Patterns of Patterns II: Discourse on Implementation

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We review how our earlier theorization of pattern methods fares in the wild. The "wild" here included a graduate school classroom in New York, a workshop at a transdisciplinary conference in Arizona, a nascent citizen science project in Bristol, and a professional development day for a university in Oxford. We encountered unexpected challenges such as working with students in a HyFlex classroom, getting conference attendees to feel comfortable evaluating the conference they were presently attending, and adapting our plans on the fly when leading workshops with surprising attendee responses. We describe and refine patterns specifications that will help other practitioners of patterns in their own forays into the wild.

CCS Concepts: • **Social and professional topics**; • **Software and its engineering** → *Designing software*; *Open source model*; • **Applied computing** → *Operations research*; • **Computing methodologies** → Modeling and simulation;

Additional Key Words and Phrases: Design Patterns, Pattern Languages, Action Reviews, Futures Studies, Causal Layered Analysis, Emacs, Free Software, Peeragogy, Climate Change, Innovation, Anticipation

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1 INTRODUCTION

The previous installation in this series presented a high-level methodological synthesis that aimed to get at the heart of what design patterns are [Corneli et al. 2021]. Here, we want to talk about how we have implemented the methods described previously, and give some reflections on where things are going next. We will begin with a recapitulation of the main points made in the earlier paper. In short, "Patterns of Patterns" encapsulated everything we had to say about design patterns with *one* overall pattern which operated at a very high level. Here, we elaborate many practical patterns which expand on the same theme. This fully-fledged collection of patterns of patterns can help you organise your work with Design Pattern Language methods.

2 RECAP OF "PATTERNS OF PATTERNS"

We introduced a synthesis of methods that operationalise the "sensory", "cognitive" and "motor" systems from psychology in the context of social intelligence. The particular methods we outlined were certainly not the only

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way to implement these system features. What drew our attention is that each of the methods we selected comes with a framework or template, and works much like a design pattern.

- Project Action Review (PAR): *a set of five review questions to explore at a project checkpoint.*
- Causal Layered Analysis (CLA): *a set of four "layers" that can be used to unpack a problem area of interest.*
- Design Pattern Languages (DPL): *a three-part template of context, problem, and solution.*

We made the further assertion that these sensory, cognitive, and motor methods can be hooked together, theorising design patterns as little pieces of moveable social intelligence. We called the specific method that combines PAR, CLA, and DPL the "PLACARD" pattern.

We applied these methods to analyse the design Pattern Language literature and practices, and also developed a case study examining the way the Emacs Research Group used related methods. We built on these analyses to outline potential futures for the development of pattern methods. All of these potential futures have early indicators attached to them, in the sense of William Gibson: "the future is already here, it's just not evenly distributed". But, now with reference to Alan Turing, much remains to be done.

3 METHODOLOGY

In the current paper we will apply a similar reflective methodology, examining major events in our work that took place since the publication of "Patterns of Patterns". We ran three formal workshops that were inspired by the original set of methods, and we will describe *how the methods evolved further in those settings*. We also used the aforementioned paper as a focal reading over three sequential years of a postgraduate course, CIS 9590 "Information Systems Development Project" at Baruch College, part of the City University of New York. Together, an analysis of these touchpoints suggests ways in which the methods can continue to evolve. As before, *we will use a case study in Causal Layered Analysis as a method for describing that evolution.*

We used design patterns directly when developing and running the workshops. A selection of these patterns are included here. We also include the itinerary for each of the workshops to help bring the reader into the scene, and encapsulate post-workshop reflections as further design patterns.

4 CASE STUDY 1: "GOING META" WORKSHOP AT ANTICIPATION 2022

This workshop functioned as a further pilot of methods that we already shared in earlier pilots (at PLoP 2021, at Oxford Brookes Creative Industries Festival, and previously in more nascent forms). Our aims were to explore the methods in a hands-on way, and provide attendees with a rapid introduction to peeragogy. We also wanted to try out some new "pattern cards" to organize the workshop. Our pitch to Anticipation attendees was that this workshop would help to establish a position of maximum leverage, exercising our "Critical Anticipatory Capacities" using "Creativity, Innovation and New Media" (two of the conference's themes).

