Patterns of Patterns II

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Our earlier paper "Patterns of Patterns" combined three techniques from training, futures studies, and design in a design pattern called PLACARD that helps groups of people work together effectively. We used that pattern in five hands-on workshop case studies which took place at various locations in the US and the UK. This experience report documents what we learned, including the way our thinking about PLACARD evolved, together with additional patterns our work generated. We evaluate the reproducibility of our methods and results, and consider the broader economic implications of this way of working. We discuss implications of our prototyping work for the design of future platforms, drawing connections with recent developments in cognitive science and artificial intelligence. This positions our patterns of patterns as a toolkit for the design and governance of systems that combine social dynamics with technical components.

1 INTRODUCTION

This paper is primarily an experience report describing a series of workshops exploring pattern-based methods for co-creation. Patterns served a design function in setting up the workshops, and were discussed as contents of the workshops. Furthermore, patterns were engaged at all stages of development. Our aim is to understand

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and express the potential that is implied by design pattern language methods. The paper itself has the following structure. We begin with a brief recapitulation of the prequel, "Patterns of Patterns" [Corneli et al. 2021]. We then motivate our approach to design pattern methods, and provide an overview of the patterns we identified across five workshops, which become case studies in our treatment here. In brief, we show how our methods became more reliable as repeatable patterns, with implications across increasingly broad contexts of application. We then discuss connections to related work, positioning this paper as a contribution to contemporary discourse about openness and reproducibility in qualitative research. We conclude with our assessment of how these design patterns could inform the design of future platforms for co-creation. For concision, details of the patterns themselves are presented in an Appendix.

2 BACKGROUND

In "Patterns of Patterns" [Corneli et al. 2021], we introduced a synthesis of methods that operationalize social intelligence. The particular methods we outlined were certainly not the only way to implement the necessary 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 topic of interest.*
- Design Pattern Languages (DPL): *each constituent pattern follows a three-part "Context/Problem/Solution" template.*

The Project Action Review adapts the precursor After Action Review (AAR) to horizontally-managed group work. The AAR has seen widespread use in military, business, and healthcare settings, and has proved to be an effective training approach in task environments characterized by a combination of high complexity and ambiguity [Keiser and Arthur 2021, 2022]. Causal Layered Analysis has been used for over thirty years by members of the futuring community to scaffold change-making initiatives by understanding and changing the core metaphor or "myth" that underpins a given social situation, along with its relationship to other levels of social organization [Inayatullah et al. 2022]. Design Pattern Languages are comprised of *design patterns*, which are methods that (*1*) describe a context (*2*) in which a recognizable problem occurs, together with (*3*) a solution strategy that should resolve the problem, possibly with reference to further patterns that provide needed detail. We called the overall method that combines the three methods PAR, CLA, and DPL the "PLACARD" pattern. We elaborated our description of PLACARD with case studies, and used our analysis of these to outline four potential futures for the development of pattern methods.

Table 1 arranges these four futures schematically in relationship to the four economic domains they are most closely associated with: the *household*, the *state*, the *market*, and the *commons* [Raworth 2017, p. 71]. The potential for design to interact fruitfully with these domains has been noted by Boehnert [2018]. We observe that patterns only reach their potential in these domains if they are accompanied by certain *freedoms*, familiar from the Free Software movement.[1] For example, if patterns were to become computational, they could be used like any other computational service (or other household device). Legal protections would need to be added to ensure access to source code (present for Wikipedia, absent for Netflix). This is important because patterns need to be adapted to local circumstances before they can be applied. However, benefits will only accrue locally or to private individuals, unless further design intelligence is applied to develop and share patterns that empower everyone, and which take account of our role within broader ecosystems.

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[1]https://www.gnu.org/philosophy/free-sw.html

Economic Domain	Potential Future for Design Patterns	Related Software Freedom
household	patterns become computational	"The freedom to run the program as you wish, for any purpose (freedom 0)."
state	free/libre/open source licensing	"The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1)."
market	empower individuals and communities	"The freedom to redistribute copies so you can help others (freedom 2)."
commons	widespread economic empowerment	"The freedom to distribute copies of your modified versions to others (freedom 3)."

Table 1. Analogy between Raworth's economic domains, our potential pattern futures, and Stallman's four software freedoms

3 METHODOLOGY

The workshop methodology that we presently employ traces its origins back to a presentation at the 2019 Anticipation conference.[2] Our goal at the time was to provide a rapid introduction to our work on peeragogy.[3] We wanted to use a format in which the audience would participate actively, since we thought that would better embody the spirit of peeragogy than a lecture. Thus, we wrote our presentation in the form of a dramatic dialogue and asked attendees to pick parts and perform the dialogue. While the attendees appreciated the opportunity to participate, one of them remarked that use of a pre-determined script felt confining.

In response to these comments, we developed a more open-ended approach and refined it in pilot workshops. Instead of handing participants a finished script, we provided them with design patterns and functional roles as a framework within which to improvise their own dialogue. Moreover, we made it clear that these roles and patterns were are only meant as a starting point and encouraged them to reinterpret and modify the material they were given, and to develop new patterns in the course of the workshop.

Our starting assumptions were that a short training in PLACARD methods and the patterns that operationalize those methods would help participants who were not familiar with Peeragogy [Corneli et al. 2015, 2016]—and who, indeed, had never previously met each other—learn together and collaborate effectively in the workshop setting. We also expected that these workshops would support a form of distributed collaboration, across workshop contexts and topics, as we gathered themes and insights from people who would never meet at all. During the course of an individual workshop and over the longer time-scale of multiple workshops, methods and patterns evolved. Their interpretation changed in accordance with community understanding, and new patterns emerged from repeated experiences. A representative selection of the patterns can be found in an Appendix, and Table 2 presents an overview. The high-level subdivisions in this table mirror the structure of PLACARD: "Identifying themes", "Organizing structure" and "Making it actionable". In some of the workshops, the design patterns were shared with attendees in the form of pattern cards which could be used as in-workshop manipulatives. In others, the patterns were primarily used to design and analyze the workshop, and stayed more or less behind the scenes. Our case study descriptions clarify those details.

We assess each of the case studies using a structured framework we use to reflect on which aspects of the case study are reproducible: methods, results, interpretation [Goodman et al. 2016]. These reflect PLACARD's three dimensions—*methods reproducibility* pertains to the motor task of replicating an experimental set-up form

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[2]A fictional peeragogical anticipatory learning exploration, 11 October 2019, Paper Session 13, http://anticipationconference.org/wp-content/uploads/2019/10/Anticipation_2019_paper_113.pdf
[3]https://peeragogy.org

a published description; *results reproducibility* pertains to the sensory task of collecting data from a potential replication, and comparing results of a previous experiment; and *interpretation reproducibility* pertains to the cognitive task of verifying the processes of analysis and inference used to draw conclusions from data. As we draw our interpretations here, as part of our per-section evaluations, we flag the most closely related domain in Table 1, to highlight the potential reach/impact of each case study.

PLACARD 'By using the PAR (or another sensory method), we are able to identify recurring themes. Then, by using the CLA (or another cognitive method), we are able to organize these repeating themes in a structure that exposes the underlying trends, causes, and potential terminating states. With DPL (or another motor method) we can make what we have learned actionable.' [Corneli et al. 2021]

⇓ **Process**: Workshop design, delivery, and analysis adds actionable detail to that proposition.

