

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 of three techniques from design, futures studies, and learning management in the form of a design pattern called PLACARD [Corneli et al. 2021]. We saw the PLACARD pattern as really getting to the heart of what design patterns are. To back up this claim, we presented a theoretical analysis, and a case study. During the two years which have elapsed since then, we have had opportunities to deploy and further develop these methods in various contexts. We will describe some of these applications in the four cases studies below. We have distilled this experience into a collection of practical patterns which augment the earlier high-level pattern. This fully-fledged collection of patterns of patterns can help you organise your work with Design Pattern Language methods.

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2 BACKGROUND

2.1 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 way to implement these system features. What drew our attention is that each of the methods we selected comes with a framework or template; each of the methods is, essentially, 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.

2.2 The broader context

Iba and Isaku [2016] describe a large collection of patterns for creating patterns. We are interested in exploring similar themes (without duplicating that work). That said, there are interesting points of common ground: the division that we build on here could be compared with Iba and Isaku’s threefold decomposition of pattern development into mining (a sensory activity), writing (a cognitive activity), and symbolizing (a motor activity).

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”. Our main site of investigation was a series workshops that were inspired by the original set of methods. We will describe the methods we used to run the workshops and also how the methods evolved further as the work proceeded.

We used Causal Layered Analysis as the central spine to organise a set of workshop activities, creating a topic-agnostic workflow that guides participants from *litany* to *system* to *worldview* to *myth*, and then returns them from *myth* to *worldview* to *system* to a new *litany*, in the form of new ideas for possible actions. We also structured the workshop with various *roles* that participants could take on during the workshop (Figure 1), although the structure of roles changed over the course of successive runs of the workshop.

With that basic workflow in place, we refined the description of constituent and adjacent activities using Design Patterns Language methods. We made a point of ensuring that the patterns we were using had the opportunity to grow and evolve, and that their use fostered the emergence of additional patterns. We endeavour to show this process within the paper. As such, the paper includes a combination of patterns that follow a formal template, and proto-patterns with less structure. We also made use of alternative (and intuitive) pattern template structures as appropriate. Proto-patterns without any substructure are distinguished by a “◆” marker, evoking the concept of *pattern mining*. In our view, additional formality does not always help with communication, and we endeavour to show how and when it is helpful, and when it is not. For one thing, proto-patterns admit multiple different formalisations, which offers flexibility. The downside is that their lack of explicit detail can make them less replicable in other ways. Throughout this work, design patterns play the role of lightweight

- 👉 **I**ntroduction...
- 👉 *Before the workshop...*
- 👉 Scenario building activities
- 👉 *Before the workshop to Litany...*
- 👉 Intermezzo: *From Phase 1 to Phase 2...*
- 👉 Scenario exploration activities...
- 👉 *After the workshop...*
- 👉 The future...
- 👉 Appendices...
- 👉 Analyst's Handbook...
- 👉 Historian's Handbook...
- 👉 Kaijū Communicator's Handbook...
- 👉 Designer's Handbook:...
- 👉 Notes :ignore:...

Fig. 1

hypotheses, structuring the experience and receiving a degree of validation or invalidation through the workshop interactions. Their survival to the next workshop (or not) gives a sense of the evolutionary character of the method.

On that note, we carefully reviewed the lessons learned after each workshop, by using the Project Action Review template, or through less formal but nevertheless detailed post mortems, and by looking for new patterns. Writing this paper is an opportunity for review at a deeper rhythm.

4 CASE STUDY 1: “GOING META” WORKSHOP AT ANTICIPATION 2022

This workshop functioned as a more developed 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 both to introduce the methods to attendees, and to ‘workshop’ the methods. Our pitch was that we would help attendees to establish a position of maximum leverage, exercising our “Critical Anticipatory Capacities” using “Creativity, Innovation and New Media” (two of the conference’s themes) to explore the future of anticipation.

4.1 Input patterns

A small selection of patterns describing the workshop activities, based on the more informal descriptions in our playbook, were shared with workshop attendees in the form of “pattern cards”, with which we transparently structured the workshop activities. A selection of these are shown in Figure 2. Several of these are detailed below, along a few more-abstract patterns that characterise the process.

