

Towards a Process-Support Tool for Dutch Wind-on-Land Decision-Making Processes

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Abstract

The development of wind parks in the Netherlands is not fast enough to reach the goals set by the government for 2020. Opposition of local actors is one of the most important causes of the slow progress. More and more projects are developed using a process approach in which all important actors participate to make decisions about the wind park. These decision-making processes can be slow due to the following reasons: a lack of trust between the actors, a lack of information and the difference in languages between the actors. We have developed a tool called WINST (Wind In Nederland Support Tool) to mitigate these problems. The tool calculates the effects of different options on the goals of the actors. Interviews with the actors, including the process managers, involved in wind park Deil were used to evaluate the tool. The interviewees all stated that the tool was useful to help the process manager to structure the process, get it up-to-speed and quickly give an indication of what a proposed solution will do for the goals of the actors. Future works have to validate the tool before it can be used by a process manager.

Key words: Wind Parks, Decision-Making Processes, Process-Support Tool, Participation Methods, Spatial Planning, Business Cases

1 Introduction

The Dutch government set the goal to reach a total amount of electricity produced by wind turbines on land of 6000 MW in 2020 (SER, 2013). Now approximately 2000 wind turbines are installed on land, which provide 2000 MW of electricity (SER, 2013). To reach the ambitious goal new wind-on-land projects have to be developed rapidly, but the past two decades the development of wind parks has been a rather lengthy process (van Lierop, 2014). When we look to neighboring countries like Germany (Breukers & Wolsink, 2007) and Denmark (Kamp, 2010) we see much faster development of wind-on-land parks than in the Netherlands. The wind parks in Houten and at Deil are examples of this, as the Houten project took 15 years before actual construction started (Houten, 2014) and the first initiatives for the wind park at Deil started over 10 years ago, while no final arrangements are

made till today (Santen, 2014). The largest delays during the development of wind parks are caused by problems during the decision-making process.

In recent years more wind park projects are developed using a process approach in which all involved actors are included to create the needed local support (Oskam, 2014). This means that instead of a project approach, in which every actor is acting only according to its original task, the actors are discussing the project and its characteristics together. In theory these decision-making processes lead to a faster solution, because the opposition should decrease, but in reality these processes are taking a long time to complete too. The task for a process manager is to manage this decision-making process, but this is a very complex task.

The process manager can use tools to help during the decision-making processes, but for wind-on-land projects no tools are available that capture the complexity of these projects. Although different models are made that calculate the business case for the project developer, there is no tool available that includes all important actors of the process. Existing models look mostly at a wind park from the perspective of the project developer, such as the business case model of Agentschap NL (Veghel, 2013). Only financial (Veghel, 2013) or environmental (Dominguez, Navarro, Marti, & Garcia, 2001) aspects are included in the existing models, while the processes are including much more than only these aspects. In wind-on-land projects the influence of the park on the surroundings, the risk of participation options, and the development of the region are only a few of the issues present.

In the field of environmental issues, such as land and water resource management, there is a move from pure analysis of effects to application in decision-making or policy context (Matthies, Giupponi, & Ostendorf, 2007). This means that also economical and socio-technical issues are included in the tools or context of the tools. Since the 1970's these decision-support tools have been a popular way of approaching environmental issues (Matthies, Giupponi, & Ostendorf, 2007). A well-known example of such a tool is the *Blokkendoos Ruimte voor de Rivier*. With this tool remarkable results are booked in a multi-actor context (Zhou & Mayer, 2010), but in the field of wind park development such tools are not yet present. A comparison between these environmental issues and wind power projects can be made, because both have effects on multiple actors, local spatial quality and the local environment. Both involve different layers of government and are expensive projects. This is an indication that a tool for the support of a wind park decision-making process can have similar effects as these popular environmental decision support systems.

Because there is a change to process-based decision-making new support tools are needed for wind park projects. We have designed a tool that includes all actors and the most important aspects of a wind park, but before a tool is designed, it is important to look into the problems of the decision-making processes. Only then a fitting tool can be designed. Therefore we developed the following research question:

How can the problematic aspects during the decision-making process of wind-on-land projects be managed?

When these aspects are identified after research, we want to make these aspects less problematic. Therefore the design question of this research will be:

How can a process-support tool help the decision-making process of wind-on-land processes?