Identifying themes:

[1]	Dérive Comix	'document what you see'
	Share Back	'individual groups should present key findings'
	Pilot to Anticipate	'anticipate the issues likely to arise in future iterations'
[2]	Context Setting	'describe the hoped-for outcomes'
	Time Traveler	'provide historical context and anticipate alternate futures'
	Reflector	'appraise each developing scenario'
	Contested Space 🔹	'each space need not support every use equally'
[3]	Do Your Research	'start doing the research in a more centralized way'

Organizing structure:

[1]	Meaning Map	'get everyone on the same page'
	Pattern Language Components	'build patterns piece by piece'
	Going Meta	'explore how the project's methods can be applied to itself'
[2]	Facilitator Roles	'structure the work'
	Analyst	'identify and orchestrate the dynamic network'
	Linker	'providing visualization of patterns and interconnections'
	Funding of Public Space 🔹	'create a register of impacts'
[3]	Structure Conversations	'structure the discussions around shared interests'
	Destructure Patterns	'a less formal discussion can surface useful meanings'
[4]	*Adapt Layers As Needed*	'layer-based analysis facilitates effective communication'
	Avoiding Mistakes	'navigate common project development pitfalls'
	Scaling and Adaptability	'aim to seamlessly adopt new advancements'

Making it actionable:

[1]	Reinfuse Expertise	'enable richer and more complex thinking'
	Functional Roles	'introduce different perspectives'
	Increase Participant Control	'participants should not remain only an audience'
[2]	**Wrinkler**	'what might derail or counter the proposed solution'
	Stepper	'decide which actions would be most useful'
	Rebalance Social Services 🔹	'address complex local challenges'
[3]	The Future Begins Now	'take preliminary actions before leaving'
	Structure Outputs	'link intermediate artifacts into a relevant template'
[4]	*Engagement and Guidance*	'create a collaborative learning environment'

Table 2. A summary of our collected "Patterns of Patterns". Legend: Small caps is used for formalized patterns; bold is used to denote roles; italic serif font is used to denote proto-patterns. Proto-Patterns that were created by workshop participants in Case Study 2 are further distinguished by a "🔹" marker. Numbers in the left-most column cross-reference the case studies ([1], [2], [3] and [4]) in which the patterns were initially developed and used.

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

This workshop functioned as a more developed pilot of methods that we had previously trialed at PLoP 2021 as "Flaws of the Cool City"[4] and at the Oxford Brookes Creative Industries Festival as "Dragon versus monkey: A kaijū introduction to peeragogy".[5] Our central aim was to 'workshop' the methods with attendees. Our pitch was that the workshop would help attendees establish a position of maximum leverage, exercising "Critical Anticipatory Capacities" and using "Creativity, Innovation and New Media" (two of the conference's themes) to explore the future of anticipation.

Fig. 1. Left: In the workshop, participants used pattern description cards to structure discussions (cf. the Pattern Language Components and Functional Roles patterns). Right: Facilitators took notes and made diagrams (Meaning Map).

Figure 1 shows the workshop in process (left) and details of the notes taken by one of the facilitators (right). Facilitators moved between facilitating small-group and whole-group activities. The discussion ranged over various themes, including collective agency and how to engage more people in futures discourse.

In the concluding Project Action Review, participants had different responses to our request to reflect on the workshop's activities. Some considered the workshop to have led to good conversations, but doubted if the manipulatives and other structure helped. However, as mentioned in Section 1, we had observed that some participants had used the manipulatives in creative ways—such as asking each other to pass around the cards to better narrate the points they were making in the conversation. Even if another conversation with these attendees would have been good, it would have been a very different conversation. Overall, workshop attendees had plenty of feedback for us about how we could improve our use of the methods;[6] they did not, however, adopt any actions for themselves to take forward around the points we discussed. This was in keeping with our primary aim for the workshop, but somewhat surprising since we were used to Project Action Reviews helping to establish a collective sense of direction. We reflected that we could make that particular aim clearer in future workshops.

4.1 Evaluation

Methods These or similar pattern cards can be re-used, as can the meeting itinerary (indeed, later case studies follow a similar itinerary).

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[4]https://www.hillside.net/plop/2021/index.php?nav=program#focusgroups
[5]https://www.brookes.ac.uk/research/networks/creative-industries-research-and-innovation/festival-2021
[6]https://groups.google.com/g/peeragogy/c/V-knbZkwhB0/m/jUbw3_I9AAAJ

Results As discussed above, we would likely have had a good discussion with the participants without the manipulatives, but (*a*) that would have had extremely low reproducibility; and, in particular, (*b*) we would not have received feedback on the manipulatives had we not used and presented them.

Interpretation The fact that we received usable feedback on the materials shows that they can be used in a co-design process. However, the apparent resistance by attendees to forming an action plan based on our discussion suggested that we were the primary beneficiaries of this "methods workshop". The workshop was effectively an open house, and the feedback applied, correspondingly, at the **household** level.

5   CASE STUDY 2: PUBLIC SPACE FOR PUBLIC HEALTH

This workshop was commissioned by co-author Abby Tabor as part of her research project at the University of the West of England on "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 organized by facilitators using a software tool based on Org Roam and Org Roam UI.

Inspired by our experience in the Anticipation pilot, here looked for new methods to INCREASE PARTICIPANT CONTROL. In particular, we generated some further articulations of the FUNCTIONAL ROLES that would help with this. The roles presented come with mnemonic symbols based on the chess set: at the workshop, participants were provided with additional physical manipulatives, i.e., the chess pieces that correspond to the symbols here, along with new pattern cards. As mentioned previously, in the Anticipation pilot, the roles were aligned with the PATTERN LANGUAGE COMPONENTS. In the pilot, the "*KAIJŪ COMMUNICATOR*" role had final say over the challenges implied by the 'HOWEVER' keyword.[7] Here, this role was renamed and adapted as the "WRINKLER", and ascribed a conversational perspective rather than a "role-playing persona" that would be taken on by whomever was holding the card. In still-earlier pilots, the roles had been assigned more elaborate responsibilities, and participants would receive a brief training for the role prior to taking it on. For example, we had made use of a *DESIGNER* role, now dropped entirely, which was to be filled after a briefing on design pattern methods and a specific collection of design patterns.

As presented in this workshop, the roles were strictly functional and were not the focus of role play as such. Rather, an attendee would fill a given role momentarily within a conversation, while remaining fully themselves. The roles were again outlined as pattern cards, together with an informal verbal description. The reader may refer to Table 3 which explains the mnemonic meaning of the chess pieces which accompanied each role description. The LINKER role was filled by offsite facilitators, and the REFLECTOR role was filled by onsite facilitators. A designated STEPPER role was only proposed after the workshop, though participants were asked to look for "Next Steps" in putting the patterns they were prototyping into action (in the style of [Corneli et al. 2015]). These were elaborated using the 'SPECIFICALLY' keyword from the PATTERN LANGUAGE COMPONENTS. This served a core purpose in the event, intended to address the limitation from the previous workshop. As noted, previously, the implied "Next Steps" were all presented in the form of feedback or advice for the workshop facilitators, rather than as actions which the attendees could (at least in principle) adopt and complete themselves.[8]

In the spirit of INCREASING PARTICIPANT CONTROL, the FACILITATOR ROLES could be distributed to participants, though doing so in a future workshop would require spending more time on training, and potentially also improved tooling for moderating the flow of information within (and beyond) the workshop.