DÉRIVE COMIX (s)

Context you want to develop some future scenarios to explore with a group.

If you have a group BUT everyone has their own experiences;

Then Gather data. For example: go for a walk [Debord 1956], or just look out the window wherever you are. (Alternatively, close your eyes and conduct a mental exploration of your selected theme: what do you see in “your mind’s eye?”) 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 (c)→(m)→(s)

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 page.

REINFUSE EXPERTISE (c)

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 (s)

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

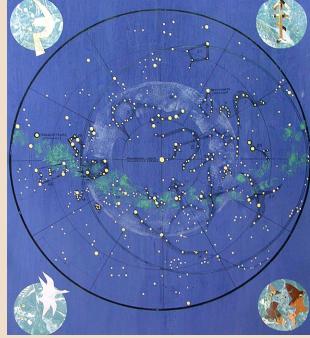
 <p>Dérive Comix</p> <p>Context you want to develop some future scenarios to explore with a group. If you have a group BUT everyone has their own experiences; Then Go for a walk or just look out the window wherever you, and document what you see. Follow up by preparing your materials to share in a succinct fashion, e.g., as photos, a screenshot, slides, sketches, a zine, a map, or some PostIt® notes.</p> <p>Image: Black and white shot of man from behind standing near window covered in water, Melbourne. Photograph by Sam Austin. Public domain via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Window_with_water_and_man_(Unsplash).jpg</p>	 <p>Meaning Map</p> <p>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.</p> <p>Image: Sai Gon Water Bus - Line 1 map in the Binh An station. Public domain via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Sai_Gon_Water_Bus_-_Line_1_map_in_the_Binh_An_station.jpg</p>
 <p>Reinfuse Expertise</p> <p>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.</p> <p>Image: Old Moksha Star Map used by travellers and navigators in Middle ages. Public domain via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Medieval_Moksha_Star_Chart.jpg</p>	 <p>Project Action Review</p> <p>Context Work in progress. If we are working on something together BUT we might lose momentum; Then use a review template to think about our progress. Questions like the following can be asked at any point in a project, and provide a momentary record of perspectives which can be analysed later.</p> <ol style="list-style-type: none"> 1. <i>Review the intention: what do we (did we) expect to learn or make together?</i> 2. <i>Establish what is happening: what and how are we learning?</i> 3. <i>What are some different perspectives on what's happening?</i> 4. <i>What did we learn or change?</i> 5. <i>What else should we change going forward?</i> <p>Image: Knoestige bomen aan het water (Gnarled trees by the water). Public Domain via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Knoestige_bomen_aan_het_water_Knoestige_bomen_bij_het_water_en_jagers,_RP-T-1975-46.jpg</p>

Fig. 2

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 about the different parts of the patterns and build them up piece by piece.

FUNCTIONAL ROLES

(s)

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.

In this workshop we tried aligning the PATTERN LANGUAGE COMPONENTS with FUNCTIONAL ROLES, as per “Phase II” in the itinerary that follows. In subsequent workshops, we decided to separate these two dimensions more distinctly.

4.1.1 Workshop 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 Output patterns

The framing our workshop within the Anticipation conference suggested a pattern that could be repeated in other settings:

GOING META

(c)

Context In the course of working on a project together.

If We may find a *gap* between our ideals and our methods;

Then 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.

Reflecting on the attendees’ contributions, both in terms of their concrete comments about the Anticipation community as well as the way they interacted within the workshop gave rise to the following proto-pattern:

◆ INCREASE PARTICIPANT CONTROL

(m)

When organising a collaborative activity, participants should not remain only a audience, or only deliver scripted lines. Give them increasing responsibility.

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 Input patterns

Alongside the main components of the initial workshop, we looked for new methods to INCREASE PARTICIPANT CONTROL. In particular, we generated some further articulations of the FUNCTIONAL ROLES to help with this.

The patterns are presented here with a mnemonic symbol based on the chess set; at the workshop, participants were provided with physical manipulatives from a chess set that helped them get a grasp on the roles, along with new pattern cards with the text on.