We will first define the boundaries of this research in section 2 and the problems during the decision-making processes of wind-on-land projects in section 3. Section 4 shows how a tool can help to mitigate the identified problems. Then we will discuss the working of the tool (section 5) and elaborate on the use of the tool in section 6. The preliminary assumption that a tool is a useful way to mitigate the problems during the decision-making process will be evaluated in section 6.

2 The Wind-on-Land Processes

Wind parks across the Netherlands are not only very different, the decision-making processes differ as well. We looked at projects from 5-100 MW with an already started decision-making process where participation for citizens is an option. After analyzing multiple wind parks to see if they fit within this demarcation, we found the following cases, which were analyzed during this research; the wind parks of Deil, Houten, Dronten and Nijmegen.

In Figure 1 we see the phases of wind-on-land development processes (Karremans, 2014). The process of decision-making which includes all the crucial actors is taking place in the Feasibility, Scoping and Definition phase. In these phases the important decisions about the products of Figure 2 are made, so we research the decision-making process during these phases.



Figure 1 Phases of wind-on-land development processes (Karremans, 2014)

In the Pre-feasibility phase the *Gebiedsvisie* and the *Ruimtelijke Visie* are made in which the municipality is taking position on the potential wind park on the site identified by the province (Karremans, 2014). Also project developers are making their first business case and start negotiating with land owners.

After this phase the three phases follow in which the negotiation is done and the project is defined. Decisions have to be made about the amount, location, type and height of the turbines, about the financial arrangements of the wind park, about potential participation of local actors and about the impact of the wind park on the region. After success in these three phases the permits are given, the Municipal Development Plan is changed by the municipality and the project can proceed to the actual construction in the Realization phase and the running of the wind park in the Operational phase (Karremans, 2014). The products that have to be finalized and delivered are shown in the figure below and will be included in the tool.

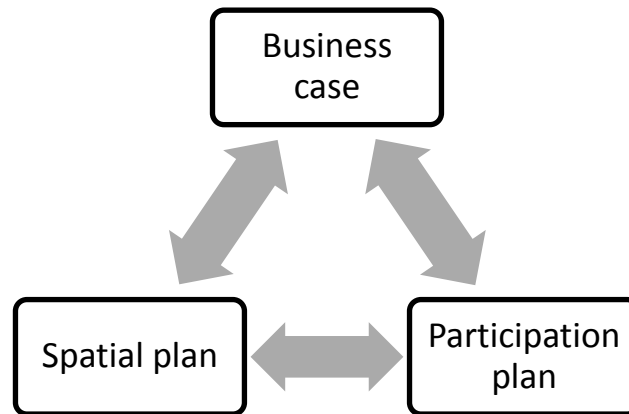


Figure 2 Products of decision-making process for wind parks

In Figure 2 we see that the three products are dependent on each other. In the project approach only the business case of the project developer counts, but in this research we take a broader look at a wind park project. Therefore the business case does not only include the business case of the project developer, but also the potential business cases of the municipalities, the citizens and the provinces. The business cases are closely related to each other, because of the participation plan in which the options for local actors to participate are described. The impact on the spatial quality of the wind park is depending on the location and the technical characteristics of the wind park. These choices influence the performance of the park and thus the business case very much. When citizens are participating they can have influence in the characteristics of the wind park and thus the spatial plan.

3 The Problems during Wind-on-Land Decision-Making Processes

We can identify three reasons for the lack of progress in the decision-making processes: the lack of trust among actors, the lack of information and the difference in languages. We will discuss each of these aspects briefly.

Lack of trust

Koppenjan and Klein (2004) state that trust between the different actors is the most important factor influencing the outcome of a process. The lack of trust between the actors can be seen in many cases, such as at wind park Houten in which the citizens on the one side and the municipality and the project developers on the other side have a feeling of distrust in each other (Gedeputeerden windpark Houten, 2013) and at wind park Deil (van Santen, 2014). This lack of trust is caused by a lack of communication among the actors and the absence of clarity about their goals. The length of the process exacerbates the lack of trust as actors can get frustrated about the 'blocking' behavior of others.

