direct countermeasures to. We need to lift the countermeasures we suggest to be more adaptable and general because we do not know where the next event will emerge, ex. good processes rather than specific tasks. What kind of event is classified as uncertain will be a dynamic definition based on multiple factors.

In this principle lies the measurement of Percent Plan Complete (PPC) which measures the percentage of tasks committed at the start of the week that is being done at the end of the week. This is referred to as a measurement of workflow reliability and activities that have not been done at the end of the week should be analyzed in order to learn from it. The method of “5 Whys” can be used to find the root causes for why it was not conducted as planned and search for “root causes”. We claim that in a complex world, a true root cause cannot be found, but the method of using 5Whys often helps the user to go beyond the level of more obvious symptoms and closer to systemic causes. The first writer's experience from testing the “5 whys” is that it quite often is situations outside the trade workers' immediate responsibility that are analyzed as

the root cause. So it is in a sense beyond the scope of what they made a promise on earlier. Originally the PPC measure worked on a weekly basis, but the possibility to trace PPC on shorter time intervals has been acknowledged (Ballard & Tommelein, 2021).

A COMMITMENT TO A PLAN

“Projects are a network of commitments” (Ballard & Tommelein, 2021).

A plan contains an element of trust and/or power to be executed. A static plan may need a larger element of power to be effective, especially if the plan deviates from the present and it becomes harder to gain the wanted trust. If the plan is not reached any negative deviations from the plan will often have economic consequences. To avoid this deviation resources are adjusted during the execution of the task to regain any lost time. If the plan is delayed because of something that the trade cannot be blamed for, the demand for compensation for forcing the plan back on time is often presented by the trade in advance. When the trades are involved in the planning the trades not only commit to the plan towards the project management but also to the other trades that are part of the planning process. As an example the Last Planner System facilitates a reversed-phase scheduling process where all trades are often gathered and everyone expresses a common commitment toward each other that they will manage to follow the plan. In our experience, this commitment from one trade to another is an important part when involving the trades in the planning process and the commitment to another trade seems to be just as strong if not even stronger than the commitment to the project management. Our experience is mainly based on a Norwegian culture that has been labelled as a “high trust society” (Covey, 2022) with a flat structure, this might influence the level of commitment among the trades.

A RELIABLE PROMISE TO COMMIT

A promise is a statement of intention made in certain specifiable conditions (Árdal, 1968). Statements may include all kinds of stated confirmation and signs of commitment to follow up a plan, including contracts, handshakes, subtle signals, and spoken utterances. A statement may include both explicit statements like “I promise I will do x” and also “I will do x” due to its implicit obligation in the latter statement (Árdal, 1968). In construction, a contract is a document of a promise between two firms where one firm promises to follow the terms to deliver the contract's content by a negotiated payment. A promise to a plan relates to reliability and how seriously the promise giver takes their promise (Ballard & Tommelein, 2021) and building and rebuilding trust with promises and apologies (Schniter et al., 2013). A promise is, therefore, related to a personal or cultural commitment to the task. An often-important part of people's integrity is to keep their promises. When a promise is not kept and the commitment is not delivered, the blame might be put on the person that promised to deliver, and explanations for not delivering are often noted to be bad excuses and apologies. We want to challenge how a commitment is pushed to give a more nuanced picture of the actual promise.

FROM A PROMISE IS GIVEN TO A PROMISE IS KEPT

One of the five original Last Planner Systems principles is “Make and secure reliable promises” (Ballard et al., 2009), but is a promise something you can do in advance and secure? The principle was in the 2020 benchmark for Last Planner System modified. It has become: “Make and secure reliable promises, and speak up immediately should you lose confidence that you can keep your promises (as opposed to waiting as long as possible and hoping someone else speaks up first).” (Ballard & Tommelein, 2021). The new version acknowledges that the situation might change after making the promise, but it still signifies that the promise is yours to keep. We want to challenge how a promise is treated in both theory and practice, because of the emergent events that can take several forms. We do this to increase “reliable promising” (Ballard & Tommelein, 2021) by creating a better contract to the promise that a performer can

