Growing Organizations with Patterns: Lessons from Drama

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ABSTRACT

Organizational patterns of software development have been mined in highly successful software organizations. Yet, no case of their application in a production setting has been reported. Our fear is that this is so because practitioners are expected to apply organizational patterns out of their descriptions. Organizational patterns of software development inspired explicitly stating and documenting drama patterns. We think that drama patterns have something to give back: interactivity and involvement exhibited by the process of building drama plays with drama patterns can be introduced into applying organizational patterns of software development. The key to this is that organizing people in software development is like creating a drama play. As in drama plays, the members of software development organizations take different roles and go through a number of situations in which they communicate and collaborate with each other. Although their drama plays will never be performed in front of the audience, these drama plays are going to determine the software systems they build. Coming out of two particular cases of pattern application related to people, one of which is about a software development organization built out of patterns with the applier not being aware of the notion of an organizational pattern, and the other about drama play built by intentionally applying drama patterns, some lessons have been drawn on how to apply organizational patterns of software development.

CCS CONCEPTS

• **Software and its engineering → Agile software development**; **Collaboration in software development**; • **Applied computing → Performing arts**.

KEYWORDS

drama, patterns, organizational patterns, pattern language, pattern composition

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1 INTRODUCTION

Having an architect not know about Alexander's patterns [4] doesn't mean that a piece of architecture produced by that architect has not been built with patterns. Alexander actually mined his patterns primarily in the highly admired architecture of the past. His thesis is that all those famous and many more anonymous architects of the old, most of whom built only their own houses, managed to this by applying patterns [2]. They did not have any pattern descriptions to follow. Yet, their creations are full of patterns.

Similarly, organizational patterns of software development have been mined in highly successful software organizations built unaware of patterns [13]. There are dozens of organizational patterns of software development described [5, 10, 11, 13, 14, 23]. Yet, no case of their application in a production setting has been reported. While this doesn't prove that organizational patterns are not used in practice, it throws a shadow of doubt to what extent is this outstanding body of organizational knowledge really used. Our fear is that this is so because practitioners are expected to apply organizational patterns out of their descriptions. Of course, no one is advising against discussion, but something more interactive and involving is needed.

The idea of patterns has been transposed into drama [25]. If we consider drama plays to be organizations of the actors as they perform, such organizations can be built with a special kind of organizational patterns called drama patterns. A drama pattern represents a particular intriguing dramatic situation that tends to recur in different contexts and gives a clue how to resolve it [25]. We have identified a number of drama patterns. Nine drama pattern descriptions have already been published [25], and additional seven are included in this paper (Appendix A). One of the authors, Aleksandra Vranić, applies these drama patterns on daily basis, building drama plays with children of all ages within drama education classes in an art school. Drama patterns are not applied only in isolation, but from the beginning to the end to build complete drama plays, resulting in fairly complex pattern compositions. Children are very happy with the process, which is very interactive and involving, and the resulting drama plays are perceived as highly involving

also by the audience. It is important to emphasize that the process doesn't require children to study descriptions of drama patterns, nor to learn about them explicitly.

Organizational patterns of software development inspired explicitly stating and documenting drama patterns. We think that drama patterns have something to give back: interactivity and involvement exhibited by the process of building drama plays with drama patterns can be introduced into applying organizational patterns of software development. The key to this is that organizing people in software development is like creating a drama play. As in drama plays, the members of software development organizations take different roles and go through a number of situations in which they communicate and collaborate with each other. Although their drama plays will never be performed in front of the audience, these drama plays are going to determine the software systems they build since—according to Conway's law—organizations which design systems are constrained to produce designs which are copies of the communication structures of these organizations [12].

The rest of the paper is structured as follows. Section 2 describes a case of building an organization in a production setting under aggravated conditions with organizational patterns, but without the appliers being aware of the existence of the patterns. Section 3 describes a case of building a drama play by applying drama patterns. Section 4 draws some lessons by comparing the two cases. Section 5 elaborates on pattern composition. Section 6 relates our findings to the work done by others. Section 7 concludes the paper.

2 A DRAMATIC ORGANIZATIONAL STORY WITH A HAPPY ENDING

Managing a team in an organization to deliver regular milestones is sometimes hard, especially when there are several projects running in parallel. One of the authors of this paper, Waheedullah Sulaiman Khail, participated as a developer in a project where he observed how sequences of organizational patterns applied together helped in delivering tough milestones.

Within the project, bimonthly milestones were defined, but they were often not reached on time. Many times, it looked like a release would be postponed. The main reason was that the same team was working for other projects in parallel.

Figure 1 shows the structural correspondence of the organizational patterns used to build the corresponding organization. Solid edges point to the patterns that elaborate the patterns they originate from. The dashed edge indicates what pattern is the *Echoes* fundamental property echoing. The patterns are numbered in the order of their application, which is described in the remaining part of this section.

2.1 Setting the Stage

When one of the project's releases was critical, the top manager called a meeting with the development and analysis teams. This was an application of the *Recommitment Meeting* pattern [13].

The top manager announced in the meeting what critical tasks should be done in order to deliver the next release. He asked the developers not to accept any other tasks in the meantime. The tasks for the critical project were rescheduled. This was an application of the *Size the Schedule* pattern [13].

Though everybody committed to the schedule, they had a feeling that the schedule is too ambitious. Of course, requiring the members to meet an unrealistic schedule would constitute a *Death March* antipattern [1, 26]. No one can really be sure of a schedule, but we can make sure the most important work is done first. Thus, all members were assigned their tasks along with the level of importance. This was an application of the *Work Queue* pattern [13].

For peer testing purposes, in which one developer tests the code produced by another developer, different environments were created and each developer was to develop and test in their local branch. After testing locally, they had to merge them into the development environment. The analysis team and general tester group (shared among the projects) could test the functionality in the development environment before it was merged into the customer test environment. This was an application of the *Named Stable Bases* pattern [13].