TIME TRAVELLER

(s)

Question *What has happened in the past, what could happen in the future?*

Role To provide historical context and anticipate alternate futures.

WRINKLER

(m)

Question *What could go wrong?*

Role. Consider what might derail or counter the proposed solution. Each wrinkle can be assigned a level of perturbation (from low to high).

ANALYST

(c)

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.

(*We also characterised some roles which would be filled by offsite and onsite facilitators.*)

FACILITATOR ROLES

(c)

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.

LINKERS

(s)

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

(c)

Question *How is the scenario evolving?*

Role To appraise each scenario, provide a format for reflection (PAR), make decision to continue, reset, end.

5.2 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) 🎉

5.3 Intermediate artefacts

Intermediate artefacts generated within the workshop included mindmaps created with participants, on paper. We used a graphical template following the outline of the Causal Layered Analysis layers to explain the workshop’s overall workflow, and also asked participants to use a version of this diagram as a “grid” for note-taking within Phase I, to encourage them to work from their observations to the core underlying themes and issues.



Fig. 3

Participants then clarified these core themes in a share-back process, and in Phase II, developed them further in the form of shared future stories, outlining paths to action. Photos in Figure 3 show the movement from initial sketching at the litany level within small groups, to a collection of themes shared across groups, to Phase II work using PATTERN LANGUAGE COMPONENTS to identify both general and specific possibilities for action.

5.4 Output patterns

Reflecting on the contributions of the workshop convenor and special guest, we observed a pattern that could be used in subsequent workshops.

CONTEXT SETTING

(c)

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 and describe the hoped-for outcomes.

Participants created several patterns by making use of the PATTERN LANGUAGE COMPONENTS and FUNCTIONAL ROLES. They presented below in summary proto-pattern form. These summaries condense details which developed in the workshop using manipulatives (cards and chess pieces) with greater articulation, but less coherence.

◆ CONTESTED SPACE

(s)

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 uninverting. It can be the site of conflict. However, the need for complex uses of public space does not mean that each space needs to support every use equally.

◆ REBALANCE SOCIAL SERVICES

(m)

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 Médecins Sans Frontières to address complex local challenges?

◆ FUNDING OF PUBLIC SPACE

(c)

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. In order to make the benefits of such investment clear, increase transparency around investments in public welfare, e.g., create register of impacts of local social enterprises.

(The right-hand panel of Figure 3 shows how participants elaborated the FUNDING OF PUBLIC SPACE proto-pattern on the day, using the PATTERN LANGUAGE COMPONENTS that we provided as keywords on index cards; the others listed above were diagrammed out similarly on the day.)

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. This itinerary reused the language “experts to citizens”, “citizens to action” from the previous workshop (with a slight variation suited to the context). These phases mirrors the DÉRIVE COMIX—MEANING MAP—REINFUSE EXPERTISE structure introduced earlier.

6.1 Input Patterns

DO YOUR RESEARCH

(s)

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.

Example In the current setting, this pre-research included 1-to-1 interviews with about half of the invitees, as well as internet research to find and explore related scenarios developed by others.¹

STRUCTURE CONVERSATIONS

(c)

Context Having convened a workshop or other participatory research activity.

If unstructured discussions are likely to take lots of time but without yielding concrete benefits.

Then structure the discussions around shared interests to move things forward more effectively.

Example At this workshop, we decided to group participants around tables according to the faculty where they were employed (or most closely aligned, in the case of university-level support staff).

THE FUTURE BEGINS NOW

(m)

Context Having developed possible next steps.

If appears that leaving without concrete commitments means concrete actions are less likely to take place.

Then introduce early actions within the collaborative setting to create commitment.

Example One way to build commitment would be to ask people to develop and share a method for a small-scale experiment that they plan to carry out.

¹<https://royalsociety.org/topics-policy/projects/research-culture/changing-expectations/visions-of-2035/visions-of-2035-materials/>

6.2 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.