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[7]https://hyperreal.enterprises/open-future/

[8]https://www.eventbrite.co.uk/e/public-space-for-public-health-a-call-to-action-tickets-492522286417

Role	Manipulative(s)	Explanation
TIME TRAVELER	♛	In chess, the Queen can move linearly in any direction: forward, backward, and diagonally. Similarly, the TIME TRAVELER role 'moves' both backwards and forwards in time, and also explores the conditions that appear at those points in time.
ANALYST	♗, ♝	In chess, there are two Bishops, both of which move diagonally, so that both are restricted to different colored squares. Here the ANALYST role divides its attention across two different spheres: articulations within the current challenge, and articulations of this challenge relative to other challenges.
WRINKLER	♞	In chess, the Knight moves in a skewed fashion: in order to go in one direction, it must also go a little bit in another direction. The WRINKLER role, similarly, looks at how a given strategy might go askew, due to unintended consequences or otherwise.
LINKER	♜	In chess, the Rook moves any distance, as long as it goes in a straight line. The LINKER role, similarly, can record a link between any two related concepts. Since all concepts are potentially related in some fashion, the LINKER focuses on making *useful* connections.
REFLECTOR	♔	In chess, capturing the King means the end of the game, so players are concerned throughout with any threat to their King. Here, the REFLECTOR role senses how the discussion of a given scenario is progressing and when it would be good to draw it to a close and move on.
STEPPER	♙	In chess, Pawns move one space at a time (or two at the beginning of their movement). Pawn are individually weak, but collectively, their placement is important for strategy. The STEPPER role similarly describes the immediate next actions that should be taken at a point in time.

Table 3. Mnemonic for manipulatives based on the chess set

5.1 Intermediate artifacts

Intermediate artifacts generated within the workshop included mindmaps created by 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. 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 2 show the movement from:

- Initial sketching at the start of Phase I, beginning at the *litany* level, within small groups, on to:
- A collection of themes shared across groups at the end of Phase I, to create a MEANING MAP which, in CLA terms, is intended to bring everyone into a shared *myth* layer, on to:

Fig. 2. Use of diagrams and manipulatives to create Meaning Maps and new patterns. In the upper-left photo, the CLA layers are mapped to concentric circles; from outside to center: litany, system, worldview, myth. The Share Back pattern was used to collect core themes from groups working separately, conceptualized here as the basis of a shared myth, comprising a Meaning Map that pulls together the themes from small group discussions (lower left). Pattern Language Components were then used to sketch solution strategies to key problems and concerns, e.g., Funding of Public Space (right).

- Phase II, using Pattern Language Components to identify both general and specific possibilities for action around a theme.

5.2 Output patterns

Participants created several patterns by making use of the Pattern Language Components and Functional Roles. For example, the right-most image in Figure 2 shows the participants' articulation of a Funding of Public Space pattern (created with help from a workshop facilitator). Using the Pattern Language Components 'HOWEVER', 'BECAUSE', 'THEREFORE', and 'SPECIFICALLY' made it easy to write down structured candidate patterns (i.e., outlining the typical Context/Problem/Solution triad, with the addition of 'Next Steps'). In Appendix 10, these candidate patterns are re-compressed into a succinct textual statement of the core idea of the pattern.

Although in this workshop we were successful identifying in "paths to action",[9] the main limitation was in regard to follow-through. We had initially planned to adapt Org Roam or some other similar tool into a wiki that participants could use after the workshop to keep track of patterns and next steps, recording progress, any blockers or 'reverse salients' [Hughes 1993], and any evidence for or against the patterns, as well as their elaboration. Our view is that other technologies such as the Federated Wiki [Cunningham and Mehaffy 2013] would have required too much training time to be used for the purpose we had in mind. In the end, we simply didn't deploy an end-user-writable software platform.

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[9] https://www.eventbrite.co.uk/e/public-space-for-public-health-a-call-to-action-tickets-492522286417

5.3 Evaluation

Methods We expanded the system of manipulatives to include CLA diagrams, a SHARE BACK process, and explicit PATTERN LANGUAGE COMPONENTS. Elicitation of structured patterns required active facilitator involvement.

Results Mapping user contributions by offsite facilitators was both intensive, and rather subjective in nature. This could be improved by reworking the mapping tools so that they could be used in real time by workshop attendees.

Interpretation Firstly, the workshop was developed as paid consulting work, connecting the overall process overtly to the themes of the **market**. The results of our offsite work could be viewed by attendees, but were not shared in a form where they could be directly extended. Nevertheless, within the workshop itself, we saw attendees successfully adopt pattern methods, and use them to talk about potential futures. This suggests the possibility for benefits accruing at the **state** level, with the potential for an Open Future Design workshop to function as a new kind of forum or senate, by analogy to developing practice around citizen juries.

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 organizational 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. The itinerary for this workshop adopted the language "experts to citizens", "citizens to action" from the previous workshop. These phases mirror the DÉRIVE COMIX—MEANING MAP—REINFUSE EXPERTISE structure introduced in the first case study; in CLA terms, the overall effect is a journey from *litany-to-myth* and then *back-from-myth-to-litany*, with the new litany taking the form of potential actions, or more specifically, potential future headlines describing the actions.

6.1 Intermediate artifacts

Figure 3 shows how the PATTERN LANGUAGE COMPONENTS were used in the second phase of the workshop, building on a CLA-based discussion that developed the MEANING MAP in the workshop's first phase (background, right). In this case, the keywords and manipulatives corresponding to FUNCTIONAL ROLES (cf. Table 3) were not used to spell out entire draft patterns (as in Figure 2), but rather, to generate a network of relations.

Figure 4 shows how material was then drawn together, using Org Roam to analyze the workshop themes (per the LINKER pattern), further elaborating the MEANING MAP. Contents of the paper-based diagrams, like those in Figure 3, were condensed and edited in the digital notes, rather than represented verbatim. For example, the idea of reintroducing a "common room" (Figure 3, left) is folded into the "Research Environment" node, along with the challenge of holding conversations when "people aren't here" in person. The digital notes also provided an opportunity for corrections, consolidation, and synthesis of links which hadn't been spelled out directly with the manipulatives. E.g., "Richard Owens" [sic] (Figure 3, right) is represented in the digital notes as *Richard Owen*, key proponent of responsible innovation [Owen et al. 2013], within the "responsible" node.

The overall process illustrated in Figure 4 moves in the opposite direction of *Figures 3-7* of Iba and Isaku [2016], insofar as those figures complexify a tree as a graph. Here, we move from an interlinked graph of topics to a summary map in tree form, represented here by the Outline of an Open Research Action Plan node.