4.1 Itinerary

What does the future hold for the anticipation community that we are part of?

Study Hall (5 minutes)

Participants take some time to review this itinerary.

Welcome (5 minutes)

We will briefly introduce design patterns and the workshop methodology and goals with the audience. Briefly, our goal is to help everyone here "go meta" and answer the thematic question above.

Phase I: Envisioning the future (20 minutes)

Groups review 4 cards in order. 1 | **Participatory Scenario Planning:** Get everyone on the same page: *today by using big sheets of paper*. 2 | **Dérive Comix** Bring data: *captioned mental images of "anticipation in action" (feel free to refer to photos on your phone).* 3 | **Meaning Map** Combine and structure the group's data in a network diagram, and cluster it around potentials for evolution. 4 | **Reinfuse Expertise** to enrich these scenarios, and add further structure to distinguish them (e.g., in terms of their value dimensions).

Phase II: Exploring the future (20 minutes)

Groups use 5 cards to structure a light-weight role-play. 1 | **Play to Anticipate the Future:** We use play to explore what the scenarios might be like: *grab another sheet of paper*. Each person should volunteer for a role. The roles are simple and conversational, and their purpose here is to help us find new patterns. Each role has control over a special word: 2 | **Kaiju Communicator** = "*however*", 3 | **Analyst** = "*because*", 4 | **Designer** = "*therefore*", and 5 | **Historian** = "*specifically*". If you want to swap roles, you can, if it's agreed.

Phase III: Enacting the future (20 minutes)

Groups will present the futures they developed and give a summary of their explorations. Other groups will have a brief chance to ask questions.

Phase IV: Project Action Review (or "PAR") (20 minutes)

We will work together with participants to build a **Roadmap** towards the desirable scenarios. We do this by carrying out a **PAR** of the activities we've done today, and structuring the next steps.

1. Review the intention: what did we expect to learn or make together?
2. Establish what is happening: what and how are we learning?
3. What are some different perspectives on what's happening?
4. What did we learn or change?
5. **What else should we change going forward?**

Phase V: ***After the workshop***

Take action on the next steps we've gathered. Share progress via https://groups.google.com/g/peeragogy.

4.2 Selected Patterns for Case Study 1

GOING META

Context: In the course of working on a project together.
Problem: We may find a **gap** between our ideals and our methods;
Solution: Try "going meta", to explore how the project's methods can be applied to itself.
Example: *In a community that usually focuses on anticipating the future for others, try inviting members of the community to anticipate the future of the community.*

DÉRIVE COMIX

Context you want to develop some future scenarios to explore with a group.
If you have an group BUT everyone has their own experiences;
Then Go for a walk or just look out the window wherever you are, and document what you see. Follow up by preparing your materials to share in a succinct fashion, e.g., as photos, a screenshot, slides, sketches, a zine, a map, or some PostIt® notes.

By itself, looking to the immediate surroundings only gives an imperfect picture of how to develop a future scenario. Direct observations might include little to no evidence of, say, top-level government policy which likely is a major factor in the future. Two further patterns access more levels of meaning.

MEANING MAP

Context We have collected images describing people's worlds (see Dérive Comics).
If you want to distill shared meaning BUT everyone has their own experience;
Then talk together about the problems and opportunities that everyone sees. Maybe some of these will cluster together, or maybe everyone will have their own different perspective: that's OK. You can use these different viewpoints to get everyone on the same map.

REINFUSE EXPERTISE

Context a group wants to build a Meaning Map.
If everyone has experience as a citizen BUT they also have expertise;
Then begin by removing expertise to get everyone on the same page, and subsequently reinfuse expertise to enable richer and more complex thinking.

PATTERN LANGUAGE COMPONENTS

Context In a collaborative setting with people who are new to design patterns.
If new attendees are being invited to create new patterns BUT the context, problem, solution language brings assumptions that they may not be comfortable **Then** introduce more dynamic keywords such as HOWEVER (to describe a gap or conflict), BECAUSE (to describe a set of operating causes), THEREFORE (to describe a rationale based on related data) , and SPECIFICALLY (to describe next steps) in order to help people talk the different parts of the patterns and build them up piece by piece.