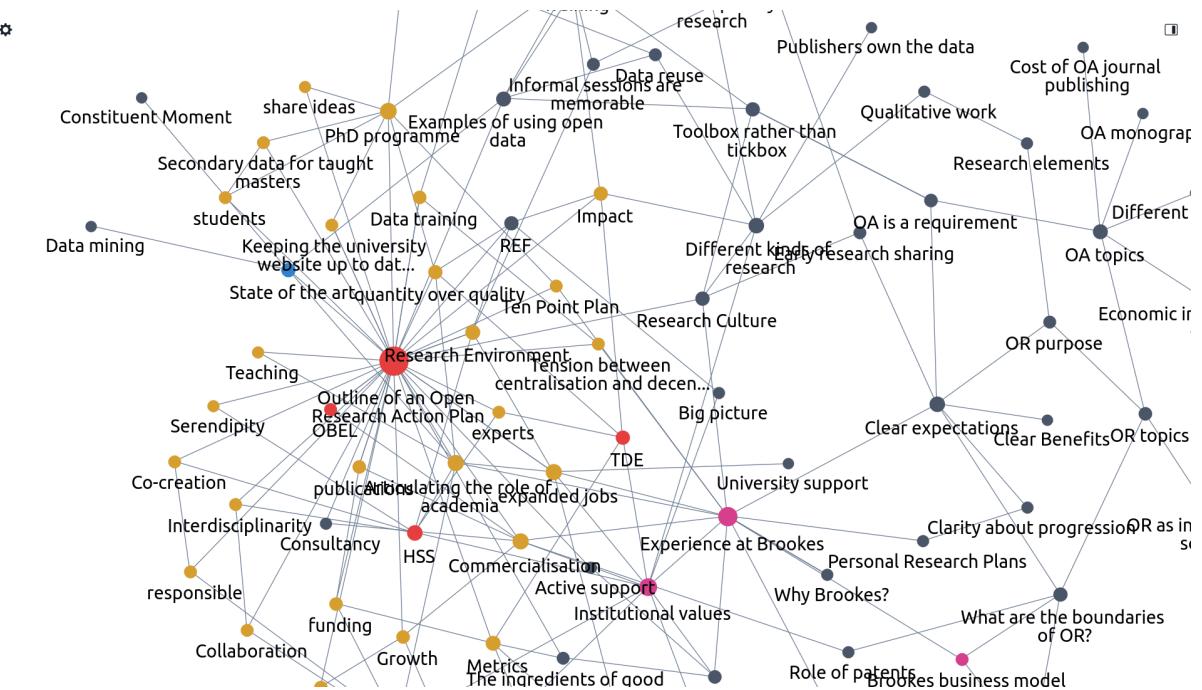


Fig. 4

6.3 Output Patterns

💎 STRUCTURE OUTPUTS

(m)

Having gathered themes from a participatory project, they may have some explicit (e.g., because of how the information was gathered, cf. STRUCTURE CONVERSATIONS). Additional structure can be created, if you link intermediate artefacts into a relevant template.

In this setting, we used a template provided by the UK Reproducibility Network for developing an Open Research Action Plan [Darby 2021] — itself a complex pattern. We linked the themes discussed in the workshop into this template, to form a bullet-point draft of an action plan, incorporating the next steps and concerns raised by attendees. We did not specifically include all of the background that appeared in our earlier interview (cf. Do YOUR RESEARCH). Figure 4 shows all of this material in an intermediate form, where we used Org Roam to analyse the workshop themes (per the LINKERS pattern, above).

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

7.1 Introduction the course from the instructor, Mary Tedeschi

CIS 9590 is Information Technology Project Design and Management is the “Computer Information Systems” (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.

7.2 Our use of “Patterns of Patterns” within the course

We used the paper “Patterns of Patterns” as a focal text with three successive cohorts of CIS 9590 students. 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. We focus primarily on the latest iteration of the course (Spring 2023), in which we made the most explicit use of the methods described above. Figure 5 shows some of our anticipations of the relevant concerns that apply in this context.