2.2 Making Progress

The project delivery manager regularly checked the development and analysis teams making sure they made observable progress. This was an application of the *Someone Always Makes Progress* pattern [13].

The project delivery manager established a close relationship with the developers. The discussions between the project delivery manager and developers were always friendly. They were always finishing with a "do what you can do and I will do my best" commitment. It was never like "this task must be finished by today." This close and friendly relationship made the developers work harder for the goal and achieve it. These were *Echoes* of the *Recommitment Meeting* pattern [13]. Echoes are not a pattern, but one of the fifteen fundamental properties of things that do have life as identified by Alexander [3]. In the essence, *Echoes* represent a repetition of some structure, not necessarily to the full extent.

All this was contributing to the *Community of Trust* pattern [13] as an overall framework for the organization.

2.3 Overcoming Impediments

Due to the fact that there were other ongoing projects (in parallel), attempts have been made to assign part of this release team to other tasks. However, in order to complete the critical tasks, one of the managers was assigned to stop any other task to squeeze in and interrupt the current flow. This was an application of the *Firewalls* pattern [13].

At the same time, the analysis team was making sure to get all the required information from the customer to prevent any delay for the developers. This was an application of the *Engage Customers* pattern [13].

By the start of the second week, a part of the developers was engaged with some tasks from another project. This was done only after the delivery manager was satisfied with the progress on the critical milestone.

2.4 Happy Ending

Two days before the release was planned, the development team was invited for a dinner. This would be a thank you note for achieving

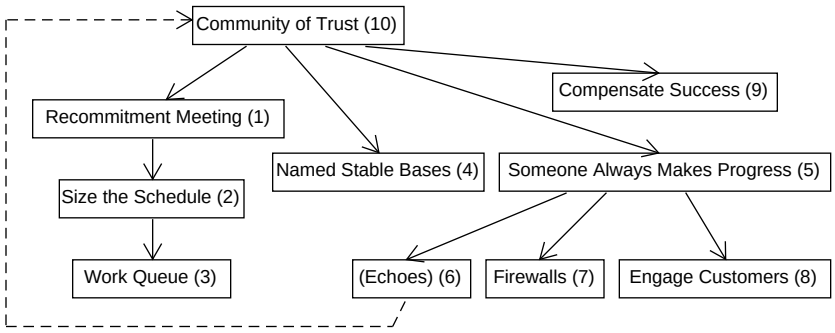

Figure 1: Organizational pattern example (the patterns are numbered in the order of their application).

a very tough schedule and delivering up on the expectation. This was an application of the *Compensate Success* pattern [13].

3 SETTING UP A DRAMA PLAY IN DIRE STRAITS

Usually, organizational changes are introduced under pressure. In order to come as close to this as possible with drama patterns, we have chosen to describe here a successful setting of a drama play in dire straits. A group consisted of ten 7–10 years old children and was lead by Aleksandra Vranić as a teacher.

The scenario of the play (created by Aleksandra Vranić) was based on the essential motif from the story of Alice in Wonderland, namely on the second Lewis Carroll's novel on Alice, Through the Looking-Glass, and What Alice Found There, in which, as the its title says, Alice gets to Wonderland through a mirror. She finds herself in a large room with many doors. She tries them one by one hoping that one of them will bring her back home. But each door gets her just into another bizarre situation. In one, Alice meets a deaf witch who thinks she's Gretel and leads a funny conversation with her. In another, Alice meets a group of robots who force her to behave like them. In yet another, Alice meets a fashion designer who tries to sell her some of the goods she designed. The situations can vary in realization and the story can be extended with further ones.

The story ends with Alice being waken up by the children whom she recognizes from appearing in Wonderland, which is a motif from The Wizard of Oz.

It is important to say that the teacher considered the scenario merely as a frame for building a play and not as something that needs to be followed duly. Quite on the contrary, the teacher was prepared to modify the scenario according to the situation and suggestions coming from children.

Figure 2 shows the structural correspondence of the drama patterns used to build this play. As with the organizational patterns shown in Figure 1, solid edges point to the patterns that elaborate the patterns they originate from, and the dashed edge indicates what pattern is the *Echoes* fundamental property echoing. Again, the patterns are numbered in the order of their application, which is described in the remaining part of this section. The patterns are annotated by the scenes they constitute.

3.1 Introduction and First Scenes

As drama education is an after class activity, the children were very playful and lacked discipline. When asked do they know of the Alice in Wonderland story, they all recognized it from various adaptations. Being asked how Alice made it to Wonderland, which is the key moment in the story, the children knew this happened through a rabbit hole, but some mentioned a mirror, the way it happened in the second novel on Alice. Some also mentioned that before entering Wonderland, Alice fell asleep.

The teacher carefully supported the ideas that corresponded to the intended scenario, emphasizing that the story of Alice they were going to develop is a bit different. She explained that by entering Wonderland, Alice was confused and frightened and she wanted to get back home. She saw many doors and didn't know which one to open. This is how an application of the *Loosely Coupled Situations* pattern (see Appendix A.1) was incepted. The teacher said that in Wonderland all sorts of odd situations can happen, with one of them being Alice meeting a deaf witch, which is exactly what happened as she opened one of the doors. The children were told that the witch expected Gretel, while Alice inquired her on how to get home, which, given that the witch is deaf, creates a funny situation. Of course, the witch didn't help Alice and she left the room to search further. All the children who wanted to tried this scene switching the roles. This was an application of the *Misunderstander* pattern (see Appendix A.2).

Afterwards, the teacher introduced another scene: Alice meets a fashion designer who maintains her studio filled up with fashion figurines. The fashion figurines were played by the remaining children, so that everyone was engaged. The children were told that the figurines were supposed to be still, but that occasionally they could slightly change their position or wink. At the same time, the fashion designer was to walk among them correcting their cloths. This was an application of the *Freeze What's Important* pattern (see Appendix A.3).