Note that in this workshop we tried aligning the Pattern Language Components *with* Functional Roles *(see next section). We later decided to separate the two.*

5 CASE STUDY 2: PUBLIC SPACE FOR PUBLIC HEALTH

This workshop was commissioned by Abby Tabor as part of her project "Designing urban environments for human health: from the microbiome to the metropolis". The aim was to gather attendees with an interest in the project themes and work together to envision next steps. Elaborations of these were developed by participants, and were organised by facilitators using a software tool based on Org Roam and Org Roam UI.

5.1 Itinerary

Public spaces are the foundation of healthy communities.

0930-1000. Arrival, tea and coffee (Waterside 3)

Informal meet-and-greet with other attendees.

1000-1030. Media screening and introduction to the workshop (Cinema 2)

Abby will outline the aims of the workshop. Judith will introduce polyphonic documentary as a way of communicating beyond the workshop. Consent forms needed for the next phase.

1030-1045. Introduction to the hands-on activities (Waterside 3)

Joe will walk through this itinerary, as an overview of the workshop itself.

1045-1230. Session 1: experts to citizens (Waterside 3)

In this session we aim to get everyone on the same page, using big sheets of paper and whiteboards.

***Dérive Comix*: Share your mental images of "public space & public health" (feel free to refer to photos on your phone or other data you've brought along).

***Meaning Map*: Combine and structure each group's data in drawings and diagrams, finding common themes.

***Envisioning the future*: Share key findings as *future stories*, which we will collect in one overall map.

1230-1330. Lunch (provided) 🍲

1330-1500. Session 2: citizens to action (Waterside 3)

In this session we explore the scenarios that we developed and identify paths to action.

When you return from lunch, the offsite facilitators will have created a digital version of the meaning map. They will walk through what they've created. Joe will describe the hands-on methods that we will use to communicate our findings from this session to the offsite facilitators, who will use them to elaborate the map.

We will ask you to map out the challenges that your future stories present, and ways of addressing them, using the four keywords and blank cards as your "game board", and using the roles to elaborate the findings.

1500-1515. Review (Waterside 3)

5 minutes summary from Abby and Joe; 5 minutes outlook on Phase III from Leo and Noorah; 5 minutes comments from participants.

1515-1530. Close (Cinema 2)

***(10 minutes) Media screening*: We will watch some short films depicting public space, with new eyes.

(5 minutes) Closing remarks from Abby

1530-1700. Reception (Watershed bar) 🥂

5.2 Selected Patterns for Case Study 2

CONTEXT SETTING

Context A workshop or other working context has been convened.
If the facilitators have ideas that they would like to explore with attendees BUT these ideas are not top of mind for attendees.
Then do some context-setting, e.g., showing videos, giving a short talk about why people have been invited, describing the hoped-for outcomes.

FUNCTIONAL ROLES◆

Context When building a new set of design patterns.
If you have ideas about the components of a pattern BUT the pattern hasn't been fully formed yet.
Then introduce some different perspectives to critique the pattern as it develops.
Specifically, Time Traveller, Wrinkler, and Analyst are roles that we have found useful.

The superscripted "◆" is used to indicate that this pattern comes with a small embedded pattern language. The following patterns are described using a more informal template, outlining the kinds of questions that people taking on the roles might ask, and further specifying the function served. They are also presented with a mnemonic symbol based on the chess set. The list is not intended to be an exhaustive listing.

TIME TRAVELLER ♕

Question *What has happened in the past, what could happen in the future?*
Role To provide historical context to the challenge and anticipate alternate futures.

WRINKLER ♘

Question *What could go wrong?*
Role. To propose 'wrinkles' that may derail, block or counter the proposed solution. Each wrinkle can be assigned a level of perturbation (from low to high).

ANALYST ♗♗

Question *What are the moving parts?*
Role 1 Consider the current challenge and all the components of the potential solution (actors, resources, institutions). Identify and orchestrate the dynamic network of these components.
Role 2 Consider the other challenges specified beyond the current focus. Identify and orchestrate the integration of these components relevant to the present challenge.