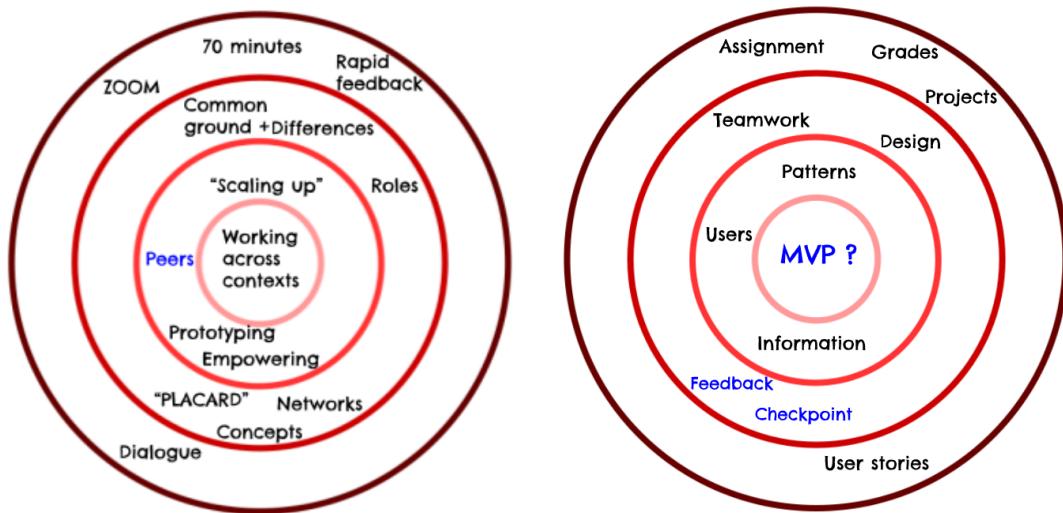


Fig. 5. Diagrams inspired by Causal Layered Analysis describing our working context as guests in CIS 9590 (left), and our initial understanding of the students’ working context (right).

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. Reading these written responses showed that the students had not only understood the main ideas of our paper, but added to them. In effect, they created alternative imaginaries for the paper’s history and future. For instance, in their 2022 ‘case study’, they generated a “Recommendation and Implementation Plan” which proposed specific actions which a group could take based

on our ideas; and, in 2023, the students produced a slide presentation based upon our paper, exploring its relationship to themes such as “emerging technology”.

Building in part on these student responses, we will now present our reflections using the Causal Layered Analysis layers.

7.2.1 Litany. Initially our paper was introduced as a contemporary reading, relevant to the “CIS” theme. Mary chose a contemporary paper in part because students would not be able to “cheat” in their reports, because our paper wasn’t described extensively on Sparknotes or similar. Along with this (intentional) challenge, CIS 9590 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.

7.2.2 System. Whereas in our rounds of earlier participation we were more there for enrichment, in the most recent iteration our contributions were more closely integrated into the main activities of the course. We attended more sessions, including one in which we attempted to run a short version of the workshop with attendees. This allowed us opportunity to interact with the students on an ongoing basis as they designed and implemented their projects. Furthermore, Mary attended at least as many meetings of the Peeragogy project, fostering an exchange of ideas and viewpoints between these two contexts. In the short term, this led to productive synergy and, in the long term, could lead to our pedagogical and peeragogical initiatives becoming more integrated into a larger system. This collaboration continued post-semester, insofar as Mary invited the students to express interest in possible internships in the Peeragogy project.

7.2.3 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. More informally, the ideas underlying PLACARD informed our comments; for example, in a session with Mary in which we ‘workshopped’ CIS 9590 with other peeragogues, discussants suggested adding more touchpoints for peer learning and feedback.

7.2.4 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. The possibility of student internships within the Peeragogy project would create the reciprocal opportunity for further student practice with CIS skills in an applied context, helping to build tools and platforms for peer learning and peer production (including through use of pattern methods). Indeed, the particular combination of peer learning and formal education developed here led us to wonder how far off the Peeragogy project might be from being able to support informal learning of relevant programming concepts (preliminaries to CIS 9590) or applied computing projects (an analogue of CIS 9590).