The moment Alice entered the scene, she and the fashion designer ended up in the front part of the stage, while the figurines

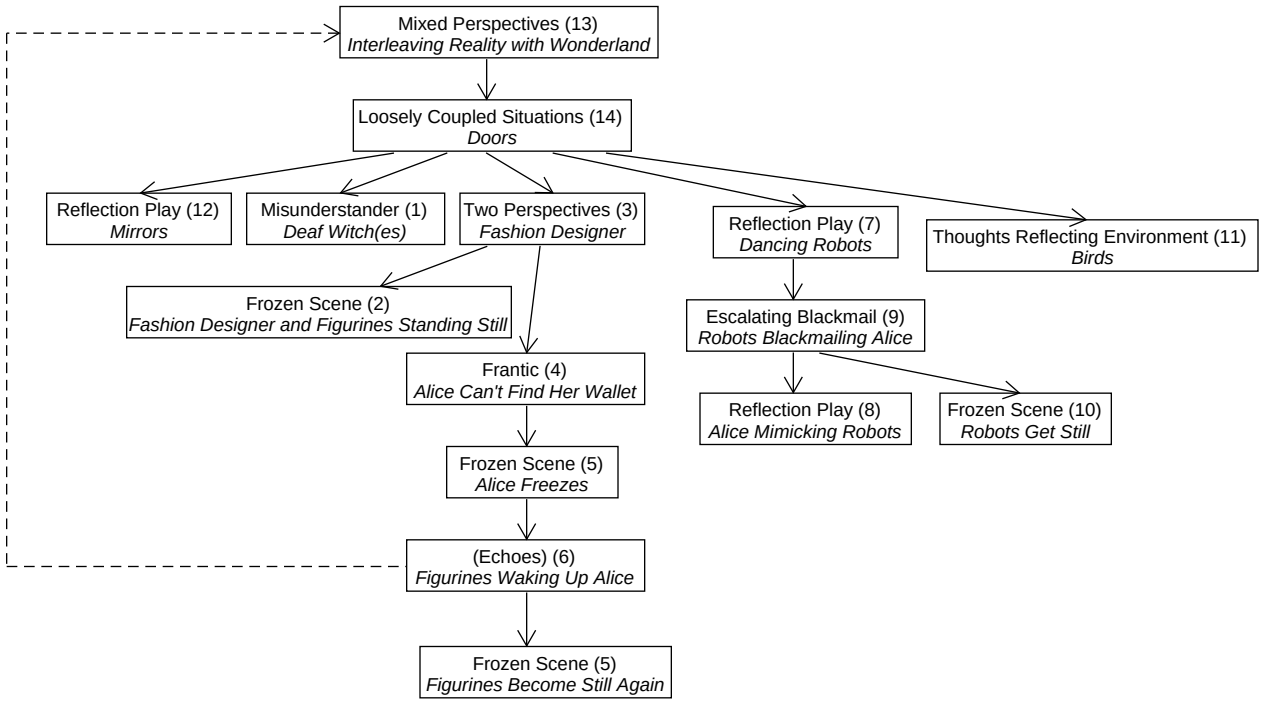

Figure 2: Drama pattern example (the patterns are numbered in the order of their application and annotated by the scenes they constitute).

remained still in its back part. This was an application of the *Two Perspectives* pattern (see Appendix A.4).

The children were also told that the fashion designer couldn't help Alice finding her way back home. Instead, she tried to sell Alice something asking for money. Alice had no wallet, but she was to search her pockets looking for it. This was an application of the *Frantic* pattern (see Appendix A.5).

The children then tried the scene. At the moment that Alice was frantically checking her pockets looking for her wallet as the fashion designer asked her to pay for the item she picked, the teacher intervened instructing Alice to freeze with a sigh and surprised face expression. This was an application of the *Freeze What's Important* pattern (see Appendix A.3).

The teacher then instructed the figurines to approach Alice shaking her and calling upon her to wake up. This was an application of the *Echoes* fundamental property of the *Mixed Perspectives* pattern (see Appendices A.7 and A.6), which culminates in the final scene, where children are waking up Alice in the park (see Section 3.4). However, at this moment, no one knew how the final scene would look like.

When Alice exclaimed "a-ha," signaling remembrance, the figurines were to get back to their former positions and become still again. This was yet another application of the *Freeze What's Important* pattern, this time within an instance of the *Echoes* fundamental property.

Upon unfreezing, Alice was to tell she remembered she left her wallet at home. She was to make the fashion designer give her something out of pity, which happened to be a bandanna, and then leave the room. This rounded off the *Frantic* pattern. The purpose of the bandanna as an evidence that Alice indeed has been to Wonderland wasn't planned. It was only the final scene that put the bandanna into the context of the *Mixed Perspectives* pattern.

Some of the children playing figurines needed to be instructed not to move too much or be encouraged to make sporadic moves, which happened during the rehearsal itself, i.e., upon spotting that something went wrong, the teacher stopped the scene and provided correcting instructions right away. The scene was rehearsed many times with children switching the roles as they wanted to, and each time the performance was smoother and smoother as children adopted the instructions more thoroughly.

The next room that Alice entered was introduced then: a room with dancing robots. This was a scene with music. All the children apart from the one playing Alice were instructed to dance making robotic moves similar to each other. This was an application of the *Reflection Play* pattern. As Alice enters the room, the music stops and Alice starts talking to robots asking to direct her home. The robots promise to help her if she would talk as they do. Alice starts talking with a robotic accent, but robots then require her to dance with them. They make several dances with each one started by the chief robot. The music changes accordingly. This was another application of the *Reflection Play* pattern. Finally, Alice reminds

robots they promised to help her, but instead they declare she will remain with them forever. This was an application of the *Escalating Blackmail* pattern around the *Reflection Play* pattern. Alice escapes with robots chasing her, but, eventually, they give up and remain still on the stage. This was yet another application of the *Freeze What's Important* pattern.

