



Bridging Creativity and Production in Packaging Design

Luana Cieza - Master of Design
Experience Design

paradox

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Thank you to the designers, print specialists, and industry experts who generously shared their time and knowledge. Your perspectives provided invaluable insight into the realities of packaging design and production.

Bridging Creativity and Production in Packaging Design

A thesis project presented in partial fulfillment of the requirements for the degree of Master of Design with a specialization in Experience Design at San José State University in San José, California.

Thesis Comitee

COMITTEE CHAIR

Connie Hwang
Graphic Design Program
Director and Professor, SJSU

COMITTEE ADVISOR

Alexis Muller
Associate Experience
Designer, Adobe

COMITTEE ADVISOR

Jenna Johnson
Creative Director,
White and Salt

Abstract

Packaging design exists at the intersection of creative exploration and technical precision. Yet the transition from design to production remains fragmented, often resulting in mis-communication, costly revisions, material waste, and delays. Designers, print suppliers, and clients frequently rely on disconnected tools and workflows, making it difficult to preserve design intent and ensure technical feasibility throughout the process.

This thesis explores how emerging technologies, including artificial intelligence (AI) and computer-aided design (CAD), can improve the packaging design workflow by strengthening the connection between two-dimensional dielines and three-dimensional structural visualization.

Through interviews, literature review, and proto-typing, the project investigates how integrated tools can identify technical issues earlier, validate structural and print specifications in real time, and support more effective collaboration across stakeholders.

The resulting concept, Paradox, demonstrates how technology can reduce technical complexity and help designers move from concept to production with greater confidence.

By bridging creativity and production, this thesis proposes a more efficient and sustainable approach to packaging design that improves accuracy, reduces waste, and allows designers to focus more fully on creative decision-making.

01. Introduction

“Designers often lack the right tools to navigate structural complexity at early stages of the packaging design proces”.

“A Preliminary Decision-Making Tool for Sustainable Packaging Design.”

	Illustrator	Esko	Pacdora	Figma	Grammarly	Chatgpt	Paradox
Packaging Specific Workflow	●	●	●	●	●	●	●
Easy to Use	●	●	●	●	●	●	●
Intelligent Guidance	●	●	●	●	●	●	●
Template Automation	●	●	●	●	●	●	●
Production Readiness	●	●	●	●	●	●	●
Real-time Collaboration	●	●	●	●	●	●	●
Automation / AI Assistance	●	●	●	●	●	●	●
Live 2D - 3D Visualization	●	●	●	●	●	●	●

● Strong ● Partial ● Weak or None

Comparative analysis of existing tools and the capabilities integrated in Paradox.

The Problem

Packaging design requires balancing creative exploration with technical precision.

However, the transition from conceptual design to production is often fragmented. Designers, print suppliers, and clients rely on disconnected tools and manual handoffs, which lead to miscommunication, late-stage errors, costly revisions, and material waste. As a result, packaging designers spend a significant portion of their time troubleshooting files instead of doing what they do best: creating.

“The later a mistake is caught, the more expensive it becomes”.

NASA Johnson Space Center Error Cost Escalation Through the Project Life Cycle

60% of packaging teams still rely on manual file handoffs

2026 Esko Industry Report: “Packaging at Scale”

Initial Hypotheses

1. Automations might reduce errors in dieline preparation process

If packaging designers have access to a tool that validates dielines and print specifications before submission, the number of print production errors will significantly decrease, leading to reduced waste and faster approval times.

2. AI might reduce iterations and material waste

If designers and suppliers can use AI to preview dielines in 3D before production, it will reduce misunderstandings, the number of revision cycles, and paper waste.

3. Centralized collaboration could improve workflow efficiency

If designers, suppliers, and clients collaborate within a single space or tool that tracks the “design intent”, and print requirements, the overall time from design finalization to production will decrease, reducing miscommunication and rework throughout the process.

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02. Defining the Scope

Manifesto

Packaging design should be seamless. Ideas should move fluidly from concept to production without being diminished by technical barriers, fragmented tools, or preventable mistakes.

Technology should do more than automate repetitive tasks. It should clarify complexity, build confidence, and protect the space where creativity thrives. The best tools do not replace designers. They amplify human judgment, preserve design intent, and help bring ideas to life with greater precision and care.

Packaging remains one of the most tangible ways brands connect with people. When creativity and production work in harmony, designers can spend less time troubleshooting and more time doing what they do best: creating.

My Assumption

Within the current packaging design workflow, there is a significant gap between creative design and production. Packaging designers often rely on disconnected tools and manual handoffs, which increase the likelihood of miscommunication, technical errors, and costly revisions late in the process.

Known:

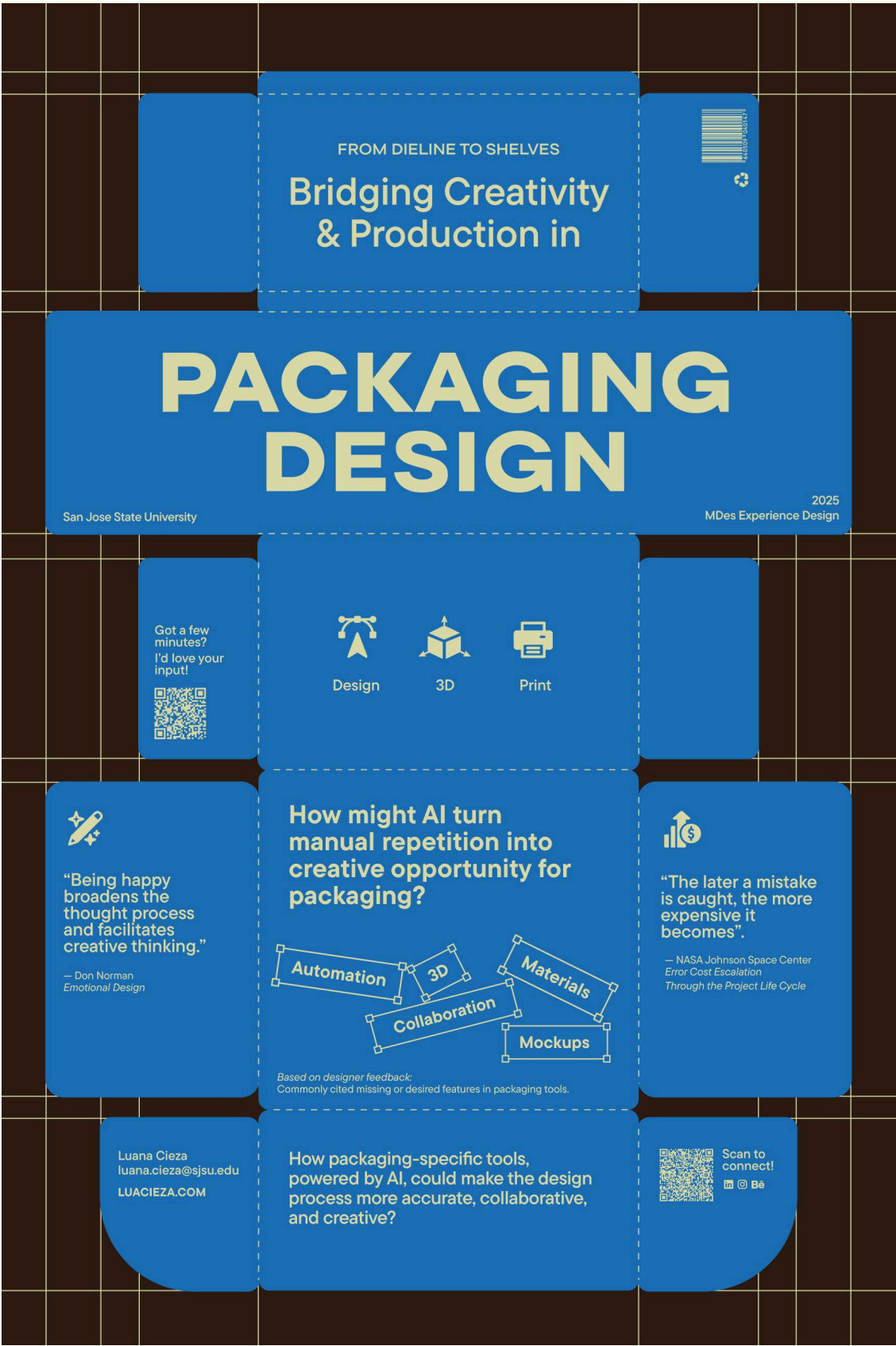
- Packaging design requires balancing creative intent with technical and manufacturing constraints.
- Designers, clients, and print suppliers often work in separate tools and workflows.
- Many production issues are only discovered during prototyping or prepress review.
- Errors identified late in the process can lead to delays, rework, and material waste.
- Emerging technologies such as AI and CAD can help automate validation and improve accuracy.

Unknown

- Which production issues create the most friction and misunderstandings for packaging designers.
- How designers prefer to receive technical feedback without disrupting creativity.
- What features would most effectively bridge 2D design and 3D visualization.
- How AI can provide useful guidance and automation while preserving creative control.
- Whether an integrated workflow can reduce troubleshooting and increase confidence before production.

“Understanding how a 2D design will behave when folded is often left to trial and error, which can be time-consuming and material-intensive.”

Amanda Paige. Rapid Design and Simulation of Functional Digital Materials. Master’s thesis, Massachusetts Institute of Technology, 2016



This poster represents my earliest research efforts, which were mostly literature reviews, in October 2025 at the SJSU/Adobe In Process event.

Project Territory

My thesis project explores how packaging design can be improved by strengthening the connection between creative intent, good communication between stakeholders, and technical knowledge. Inspired by Charles Eames’s What Is Design? framework, this model identifies the key elements that must work together to achieve an ideal packaging outcome.

Together, these elements help ensure that the final package accurately reflects the designer’s original vision while meeting the practical demands of production.

Main Concepts

Design Intent

Design intent refers to the purpose and creative vision that guide a design solution. In packaging, this includes visual aesthetics, brand expression, user experience, and the emotional message the package is meant to convey. Preserving design intent throughout production is essential to ensuring that the final package reflects the vision rather than a compromised version of it.

Communication

Communication is the process of translating design decisions into a shared understanding among all stakeholders, including clients, designers, print suppliers, and, in some cases, management teams. In packaging design, clear communication is essential to prevent misunderstandings, delays, and costly revisions while ensuring alignment between creative goals and technical requirements.

Technical Knowledge

Technical knowledge encompasses an understanding of materials, structural engineering, print specifications, color management, manufacturing methods, and production constraints. This expertise enables designers to make informed decisions and anticipate how creative ideas will translate into physical form. Without sufficient technical knowledge, design concepts may prove difficult or impossible to manufacture as intended.

Secondary Concepts

Collaboration

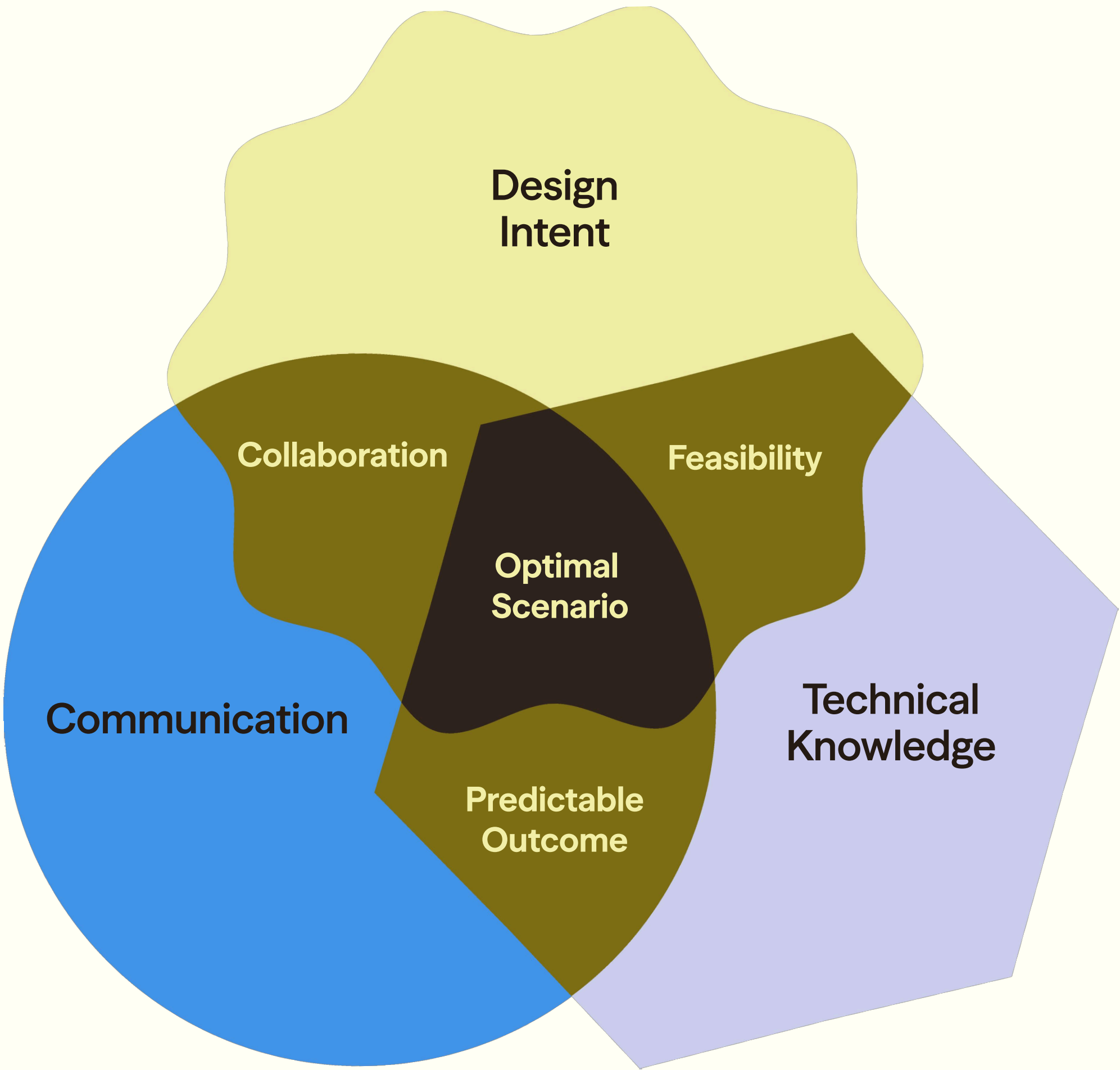
Collaboration is the active coordination of stakeholders working toward a shared outcome. Strong collaboration reduces friction, surfaces issues earlier, and helps preserve both design quality and production efficiency.