In brief, the organic, playful, interactions within the workshop were useful in creating the more formal output (a draft policy document) precisely because these interactions were informed by a suitable metalanguage, including the apparatus of Causal Layered Analysis, the PATTERN LANGUAGE COMPONENTS, the FUNCTIONAL ROLES, the MEANING MAP, and other patterns described so far in the paper. Counterfactually, we could have written up

Fig. 3. The PATTERN LANGUAGE COMPONENTS were used organically within the workshop (cf. *Destructure Patterns*).

an action plan based solely on desk research—e.g., writing a synthetic plan based on identified organizational values "Success, Openness, Learning by doing, Adaptability and Creativity, and Equal opportunity... SOLACE" [Corneli 2023]. However, that level of analysis only provides a "mental picture", in the terminology of Alexander [1964]. A hypothetical Open Research Action Plan based on stakeholder interviews and the "SOLACE" concept, omitting the workshop experience, might express the university's stated values, but it would not draw on the same richness of meaning, nor the same level of practical detail.

6.2 Evaluation

Methods We used the same manipulatives as in the previous case study, but this time with less structure. This may suggest a level of reproducibility between that of generically useful PostIt® notes and highly-structured design processes.

Results The results were first collected in a graphical form, and then presented using a standard text template. The pattern components were used to structure the map, though that process was still largely subjective. Algorithmic additions to the methodology could enhance reproducibility, for example, by using the pre-existing template and a clustering algorithm we could (in principle) make the synthesis phase entirely reproducible.

Interpretation The collated material was shared with a new working party that intends to create a new organizational strategy. While the working party may ultimately develop a different interpretation of the role of open research from the picture created by workshop attendees, they will benefit from having seen that that picture. This suggests a range of benefits accruing at the **market** level, both in the internal ideas marketplace, as workshop attendees will have their voice heard within the organization, and also at the organization level, as the university articulates its position within the sector in a way that incorporates on-the-ground realities. As alluded to in the previous case study, a system for updating and maintaining diagrams like Figure 4 in real time would have uses in a form of "citizen science". That suggests a technology-enhanced information ecosystem, with benefits at the **state** level. However, from an organizational strategy

Fig. 4. Screenshot of Org Roam UI, showing the development process leading to a draft Open Research Action Plan (ORAP). Color-coding is: (Gray) Background themes and concepts based on interviews (cf. Do Your Research); (Purple) Selected themes from that background material which became the focal themes in the workshop; (Yellow) Workshop themes and concepts; (Red) Key points of organization for workshop themes, including discussions per faculty as suggested by Structure Conversations. The node "Outline of an Open Research Action Plan" includes the ORAP, instantiated here as a bullet-point outline, with links to all the workshop outputs.

perspective, the distilled bullet-point outline was an essential "product", and the map itself contains too much information for immediate decision-making needs.

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

7.1 Introduction to 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 with, 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 students to use the same software tool uniformly.

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 a 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, by guest lecturers Raymond Puzio, Joe Corneli, and Charlie Danoff

Mary assigned our paper "Patterns of Patterns" [Corneli et al. 2021] 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. Each semester, students asked many thoughtful questions about the paper; each cohort also produced their own collaboratively-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 their 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". It is worth highlighting that while our paper did touch briefly on the theme of emerging technology, the students considerably elevated the importance of that theme in their feedback.

7.3 Experience report by CIS 9590 student, Kajol Khetan

The PLACARD method emphasizes understanding the context, selecting an appropriate language or languages for thinking about problems in that context, and taking relevant actions to guide the development process. In our project work, we adapted the CLA component of this framework by identifying the layers relevant to our chosen problem, namely, to create a website that allows users to discover nearby coffeeshops easily. We identified the following layers for our analysis (each with several facets): User Interface, Functionality, Data Flow, Infrastructure, and External Factors.

CLA guides us to look for *causal relationships* operating within and between these layers. In particular:

- Changes in the User Interface layer influenced user engagement and ease of interaction.
- Adjustments in Functionality impacted the overall user experience and satisfaction.
- Data Flow optimizations directly affected the accuracy and relevance of coffee shop information.
- Infrastructure decisions impacted website performance and responsiveness.
- External factors influenced design choices and user satisfaction.

Our adaptation of Causal Layered Analysis led to a comprehensive understanding of the website's components and their interdependencies, and facilitated a structured approach to development. The nearby coffee shops website was successfully developed and deployed. Users can input their location and receive a map display of nearby coffee shops, along with relevant information such as ratings, reviews, and operating hours. Our group's process could be condensed into an overall proto-pattern, *Adapt Layers as Needed*.

7.4 Experience report by CIS 9590 student, Manvinder Singh

During my final project class led by Professor Mary Tedeschi, the research paper "Pattern of Patterns" and its authors played a pivotal role in shaping my project decisions. The authors' active engagement in our Zoom

sessions provided invaluable insights into project layout, helped me avoid common mistakes, and encouraged a scalable and adaptable approach. Their active engagement and promises to come again in the following weeks to see progress on everyone's individual project kept the butterflies, nervousness, and willingness to deliver all alive at the same time. The guest lecturers' contributions, together with the way we adopted their paper, suggests several proto-patterns which could be used to structure future versions of the course: *Engagement and Guidance*, *Avoiding Mistakes*, and *Scaling and Adaptability*.
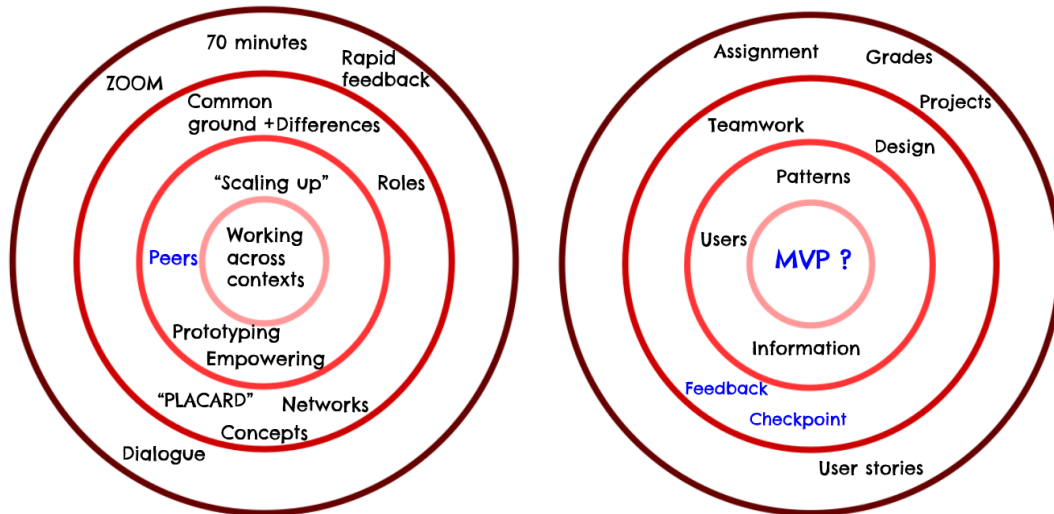

Fig. 5. Diagrams created before our first session with the CIS 9590 students, inspired by Causal Layered Analysis. The diagrams describe our working context as guests in CIS 9590 (left), and our initial understanding of the students' working context (right).