Lack of information

Klaassen (1995), ten Heuvelhoff, de Bruijn & in 't Veld (2010) and Koppenjan & Klein (2004) indicate that adding information to the network is a key function the process manager has to fulfill. The actors involved in a wind park all have different backgrounds and professions. Therefore the level of knowledge and information is not evenly spread among these actors. This creates friction during the negotiation process when actors cannot participate in the discussion or ask questions that are

obvious for other actors (van Santen, 2014). The actors also have their specific information and are often not willing to share this information in the process. This is of course caused by the lack of trust mentioned before. The lack of sharing of information leads to problems for actors who are trying to grasp the dependencies in the wind park project.

Different languages

The actors have different backgrounds, as was mentioned before, and this causes another problem for the process. The language the actors speak is different, because they see the wind park project from another perspective. With different languages we mean both a different jargon and a different view on the essence of the project. The project developer sees a business case, the municipality sees spatial plans and local support and the citizens see local environment and participation as being the most important aspect of the project (van Santen, 2014). Therefore communication is focused on their own goals and means, which makes the negotiation like a meeting about various different projects. Ten Heuvelhoff, de Bruijn and in 't Veld (2010) state that enriching problem definitions and solutions is an important task of a process manager. Therefore in the early stages these negotiations should focus on getting clear problem definitions.

4 Dealing with the Problems by Using a Tool

The problems mentioned in the previous section can be managed by a process manager. To help the process manager with this complex task we developed the WINST (Wind In Nederland Support Tool). The problems during the decision-making process are (section 3); lack of trust, lack of information and different languages. To mitigate these problems we identified requirements for the tool, which will be described in this section.

Provides an overview of the financial room to maneuver – To decrease the uncertainty about the business cases and increase the available information the financial room to maneuver can be defined better (Klaassen, 1995). Existing models primarily focus on the room for the project developer, such as in the Agentschap NL model (Veghel, 2013), but the introduction of the other actors gives us a better overview of the total financial room to maneuver in a wind park project. This is needed, because in recent years participation of local actors has been a part of most wind park projects.

Provides insight in the goals of actors – Except for the business cases the actors have other goals that are important to identify. For instance some citizens value the goal of low nuisance of a wind park higher than the potential income via participation methods. This is caused by the significant effects a wind park can have on its surroundings (Breukers & Wolsink, 2007). If the tool can give insight in these goals it can help to decrease the lack of trust and information. The lack of trust can be decreased by the fact that the actors have a better understanding of each other.

Provides insight in linked variables between the different products – Because of the difference in backgrounds the actors mostly focus with their expertise on one of the three products, described in section 2. Sharing this knowledge and making the dependencies visible using a tool can help to decrease the lack of information. Also the effects of different languages can be decreased as the discussion will focus on the dependencies in the tool. The tool will help to let the actors ask the right questions and create a jargon among the actors based on the tool. This can help to decrease the difference in languages.

Provides insight in the effects of wind parks on surroundings – The effect of wind parks on the surroundings is one of the important aspects that can cause opposition by local actors. By giving insight in these effects trust can be increased, because this can decrease ungrounded expectations by local actors. Multiple authors state that financial participation of local actors positively influences the local acceptance, such as Breukers & Wolsink (2007), Jober, Laborgen & Mimler (2007) and Krens (2011). The citizens can have a direct say in the characteristics of the wind park by participating and insights in the effects of the wind park on the surroundings can be crucial in that case.

Provides insight in the differences between participation methods – As is stated by Breukers & Wolsink (2007), Jober, Laborgen & Mimler (2007) and Krens (2011), financial participation positively influences the local acceptance of wind parks. Therefore in recent years more participation methods are introduced to let citizens participate. For both citizens and project developers the effects of these methods are not always well-known, so insight in the differences between participation methods can be crucial. At the same time the key characteristics of participation methods are needed to calculate the effects on the goals of the actors.

In the next chapter we will discuss how these requirements are reflected in the WINST. These requirements were also used to structure the interviews with the actors of wind park Deil, who reflected on the WINST prototype. This reflection will be discussed in the conclusion in section 6.

5 WINST: Prototype

The basis of the WINST is the Agentschap NL model, developed by Rebel Group (Veghel, 2013). This model analyzes the business case of a wind park very thoroughly from the perspective of a project developer and calculates the key indicators for the business case of the municipalities. Two important actors are not mentioned in this model and were added to the WINST: the citizens and the provinces. In Figure 3 the sheets of the WINST are presented together with the most important issues presented on these sheets.