All this has been achieved within only one lecture (two hours).

3.2 Progress and Rehearsal

In the next lecture (next week), another scene was introduced: the woods. Alice enters the woods and she is frightened and is fearfully looking around. All other children stand still in the background and produce different twitting sounds. As Alice turns back and then again forth, the twitter changes into words: "I'm afraid. I'm cold. I'm thirsty. Where's the way? I don't know. I don't know. I'm lost." One of the birds emphasizes the question: "Where's the way?" All other birds respond together: "There it is! There it is!" Alice then leaves the room. This was an application of the *Thoughts Reflecting Environment* pattern.

The scenes from the previous lecture were rehearsed at a very good level. In the deaf witch scene, a problem occurred: many children wanted to play a witch. The scene was rehearsed many times with children switching in the role of the witch. The teacher understood this wasn't sustainable for a play and that she had to reinvent the scene so to accommodate all the children that wanted to play a witch at once, but the solution didn't come at the moment.

3.3 Elaboration and Adaptation

The third lecture started with the elaboration of the scene in which Alice gets to Wonderland through a mirror. She falls asleep on a playground or in a park as she gets tired. All other children gather behind her standing in a half-circle. Alice was to wake up—at least apparently—finding herself in a mirror room. The children were reminded of the *Reflection Play* pattern they already had played earlier as an étude (with no particular story behind it). Alice was to make a *Reflection Play* approaching most of the reflections, looking at each of them, and making moves observing the reflection repeating them. All other reflections were to repeat the moves all the while. The children were not satisfied with the idea that the reflections were to be standing while Alice was lying down, so the scene was adapted to have the reflections start in the laying position, too. This was a multifold application of the *Reflection Play* pattern. The scene ends with Alice turning to the audience saying: "There are so many doors here. One of them must get me home. I'll try this one."

The teacher instructed Alice to run out of the scene, but the reflections were to remain there. They were instructed to start the woods scene and play birds. Alice then got back and the whole woods scene was rehearsed. Upon finding her way out of the woods, Alice left the scene.

The birds were told to remain on the scene as they all were going to be witches. They were given witch hats to put them on. They accepted this with delight. A door knocking sound opened the deaf witch scene. Alice got back to the scene, where she was interrogated by the deaf witches who misheard her answers and, furthermore, misheard their own words creating the utmost confusion. For example, one of the witches said to Alice: "Gretel, come here and help me." Alice complained: "I'm not Gretel. My name is Alice." The witch was confused: "Malice?" Another witch objected: "No. She said practice." Yet another asked: "Chalice?" And so on. Finally, Alice notices the witches are deaf and leaves the room disappointed. The scene was rehearsed once more.

3.4 Integration

The fourth lecture was devoted to integration. Therefore, it started with the ending scene in which Alice sleeps in a park and all other children are waking her up. As she wakes up, she tries to convince them she was in strange places. They don't believe her, but Alice starts recognizing them as the creatures she met with the fashion designer being among them. As a final proof for her story, Alice pulls the bandanna the fashion designer gave her out of her pocket showing it to the alleged fashion designer and asking her whether she really doesn't remember she gave her the bandanna. This was an application of the *Mixed Perspectives* pattern (see Appendix A.6). In the end, Alice just concludes how good it is she found her way back home and joins the rest of the children in a joyful play.

A whole play was rehearsed then. The *Loosely Coupled Situations* pattern (see Appendix A.1), incepted at the very start, was finally applied in its full extent. At the transition between the mirror and woods scene, the reflections spontaneously repeated Alice's door knob opening gesture and one of the boys made a creaky sound as a joke. The teacher was amazed by this and explained that Alice need not leave the scene as now it was clear she entered another room. By this, the play was ready for a stage performance.

4 THE LESSONS

Now that we saw two particular cases of applying patterns to organize people, we can present some lessons on how to apply organizational patterns for software development based on what we know from applying drama patterns. A general idea is to approach organizing people as if you were creating a drama: one that should have a happy ending. For this, you should envision a story that you would like to tell about your organization. As in all stories, there will be some ups and downs, and many curious situations to overcome, but also a lot of fun. Be prepared that the story will develop in many ways difficult to predict at its beginning.

In a way, you who need to organize people at work act as a drama director. You know about the organizational patterns, while the employees you need to organize—the participants—need not know about them.

4.1 Where to Start

You might be tempted to start from the beginning, i.e., to identify the top pattern and try to apply it. Don't. Instead, start in the middle (compare the structural order with the actual order of application in Figures 1 and 2). However, present your organization members with a general idea of the story of your organization first. Subsequently, find out how organization members perceive this story and what do they know about it. This would probably involve incepting a pattern that can't be realized fully at the moment. This occurred in a very similar way in both work and drama example (recall Sections 2.1

and 3.1). In the software development example, initiating a meeting in order to revise the commitment (the *Recommitment Meeting* pattern) was actually an inception of establishing a community of trust (the *Community of Trust* pattern), while in the drama example, the idea of Alice being faced with many doors as a framework for the whole play was incepted (the *Loosely Coupled Situations* pattern).

Afterwards, identify the situation that is of most interest to participants at the moment. Observe the forces at work within that situation and choose an organizational pattern that could get those forces into balance. In the software development example, the top manager recognized there is a problem with the schedule, so he initiated rescheduling the tasks the developers could still commit to, but not becoming overtaxed, effectively applying the *Size the Schedule* pattern. In the drama example, as there was no real organizational (problem) situation there, it had to be induced by the teacher by telling the children how Alice met a deaf witch. The children then worked on overcoming the inability of the deaf witch to understand Alice, which was an application of the *Misunderstander* pattern.

When one of the project's releases was critical, the top manager called a meeting with the development and analysis teams. This was an application of the *Recommitment Meeting* pattern [13].