7.5 Evaluation

Methods Guest-lecturing and receiving written feedback on our paper were directly replicable across cohorts. The workshop methods introduced to the latest cohort adapted reasonably well to the online/hybrid classroom, though another round of prototyping could improve them.

Results The student experience reports suggest a strong uptake of the methods we introduced. With Mary, we discussed peeragogy-inspired learning design suggestions that could be used in future classes.

Interpretation The experience went well enough that we were invited back several times, and, following the latest sessions, invited to continue the conversation with other instructors in the New York region (at PACE and Baruch). Students reported improvements to their product design and development processes, with benefits at the **market** level. We also see the potential for benefits accruing at the **commons** level, working across contexts by openly sharing and interlinking Meaning Maps like those depicted in Figure 5.

8 CASE STUDY 5: PLOP 2023 SHEPHERDING AND WRITERS' WORKSHOP

Our account would be incomplete without an overview of the way our thinking, and this written presentation, continued to evolve in the Pattern Languages of Programs 2023 context. As in Case Study 1, at the Writers' Workshop, we were primarily asking for feedback. As in Case Study 4, participants had an entire paper to wrap

their heads around. Our a result of the discussions with our shepherd and workshop attendees, we clarified our use of proto-patterns, ultimately focusing our presentation of the paper by moving the patterns and proto-patterns to the appendix. We rewrote the introductory sections to make it clearer that our focus is on the process of evolving patterns, rather than the presentation of polished patterns (more typical at PLoP).

8.1 Input patterns

We put our pattern catalogue and surrounding narrative forward for scrutiny and discussion. The process was governed by pre-existing patterns for paper shepherding and Writers' Workshops. We continued to use patterns like STRUCTURE CONVERSATIONS after the workshop, building in several rounds of internal peer review.

8.2 Intermediate artifacts

We began by significantly shortening the paper, moving around 8000 words from our conference submission [Corneli et al. 2023] into an "outtakes" directory. We restructured Table 2, and combined two earlier figures into Figure 6. In particular, Figure 6 now shows both the abstract workflow of pattern synthesis following the PLACARD method, and the concrete process of pattern development that we followed. These correspond to outside-in and inside-out readings of the diagram. Further significant revisions to the text were made. In particular, the evaluation sub-sections were added.

8.3 Evaluation

Methods The methods used at PLoP are well-established, having evolved into relatively firm traditions over 30 years. These were augmented by peeragogy patterns [Corneli et al. 2015] and ideas from the current paper.

Results Our paper received significant revisions focused on addressing the main takeaways from the workshop. No new patterns were added, but the existing patterns were revised and the catalogue restructured.

Interpretation PLoP methods are useful for polishing an existing set of patterns. In and of themselves, PLoP workshops do not provide a complete recipe for creating useful pattern languages. PLACARD and the associated patterns in this paper are therefore complementary to the existing PLoP methods. Having been through one complete cycle of research, writing, and revision since we presented "Patterns of Patterns", we have now developed a complete methodic description for working with patterns in workshop settings. We have touched on potential benefits across the four economic domains mentioned above. The process of revision associated with PLoP helped us articulate these benefits in a cohesive manner, producing a more salient contribution to a knowledge **commons**.

9 DISCUSSION

9.1 Related Work

We have taken a design-patterns-based approach to meta-research, using design pattern methods to study design patterns. Broad thematic areas within meta-research include: "methods, reporting, reproducibility, evaluation, and incentives (how to do, report, verify, correct, and reward science)" [Ioannidis et al. 2015]. In this connection, Figure 6 has a theory-building role, showing how the PLACARD pattern was expanded into further design patterns which we developed across Case Studies 1-3. Whereas common problems in quantitative research are relatively well established [Munafò et al. 2017], to date, the corresponding challenges and solutions in qualitative research have been less well studied. The diagram in Figure 6 depicts both a research cycle for generating new design patterns, which can now be run with variations, repeatedly, and also a roadmap for deepening our collective understanding of and facility with pattern-based inquiry. Heiberg et al. [2022] make use of a similar diagrammatic approach to map evolving relationships between technical and institutional concepts, superimposed upon a 'radar plot' which shows which concepts are central and which are peripheral.
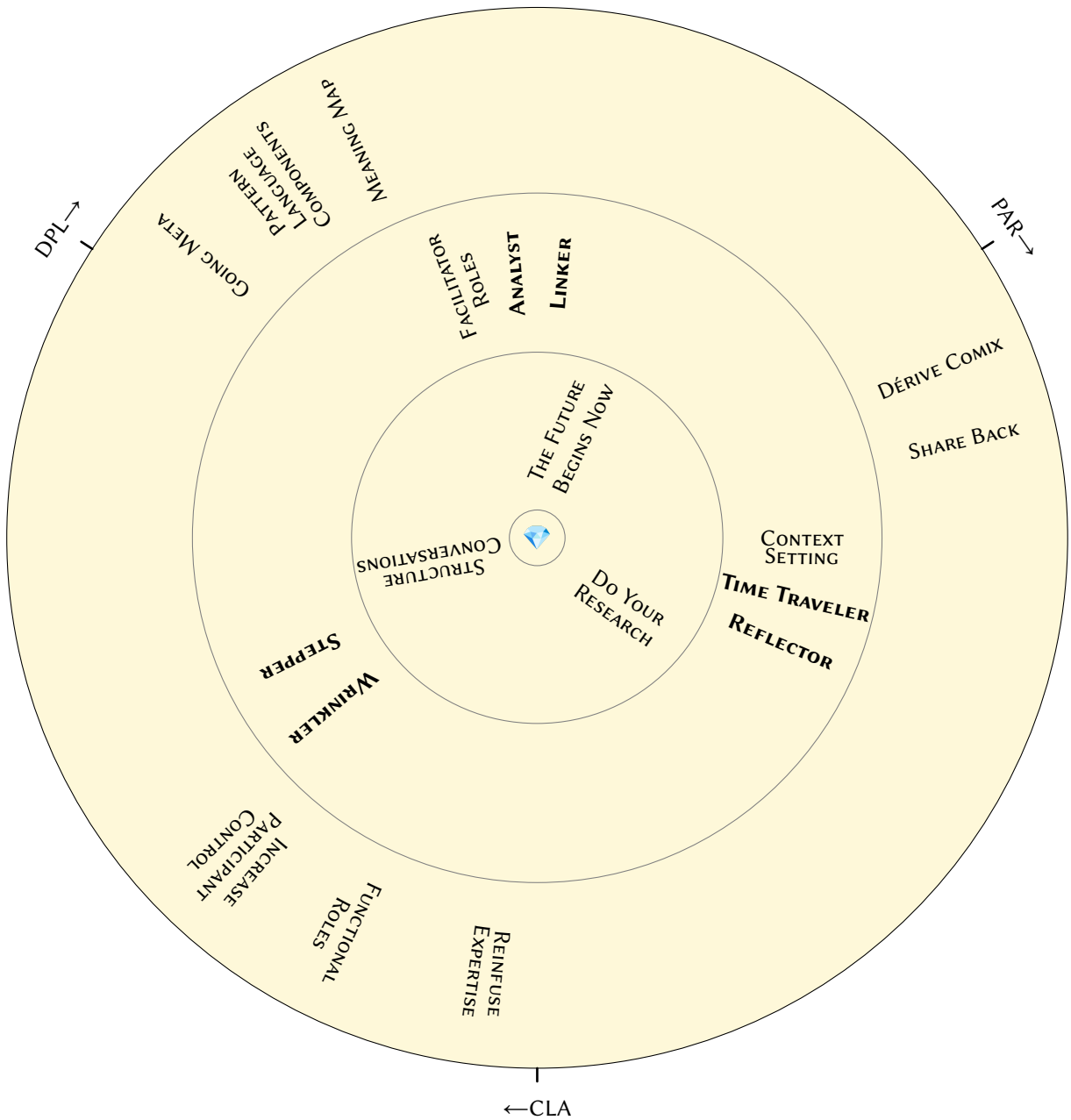
Fig. 6. Relationships between the component methods of PLACARD and the patterns introduced in this paper. For example, the sensory dimension, PAR, serves to "Identify themes". This process can be implemented through the Dérive Comix and Share Back patterns; further nuance can be added with the Context setting pattern along with the **Time Traveler** and **Reflector** roles; and still more articulation can be added with the Do Your Research pattern. The three layers of patterns correspond to our workshops [1], [2], and [3], and roughly align with the CLA *litany*, *system*, and *worldview* layers. Proto-patterns that were generated at any workshop or in subsequent analysis live at the myth level, denoted by 💎.