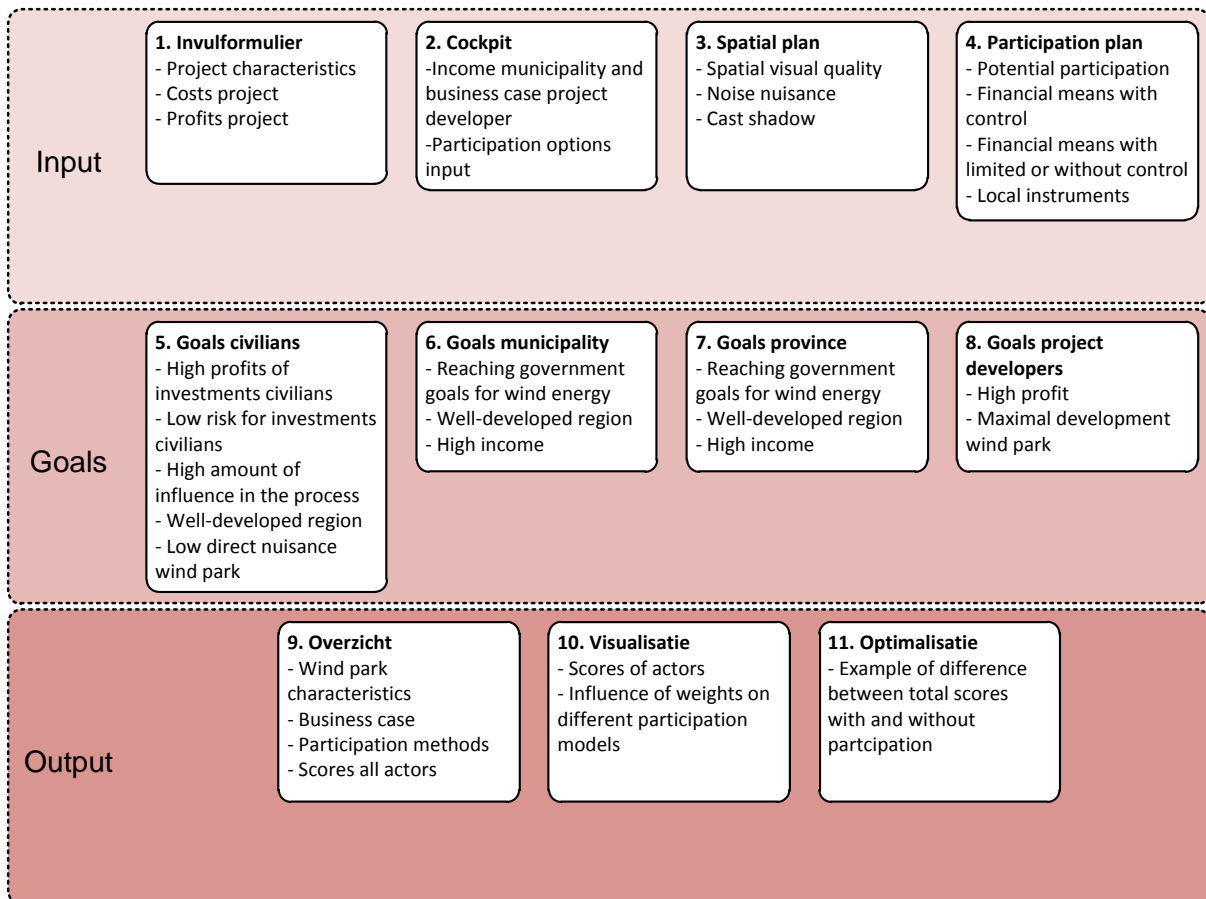


Figure 3 The Eleven Sheets of the WINST

Actors have more goals than just making profit, so we added the goals of the different actors to the tool. So for instance for the citizens we added low risk for investments, high amount of influence in process, well-developed region and a low direct nuisance of the wind park to the tool. The tool lists the key variables that influence the goals, as is shown in Table 1 in the ‘Score based on’ column. Using these variables the actor can fill in a multi criteria table. If for instance much local instruments are used, which help develop the region, the citizens can give a high score to this goal. The citizens also have to give weights to the different goals. So if the citizens prefer a well-developed region over high profits of investments and high profits of investments over a low risk for investments, the citizens will give the well-developed region a score of 3, the high profits of investments a 2 and the low risk for investments a 1. Using this input the tool can calculate a score for the citizens for that specific package of decisions. This score is an indication of how the goals of that actor are reflected in the proposed options for the wind park. The goals of each actor are presented on a separate slide, as indicated in Figure 3.