Feasibility

Feasibility refers to the extent to which a design can be manufactured successfully within technical, material, budget, and time constraints. A feasible design maintains its core intent while accounting for real-world production requirements.

Predictable Outcome

A predictable outcome is the ability to anticipate how the final package will appear and perform before it is manufactured. This includes confidence in structural integrity, print accuracy, assembly, and user experience.



Based on Charles Eames’S “What is Design?” framework

How can I help packaging designers spend less time troubleshooting and more time creating?

Calling Intention

My interest in this project began long before graduate school. As a packaging designer, I have spent years transforming ideas into physical objects that must look beautiful on screen and perform flawlessly in production. Time and again, I encountered the same frustrating pattern: designs that seemed finished were sent back due to technical issues, some misunderstanding with a supplier, or physical constraints that surfaced only at the final stages of the process.

I have experienced firsthand what it means to navigate packaging design both before and after the recent rise of artificial intelligence. While technology around us have evolved dramatically, the core challenges of the workflow have remained largely unchanged. Designers still spend significant time troubleshooting files, coordinating across disconnected systems, and resolving problems that could have been identified much earlier.

These experiences led me to question how technology might better support the packaging design process. Rather than replacing the designer, I believe artificial intelligence and computer-aided design (CAD) can reduce technical complexity gaps, improve collaboration, and help teams and designers move from concept to production with greater confidence.

At the same time, I recognized that my own experience could bias how I understood the problem. To challenge my assumptions, To challenge my assumptions, I began exploring whether these frustrations were shared by others across the industry and how emerging technologies could help address them.

This thesis is the result of that exploration and of a belief that technology should close that gap between creativity and production i packaging design.

30%

more time is spent on production fixes instead of creative work

2026 Esko Industry Report:
“Packaging at Scale”

“Being happy , broadens the thought process and facilitates creative thinking”.

— Don Norman, *Emotional Design*

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03. Research

Literature Review

My literature review explored packaging design from multiple perspectives, including structural engineering, print production, sustainability, prototyping, and emerging technologies. I reviewed academic papers, industry publications, and foundational books to better understand where breakdowns occur in the packaging workflow and how technology might help address them.

Several sources confirmed that packaging design is inherently interdisciplinary. Klimchuk and Krasovec describe packaging as a process that must balance branding, usability, manufacturing, and consumer behavior.¹ McCue emphasizes that even strong design concepts can fail if technical production details are overlooked.² Together, these sources reinforced that successful packaging depends not only on visual creativity, but also on technical precision and collaboration across disciplines.

Research on prototyping and simulation highlighted a recurring challenge: understanding how a flat design will behave once folded into a three-dimensional structure. Ghassaei notes that this process is often left to trial and error, making early exploration both time-consuming and material-intensive.³ Her work on computational origami and interactive simulation demonstrated how digital tools can help designers move seamlessly between 2D & 3D, increasing confidence before concepts are produced.

Additional studies emphasized the importance of collaboration and communication. Industry articles and production guides consistently stressed that clear dialogue between designers and print suppliers is essential to reduce costly revisions and ensure that design intent is preserved throughout production.⁴ These findings aligned closely with my own professional experience in packaging design.

Finally, several sources pointed to a broader opportunity for emerging technologies. Tools such as Adobe Fantastic Fold and sustainability decision-support systems suggest that automation and simulation can reduce technical friction without replacing the designer’s role.⁵ Rather than taking over creative decisions, these tools can help designers navigate complexity more efficiently and focus on what they do best: creating.

Taken together, the literature confirmed that many of the frustrations I had experienced are systemic rather than individual. It also revealed a clear opportunity to develop tools that bridge creativity and production, simplify technical complexity, and strengthen collaboration across the packaging design process.



Overview of color models, opacity, and print production concepts, reproduced from Claudia McCue, Print Production: A Complete Guide to Planning, Printing and Packaging, 52–53.

1. Marianne R. Klimchuk and Sandra A. Krasovec, *Packaging Design: Successful Product Branding from Concept to Shelf*, 2nd ed. (Hoboken, NJ: Wiley, 2012).
2. Claudia McCue, *Print Production: A Complete Guide to Planning, Printing and Packaging* (London: Bloomsbury Visual Arts, 2022).
3. Amanda Paige Ghassaei, *Rapid Design and Simulation of Functional Digital Materials* (Master's thesis, Massachusetts Institute of Technology, 2016).
4. Michael John and Jason Troutman, “Better Together: Restoring Order in the Packaging Design & Print World,” Flexographic Technical Association, June 8, 2018; Elizabeth Gooding and Mary Schilling, “Prepped for Print: What to Consider When Packaging Design Files for Production,” Dots & Pixels.
5. Theresa Christine Johnson, “Could Adobe’s Fantastic Fold Be the Future of Package Design?” *The Dieline*, December 12, 2018; Elisabeth Pauer et al., “A Preliminary Decision-Making Tool for Sustainable Packaging Design,” *Landscape and Urban Planning* 245 (2024): 104672.

Interviews

To ensure this project was grounded in real industry needs rather than my own assumptions, I conducted a series of interviews and research activities with professionals and students across the packaging design ecosystem. Participants included packaging designers, print and production specialists, design educators, industry leaders, and design students. Together, they represented a wide range of perspectives, from early-career practitioners to highly experienced experts working in the United States and internationally.

The research combined both qualitative and quantitative methods to uncover not only what participants said, but also how they prioritized challenges and evaluated potential solutions. Qualitative methods helped reveal behaviors, frustrations, emotions, and unmet needs, while quantitative exercises made it possible to identify recurring patterns and compare responses across participants during the design process.

Qualitative Methodologies

- **Semi-Structured Interviews**
Guided conversations that explored participants' workflows, pain points, and experiences working across design and production.
- **Co-Creation Card Sorting**
Collaborative exercises used to organize concepts, surface priorities during the design process, and uncover relationships between key ideas.
- **Wheel of Emotions**
A reflective tool that helped participants articulate how different specific stages of the packaging design process made them feel.
- **Empathy Mapping (Says, Thinks, Does, Feels)**
A synthesis framework used to organize interview insights into observable actions, underlying thoughts, and emotional responses.

Quantitative Methodologies

- **Priority Ranking Tasks**
Participants ranked pain points, features, and design criteria according to importance.
- **5-Point Likert Scale**
Structured rating questions used to measure levels of agreement and perceived significance.
- **A/B Testing**
Comparative evaluations of alternative concepts and interface directions to understand participant preferences.
- **Frequency Analysis**
Counting recurring themes and pain points.
- **Task Timing and Severity Scoring**
Measuring time spent on production tasks and rating the impact of workflow challenges.

25 Participants

10

Main Users

PACKAGING DESIGNERS

5

Power Users

DESIGN EDUCATORS & LEADERS

4

Extreme Users

DESIGN STUDENTS

5

SME

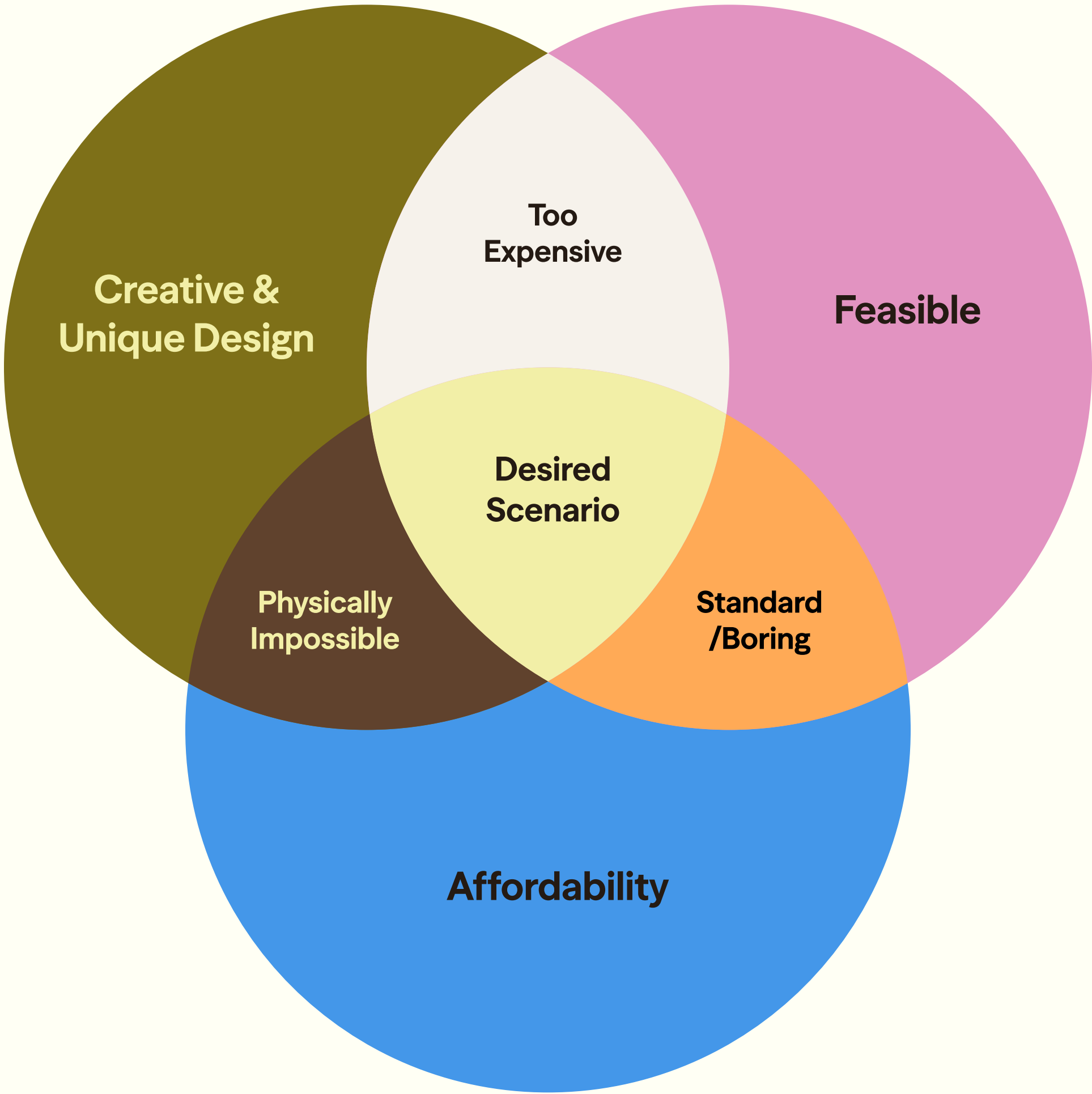
PACKAGING & PRINT EXPERTS

The Ideal Scenario

One of the clearest findings from my research was that packaging design is a constant balancing act between three competing priorities: creative differentiation, technical feasibility, and cost. Designers are expected to create packaging that feels distinctive and memorable, while also ensuring that it can be manufactured reliably and produced within budget.