FACILITATOR ROLES◆◆

Context Developing a collection of interrelated design patterns.
If you are getting ideas from participants who play Functional Roles BUT the ideas aren't all connected with each other in a structured way.
Then introduce facilitator roles to help structure the collection.
Specifically, Linkers, and Reflectors are two roles that we have found useful.

The superscripted "◆◆" means that this pattern introduces a sub-sub-language; see remarks above.

LINKERS ♖

Question *How do proposed scenarios build into patterns across layers, and how do they interact within the constellation?*
Role. Data wrangling as it comes in, providing visualisation of patterns and interconnections.

REFLECTORS ♔

Question *How does the scenario look?*
Role To appraise each scenario, provide a format for reflection (PAR), make decision to continue, reset, end.

6 CASE STUDY 3: OPEN RESEARCH FUTURES

This workshop was developed as an "Away Day" for faculty and staff members at Oxford Brookes University. The aim of the workshop is to elaborate the institution's open research strategy relative to its existing organisational strategy. Methodologically, this workshop builds on a pre-seeded Org Roam network of interlinked themes and an additional activity that enlists attendees in taking concrete actions on the identified next steps.

6.1 Itinerary

Open Research can accelerate progress on Brookes 2035 Strategy

1000-1015. Arrival, tea and coffee ☕

Informal meet-and-greet with other attendees.

1015-1030. Introduction to the themes of the workshop

David Foxcroft will introduce the context and aims of the workshop: the Open Research Programme, and the way what we're doing relates to Brookes strategy and vision. The "SOLACE" acronym is useful for organising this.

1030-1045. Introduction to the hands-on activities

Joe will walk through this itinerary and give an overview of the workshop, briefly describing where the methods came from (Corneli & al., 2021), and what can be expected based on previous pilot workshops.

1045-1230. Session 1: Experts to citizen/scientists

We have an initial "map" of open research at Brookes, based on interviews with the Open Research *ad hoc* Advisory Group. Today, we will work in ≈4 small groups, organised by faculty, to elaborate this map. We will draw on our experience as consumers and producers of research, organising our observations by their depth of meaning. We will share our findings with the larger group as "future stories".

1230-1330. Lunch (provided) 🍲

1330-1445. Session 2: Citizens to action

In this session, we explore the future worlds we imagined and identify potential paths to action. We will do this using two simple design languages. The first helps us find patterns in our current context. The second helps us see how those patterns evolve over time. Both phases will be lightly facilitated, with share-back at intermediate points.

1445-1455. Comfort break 🚽 🌲 💨

1455-1545. Session 3. What now?

In the previous session, we identified possible next steps and their potential ramifications. We will use this session to discuss the *first steps* that we want to take following this meeting, and the accountability that we want to put in place following the workshop. We will use some of the publication types available on Octopus.ac to write these up.

1545-1600. Closing

Reflections on the day.

6.2 Selected Patterns for Case Study 3

DO YOUR RESEARCH

Context Prior to beginning a formal workshop or other participatory research activity.
If it looks like it will be possible to do participatory research BUT the participants haven't begun speaking with each other yet.
Then start doing the research in a more centralised way before inviting direct collaboration, in order to give participants something to engage with.

THE FUTURE BEGINS NOW

Context Having developed possible next steps.
If appears that leaving without concrete commitments means concrete actions are less likely to take place.
Then create commitment by introducing early actions within the collaborative setting.

7 CASE STUDY 4: CIS 9590, INFORMATION SYSTEMS DEVELOPMENT PROJECT

We used the paper "Patterns of Patterns" as a focal text with three cohorts of students in a capstone Master's course in information systems. The course syllabus is focused on developing group projects with a computer programming component. Our hope was that the topics in the paper would inspire them with new ideas about design and collaboration.

Each year, students asked many thoughtful *questions* about the paper; they also produced their own *written response* to the paper, engaging the original paper in depth; and in the latest run, we offered some in-class *exercises* based on the workshop methods described above.