make but also creating a better framework for improvement measures on the tasks that are outside the performer's control. We are not trying to underestimate the importance of respect for each other's concern on the contrary we want to increase the respect by letting the performer and the requestor understand the scope and limitations of the promise and also let the requestor see when the performer goes beyond expectancy to deliver the task that is planned for and reduce the amount of work that no one is accountable for. We use the promise made by the performer as input to a PPC measurement as an example. For simplification, we assume there is perfect communication between the performer and the requestor for the scope of the promise and task that is planned, even though this might be an issue in practical application. The performer makes the promise to do the task after clarification and negotiation according to the Last Planner System (Ballard & Tommelein, 2021) and the task is considered defined, sound, sized and sequenced. The task is put into the workplan and the (weekly) period for the plan starts. Then something emerges that was not accounted for in the initial preparations. We believe that at the moment something emerges having a system that respects what really happens is important to the situation. We currently suggest two questions should be asked about the emerging matter;

Is the emergent matter within the scope of the promise put into the plan?

Is the emergent matter within the expertise of the performer/promiser?

If we put those two questions in a matrix (Figure 1) we get 4 quadrants where the emergent matter can be categorized;

		Emerging matter related to the promisers scope of influence	
		able to control	not able to control
Emerging matter related to the scope of the promise made	within	<p>"Keep your promise" or fall behind</p> <p>1</p>	<p>"Alert the accountable" to clear the path or find alternatives or fall behind</p> <p>3</p>
	outside	<p>2</p> <p>"Have a buffer of recources" or fall behind</p>	<p>4</p> <p>"Alert the accountable"</p> <p>Does not affect the inital promise, but evaluate if scope can/should be expanded</p>

Figure 1: Emerging matter related to scope and expertise.

In quadrants 1 and 2, the performer has expertise within the emergent matter. This means that the performer can have the attitude to deal with those issues, if is not done, it will be because of prioritization or capacity issues. In quadrants 3 and 4 it is outside of the performer, control but in quadrant 3 the matter will still affect the performer's promise, while in quadrant 4 the emergent matter will not be within the promised scope. All the emergent matters can stop the progress of the planned work, but having a language to categorize and communicate and discuss how to deal with them can be useful. It will depend on the consequences of the emergent situation if it becomes a delay or not and the ability to making-do (Koskela, 2004):

- In quadrant 1: The emergent matter will be within both the scope and expertise of the performer. Example: Prerequisites that the performer is accountable in the make-ready process are missing.
- In quadrant 2: The emergent matter will be outside the scope but within the expertise of the performer. Example: An increased amount of work.
- In quadrant 3: The emergent matter will be within the scope but outside the performer's expertise. Example: The previous work is late and occupies the location for the work.
- In quadrant 4: The emergent matter will be both outside the scope and outside the performer's expertise. Example: A change in the content of the work that needs a third party to be solved.

Identifying what quadrant situations emerge might increase motivation for the performer to fix things that are within the control of the performer, but also show the performer's attitude toward fixing obstacles outside influence. It can provide a clearer language to make sure that interfaces between roles are accounted for.

An already identified reduction of PPC measures on work plans down to days and half days will reduce the consequences of emergent matters and will in practice probably need to put the promise part into a daily stand-up meeting setting. This can also give the skilled worker the possibility to promise when the prerequisites are cleared for the whole period, on a weekly plan often not the material, and never the people are prerequisites that can truly be guaranteed.

CONCLUSION

A plan is always a simplification, and when made and committed to a push on behalf of the intent is created. Trades and other project members commit to the plan at different levels and times. When committing and making the promise, they do not account for emerging matters that might affect the plan. Emergent matters are things that you had not anticipated and that will affect the work and the promise to commit to the plan. A higher understanding of the types of consequences the emergent matter can have both on the scope of the promise but also that it can affect outside of the performers space of influence or expertise. The boundaries of the promise and expertise should be recognised to manage the interface between them. Due to the emergent nature of the consequences, it must be a systematic and flexible way of dealing with these interfaces, not case specific. A better understanding of these boundaries might also motivate the performers and get more respect for each other's processes, this can again improve the total workflow reliability.

We suggest that the Last Planner System account for emergent matters when a workplan is made and separates the performer's promise from what cannot be promised by the performer. A shorter timespan on PPC should be considered to give a more reliable promise.

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