The top manager announced in the meeting what critical tasks should be done in order to deliver the next release. He asked the developers not to accept any other tasks in the meantime. The tasks for the critical project were rescheduled. This was an application of the *Size the Schedule* pattern [13].

4.2 Applying a Pattern

Don't explain the organizational pattern you are applying as such. Explain only what's necessary to get it applied. Let the participants make their own actions: just make indications or state constraints. This is observable both in the software development example, where the recommitment was made without describing the corresponding pattern, as the applier wasn't aware of the notion of an organizational pattern, and in the drama example, where the applier intentionally introduced selected drama patterns one by one (recall Sections 2.1 and 3.1 again).

This doesn't mean the participants must be kept oblivious of patterns if they exhibit an interest. However, they should not be forced to stand a theoretical introduction. Over time, the participants might develop a sensibility to patterns and even incorporate them in their vocabulary (at first, with the instance names used to refer to the general concept).

4.3 Rehearsals: Improving a Pattern

Patterns need to be be grown or nurtured. Participants should all the time be directed towards helping each other in fulfilling their roles and towards developing an appreciation for what they are building and how important it is. More experienced participants will "pull" the less experienced ones. Nevertheless, provide nudges as you go. Upon observing deviations, don't hesitate and stop the activity, and intervene with correcting instructions, just like with the children playing figurines needed to be instructed not to move too much or encouraged to make some moves (recall Section 3.1 again). Don't wait for the situation to end. Use an opportunity to affect it while it's still alive.

However, maintain a positive environment and avoid an open critique. Rather, praise what is achieved and provide encouragement: not to individuals, but the whole group. Praising individuals has a negative effect on those who are not praised.

Unlike in drama, organizational situations at work in jobs such as software development are not being rehearsed in order to master them.[1] But they do repeat and each repetition is an opportunity for improvement. As in the original deaf witch scene (recall Section 3.1), participants can be changed or their roles can be switched in repetitions, so that they all get an opportunity to try them—and learn about them. In the end, strive for engaging participants according to their dispositions.

4.4 Modifying a Pattern

Observe the context—i.e., listen to the questions and complaints raised by participants—and modify the pattern being applied accordingly. For example, in the deaf witch scene, all children wanted to play witches (recall Section 3.2). Although the solution didn't come immediately, it finally did: the scene actually could accommodate many witches provided they talk to each other (recall Section 3.3). Until a pattern (instance) is improved, it should be kept in its current form, provided it is considered to be beneficial. If not, it should be retracted (see Section 4.6).

4.5 Incepting a Pattern

While some patterns are quite specific and enclosed in their application to the extent that they sometimes represent a complete, compact scene or situation, like *Misunderstander* (recall Section 3.1 and see Appendix A.2) or *Recommitment Meeting* (recall Section 2.1), other patterns are more conceptual, providing a framework for several scenes or even a whole play or organization, like *Loosely Coupled Situations* (recall Sections 3.1 and 3.4) or *Community of Trust* (recall Section 2.2). A logical placement for conceptual patterns is before the specific ones they put together, but this is not how they can be established because, by themselves, they are just empty shells. However, they can—and should—be incepted early, although they would be played much later or only in the final stages: just like the *Loosely Coupled Situations* pattern was incepted in the drama example by the the teacher explaining the children that Alice saw many doors and didn't know which one to open (recall Section 3.1). The same way, as has been mentioned in Section 4.1, initiating a meeting in order to revise the commitment actually incepted the *Community of Trust* pattern.

4.6 Retracting a Pattern

It is known that if a pattern doesn't fit into the organization as a whole, which may mean that it is either apparent it doesn't work or it simply doesn't feel right, it should be retracted without delay [13]. However, while a pattern itself may fit, it could be too ambitious to apply it with given participants or they might have no interest in it, although both reasons usually go hand in hand. Consider the scene where Alice is to pay the fashion designer, but finds out she has no

[1] However, in some professions, such as firefighting, rescuing, or army, regular exercises comparable to drama rehearsals are performed.

wallet. Alice then freezes, while fashion figures get alive and start shaking her calling upon her to wake up (recall Section 3.1 again). Some groups who had been rehearsing the *Alice in Wonderland* play couldn't get this right. They were missing the moment for the fashion figurines to get alive or Alice was forgetting to freeze. Moreover, the participants were rejecting to rehearse the scene.

There was no case of retracting an organizational pattern in the software development example. However, the same author participated in another project where the analysis team was based in Australia, and the development team was based in Europe. The teams agreed to have a quick call every morning, practically applying the *Stand Up Meeting* pattern. However, due to a huge time difference, what was a morning to ones wasn't quite a morning to others, pushing them out of their comfort zone. After proceeding with these calls for a week, the teams agreed to cancel these "morning" calls, thus retracting the *Stand Up Meeting* pattern.

5 NOTES ON PATTERN COMPOSITION

Patterns are composed with each other in order to create a greater whole. This happens both hierarchically and on a peer-to-peer basis. Hierarchical pattern composition can be observed in pattern sequences, in which each further pattern refines the former one. In other words, a hierarchically superior pattern embraces the subordinate patterns. In our drama example, presented in Section 3, the *Loosely Coupled Situations* pattern embraces four situations each which is elaborated by a particular pattern: *Misunderstander*, *Thoughts Reflecting Environment*, *Two Perspectives*, and *Escalating Blackmail*. In the organization building example, presented in Section 2, the *Community of Trust* embraces also four patterns that elaborate it: *Recommitment Meeting*, *Named Stable Bases*, *Someone Always Makes Progress*, and *Compensate Success*. While in a drama play we can actually see how a hierarchically superior pattern is composed of subordinate patterns by simply watching the play, this is less obvious with organization building because we don't have a privilege of seeing the whole organizational "drama play."