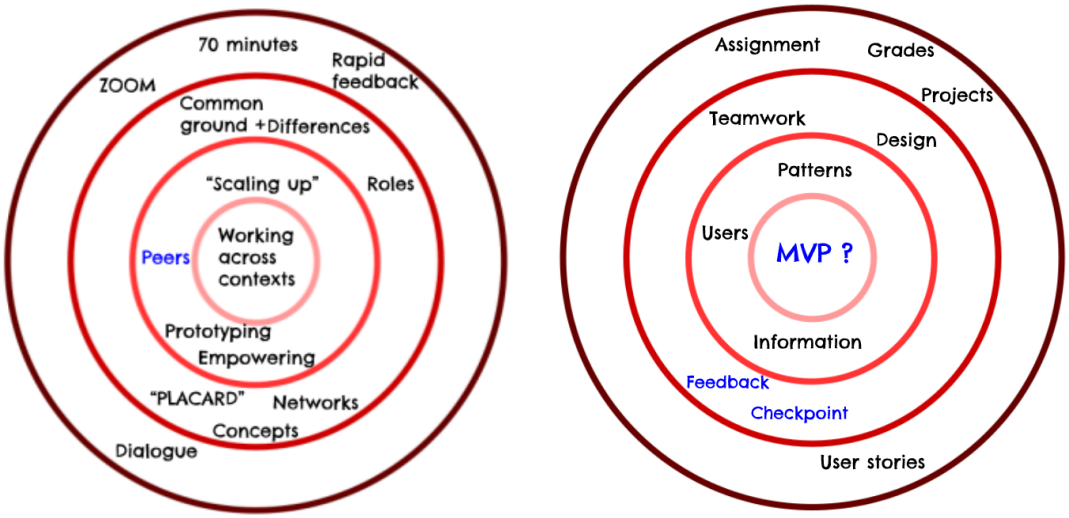

Fig. 1. Diagrams inspired by Causal Layered Analysis describing our working context as guests in CIS 9590 (left), and our initial understanding of the students' working context (right).

7.1 Litany

Initially our paper was introduced as a contemporary reading. Students would not be able to "cheat" in their reports, because the paper wasn't described extensively on Sparknotes or similar. Along with this (intentional) challenge, students encountered a range of more or less predictable problems, e.g., many felt a lack of confidence with coding. The students came to the course with a variety of different backgrounds (e.g., Python vs C++) which contributed to some friction with this course.

7.2 System

Whereas in our rounds of earlier participation we were more there for enrichment, in the most recent iteration our contributions were more integrated into the system. We attended more sessions, including one in which we attempted to run a short version of the workshop with attendees. Furthermore, Mary attended at least as many meetings of the Peeragogy project, and these two contexts became more integrated into a larger system. This continued post-semester, insofar as Mary invited the students to express interest in possible internships in the Peeragogy project.

7.3 Worldview

Students were thinking about their future careers. What they wanted to get out of the course (e.g., becoming a well-paid data scientist or business leader) at times had some friction with the practical reality of the course requirements, in which they had to deliver a concrete hands-on working project, without being able to rely on employees. PLACARD wouldn't be of much direct help with the technical challenges they faced, but we hoped it could help them organise their work in a sensible way.

7.4 Myth

A deep metaphor within the classroom setting is *pedagogy*. However, the methods that we brought as guests was more linked with our experience of *peeragogy*. In the new shared context, these two perspectives begin to integrate. Mary as a host exercised the value of *xenia* by bringing us into her course as guests.

CIS 9590 is Information Technology Project Design and Management is the CIS capstone project course for the CIS major wherein the students will apply concepts and techniques from prior course work, to design, develop, and create an implementable application for a working information system of an actual business. It also focuses on the design and management of systems to meet the increased need for information within an enterprise. The course exposes students to the fundamentals of IT project management required for the successful implementation of IT-based systems. The course presents tools and technologies for project definition, work breakdown, estimating, planning and scheduling resources as well as monitoring and control of project execution. Students utilize knowledge gained from prior coursework, and work in groups to design and manage an Information Technology project. During my first semester Spring 2020 teaching with the students using whatever development tools they were familiar, I noticed this to be a problem so with this knowledge I changed the course to require the use of Intel One API. This did not get implemented until Fall 2021. I actually taught the course three times before requiring the software tool uniformly changed. The course was a 3 hour course, first face-to-face. Then synchronous online only. In Fall 2021 we changed to 75 minutes in person and online (hybrid). Students had to self-teach Intel One API with the use of tutorials and buddy system. The students seemed to have the necessary skills to learn enough of the software to create an implementable application. This semester, Spring 2023, the students really seemed to lack the coding skills.