When one of these factors is prioritized at the expense of the others, trade-offs quickly emerge. Highly original structures may be too complex or expensive to produce. Solutions optimized for manufacturing can become generic and uninspiring. Designs driven solely by cost may sacrifice both innovation and brand impact.

The most successful packaging solutions exist at the intersection of all three. They are visually compelling, technically sound, and economically viable. This “desired scenario” became a guiding principle throughout the project. At this stage of the research, I was not sure what the final solution would look like, but it was clear that any successful outcome would need to help designers and teams involved balance creativity, feasibility, and cost. This insight established the criteria that later guided all subsequent concepts and design decisions.



Author's visual framework based on primary research interviews and literature on packaging design, structural feasibility, print production, and cost considerations.

Stakeholders



Designers (Design Team)

Packaging designers are responsible for translating brand strategy, product requirements, and consumer expectations into physical structures that are both visually compelling and technically viable.⁶ Their work spans structural concepts, graphic design, material selection, and file preparation for production.⁷ Research shows that designers often spend a significant portion of their time troubleshooting technical issues, coordinating with suppliers, and revising files rather than focusing exclusively on creative exploration. Because they operate at the intersection of aesthetics, usability, and manufacturing, designers play a central role in shaping both the customer experience and the feasibility of the final package.



Clients (or Brand and Marketing Team)

Clients define the strategic and business objectives that guide the packaging process.⁶ This group may include brand managers, marketers, product developers, and company leadership. They are responsible for setting goals, approving concepts, managing budgets, and ensuring that packaging aligns with broader market requirements. Their decisions influence timelines, priorities, and the balance between creativity, manufacturability, and cost. Effective collaboration with clients is essential to ensure that the final package meets both business objectives and production realities.¹⁰



Print Suppliers (Production Team)

Print suppliers transform design files into manufacturable products.⁷ Their responsibilities include prepress review, structural validation, proofing, material selection, color management, and final production. They are often the first to identify issues such as missing fonts, incorrect dielines, insufficient bleed, or technical constraints that could lead to costly delays or production errors.⁸ Industry literature emphasizes that close collaboration between designers and printers reduces revisions, improves efficiency, and helps preserve design intent throughout manufacturing.⁹

6. Klimchuk, Marianne R., and Sandra A. Krasovec. Packaging Design: Successful Product Branding from Concept to Shelf. 2nd ed. Hoboken, NJ: Wiley, 2012.

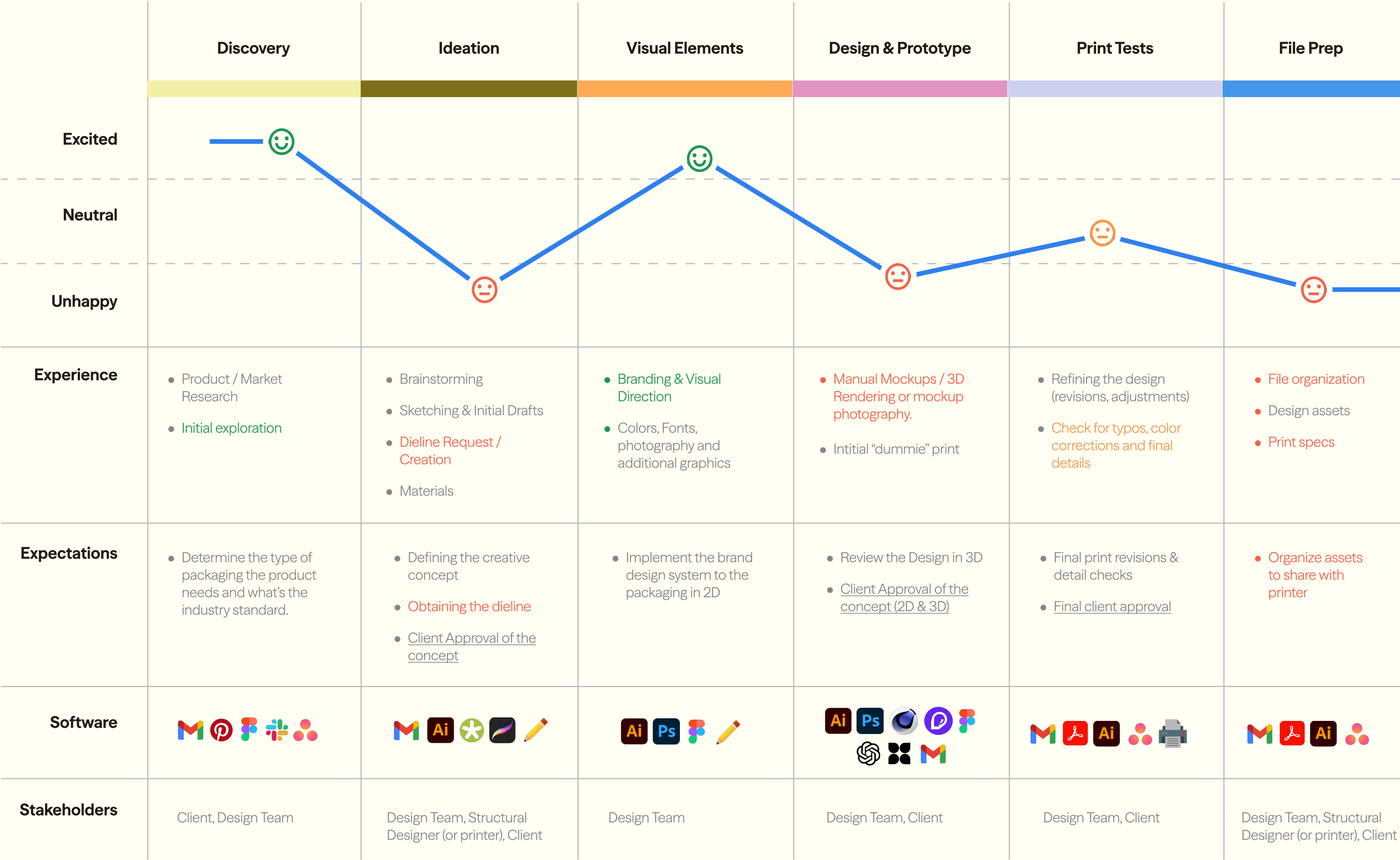
7. McCue, Claudia. Print Production: A Complete Guide to Planning, Printing and Packaging. London: Bloomsbury Visual Arts, 2022.

8. Gooding, Elizabeth, and Mary Schilling. "Prepped for Print: What to Consider When Packaging Design Files for Production." Dots & Pixels. Accessed May 5, 2025.

9. John, Michael, and Jason Troutman. "Better Together: Restoring Order in the Packaging Design & Print World." Flexographic Technical Association, June 8, 2018.

10. Stewart, Bill. Packaging Design Strategy. 3rd ed. Boca Raton, FL: CRC Press, 2019.

Journey Map



The Current Process

To better understand where friction occurs, I mapped the packaging design process from initial discovery through final file preparation. While the early stages are often energizing and highly creative, the experience becomes more challenging as technical requirements, prototyping, and production constraints enter the workflow. Designers must coordinate with clients and print suppliers, move between multiple software tools, and repeatedly verify that creative ideas remain feasible and cost-effective. This journey map highlights how the process shifts from open-ended exploration to increasingly detailed production work, revealing the moments where communication breakdowns, manual tasks, and technical troubleshooting are most likely to occur.

Main Themes

1. Software Limitations

Most participants agreed that existing design tools were not created specifically for packaging. While Adobe Illustrator remains the industry standard, designers described it as manual, rigid, and poorly suited for managing structural relationships between panels, folds, and artwork. Several participants expressed a desire for software that could automatically generate dielines, visualize designs in three dimensions, and provide more intuitive workflows similar to modern tools like Figma.

2. Structural Complexity

Packaging design requires balancing visual ideas with the physical realities of materials, folding mechanisms, and manufacturing constraints. Participants explained that even small changes to one part of a dieline can affect the entire structure, leading to unexpected issues such as misaligned flaps or boxes that no longer close properly. This complexity makes structural design one of the most technically demanding aspects of the process.

3. Mockups as Communication Tools

Mockups play a critical role in helping clients and stakeholders understand and approve packaging concepts. Designers consistently noted that realistic visualizations are often what “sell the idea,” especially when presenting new structures or premium finishes. However, creating these mockups is time-intensive and frequently requires switching between multiple tools and manual techniques to achieve convincing results.

“Packaging needs a more sophisticated software”



“Illustrator does not perform adequately for packaging”



“Illustrator is clunky. I wish it behaved more like Figma.”



① Software Limitations

“Changing one flap can create a whole domino effect.”



“Sometimes the concept is either impossible or too expensive to produce”



“You adjust one side of the dieline, and then it affects how the box closes. Suddenly the box won’t close.”



② Structural Complexity

“I spend way too much time on mockups because they usually sell the idea.”



“Visualizing how finishes will actually look like is one of the hardest things”



“You adjust one side of the dieline, and then it affects how the box closes. Suddenly the box won’t close.”



③ Mockups as Communication Tools

Main Themes

4. File Preparation Issues

A significant number of production problems stem from avoidable file setup mistakes rather than design decisions themselves. Participants cited issues such as missing fonts, incorrect dimensions, improperly labeled layers, and unresolved color inconsistencies. These technical errors often go unnoticed until late in the process, resulting in delays, rework, and additional production costs.

5. Communication & Collaboration

Packaging projects involve close coordination among designers, clients, print suppliers, and, in some cases, engineers and product teams. Participants emphasized that unclear expectations, fragmented communication, and indirect feedback loops frequently lead to misunderstandings and costly revisions. Successful projects depend on all stakeholders sharing accurate information and maintaining alignment throughout the process.

6. Physical Prototypes & Real-World Testing

Despite advances in digital visualization, physical prototypes remain essential for evaluating structure, scale, and overall user experience. Designers and print specialists described printing, cutting, and assembling mockups to confirm that packaging performs as intended in the real world. Holding the package in hand provides insights that are difficult to capture through digital tools alone, making prototypes a critical step before production.

“Most challenges are artwork-related: size, resolution, or missing fonts.”



MATT, PREPRESS
MANAGER

“Your file should be so clear that the printer understands it instantly.”



DAVID HOPKINS, FOUNDER
OF PRINT DESIGN ACADEMY

🕒 File Preparation Issues

Sometimes the client handles supplier communication, creating a telephone game.”



SARA, DESIGNER AND
STUDIO OWNER

“The client, designer, and printer all need to be aligned.”



DANIELA, PACKAGING
DESIGNER

“Building relationships with printers always improves the outcome.”



DAVID HOPKINS, FOUNDER
OF PRINT DESIGN ACADEMY

🗨️ Communication & Collaboration

“I print and fold the dielines myself. first”



MICHELLE, CREATIVE
DIRECTOR AND CONSULTANT

“If you didn’t print it out and assemble it, you missed a huge learning opportunity.”



DAVID HOPKINS, FOUNDER
OF PRINT DESIGN ACADEMY

“A physical prototype legitimizes the design.”