Hierarchical pattern composition doesn't always happen top-down. Often, and this is the case of both afore mentioned pattern compositions, it is a result of covering the patterns that already have been established by a superior interconnecting pattern.

Peer-to-peer pattern composition interconnects some of the patterns that are not in a subordinate relationship. This happens through overlapping roles. Actually, the patterns the *Loosely Coupled Situations* pattern consists of are composed in a peer-to-peer manner. Thus, the understanding seeker in *Misunderstander*, the hero in *Thoughts Reflecting Environment*, one of the front perspective characters in *Two Perspectives*, and the blackmailed in *Escalating Blackmail* are played by the same character: Alice. In the organization building example, the pattern roles are less versatile: the development team members in *Recommitment Meeting*, developers in *Named Stable Bases*, both the one that makes progress and other team members in *Someone Always Makes Progress*, and rewarded in *Compensate Success* are played by the development team members. It is worthwhile noting that, commonly, the roles in the description of organizational patterns are not explicitly stated.

Peer-to-peer pattern composition comes out of the necessity to keep a drama play or organization sufficiently cohesive.

6 RELATED WORK

According to Laurel [19], theater can be used as a metaphor for computers to help us better understand and design human-computer interaction. In effect, this paper looks at organizing people to develop software as if they were performing a theater play.

Sparks [22] explains how people can get free from undesirable bounds stemmed from the life situations they are pulled into, which, effectively, force them to play certain roles rather than being themselves. Similarly, a concept of liberating oneself from such control dramas is presented in *The Celestine Prophecy: An Adventure*, Redfield's famous novel [21]. Despite it seems that we are doomed to play drama in our everyday life situations, building an awareness of this provides us with an ability to walk out from drama at least for a moment to retrospect the situation and decide the next steps to be taken with a necessary sanity. The approach presented in this paper tacitly develops an ability to work with organizational patterns as "little dramas." By that, people learn how to manipulate organizational patterns rather than letting organizational antipatterns manipulate them.

Organizational antipatterns, which can be seen as organizational patterns to be avoided, are extensively documented [7–9, 18, 20]. While it certainly pays off to learn about what not to do, one should be careful with this because, paradoxically, people tend to do things they are being asked not to do. A famous scene from Jan Svěrák's movie called *The Elementary School* (*Obecná škola*, 1991) shows how not even a basic logic can prevent the human curiosity for weired things. In the movie, a local school director warns the children not to lick the metal stair handrail as the weather is freezing and this is very dangerous. Following this warning, several children end up with their tongs glued to the stair handrail. Consequently, this paper aims rather at raising the awareness of desirable organizational patterns and how to apply them.

7 CONCLUSIONS AND FURTHER WORK

Coming out of two particular cases of pattern application related to people, one of which is about a software development organization built out of patterns with the applier not being aware of the notion of an organizational pattern, and the other about drama play built by intentionally applying drama patterns, some lessons have been drawn on how to apply organizational patterns of software development in terms of where to start, how to actually apply a pattern, how to improve a pattern, how to modify a pattern, how to incept a higher level pattern, how to retract a pattern, and pattern composition.

The paper includes seven previously unpublished drama patterns in the example based pattern form proposed in our earlier paper [25]. It also includes two drama pattern descriptions and one fundamental property description published previously [25], expressed in the context of the *Alice in Wonderland* drama play, whose pattern structure is also described in the paper in some detail.

We plan to seek and explore other parallels between pattern based organization building as drama play building.

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A DRAMA PATTERNS

The drama patterns the play *Alice* (created by Aleksandra Vranić) consist of are presented here. They are presented in the example based pattern form proposed in our earlier paper [25]. In this form, the context part of the pattern is exemplified. The play *Alice* is used for this here. The play is based on the essential motif from the story of Alice in Wonderland, namely on the second Lewis Carroll's novel on Alice, Through the Looking-Glass, and What Alice Found There, in which, as the its title says, Alice gets to Wonderland through a mirror. She finds herself in a large room with many doors. She tries them one by one hoping that one of them will bring her back home. But each door gets her just into another bizarre situation. In one, Alice meets a deaf witch who thinks she's Gretel and leads a funny conversation with her. In another, Alice meets a group of robots who force her to behave like them. In yet another, Alice meets a fashion designer who tries to sell her some of the goods she designed. The story can be extended with other situations. The story ends with Alice being waken up by the children whom she recognizes from appearing in Wonderland, which is a motif from The Wizard of Oz.

The problem that a drama pattern addresses is expressed as a conflict of the two main contradicting forces, with other forces that could have been identified counted in within these main forces similarly as in the addition of forces as vectors in physics [25].

Each drama pattern generates a dramatic element as a resolution of the conflict of the contradicting forces in the corresponding dramatic situation [16], e.g., a change to the scene (consider splitting the stage in the *Two Perspectives* pattern), new notion that the audience has to be made aware of (consider the proof in the *Mixed Perspectives* pattern) emotion expressed by an actor (consider the disappointment of the understanding seeker in the *Misunderstander* pattern).

A.1 Loosely Coupled Situations

In Wonderland, Alice gets into a number of strange but unrelated situations. Each situation takes place in a separate room. The rooms are accessed through a connecting room.

The rooms represent separate situations. The connecting room represents a frame situation that associates the separate situations without affecting what happens in each of them. Alice represents a transitioner whose transitions trigger the separate situations.

Forces:

> There is a need to connect separate situations,
> *But* without affecting what happens in each of them.

Resolution: Introduce a frame situation from which all separate situations will be accessible. Make a transitioner trigger each separate situation from the frame situation by making a transition represented by some observable action.

The transitioner is a sufficient connection between the separate situations. Other than that, they can be kept independent of each other.