9.2 A remark on the Roles of Roles

In developing the PLACARD pattern, we were inspired by the classical neuroscientific notions of sensory, cognitive, and motor faculties. The Active Inference Framework (AIF) provides a more contemporary approach to similar concepts: see Smith et al. [2022] for a primer. Here, we suggest that AIF and DPL can support each other, with AIF concepts being given a practical implementation using design pattern methods, and DPL receiving a needed theoretical upgrade by way of Active Inference.

Both AIF and DPL have a broad scope of application, to a range of complex systems. DPL and AIF both make use of hierarchical organization, e.g., *A Pattern Language* cascades from patterns for towns to buildings to construction; whereas AIF typically zooms out, from simple to complex and reflective—from "I model the world" to "we model the world" to "we model ourselves modelling the world" [Kirchhoff et al. 2018]. Both AIF and DPL have a fundamentally generative orientation. Despite these similarities, AIF relies on quantitative methods coming from statistics and theoretical physics, whereas DPL is primarily qualitative. We wish to draw attention to the way in which the participant roles outlined above can operationalize key aspects of the Active Inference Framework.

The Time Traveler elaborates *a prior belief over states* and the *likelihood of specific observations*.
The Analyst elaborates a *generative model*, with the division between inward and outward articulations corresponding to *internal* and *external*-facing states (both with *sensory* and *active* components).
The Wrinkler elaborates a *factor of surprisal*.
The Stepper takes action to correct discrepancies between the generative model and the perceived state of the world, minimizing *prediction error*.

Active Inference is currently being explored as a new paradigm for artificial intelligence, with a focus on ecosystemic intelligence [Albarracin et al. 2023; Friston et al. 2022]. In particular, the AIF-inspired "hierarchical generative model capable of self-access" from Albarracin et al. [2023] arises through the addition of reflective meta-layers, ascending from:

	"*What am I trying to do?*"	and	"*What am I perceiving?*"
to:	"*What am I paying attention to?*"	and	"*What am I trying to pay attention to?*"
to:	"*How aware am I of where my attention is?*"	and	"*Am I trying to maintain awareness of my attentional state?*"

This is similar to the *litany-to-myth* direction of analysis that we used in the first phase of our workshops. In our workshop, the roles were introduced in the *myth-to-litany* phase, to generate potential actions. The socio-historical theory of P. R. Sarkar, which informed the development of CLA, hinges on similar roles (cf. Inayatullah [1999]; Inayatullah and Fitzgerald [1999]). The key point for our current purposes is that Functional Roles can help to bring about change across levels and domains.

9.3 Connection to other emerging computational technologies

We reflect that pattern-based information processing tools — commonly referred to as "artificial intelligence" — are being used to model and influence a wide range of social and economic contexts. Since AI and robotics routinely make use of concepts of cognitive science, this provides a common ground with the topics discussed here. To flesh this out, AI techniques can be organized in nested layers, using CLA-style thinking, as we did with our patterns in Figure 6. Machine learning, neural networks and large language models correspond to the litany layer in the outer ring, since they work rather directly with raw data, detecting regularities (such as clusters and n-gram probabilities), and using these regularities to predict what comes next or to classify items. In the next ring, we could place rule-based production systems and planners. These correspond to the systems layer. In the inner ring, we can place ontologies and knowledge representation languages, which formalize worldviews

to make them amenable to computation. For some contemporary thinkers, the innermost myth at the core is the possibility of building artificial general intelligence, though opinions vary about when and whether that will arrive, and alternative myths such as "AI empowers workers" have been proposed [Chiang 2023]. We hope these observations will be of use in implementing design patterns computationally—perhaps starting with the patterns of patterns that we have collected—and/or in designing workflows for developing future AI systems.

10 CONCLUSION

Relative to previous work on the structure of patterns which used a path-traversal metaphor to describe how patterns work [Kohls 2010, 2011], a suitable metaphor for our contribution is *a wheel which rolls more smoothly when round ball bearings are placed in the hub*. Less metaphorically, Richard Gabriel emphasized that the "patterns and the social process for applying them are designed to produce organic order through piecemeal growth" [Gabriel 1998]. We given some further articulation to this point, and our case studies have shown how such articulation can make work with patterns more effective, efficient, and scalable. In brief, our patterns of patterns exemplify the latter part of the following description:

> Technological progress is achieved through a dialectical relationship between mediation (adaptation to the end terms: the path to be travelled and the load to be carried) and autocorrelation, the relation between the technical object and itself. [Simondon 2005]

The primary limitation of this work is that it has been carried out mostly at the "paper prototype" level. Nevertheless, the process we have presented reflects the main features we would expect from future more technically developed platforms for distributed collaboration. We described prototype-level distributed-working that was carried out inside the workshops, organized via the SHARE BACK pattern; and our workshop repeated with variation over time, allowing us to learn from widely distributed teams.

Existing systems such as Alkemio[10] are being built with the need for collaboration across organizational boundaries in mind, preferring "*challenge-focused*" collaboration. A platform using DPLs to work *across related challenges* would take that idea even further. Domain-level design patterns outline potential new behaviors; improved support for the process of gathering evidence that those behaviors do (or do not) in fact work as intended is an ambitious but logical ramification of the pattern method. The FUNCTIONAL ROLES we've set forth here provide an early informal articulation of the process, and the connections to the Active Inference Framework that we alluded to in Section 9.2 could scaffold further, more formal, developments.