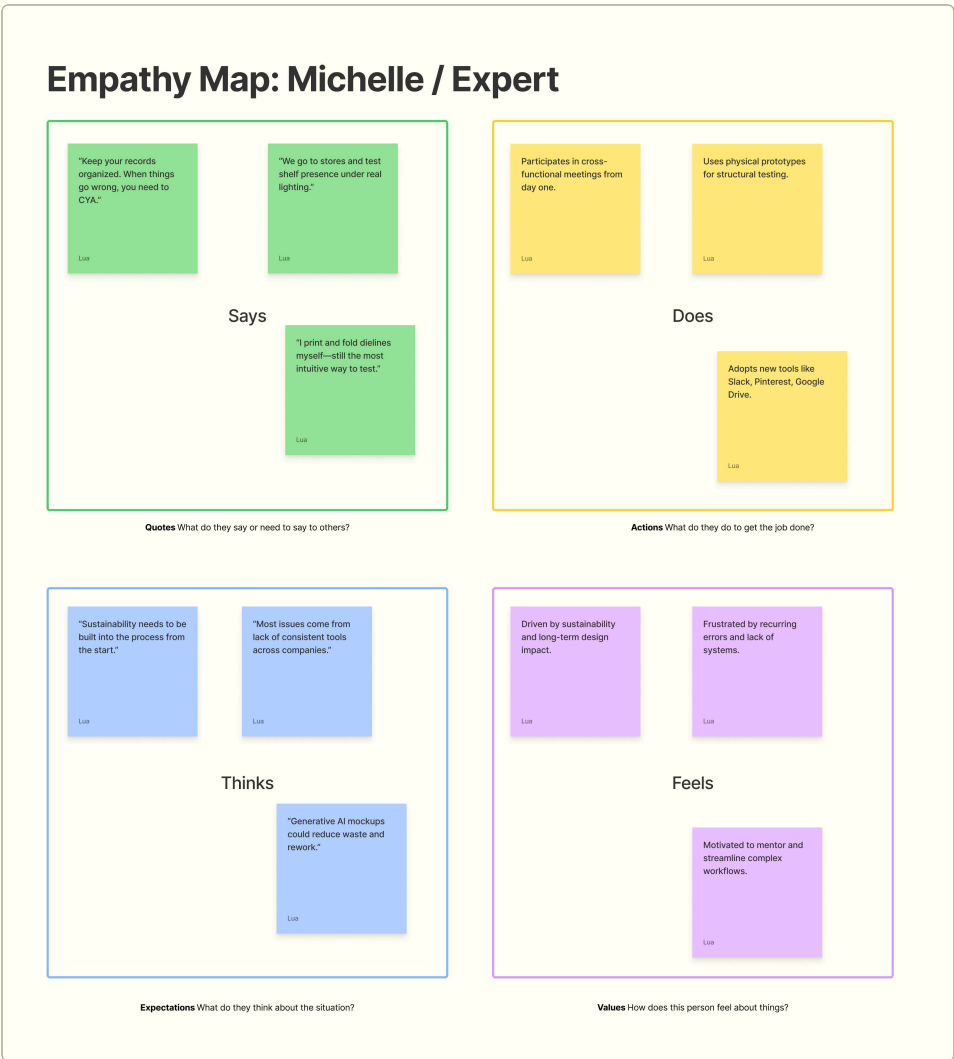
HEATHER, CREATIVE
DIRECTOR

📦 Physical Prototypes and Real World Testing

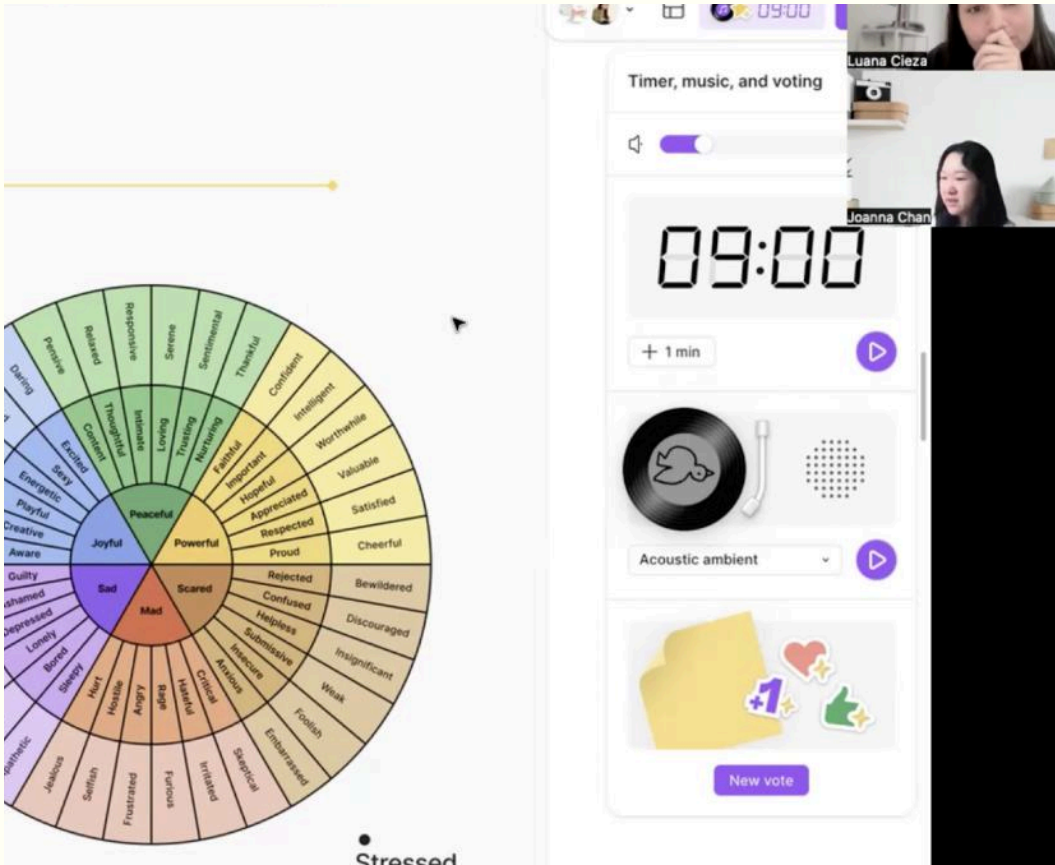
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04. Analysis & Synthesis

Making Sense of the Data



Empathy Map: Organizing interview insights into what participants said, thought, did, and felt.

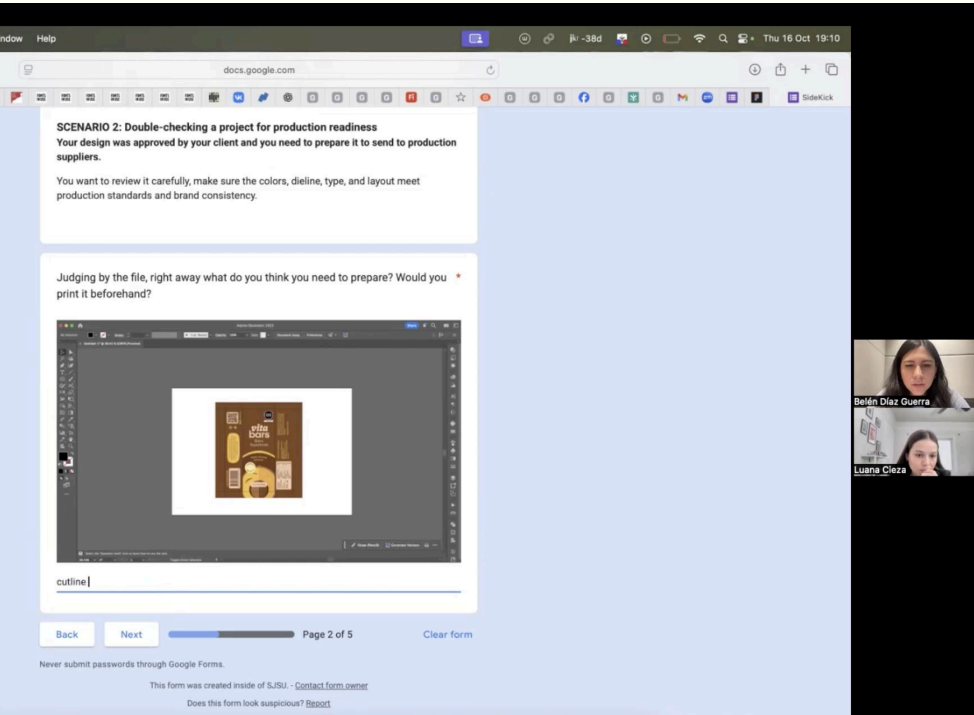


Wheel of Emotions: Capturing participants' emotional responses throughout the packaging design process.

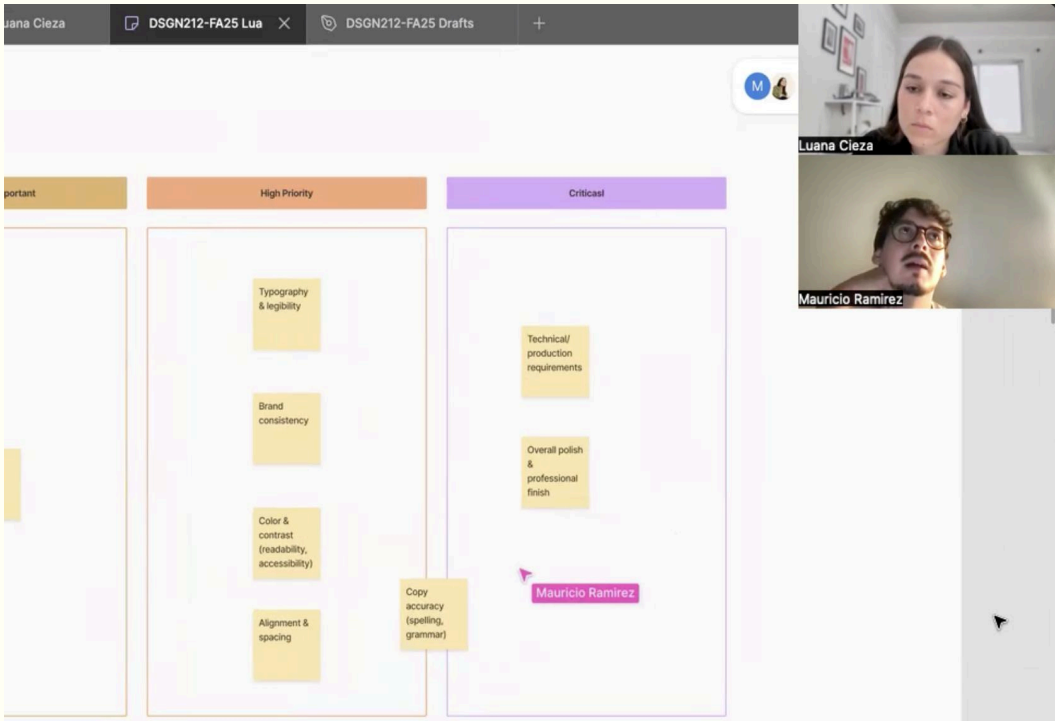
This section translates the research into the key insights that shaped the direction of the project. By analyzing interviews, surveys, and co-creation activities, I identified recurring patterns across the packaging design process, including where most time is spent, where errors often occur, and which needs remain overlooked by current tools.

The findings revealed recurring points of friction throughout the packaging design process, particularly during the stages that required collaboration between two or more teams. As projects become more technical and involve additional stakeholders, designers must navigate increasing complexity while preserving the original design intent. Participants consistently described opportunities for tools that could reduce manual work, improve communication, and provide greater confidence throughout the workflow.

Together, these insights clarified the core opportunity for the project and established the design criteria that guided the concepts that followed, eventually shaping the development of Paradox.



Survey Activities: Ranking and rating exercises used to quantify common pain points.

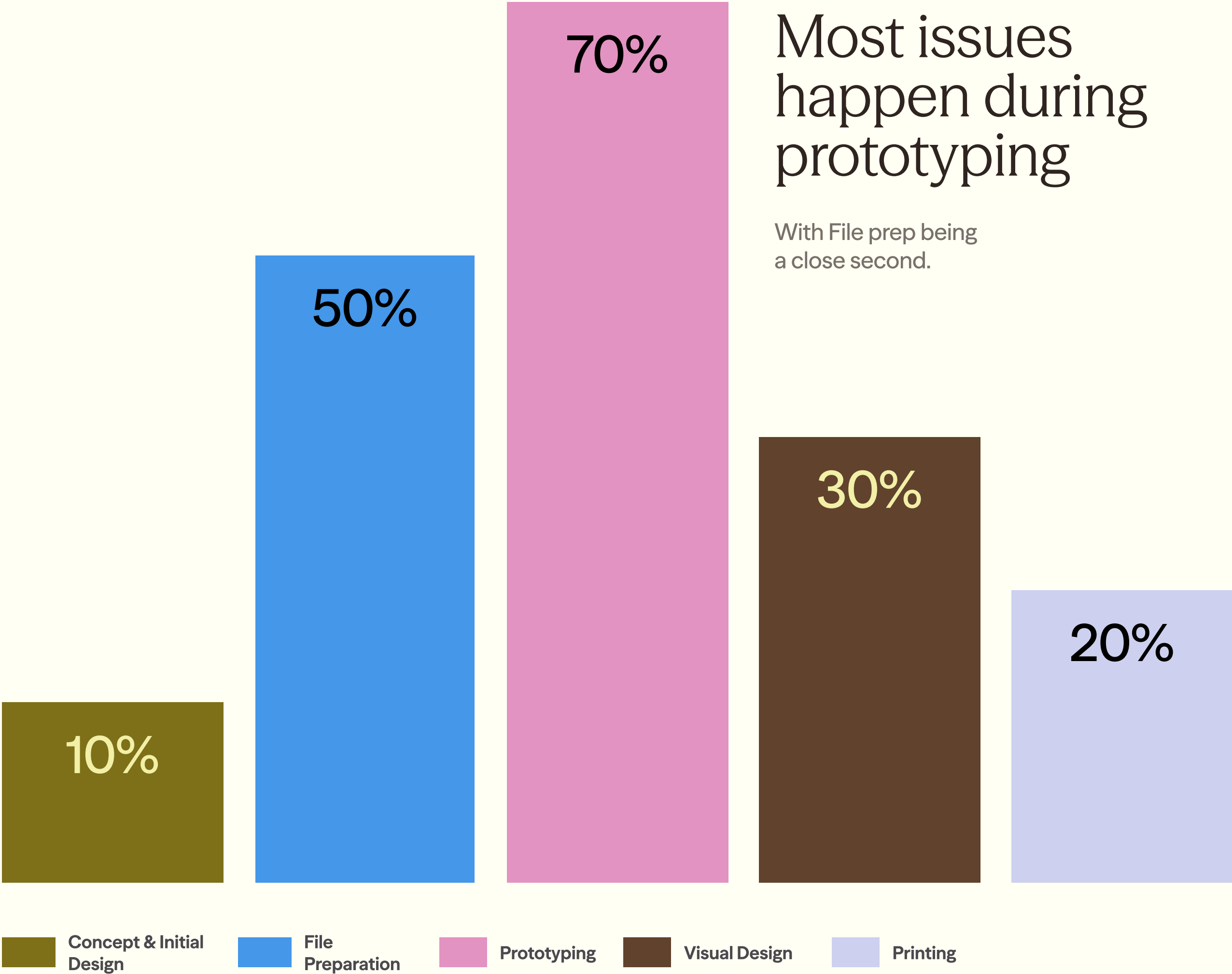


Affinity Mapping: Grouping research findings into recurring themes and insights.