Table 1 Goals Citizens and Key Variables

<i>Goal</i>	<i>Score based on</i>
High profits of investments	IRR Participation options
Low risk for investments	Risk participation options
High amount of influence in process	Control due to participation options

Well-developed region	Local fund Support sustainable initiatives Sell electricity to region Discount on electricity
Low direct nuisance wind park	Visual plan Noise Cast shadow

Before the key variables for each goal are calculated by the tool, we have to give the right input. Four input sheets are available in the tool (Figure 3). In these sheets the important choices with regard to the characteristics of the park, the financing structure, the participation methods and the spatial impact of the park are made. In Figure 3 we see per input sheet what the choices are that have to be made. In the goals also the spatial impact is included, so the actors know which choices influence the spatial quality.

After filling in the scores and weights of the goals, an overview is presented. The key variables of the wind park and the business case are displayed together with the chosen participation options. The total weighted scores of the actors are presented, so this can act as a starting point of discussion. This enables the process manager to present the outcomes of the tool. The Visualization and Optimization sheet are discussed in the next section.

6 Using the Tool

After interviewing the actors involved in wind park Deil, including the process managers, we could use their input to improve the WINST and describe the use of the WINST. We will describe the use of the tool by defining the user of the tool and the moment the tool is used in the process. We reflect on these aspects using the concept of strategic behavior. The interpretation of results will also be discussed using the Visualization and Optimization sheet, described in Figure 3.

User of the WINST

The process manager will be the only user of the WINST. Beforehand we made the preliminary assumption that all actors should be able to take the tool home to explore it, but all interviewees made clear that the process manager should use the tool and only the results should be communicated with the other actors. They stated that this would decrease the opportunities for wrong interpretations and strategic behavior. If all actors are filling in their own values, they want to defend their own outcomes and this could lead to more chaos during the process.

When the actors are all able to look through the whole tool, they might focus on the total scores. This can lead to strategic behavior, for instance when actors rate all options other actors propose very low, so their own proposal performs better. This could frustrate the process even more and might actually lead to more distrust among the actors. Therefore this insight of the interviewees helped to see that the preliminary assumption might have been naïve.

To use the WINST in a process the process manager has to know exactly how the tool works, but the process manager mentioned that a user guide would be essential for him (van den Berg, 2014). Therefore a user guide was developed to guide the process manager through the different steps of

using the tool. In these steps is included what has to be filled in on each sheet and which information is needed to do this.

Moment of Use

The tool should be used right from the start of the process according to the interviewees, because then the inexperienced actors can get up-to-speed. The inexperienced actors, like the municipality (van Os, 2014) and the citizens (Gerritsen, 2014), stated that if they had more knowledge about wind parks from the start they could have participated more actively in the beginning of the process. The project developer (Hiemstra, 2014) and the province (Gelinck, 2014) mentioned that this could speed up the process, as the inexperienced actors held up the process in the first months of the Deil project.

Therefore the tool should be introduced within the actor groups, so the process manager can focus on expanding the knowledge of the actors. This also means that the opportunities for strategic behavior are limited, because in this phase no scores and weights are asked. When all actors know how wind park projects work and how this is reflected in the tool, the process manager can ask the actors to think about their weights and scores.

The citizen interviewee (Gerritsen, 2014) stated that the process manager should have the ability to derive the weights and scores from the conversations with the actors and see when actors are not communicating their real preference. This demands a lot of experience and skills from the process manager. Therefore the process manager will have to emphasize to the actors that the WINST will not be used to make the decision, but to support the decision-making process. Outcomes of the tool are not final decisions, but are the input for a discussion that will help to learn about the complexities of a wind park project and the other actors involved.

Visualization and optimization

Although the tool is not meant to 'pick a winner' based on the total scores, the scores can be used to help the process manager. In the Visualization sheet the importance of weights is explained. This can be used to show actors that are not experienced with multi criteria tables how this method works. It is again important to emphasize that the tool will not be used to make final decisions and that the weights given in the beginning can be discussed and changed later on in the process.