Whatever underlying formalism is used, and independent of the specific technologies that become part of future software implementations, further work is needed to identify analogies between action arenas, to highlight the ramifications of complex actions, to show predicted costs and benefits, to search for tipping points that allow the effects of change to reach across level boundaries, and to surface new questions for consideration. The overall need is summed up by *Noema* magazine's editor-in-chief, Nathan Gardels: "It's time for new cooperative platforms that address irreducible interdependence."[11]

To illustrate how our work could help to address that need, Figure 7 juxtaposes the relationships between the components of PLACARD with a design diagram outlining the key sustainability features abstracted from experiences with an early online community [Krowne 2003]. If PLACARD were used to design and build a system with features from the diagram at right, we might expect to see system-builders employing:

- DPLs related to money, organizations, and social interactions,
- a CLA (or a collection of CLAs) that expresses the purpose(s) of the organization,
- and ongoing PARs that help to keep things on track.

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[10]https://alkem.io/

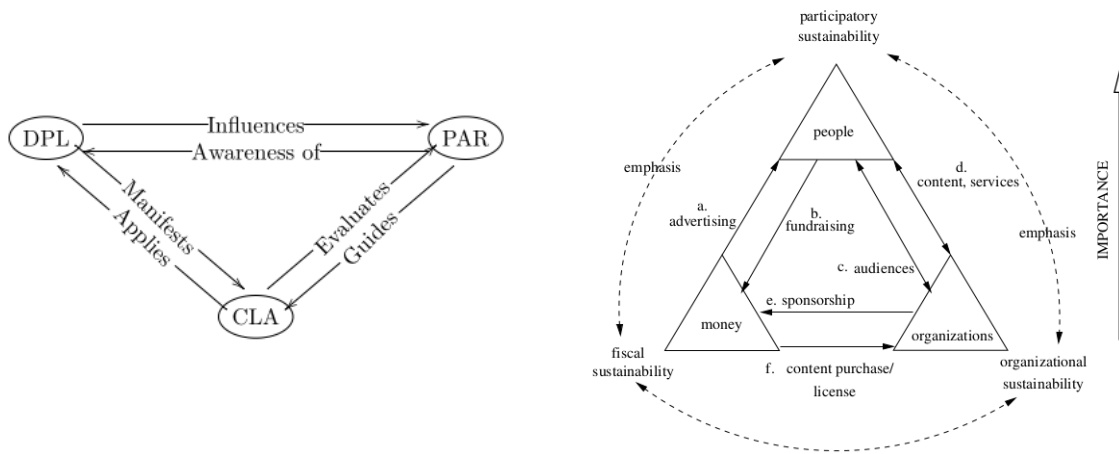[11]https://www.noemamag.com/from-globalization-to-a-planetary-mindset

Fig. 7. The interrelated components of PLACARD (left) could scaffold a range of beneficial platform design principles (right, from Krowne [2003], used with permission).

Fig. 8. A team facing a complex challenge depicted by a tangled web of lines and nodes indicating a complex problem. The colorful orbs can be taken to represent other teams tackling related challenges. Illustrated by DALL-E.

A community platform taking our collection patterns for "Identifying themes", "Organizing structure", and "Making it actionable" as its core content would be one possible instantiation. This could be used as a foundation for building further cooperative/collaborative platforms. One way to situate such a platform would be as the "Going Meta" of contemporary efforts to model social and ecological systems within the Doughnut Economics paradigm.[12] The different local implementations of these ideas is a space to look for further design patterns.

Building on our remarks in the Discussion section, we suggest that the existence of common patterns in social and artificial intelligence can inform the further development of the theory and practice of social machines, building on the work of Shadbolt et al. [2019]. Patterns of patterns can facilitate a unified approach to the design and governance of such systems. We have begun (as we mean to carry on) by focusing on the development and articulation of multi-purpose tools for thought. We hope that future software systems will better enable groups of collaborators and cross-group collaborations. Figure 8 is dream-like AI-generated image, showing what these interlinked collaborative settings might look like.

Given our assessment of the reproducibility of our methods, we would expect them to translate well to a variety of related research settings. For example, in our comments on Figure 7, we noted that PLACARD methods could inform platform design, without any commitment as to whether those systems would be digital or analog in nature. In each case study, we evaluated our methods, with respect to whether they already have or could be extended to have benefits at the household, market, state, or commons level. The result is a rigorously documented exploration of complex social interactions around relatively light-weight technologies for co-design and collaboration, which can serve as the jumping-off point for further stages of co-design and development.

Whether future work on patterns of patterns proceeds by developing computer programs that mine the space of potential patterns for those which support human thriving, or by building institutions that achieve something similar, or through some combination, developing the initial representations that support collaboration may be the hardest part. Subject to the limitations of paper prototyping in hands-on workshops, and the pseudo-code-like nature of design patterns, our contributions can help scaffold those future efforts.

ACKNOWLEDGEMENTS

APPENDIX: PATTERN CATALOGUE

We use this simple variation on the classical "Context/Problem/Solution" or "Context/Conflict/Solution" [Alexander and Poyner 1970] pattern template:

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[12]Downscaling the Doughnut: Data Portraits in action: A collection of tools and useful examples for creating a Data Portrait of Place, also known as City Portrait. https://doughnuteconomics.org/tools/92

Context ...	[Summary of the working context]
If ... *BUT* ...	[A conflict, problem, or gap arising in this context]
Then ...	[Actions to take to resolve the conflict]

We sometimes add an **Example** where we feel that would be helpful. In this connection, it is worth highlighting that PATTERN LANGUAGE COMPONENTS pattern covers similar ground with a different lexicon:

... **HOWEVER** ...	[A conflict, problem, or gap]
BECAUSE ...	[A solution to a similar problem arising elsewhere]
THEREFORE ...	[High-level actions to adapt and try in this context]
SPECIFICALLY ...	[Specific next steps to begin with]

Some of the patterns concern roles taken on by workshop participants, and for these we use an adapted template:

Context	[*As above.*]
Question...	[The thematic question that this role is concerned with]
Role...	[What purpose the role fulfils in the conversation]

Some proto-patterns are included which do not have any template sub-structure. They are typically *ideas for patterns* which have not been elaborated. Their titles are written in a mixed-case italic serif font. Three of our collected proto-patterns were simplified adaptations of more elaborate pattern descriptions created by workshop attendees (see for example Figure 2) and are marked with a "💎". In contrast to Table 2 which outlines both patterns and proto-patterns in historical order of their development, for ease of reading, this appendix collects the proto-patterns at the end of each subsection. It should be noted that the assignment of a pattern a subsection is somewhat subjective, and even more so for proto-patterns.

A   Identifying themes

DÉRIVE COMIX

Context you want to develop some future scenarios to explore with a group.
If the group has been identified BUT the members don't know each other well yet, and accordingly each has their own separate experience, and the group has no concrete shared meanings;
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.
Example Variants of this pattern can be used to explore potential futures, as we observed in the PLoP 2023 workshop "Future-Self Immersion with using A Pattern Language for Nurturing an Exciting Life", where participants "envision a future where they actively implement a particular pattern."[13]

SHARE BACK

Context Members of sub-groups have shared their experiences with each other, and each sub-group has developed a MEANING MAP
If we want to establish a meaning map for the whole group BUT unstructured interaction within the whole room is infeasible;
Then individual groups should present key findings to the room; or, alternatively, if the conversations are not yet at a natural stopping point ask the groups to pause their conversations and listen in briefly to the one of groups (in turn), who will continue their small-group conversation.