Where Issues Occur Most Often

Survey participants identified prototyping and file preparation as the stages where errors, rework, and technical challenges occur most frequently.

One of the clearest findings from the quantitative survey was that issues are not evenly distributed across the packaging design process. While early concept development tends to be more exploratory, technical challenges become more frequent as projects move into prototyping and production preparation. Participants reported that prototyping is where structural assumptions are tested and where many feasibility issues first surface. File preparation emerged as a close second, with common problems related to artwork setup, missing assets, and production specifications. Together, these stages represent critical points where creative ideas are translated into manufacturable outcomes, making them key opportunities for improvement.

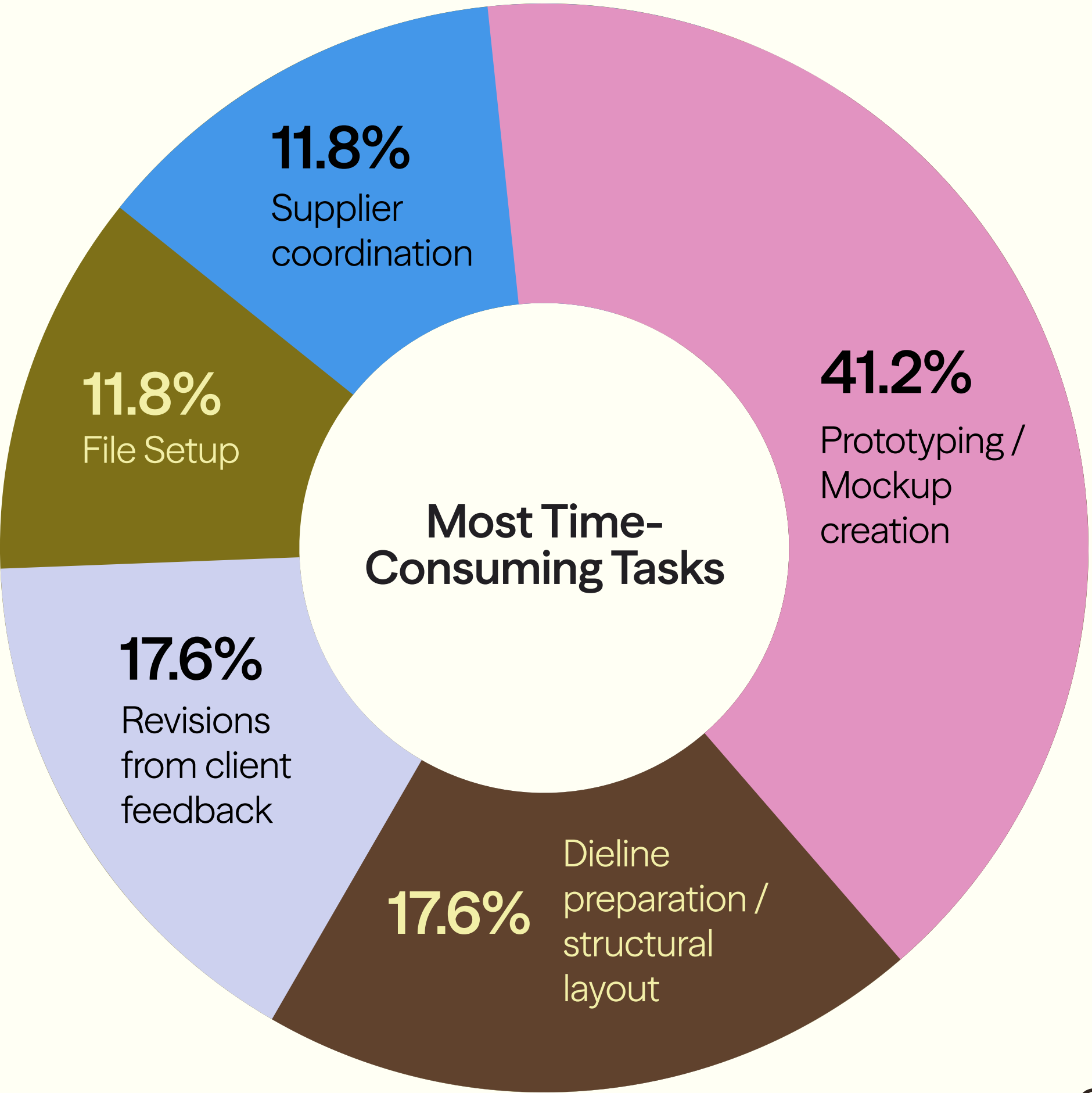


Survey responses indicating the stages of the packaging design process where participants most frequently encounter errors, rework, and technical challenges.

Where Is Time Spent in the Process?

The most time-consuming tasks are concentrated around prototyping, structural setup, and revisions.

When participants were asked which parts of the packaging design process consume the most time, one stage stood out clearly: prototyping and mockup creation. Designers explained that mockups are essential for communicating ideas to clients and evaluating how a package will look in the real world, but producing them often requires significant manual effort. Dieline preparation and structural layout were also identified as major time investments, particularly when dimensions, folds, and product requirements need to be adjusted repeatedly. Together, these findings show that a substantial portion of the process is spent translating creative ideas into realistic, production-ready representations.

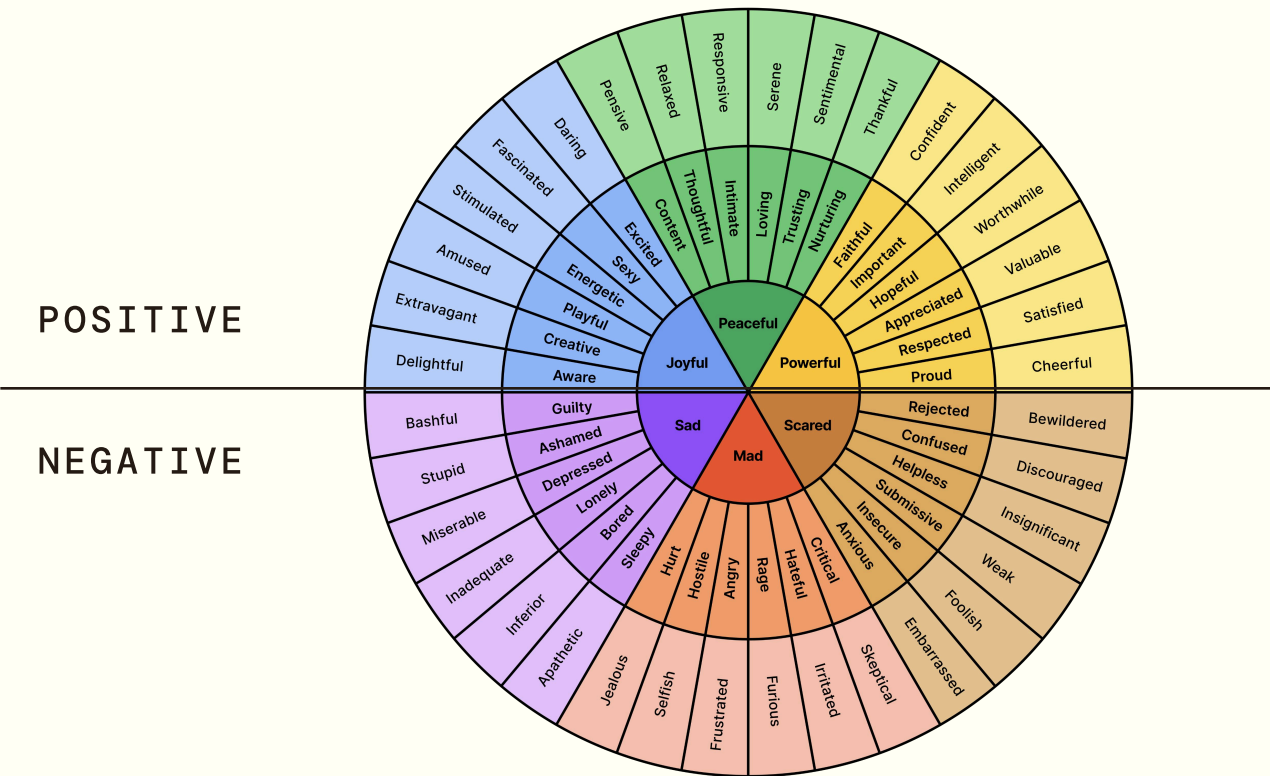


Mockups are the most time-consuming task

Survey responses highlighting the tasks participants identified as the most time-consuming throughout the packaging design process.

Top Insight #1

Dielines,file-prep & mockups
are the choke points



Dielines & Technical
Production

Designing the structural dieline is where many participants experienced the greatest technical **stress**. Small adjustments to one panel can affect folds, tabs, and how the package closes, creating ripple effects across the entire structure. Participants described this stage as **mentally demanding**, often associated with **stress, frustration, and uncertainty**, especially when they lacked confidence in the mechanical aspects of packaging.

“The mechanical plans stress me out... but I feel relief once I don’t have to do them myself.”

-Daniela, Packaging Designer

Deadlines &
File Prep

As projects approach production, attention shifts from creative exploration to technical accuracy. Participants described this stage as **a source of anxiety** because they must verify every detail, including fonts, bleeds, color settings, and layer organization, before releasing files to print. Under tight deadlines, the **fear of overlooking** a small but critical mistake creates **a strong sense of urgency and overwhelm** for the designer responsible.

“When the deadline is coming up, I panic about missing something technical right before production.”

- Mauricio Packaging Designer

Mockups &
Prototypes

Mockups and prototypes are essential for communicating ideas and securing client approval, but they also represent one of the most time-consuming parts of the process. Designers often spend many hours building realistic presentations to help others visualize the final package. While highly valuable, this stage was frequently associated with **anxiety and overwhelm** because it requires **significant effort** before a concept is fully validated.

“I spend way too much time on mockups because they usually sell the idea to my clients”.

-Tais, Packaging Designer

Top Insight #2

Packaging designers crave
semi-automation

The benefits of automation,
without losing creative control

Participants were consistently enthusiastic about the idea of automation, but only when it was positioned as a supportive assistant rather than a replacement for their creative judgment. Designers expressed a strong desire for tools that could handle repetitive tasks, surface technical issues, and accelerate structural and production workflows, while still leaving all key design decisions in their hands. Rather than asking technology to generate solutions automatically, they wanted intelligent systems that provide guidance, reduce manual work, and increase confidence without taking over the creative process. This insight reinforced the importance of designing Paradox as a collaborative partner that amplifies the designer's expertise instead of replacing it.

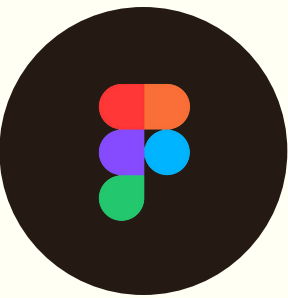
“I don’t want AI to design for me, if it points out the issue but lets me decide, that’s perfect, it helps without taking over.”