The Optimization sheet gives an example of how the tool can be used to show the effect of participation methods on the goals of actors. The different total scores of all actors combined are shown for the situation in which no participation is possible and the situation in which different participation options are available. One of the two interviewed process managers asked for this specifically, because their task is to get final arrangements for the process that lead to the highest mutual gains possible (Oskam, 2014). This can be shown as an example of why the process approach can work and where participation can lead to. An important pitfall is that, although the overall score can increase, the score of an individual actor can decrease. Introducing this sheet is therefore a delicate task for the process manager, as the focus on winning and losing the decision-making process can increase the lack of trust.

7 Conclusion & Recommendations

In this chapter we will describe the main conclusions of this research first. After that we will discuss what has to be improved in the WINST to make it ready to use and what future research can be executed based on this research.

Conclusions

To reach the goals for wind energy set by the Dutch government lots of wind parks have to be developed in the Netherlands. To decrease the opposition against a wind park and to use the potential in the region wind parks are developed using a process approach. This process takes place in the Feasibility, Scoping and Definition phases. At the end of the process three products are delivered to the municipality; the business case, the participation plan and the spatial plan. On the basis of these three products the municipality can decide to grant a building permit and change the MDP for the site.

Including all crucial actors and giving them a say in the important choices for the park also brings along problems. We identified three problems during the decision-making process; a lack of trust, a lack of information and a difference in languages among the actors. In this research we designed a process-support tool for the decision-making process to help to decrease these problems.

The tool can help to decrease the lack of information by defining the financial room to maneuver, giving insight in the dependencies between the products, in the goals of actors, in the differences between participation options and in the effects of the wind park on its surroundings. This can be done by calculations in the WINST (Wind In Nederland Support Tool), based on the Agentschap NL tool, that is able to thoroughly calculate the effects of different options in one of the three products on the goals of the actors. By giving insights in the goals of actors the understanding of the actions of the other actors can be increased. This and the language of the tool can help to increase the trust among the actors. The tool can be used to get inexperienced actors up to speed and as help during the process by giving indications of what a certain option does for the actors involved.

The tool is evaluated by the different actors involved in wind park Deil. All of these actors indicated that the tool can be very useful, especially in the beginning of the process. The interviewees stated that the WINST should be managed only by the process manager to decrease the opportunities for strategic behavior. At the start of a process the tool can be ideal to get inexperienced actors up-to-speed to show them what the complexities in a wind park project are. In later stages the tool can be used to give a quick indication of the effects of different options on the goals of the actors.

Recommendations for Future Research

After this research still improvements can be made to the tool. We identify two types of improvements; improvements that have to be made before the tool can be used and improvements that can be made to expand the tool or add to the context of the tool.

Before the tool is used in a real process, the following improvement has to be made:

A thorough verification and validation of the tool has to be conducted. Now we only roughly analyzed the outcomes by entering the default settings of the Agentschap NL model in an iterative process during the development of the tool. We assessed the outcomes by analyzing if they could be

reasonable. Before the tool is used all factors and links have to be checked for accuracy and the tool as a whole should be checked for producing values and scores that are reasonable. In this check also a sensitivity analysis should be conducted to see if the tool is very sensitive for the input of certain variables.

With the improvements mentioned above the tool could be used by a process manager, but further improvements can improve the usefulness of the tool even more. We list a few of the possible improvements:

The tool can be expanded by adding more variables and links. Although most important links and variables are included in the tool, some can be added to the tool to complete it even more. We could for instance include a model that calculates the values of the wind park on its surroundings in this tool to give the spatial plan more body. We can conclude to say that in future works there are many aspects that can be specified more or added to the tool.

A thorough guideline for the tool can be written. Although a short user guide is included in the research, a more thorough guideline can help clarifying the following points; when to use the tool and when not to use the tool, what can be negative effects of the tool, how can these negative effects be overcome, what can be strategic behavior and how can this be decreased? This and more can be added to help the process manager, when he is going to use the tool.

A process (with place for the tool) can be designed. A process design from start to finish of the process can help as guidance for the process manager. In this process design the tool can be embedded, which makes it easier for the process manager to implement the tool. Otherwise the process manager might have a process design he wants to use and has to embed the tool in that existing design, which can be hard to accomplish.

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