7.3 Proto-patterns describing the experience, by a CIS 9590 student, Manvinder Singh

◆ ENGAGEMENT AND GUIDANCE

(m)

The authors of ‘Pattern of Patterns’ actively participated in our class, to share expertise and create a collaborative learning environment. Their presence allowed us to gain deeper insights into the paper’s concepts and methodologies, leading to innovative project approaches. By closely studying the patterns of patterns identified in their research, I gained a fresh perspective on project organization and established a logical and coherent structure.

◆ AVOIDING MISTAKES

(c)

The authors' insights helped me navigate common project development pitfalls. Through their emphasis on effective documentation, regular testing, and thorough project planning, I was able to avoid costly errors. Their guidance ensured a consistent progress trajectory and maintained the professionalism of my final project.

◆ SCALING AND ADAPTABILITY

(c)

'Pattern of Patterns' underscored the importance of scalability and adaptability in project design. By considering future technologies and incorporating modular elements, I aim to seamlessly adopt new advancements. In particular, I focused on building a flexible framework that could easily accommodate emerging technologies.

7.4 Further reflections

Our anticipations (Figure 5) didn't precisely match our reflections at the end of the course. The missing steps on the way to the eventual synthesis could suggest further patterns, including elaborations on Manvinder Singh's proto-patterns that give more specificity.

8 DISCUSSION

We presented the patterns that we developed and used over successive runs of our workshop, in approximately chronological order, aiming to show how the use of certain patterns help to give rise to the "seeds" of new patterns. The evolving workshop method is a pattern language which operationalises the PLACARD pattern.

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 INCREASE PARTICIPANT CONTROL. We employed what we learned in subsequent runs. Within the second workshop, a more distinct use of the PATTERN LANGUAGE COMPONENTS helped the participants come up with their own patterns.

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 the itinerary for 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.

Table 1 summarises the patterns that were described in this paper, pulling them together from across the separate case studies. The table shows the patterns grouped in a way that elaborates our use of "PAR", "CLA", and "DPL" methods (summarised in Section 2.1) with a more rounded description of the purposes that these methods serve. Further work would be needed to fully describe the patterns' application domains, with evidence of the kinds of results that can be expected, and to describe their interconnections as a pattern language.

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

Sensory:	
CONTESTED SPACE	‘complex uses of public space’
DÉRIVE COMIX	‘document what you see’
Do YOUR RESEARCH	‘start doing the research in a more centralised way’
FUNCTIONAL ROLES	‘introduce some different perspectives’
LINKERS	‘providing visualisation of patterns and interconnections’
PATTERN LANGUAGE COMPONENTS	‘build them up piece by piece’
TIME TRAVELLER	‘provide historical context and anticipate alternate futures’
Cognitive:	
AVOIDING MISTAKES	‘navigate common project development pitfalls’
CONTEXT SETTING	‘describe the hoped-for outcomes’
FUNDING OF PUBLIC SPACE	‘create a register of impacts’
FACILITATOR ROLES	‘structure the collection’
GOING META	‘explore how the project’s methods can be applied to itself’
REFLECTORS	‘appraise each scenario’
REINFUSE EXPERTISE	‘enable richer and more complex thinking’
STRUCTURE CONVERSATIONS	‘structure the discussions around shared interests’
SCALING AND ADAPTABILITY	‘aim to seamlessly adopt new advancements’
ANALYST	‘identify and orchestrate the dynamic network’
Motor:	
STRUCTURE OUTPUTS	‘link intermediate artefacts into a relevant template’
ENGAGEMENT AND GUIDANCE	‘create a collaborative learning environment’
INCREASE PARTICIPANT CONTROL	‘participants should not remain only an audience’
REBALANCE SOCIAL SERVICES	‘address complex local challenges’
THE FUTURE BEGINS Now	‘introduce early actions within the collaborative setting’
WRINKLER	‘what might derail or counter the proposed solution’
*	
MEANING MAP	‘get everyone on the same page’

Table 1. “Patterns of Patterns” pattern catalogue

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 review of our evolving work, presented 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 — integrating concepts from fields as disparate as future studies, health sciences, open research, and information systems.