8 DISCUSSION

The first workshop mixed Pattern Language Components with Functional Roles, putting participants in the thick of a pattern-related dialogue. While this led to interesting conversations, it was more work to extract any patterns. We did find some useful process patterns this way, such as Give Increasing Control to Participants. We employed what we learned in subsequent runs. In particular, within the second workshop, a more distinct use of the Pattern Language Components helped the participants come up with their own patterns. Some examples of this type follow in capsule form.

CONTESTED SPACE

Summary: So-called public space doesn't always feel welcoming to all members of the public. It can be overrun with antisocial behaviour. It can feel exclusionary, or uninviting. It can be the site of conflict. However, the need for complex uses of space does not mean that each space needs to support every use equally.

REBALANCE SOCIAL SERVICES

Summary: Welfare-related services should be supplied in balance with local needs, though they often are not. Can varied expertise be integrated in a similar way to the domain-specific skills practised by Médicins Sans Frontièrs to address complex local challenges?

FUNDING OF PUBLIC SPACE

Summary: Even though public space is known to increase wellness in the population, well-being priorities that would lead to increased funding for public space aren't universally adopted. Could increased transparency around social enterprise and other investments in public welfare help?

There is an interesting interplay between content-level patterns like these, and process-level patterns. For instance, the workshop is akin to a public space; further development of the associated tools might make it even more of a public resource — somewhat like Wikipedia, but endorsing the contribution of original research, not forbidding it. Already, the workshop is a context in which to do a kind of rapid, local, open research.

In order for any pattern-informed research to work well, we should be gathering evidence for or against the salience of the patterns that are elaborated. The Octopus platform mentioned in Case Study 3 uses several data types that follow the rough outline of a scientific paper, *viz*., Research Problem, Rationale/Hypothesis, Method, Results, Analysis, Interpretation, Real World Application, and Peer Review. The formulation of an Octopus-like platform for recording and reporting on design patterns would probably need to change somewhat — but the **Problem**, **Rationale**, **Method**, and **Results** components are reasonably familiar for pattern authors.

9 CONCLUSION

We hoped that running these workshops would help us design the next steps for our platform and process, and this seems to have been successful. As an immediate outcome, we developed the "PLACARD workshop" — now retitled "Open Future Design" — across several successive runs in different organisational contexts in a way that makes it more robust. This relative success notwithstanding, it is worth recalling that our initial intention in Patterns of Patterns was to support distributed collaboration across contexts.

The informal pattern-based development here is a good start; software development could carry this work further. A not-so-distant future for Org Roam would allow several facilitators to make notes in near real-time into a shared map, and with some more fine tuning of the Emacs interface, a similar workflow could be used directly by workshop attendees, even across different contexts. Many rich dialogues might ensue — relating fields as disparate as future studies, health sciences, and open research.

An intriguing direction to explore is the inclusion of further computational intelligence in future systems. Articulating domain level patterns which outline potential new behaviours and gathering evidence that those behaviours do in fact work as intended is already ambitious (but logical) ramification of the pattern method. It is a further step to articulate the learning apparatus that underpins such mechanisms in a computationally-coherent way. Still, there's no particular reason to use one data format for representing complex systems related to domains such as public health and climate action, and use another for representing the meta-level. Indeed, the meta-level is just another domain. All such models should include predictions about the causal connections between actions and measurements, and should incorporate strategic intelligence to articulate action.

AI methods could be employed alongside hands-on methods to elaborate and work with these models — to identify analogies between action arenas, and highlight the ramifications of complex actions, and to show expected costs, benefits, and as well as outstanding questions. Sophisticated models will need to incorporate information from across legal frameworks, national entities, local administration, social norms, communities, and individuals, as well as inforation about leverage and tipping points that allow the effects of change to reach across level boundaries. Nevertheless, we begin (as we mean to carry on) by focusing on the development and articulation of multi-purpose tools for thought.

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