This is a drama pattern which we call *Loosely Coupled Situations*. Other examples of this pattern include:

- *Four Rooms* (1995). The movie consists of four independent stories each of which takes place in one of four different hotel rooms. The stories are triggered by the bellhop, who acts as a transitioner, entering the room.
- *Night on Earth* (1991). The movie consists of five independent stories each of which takes place in a different city. The transitioner role is not embodied in a single character, but rather as a concept of a taxi driver represented by a different character in each story. Consequently, the stories are triggered by taking a taxi ride.

A.2 Misunderstander

As she is looking for the way back home, Alice meets a deaf witch. In their conversation, the deaf witch mishears what Alice is saying and makes absurd replies possibly in words that rhyme with what Alice really said. Thus, when Alice tries to make the witch understand her name, the witch mishears it each time differently as malice, chalice, practice, etc. Finally, Alice notices the witch is deaf and leaves disappointed.

Alice acts as an understanding seeker, while the witch is a misunderstander.

Forces:

> The understanding seeker wants to be understood by the misunderstander,
> *But* the misunderstander is not capable of understanding or doesn't want to understand.

Resolution: The understanding seeker gives up disappointed, while the misunderstander fails to understand even this.

This is a drama pattern which we call *Misunderstander*. Other examples of this pattern include:

- *Deaf Postwoman* (short sketch, Aleksandra Vranić, 2009). A postwoman in a post office mishears addresses.
- *Emperor's New Cloths* (a drama play arranged by Aleksandra Vranić, 2015). The scene in which emperor asks a foreteller for a confirmation that the invisible fabric is real, but she just keeps talking about the weather forecast.

A.3 Freeze What's Important

Alice is frantically checking her pockets looking for her wallet as the fashion designer asked her to pay for the item she picked.[2] Suddenly, she freezes with a sigh and surprised face expression.

Alice acts as an important character.

[2]This pattern was first mentioned in our earlier paper [25] as *Frozen Scene*, but was not elaborated there.

Forces:

> There is a need to emphasize an act made by the important character,
> *But*, in real time, this doesn't last sufficiently long to be observable.

Resolution: Prolong the act made by the important character by freezing the scene for a sufficient time. The important character may make small moves or wink. There can be several important characters.

This is a drama pattern which we call *Freeze What's Important*. Other examples of this pattern include:

- *Cleopatra* (1963). While Queen Cleopatra stands motionless like a statue on an elevated place, the people surrounding her are very dynamic. As soon as Cleopatra starts moving and going down, the people quiet down and become motionless.
- *Vertical Road*, Akram Khan, 2011, a dance show[3]
- *Giselle: Madness*, Akram Khan, English National Ballet[4]

A.4 Two Perspectives

Initially immobile figurines start to move and approach Alice, who suddenly became frozen as she couldn't find her wallet when the fashion designer asked her to pay, shaking her and calling upon her to wake up.[5] When she woke up exclaiming "a-ha," the figurines got back to their former, immobile positions.

Alice and the fashion designer are the front perspective characters, while the figurines are the back perspective characters.

Forces:

> Two perspectives need to be shown simultaneously,
> *But* there is only one stage.

Resolution: Split the stage horizontally, vertically, or by depth into two perspectives. The perspectives can be swapped by having the characters change their position.

This is a drama pattern which we call *Two Perspectives*. Other examples of this pattern include:

- *Il Filo di Arianna* [15]. During a significant part of the play, the stage is split so that the female character is in the front, while the male character is in the back. The organization of the stage indicates clearly that they reside in separate spaces.
- Use of split screen in movies, such as the one in *Run Lola Run* (1998) act one showing Manni in the left part of the screen and Lola running to save him in the right part of the screen.

A.5 Frantic

The fashion designer tries to sell Alice something asking for money. Alice frantically searches her pockets looking for her wallet.

Alice acts as a frantic person, while the fashion designer is a provoker.

Forces:

> The provoker requests something from the frantic person,
> *But* the frantic person is unable to provide that.

Resolution: The frantic person uses all the efforts to provide what the provoker requested, albeit unsuccessfully. This is preceded by the frantic person wanting to get something or having already taken it from the provoker.

This is a drama pattern which we call *Frantic*. Other examples of this pattern include:

- *The Immigrant* (1917). The scene in which Charlie Chaplin, eating in a restaurant, notices what happens to those who have no money to pay for their meal and starts frantically searching for the money in his pockets.
- *The Police* (1916). The scene in which Charlie Chaplin is looking for a bed. When he has to pay, he scares and nervously looks for the money in his pockets.

A.6 Mixed Perspectives

In the ending scene, children are waking up Alice. As she wakes up, she tries to convince them she was in strange places, which were presented earlier in the play. They don't believe her, but Alice starts recognizing them as the creatures she met with the fashion designer being among them. As a final proof for her story, Alice pulls the bandanna the fashion designer gave her out of her pocket showing it to the alleged fashion designer and asking her whether she really doesn't remember she gave her this.

Alice acts as a perspective taker. The children are the current perspective characters. The other perspective characters are the characters from the scenes of strange places that have been presented earlier in the play.

Forces:

> The perspective taker tries to convince the current perspective characters of the other perspective existence,
> *But* the current perspective characters don't believe this.

Resolution: The perspective taker produces a proof that is difficult to explain without allowing for the existence of the other perspective.

This is a drama pattern which we call *Mixed Perspectives*. Other examples of this pattern include:

- *The Wizard of Oz* (a movie, 1939). When Dorothy wakes up with her relatives around her, she recognizes them as the characters who followed her as she was looking for the way back home from Oz. There is no particular proof for this, but the similarity of the relatives to the characters Dorothy met in Oz is obvious.
- *King Nine Will Not Return*, a Twilight Zone episode. The main character is being convinced by two doctors he's only hallucinating of World War II events that end with him collapsing in the desert, but when a nurse accidentally turns over one of his shoes, a bunch sand comes out of it.