– ALEX, PACKAGING DESIGNER

Secondary Insights

Packaging designers crave semi-automation



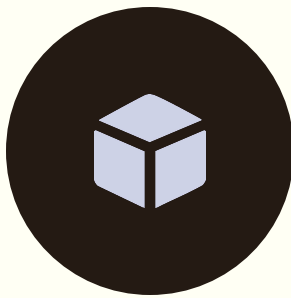
Familiar Tools, New Expectations

Many younger designers are beginning to use tools like Figma for packaging-related work because they are more intuitive, visual, and collaborative than traditional production software. This shift reflects a broader expectation that packaging tools should feel as approachable and flexible as modern design platforms while still supporting the technical requirements of print production.



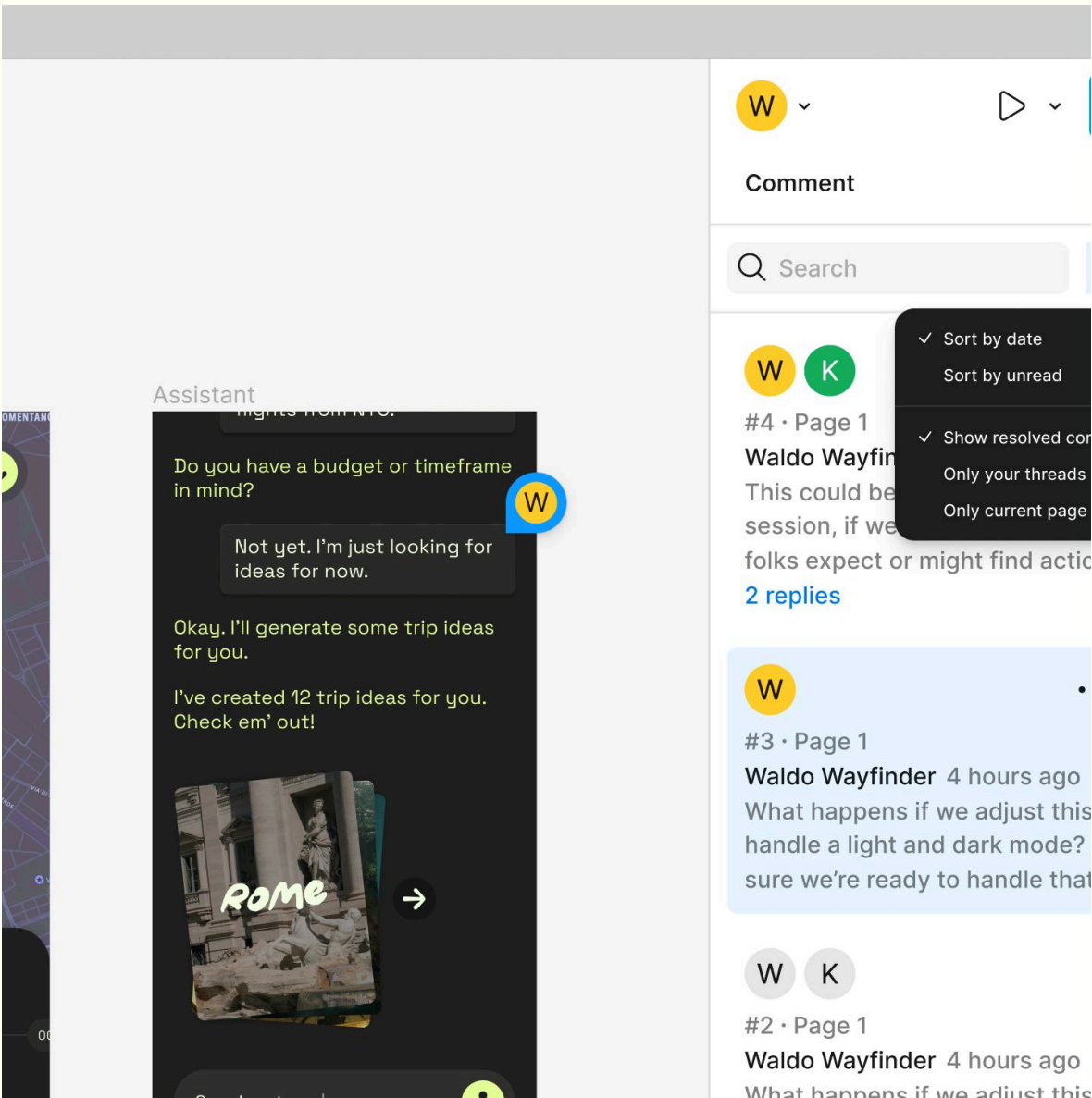
Better Collaboration Across Teams

Participants consistently described communication between designers, clients, and print suppliers as fragmented. Information is often shared through email threads, PDFs, and disconnected tools, increasing the risk of missed details and costly errors. More connected workflows could help keep all stakeholders aligned and reduce the friction caused by working in silos.



Physical Prototypes Still Matter

Despite advances in digital mockups and 3D visualization, physical prototypes remain an essential part of the process. Designers rely on printed and folded samples to evaluate scale, structure, materials, and overall feel before production. This highlights the importance of tools that complement, rather than replace, hands-on testing and real-world validation.



Figma commenting feature. Figma Laarn website.

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05. Design & Testing

Design Criteria

What The Tool Must Deliver

The insights gathered during research were translated into a set of design criteria that guided the development of Paradox. These criteria helped evaluate concepts and prioritize features based on what participants considered most important in a packaging design tool. While additional qualities such as collaboration and ease of learning were also valuable, three principles emerged as the most critical: compatibility with existing workflows, technical effectiveness, and efficiency. Together, these criteria ensured that the final solution would fit naturally into current processes, reduce costly errors, and save designers meaningful time.

1. Compatible

The tool must integrate smoothly with the software, file formats, and production workflows already used by designers and print suppliers. Rather than replacing existing tools, it should complement them and fit naturally into the broader packaging ecosystem.

2. Effective

The tool must be technically reliable and accurate. Because packaging errors can lead to expensive reprints and production delays, the system must provide trustworthy outputs and help designers identify issues before files are sent to print.

3. Efficient

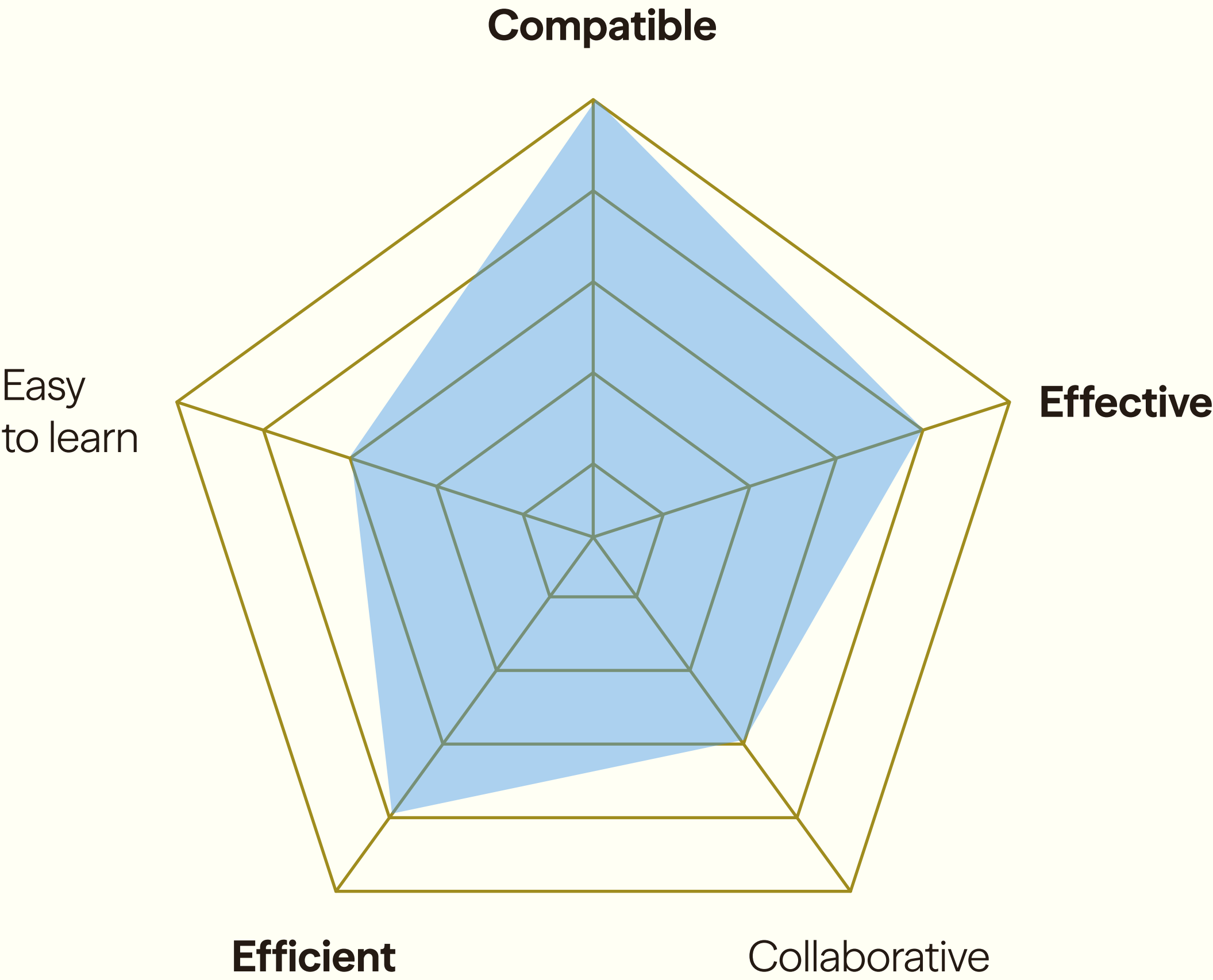
The tool must reduce repetitive work and accelerate time-consuming tasks such as dieline creation, mockup development, and file preparation. By minimizing manual effort, the tool allows designers to spend more time on creative thinking and less on troubleshooting.

4. Collaborative

The tool should improve communication between designers, clients, and print suppliers by making information easier to share, review, and validate throughout the process.

5. Easy to Learn

The interface should feel intuitive and approachable, enabling designers to adopt the tool quickly without extensive technical training.



Spider graph illustrating the relative weighting of the design criteria used to assess and prioritize design concepts throughout the project.

The Core Workflow Components

Why These Components Matter

My research revealed that the most significant opportunities for improvement were concentrated around three recurring workflow components: dieline creation, mockup development, and final file preparation. These activities consistently emerged as the most technically demanding, time-intensive, and error-prone stages of the packaging design process. Together, they formed the foundation for the design of Paradox and became the primary areas where the tool could deliver meaningful value.

Although packaging design involves many integrated activities, three core components sit at the intersection of creativity and print production: dielines, mockups, and file preparation. Dielines define structure, mockups communicate intent, and file preparation ensures technical accuracy. By bringing these components into one unified system, Paradox reduces friction, improves collaboration, and helps designers spend less time troubleshooting and more time creating.

Dielines

Dielines define the structural blueprint of a package, including cut lines, fold lines, tabs, and assembly mechanisms. They translate conceptual ideas into precise technical specifications that can be manufactured reliably. Participants described this stage as one of the most challenging aspects of packaging design because even minor adjustments to dimensions or folds can affect how the entire package functions. In Paradox, this component focuses on simplifying structural creation, enabling designers to make and modify dielines with greater confidence while preserving full control over the design.