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[13]https://www.hillside.net/plop/2023/index.php?nav=program

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 likely to be top of mind for attendees.
Then do some context-setting, e.g., give a short talk about why people have been invited, and describe the hoped-for outcomes.
Example Prior to the workshop described in Case Study 2, short videos on the themes 'public space' and 'public health' were elicited from attendees. At the start of the workshop these were projected to the assembled audience. This was accompanied by further remarks that juxtaposed what we planned to do at the workshop with previous work on "interactive documentary"[14].

TIME TRAVELER ♛

Context In an interaction that can be structured with FUNCTIONAL ROLES.
Question *What has happened in the past, what could happen in the future?*
Role To provide historical context and anticipate alternate futures.

REFLECTOR ♔

Context In an interaction which can be enabled by people taking on FACILITATOR ROLES.
Question *How is the scenario evolving?*
Role To appraise each developing scenario, provide a format for reflection (e.g., PAR, or, indeed, if time allows, the entirety of PLACARD), make a decision to continue, reset, or end.

DO YOUR RESEARCH

Context Prior to beginning a formal workshop or other participatory research activity, facilitators may have time available that goes beyond what will be asked of participants in DÉRIVE COMIX.
If it will be possible to do participatory research in the workshop setting BUT the context outside of the workshop is potentially just as important.
Then start doing the research in a more centralised way before inviting direct collaboration. Findings from an earlier research stage can be summarised and presented at the CONTEXT SETTING stage to give participants something to engage with.
Example In Case Study 3, the pre-research phase included 1-to-1 interviews with around half of the invited participants, as well as internet research to find and explore related scenarios developed by others in the sector.[15]

Pilot to Anticipate

Invoking the GOING META pattern (see Subsection B, below), we reflect that our strategy of *piloting our workshop methods* was how we choose to anticipate the issues likely to arise in future iterations of the workshop. Perhaps the future of anticipation more widely will include the increased use of pilot schemes? In support of this possibility, Unger et al. [2019] have advocated for the enthusiastic embrace of "Experimental government".

💎 *Contested Space*

So-called public space doesn't always feel welcoming to all members of the public. It can be overrun with antisocial behavior. It can feel exclusionary, or uninviting. It can be the site of conflict. Although the uses of public space are complex, each space need not support every use equally.

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[14]http://i-docs.org/interactive-documentary-what-does-it-mean-and-why-does-it-matter/
[15]https://royalsociety.org/topics-policy/projects/research-culture/changing-expectations/visions-of-2035/visions-of-2035-materials/

B   Organizing structure

MEANING MAP

Context We have collected images or other data describing people's worlds (see Dérive Comix).

If our intention is to distill well-integrated shared understandings with the group BUT, so far, everyone has been keeping most of their experience, knowledge, and perspectives to themselves;

Then talk together about the problems and opportunities that everyone sees in the data that has been gathered and shared, and document any connections you find. You can return to the exploration activities of Dérive Comix as needed. Maybe some of the identified themes will start to cluster together. Maybe everyone will have wildly different perspectives: that's also entirely OK. Either way, you can use these different viewpoints to bring everyone on the same page: just document them as part of the map.

PATTERN LANGUAGE COMPONENTS

Context In a collaborative setting with people who are new to design patterns.

If attendees are being invited to create new design patterns that operationalize knowledge at the group level BUT the typical framing language of DPLs — which have 'conflict' at the core — is not comfortable for participants (e.g., because a 'problem' or 'conflict' is seen as a bad thing);

Then introduce and describe neutral keywords such as *HOWEVER* (which can variously be used to describe a gap, a conflict, an opportunity, or even a simple juxtaposition of facts), *BECAUSE* (to describe a set of operating causes), *THEREFORE* (to describe a rationale based on related data), and *SPECIFICALLY* (to describe next steps), to help people build patterns piece by piece.

GOING META

Context In the course of working on a project together.

If we 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 itself.

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; it's hard to know when to move on to another topic; and potentially, other obstacles arise.

Then introduce facilitator roles, e.g., to help structure the work, and to decide when to keep the conversation moving or draw it to a close.

ANALYST ⚗ ⚗

Context In an interaction that can be structured with Functional Roles.

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.

LINKER ♜

Context In an interaction which can be enabled by people taking on Facilitator Roles.
Question *How do proposed scenarios build into patterns across layers, and how do they interact within the constellation of related concepts?*
Role. Data wrangling as it comes in, providing visualization of patterns and interconnections.

STRUCTURE CONVERSATIONS

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 In the "Open Research Futures" 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).

💎 *Funding of Public Space*

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 a register of impacts of local social enterprises.

Destructure Patterns

The Pattern Language Components need not be used to articulate entire patterns: a less formal discussion can surface useful meanings.

Adapt Layers as Needed

Layer-based analysis facilitates effective communication among team members, enabling seamless collaboration, and aides both design and implementation. For this to work well, we need to select the right layers. In a complex change process, we might use CLA; in prototyping project, relevant layers include the *languages* and the protocols describing an implementing suitable *actions*.

Avoiding Mistakes

Guidance from experienced developers can help avoid common project development pitfalls. Some useful methods include effective documentation, regular testing, and thorough project planning.

Scaling and Adaptability

By considering emergining technologies and incorporating modular elements within a flexible framework, we can accomadate and adopt new advancements.

C   Making it actionable

REINFUSE EXPERTISE

Context a group wants to build a Meaning Map.
If everyone has experience as human being (and resident, citizen, etc.) BUT they also have some experience as an expert which is harder to share with non-experts;
Then begin by removing expertise to get everyone on the same page, and subsequently reinfuse expertise, to enable richer and more complex thinking.

Example In preparing the first edition of the *Peeragogy Handbook*, we worked together informally until we had buy-in from around 25 contributors together with a high-level outline of the main themes we wanted to discuss. This outline was then filled in with individual chapters, most elaborating the specific experience of one or two co-authors.[16]

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 different perspectives to critique the pattern as it develops.

WRINKLER ♘

Context In an interaction that can be structured with FUNCTIONAL ROLES.
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).

STEPPER ♟

Context In an interaction that can be structured with FUNCTIONAL ROLES.
Question *What should we do next?*
Role Consider the discussion so far, and the various possibilities for action that have arisen. Decide which actions would be most useful or informative, and devise a plan in place to carry them out.

THE FUTURE BEGINS NOW

Context Having developed possible next steps in a discussion.
If it appears that leaving the discussion without concrete commitments means concrete actions are less likely to take place.
Then take preliminary actions before leaving the discussion to create a sense of commitment and follow-through.
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.

Increase Participant Control

When organising a collaborative activity, participants should not remain only an audience, or only deliver scripted lines (as was reinforced by our Anticipation 2019 experience, see Section 3). Give them increasing responsibility.

💎 Rebalance Social Services

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 practiced by Médicins Sans Frontièrs[17] to address complex local challenges?

Structure Outputs

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.

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[16]https://en.wikibooks.org/wiki/Peeragogy_Handbook
[17]https://www.msf.org/

Engagement and Guidance

Guidance from pattern experts can help create a collaborative learning environment, allowing participants to gain deeper insights into relevant concepts and methodologies, and help foster to innovative and logically-coherent project approaches.

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