[3] https://www.youtube.com/watch?v=kgcW3rTOELM
[4] https://www.youtube.com/watch?v=01Qf9ypbcq4, https://www.youtube.com/watch?v=oesf3KWe0oU
[5] This pattern was first mentioned in our earlier paper [25], but was not elaborated there.

- *Il Filo di Arianna* [15]. The female and male character reside in separate spaces indicated by the organization of the stage. However, the actions the male character takes affect the female character. For example, when the male character activates a mixer, the female character begins to shake.

A.7 Echoes

Formerly frozen, the figurines approach Alice shaking her and calling upon her to wake up. When she exclaims "a-ha," signaling remembrance, the figurines get back to their former positions and freeze again.

These are actually echoes of the *Mixed Perspectives* pattern (see Appendix A.6), which is applied in the final scene, where children are waking up Alice in the park. This, practically, amplifies the *Mixed Perspectives* pattern. Echoes are not a pattern, but one of the fifteen fundamental properties of things that do have life as identified by Alexander and which lie behind the patterns [3].

Another example of echoes can be found in our earlier paper [25]. The example is related to the play called *The Real Red Riding Hood* (created by Aleksandra Vranić). As the wolf, confused by the behavior of Red Riding Hoods, who left the scene leaving him alone, leaves the scene, too, Red Riding Hoods come back, bowing and receiving an applause by the audience. However, one of them says, „Anyway, I'm the real one." This restarts the argument over who's the real Red Riding Hood. The wolf, of course, notices this and gets back, which makes Red Riding Hoods run away in a rush. This can be repeated several times, each time quicker. These are echoes of the Reversed Advantage pattern [25], which, practically, amplify it.

There are many examples of Echoes. A particularly interesting one occurs in Barbie as the Princess and the Pauper (2004), an animated movie, in the scene when the princess meets the pauper (*Amazing Similarity* echoes there). As the princess and the pauper are amazed by their similarity, the camera goes down showing two cats who also look amazed by their similarity, although one is white, and the other black.

A.8 Thoughts Reflecting Environment

Alice enters the woods and she is frightened and is frantically looking around.[6] All other children stand still in the background and produce different twitting sounds. As Alice turns back and then again forth, the twitter changes into words: "I'm afraid. I'm cold. I'm thirsty. Where's the way? I don't know. I don't know. I'm lost." One of the birds emphasizes the question: "Where's the way?" All other birds respond together: "There it is! There it is!" Alice then leaves the room.

Alice acts as a hero passing through the woods with birds that represent an environment. The environment reflects the hero's thoughts providing them to the audience.

Forces:

> There is a need to express the hero's thoughts,
> *But* without having the hero directly express them.

Resolution: The environment reflects the hero's thoughts by modulating the sounds or visual expressions it already makes.

This is a drama pattern which we call *Thoughts Reflecting Environment*. Other examples of this pattern include:

- *Pokušenie* (*Temptation*) [6]. The name "Prym" resonates through a diabolic music tune.
- *Killer/Papa Was a Rollin' Stone*, George Michael's video. The product logos change into the words of the song.
- *Bridget Jones: The Edge of Reason* (2004). The scene in which Bridget (Renée Zellweger) rushes through the city and a commercial displayed on a banner changes into "go Bridget go."

A.9 Reflection Play

Alice sees her reflections, played by other actors, in the mirror room. She approaches most of the reflections, looking at each of them, and making moves observing the reflection repeating them.[7] Alice acts as a reflected object, while the other person is its reflection. The reflected object meets its reflection. They copy each other's moves. They don't have to actually look the same. It is not necessary to declare who's the reflection, and who's the reflected object. It is not necessary for reflected moves to occur simultaneously, i.e., they can be delayed.

Forces:

> The reflected object doesn't believe that what has shown is real and that it is its reflection,
> *But* the reflection behaves the same.

Resolution: The reflected object accepts the existence of what appears to be its reflection.

This is a drama pattern which we call *Reflection Play*. Other examples of this pattern include:

- *The Real Red Riding Hood* (a drama play arranged by Aleksandra Vranić). Two Red Riding Hoods meet and try to make sure they are not each other's reflection.
- *Metamorfoze*, Jugoslovensko dramsko pozorište (2011). The scene when Narcissus meets his reflection.

A.10 Escalating Blackmail

The robots promise to help Alice if she would talk as they do. Alice starts talking with a robotic accent, but robots then require her to dance with them. After several dances, Alice reminds robots they promised to help her, but instead they declare she will remain with them forever. Alice escapes with robots chasing her, but, eventually, they give up.

Alice acts as a blackmailed, while robots are blackmailers.

Forces:

> The blackmailers keep assuring the blackmailed they will fulfill their promise once the blackmailed respond to their next requirement,
> *But* the blackmailed becomes aware that this will never end.

[6] This is a pattern published in our earlier paper [25] presented here in the context of the *Alice in Wonderland* drama play.

[7] This is a pattern published in our earlier paper [25] presented here in the context of the *Alice in Wonderland* drama play.

Resolution: The blackmailed ends further blackmailing abruptly.

This is a drama pattern which we call *Escalating Blackmail*. Other examples of this pattern include:

- *Chichôtka (Chuckle)* [24]. Princess Chichôtka, who was always cheerful, stops laughing and becomes sad. The king announces that whoever manages to make her laugh can marry her. A poor boy succeeds. However, the king does not want to fulfill his promise.
- *Uhliarova dcéra (Coal Miner's Daughter)* [17]. A king falls in love with a poor coal miner's beautiful daughter. He wants to marry her. The daughter doesn't like the king, but is scared to reject him. Therefore, she promises to marry him, but keeps postponing the wedding and making up tasks for the king to complete in order for her to marry him. For example, he has to get her a chest for clothes which moves by itself. The king completes this task. Subsequently, the daughter wants a dress made of stars, then a dress made of suns, then a dress made of moons, then a coat made of mouse fur… In the end, she does not fulfill her promise and runs away.

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