Dieline Packaging Artwork by Jack Henry

Mockups

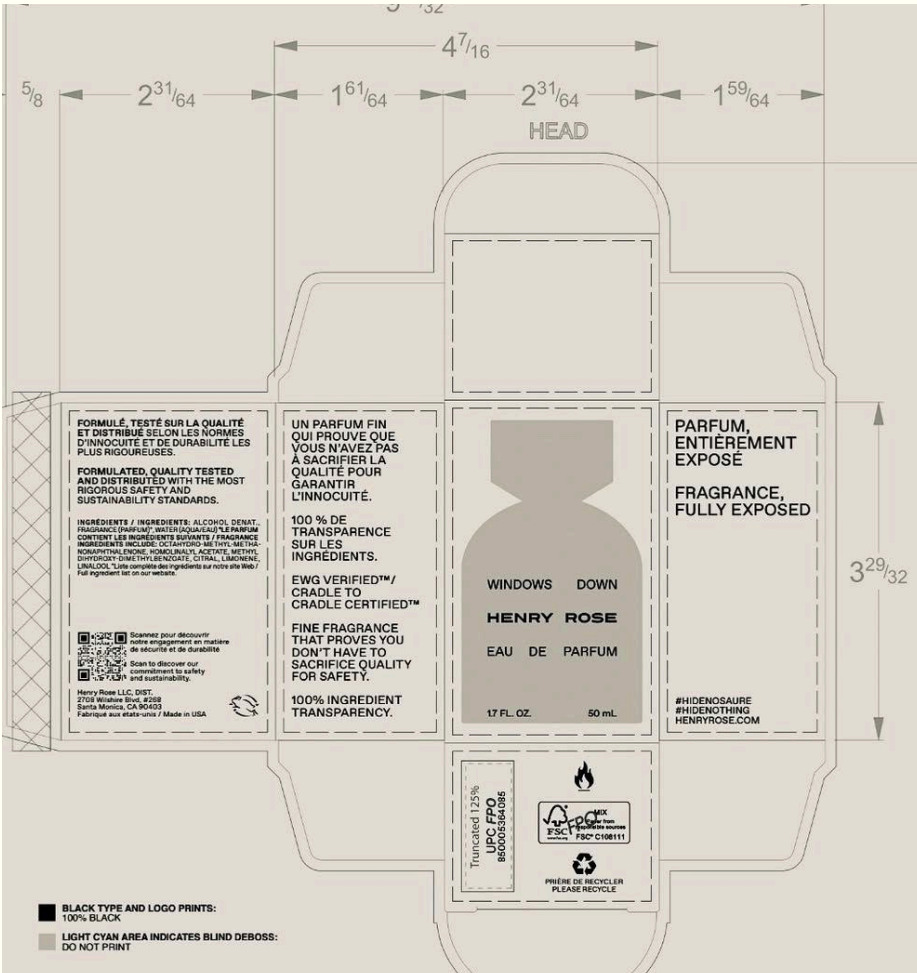
Mockups bridge the gap between two-dimensional artwork and the physical package. They allow designers and clients to visualize how graphics, color, and structure come together in three dimensions before production begins. Participants consistently identified mockup creation as the most time-consuming task, yet also one of the most essential for communicating ideas and securing approval. Paradox addresses this need by connecting the dieline directly to a live 3D representation, allowing users to preview and refine packaging in real time.



Packaging for Cottonball by Tiny Wins

File Preparation

File preparation is the final technical step before production. At this stage, designers must verify bleeds, color settings, fonts, image resolution, and layer organization to ensure files meet printer specifications. Participants described this phase as a source of anxiety because small mistakes can lead to costly delays or reprints. In Paradox, file preparation is supported through automated pre-flight checks that surface technical issues early and help designers export production-ready files with greater confidence.



Henry Rose Fragrance Packaging File

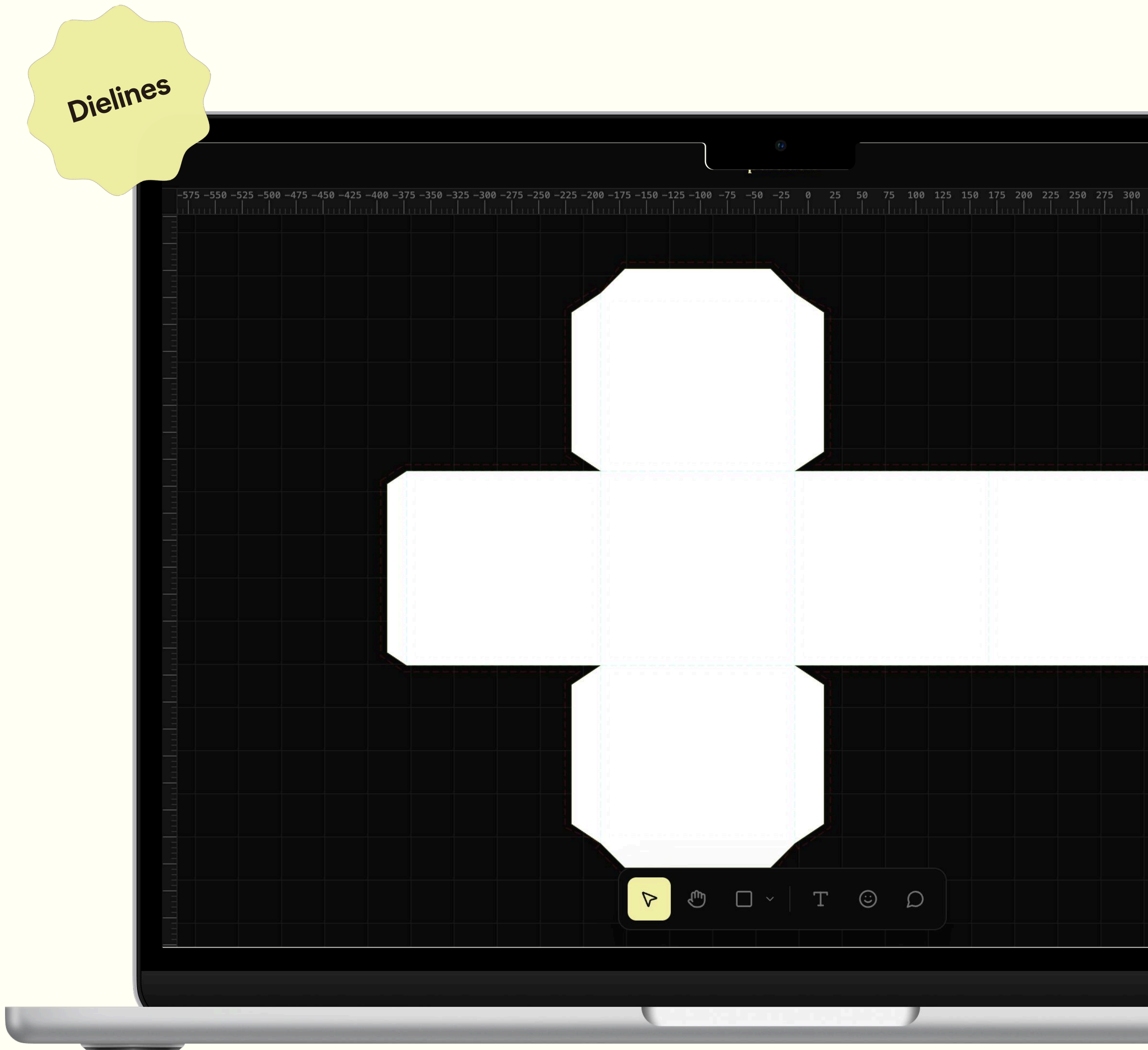
Main Features

1. Design Mode

From Idea to Execution

Design Mode is the foundation of Paradox and the place where packaging concepts begin to take shape. In this two-dimensional workspace, designers can easily create or import dielines, adjust structural dimensions, and apply artwork directly to each panel. By combining structural layout and visual design in a single environment, the mode reduces the need to switch between separate tools and keeps creative and technical decisions closely connected, however it also gives your the option of downloading your dieline to apply your design offline.

This mode is designed to feel familiar to designers while introducing a more streamlined and intuitive workflow. Tools for text, imagery, color, and comments are integrated directly into the workspace for effective feedback, allowing designers to iterate quickly while maintaining production accuracy. Design Mode transforms the dieline from a static template into an active design surface where ideas can be developed with confidence.



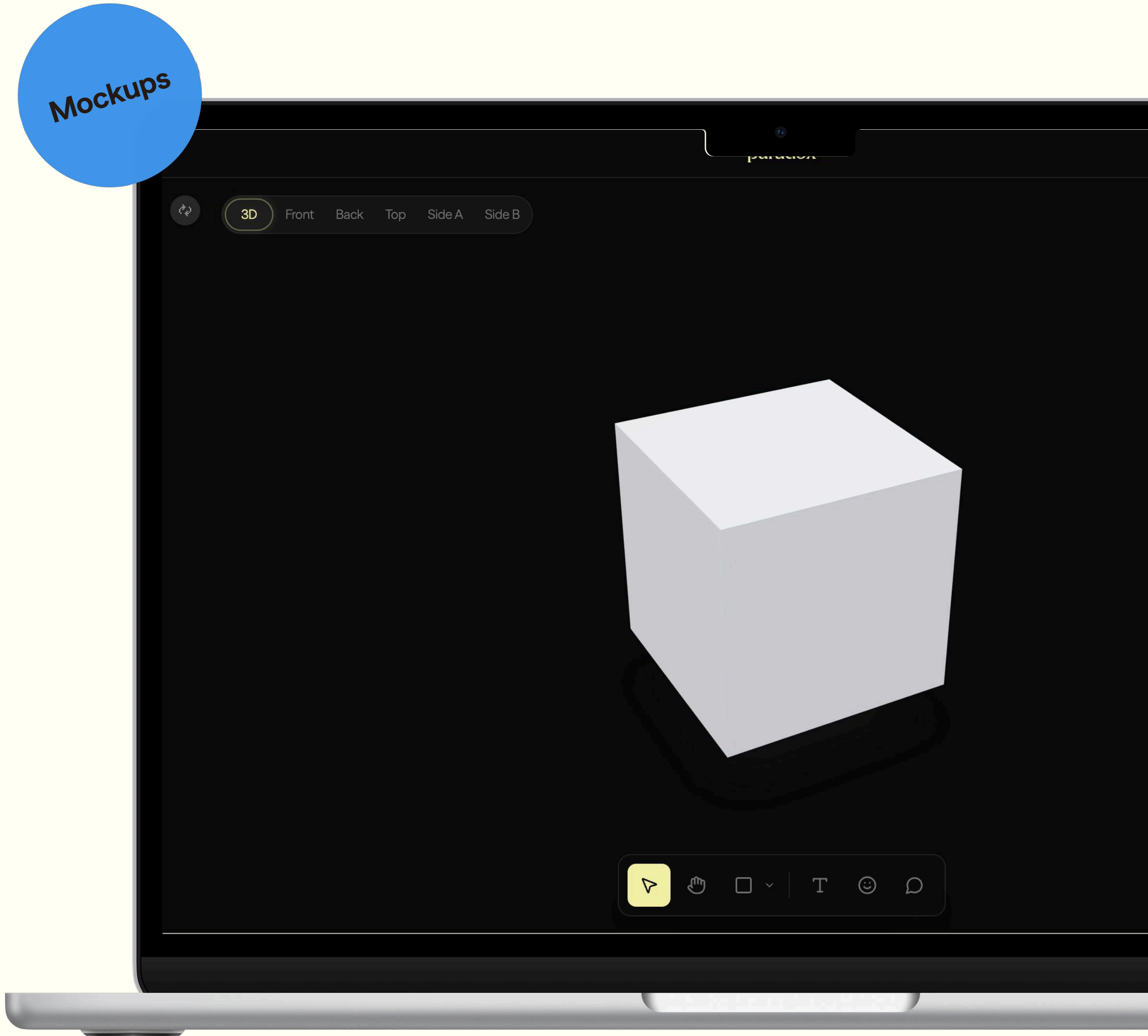
Main Features

2. Mockup Mode

Bringing Structures to Life

Mockup Mode converts the flat dieline into a fully assembled three-dimensional package in real time. Any changes made in Design Mode are immediately reflected on the 3D model, allowing designers to evaluate scale, panel alignment, and the overall visual impact of the package. This instant feedback helps to understand right away what is designed on screen and what will ultimately be produced and assembled.

Beyond visualization, Mockup Mode improves communication with clients and collaborators by making design intent easier to understand for other stakeholders. Designers can rotate the package, inspect details from multiple angles, and export the final model for augmented reality viewing. By turning technical layouts into realistic previews, this mode helps teams make decisions earlier and with greater confidence.