Org Roam could be augmented with additional “emerging technologies”. Articulating domain level patterns which outline potential new behaviours, and gathering evidence that those behaviours do in fact work as intended is already an 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. The FUNCTIONAL ROLES provide an early informal articulation of the process, at the level paper prototyping. Looking ahead to further development, 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, to highlight the ramifications of complex actions, to show predicted costs and benefits, and as well as to surface new questions. Sophisticated models will need to incorporate information from across disciplines, legal frameworks, national entities, local administrations, social norms, communities, and individuals, as well as information about leverage and tipping points that allow the effects of change to reach across level boundaries.

We have begun (as we mean to carry on) by focusing on the development and articulation of multi-purpose tools for thought.

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A SHEPHERD COMMENTS AND RESPONSE 1 JUL 2023, 05:43

Section4: Question regarding pattern contents: In section 3, it is mentioned that "We used design patterns directly when developing and running the workshops. A selection of these patterns are included here." Are the patterns presented in section 4 the same design patterns developed by the authors, or are they created by someone else?

Most of the patterns in the Case Studies were developed by the authors, a few were developed by workshop participants during the workshop and only summarised here (CONTESTED SPACE, FUNDING OF PUBLIC SPACE, REBALANCE SOCIAL SERVICES). Regarding contributions from Manvinder Singh: he was originally a 'participant', and then became an author.

Additionally, the format of the "Selected Patterns for Case Study" in section 4 varies (e.g., some have only summaries or start with questions), which raises concerns. If these patterns were developed by the authors, it should write patterns in a consistent format with context, problem, and solution. Furthermore, it is necessary to include the Forces that explain the causes of the problem and the Consequences as potential results of implementing the solution.

Personally, I (Joe) don't fully agree with the suggestion to use 'consistent format' throughout the document. The patterns are presented at different levels of formality corresponding to their stage of development. Personally I don't see forces, consequences, and potential results as entirely necessary, though they might be nice to have. In particular, if the patterns aren't understandable in their current format, they certainly need to be revised.

Maybe another co-author would like to try their hand at revising the patterns and we can see whether they are improved? 🤔

Regarding the structure: In the current paper, each subsection of section 4 presents the Itinerary first, then presents the "Selected Patterns for Case Study." However, since the patterns are embedded within the Itinerary without being presented beforehand, it becomes unclear. It leads to confusion, such as in the case of 4.1.2. Considering the flow from the METHODOLOGY in section 3, it might be more reader-friendly and coherent to present 4.1.1 as "Selected Patterns for Case Study" and 4.1.2 as Itinerary. This way, readers can follow along with the discovery of how the patterns shape the itinerary. Additionally, assigning pattern numbers to each pattern and including the number in parentheses after the pattern mentioned in the itinerary would make it more comprehensible for readers. For example, something like "Meaning Map (No.3) in the content of Itinerary."

I've restructured each subsection 'in order' with clearly delineated inputs, process, and outputs. ✓

4.1: Regarding DÉRIVE COMIX: The solution "Go for a walk or just look out the window wherever you are, and document what you see" is important for solving the problem. However, in the Itinerary, it is mentioned to "Bring data: captioned mental images of 'anticipation in action' (feel free to refer to photos on your phone)," which does not align with the solution of the pattern.

Slightly reworded to make these align better. ✓

4.5: The subsection name of "Proto-patterns describing the experience, by a CIS 9590 student, Manvinder Singh" seems to be unrelated to the "CASE STUDIES" which is the name of section 4. It might be better to present this as a separate section. Furthermore, the content written here appears to be a summary of what was learned from the case studies rather than patterns. If it is intended to be patterns, it is necessary to include the context, problem, and solution.

The \LaTeX section level was incorrect, which was the main source of confusion here. These are "outputs" from Case Study 4 — not reflections on all of the case studies.

That's fixed now. 

(As for how formal we need to be about presenting them, see my comment above for now.)

Examples: AVOIDING MISTAKES, it is necessary to describe the effective solutions and the potential problems that may arise if those solutions are not implemented.

I can see how some more *detail* would be helpful here, though I'm not entirely sure that more formality is what's needed yet. 