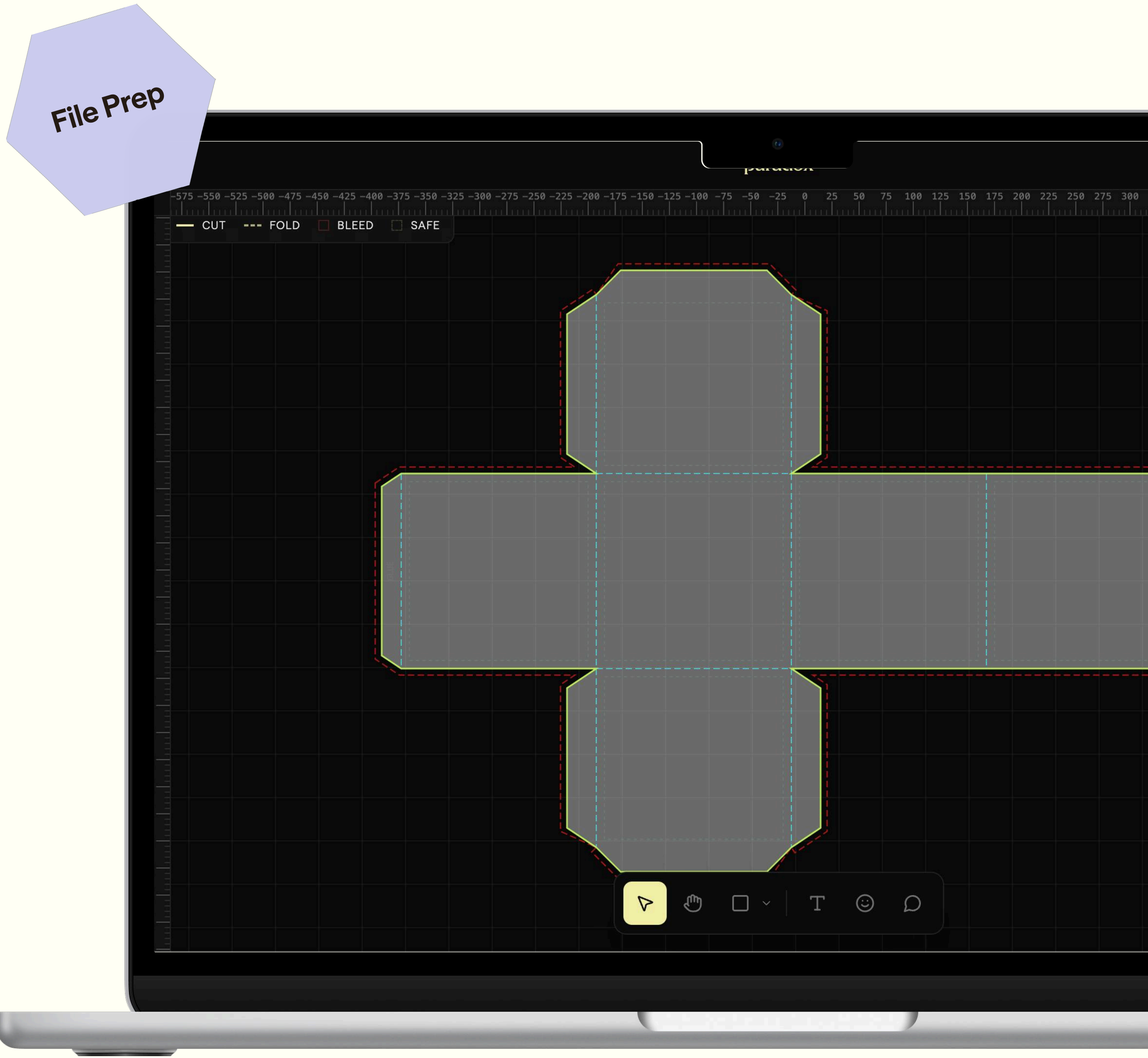
Main Features

3. Print Mode

Preparing for Production

Print Mode prepares the project for production by translating the design into a technically accurate, print-ready file. Here, designers can review cut lines, fold lines, bleed areas, and color specifications while ensuring that all required assets are correctly embedded. The interface emphasizes clarity, helping users verify critical details before sharing files with print suppliers.

A built-in pre-flight check scans the project for common issues such as missing fonts, low-resolution images, and inconsistent color settings. Rather than automatically changing the design, the system highlights potential problems and allows the designer to decide how to resolve them. Print Mode serves as the final layer of quality assurance, reducing costly errors and giving designers greater confidence before production.



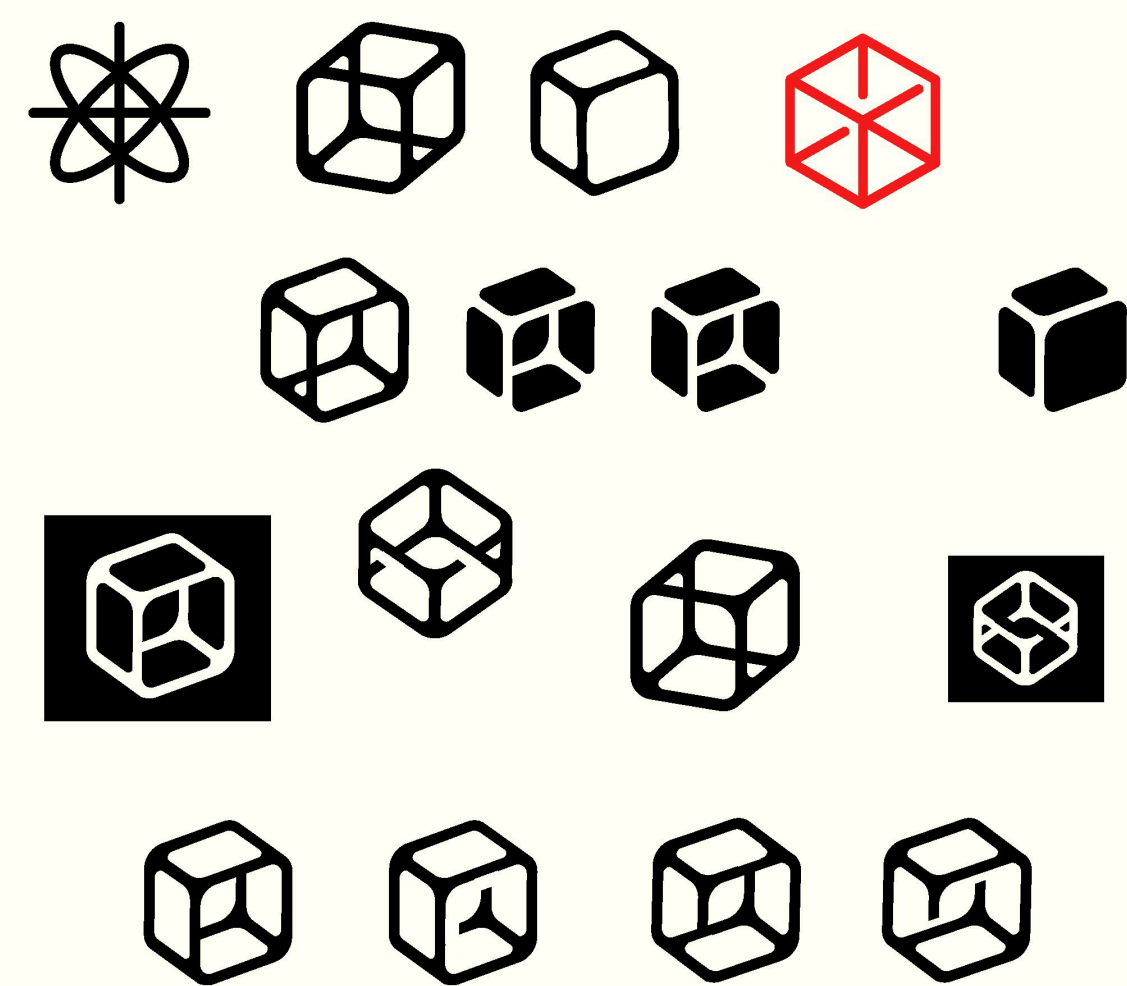
Visual Design
Process

A visual identity that reflects packaging, uncertainty, and transformation.

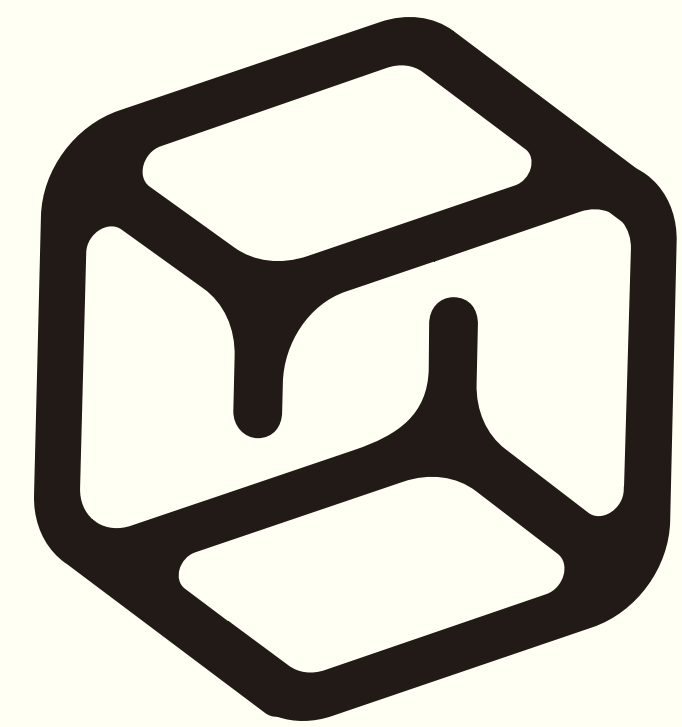
The identity for Paradox was developed through an iterative process that explored how to represent the central themes of the project: packaging, dimensional transformation, and the uncertainty that exists between concept and production. Early sketches investigated a wide range of geometric forms inspired by cubes, folding cartons, and optical illusions. Many of these concepts emphasized the transition between two-dimensional and three-dimensional space, reflecting the core functionality of the tool.

The final mark combines the outline of a cube with a fluid negative shape that suggests transformation and movement. This inner form evokes the moment when a flat structure folds into a finished package, while also referencing the idea of ambiguity and multiple possible states that inspired the project's name. The resulting symbol feels both technical and expressive, balancing precision with creativity.

The accompanying wordmark uses a high-contrast serif typeface to create a distinctive and contemporary presence. The contrast between the structured geometric icon and the more elegant typography reinforces the central concept behind Paradox: the meeting point between technical rigor and creative exploration.



Paradox logo explorations.



Paradox Final Brandmark

paradox

Paradox Final Wordmark

Visual Design Process

Typography System

The typography system for Paradox was designed to reflect the dual nature of the project: a tool rooted in technical accuracy while also supporting creative expression. The wordmark uses a high-contrast serif typeface that introduces personality and sophistication, giving the brand a distinctive and memorable presence. Its sharp transitions and refined details convey a sense of craftsmanship and intentionality.

For the interface and supporting materials, a modern sans-serif typeface provides clarity and readability across both digital and printed contexts. This contrast between serif and sans-serif mirrors the broader concept behind Paradox, where structured production requirements coexist with creative exploration. Together, the two type styles create a visual language that feels precise, contemporary, and approachable.

Labels

DM Mono - Medium

Headlines

Season Mix - Regular

Subheadlines

Season Sans Medium

Paragraphs

Season Sans Regular

Buttons

DM Mono - Medium

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Easy Packaging for Everyone

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CREATE FILE

Visual Design Process

Color Palette

The color palette was developed to reflect the central tension that inspired Paradox: the coexistence of creative freedom and technical rigor. A deep brown serves as the primary background color, creating a calm and focused environment that reduces visual fatigue during long design sessions. Warm cream tones add softness and readability, while bright accent colors, including blue, olive, and lavender, highlight key features and distinguish the platform's core workflow components.

Each accent color is intentionally assigned to one of the three primary components of the packaging process: dielines, mockups, and file preparation. This system reinforces the conceptual structure of the tool while helping users quickly recognize different modes and functions. Together, the palette balances warmth and clarity, giving Paradox a visual identity that feels both sophisticated and highly functional.



MDes Gallery Exhibit



At the MDes Gallery Exhibit Installation



At the MDes Gallery Exhibit Installation

Transforming research into an interactive experience.

The MDes Gallery Exhibit translated Paradox from a digital prototype into a hands-on public installation. Rather than presenting the project as a static concept, the exhibit invited visitors to engage directly with the tool and experience the packaging workflow for themselves. Participants could customize a package digitally, view it as a 3D model and in augmented reality, or create their own version physically using printed templates, markers, and stickers.

01.
Open Paradox

Scan this QR code and enter the app instantly.

02.
Choose your box type

Select the type of packaging you'd like to start with.

03.
Customize your box

Choose your box color, add emoji stickers, text, or upload your own images.

04.
Go to Mockup Mode

Check the 3D model of your box design and view it from every angle.

05.
See it at Real Scale

Click Download AR to place your design on the table and visualize it in real life.

06.
Share your Work!

Check the 3D model of your box design and view it from every angle.

Design Your Own Packaging

WHY PARADOX?
Paradox was inspired by the Schrödinger's Box idea, where something is able to exist in two states at once. Packaging design often lives in a similar tension, creative yet technical, flat yet three-dimensional, digital yet physical.

A TOOL THAT SUPPORTS CREATIVITY
The tools we design with should expand imagination, reduce friction, and help ideas move forward, not limit them.

WOULD YOU LIKE TO TEST THE DEMO? EMAIL ME AT → LUANA.CIEZA@JSU.EDU

01.
Pick a Template

Choose a packaging template based on the box style you'd like to make & grab one from the display at the front of the table.

02.
Customize your box

Use the materials provided to make it your own, draw, add stickers, and have fun with it!

03.
Fold and Assemble

Follow the crease lines and tabs to build your package. Use the double-sided tape provided to secure the box if needed.

04.
Admire Your Creation

Step back and enjoy your finished packing creation.

05.
Share your Work!

Snap a photo or short video of your box and share it scanning this QR code, I'd love to see what you made.

Digital

Physical

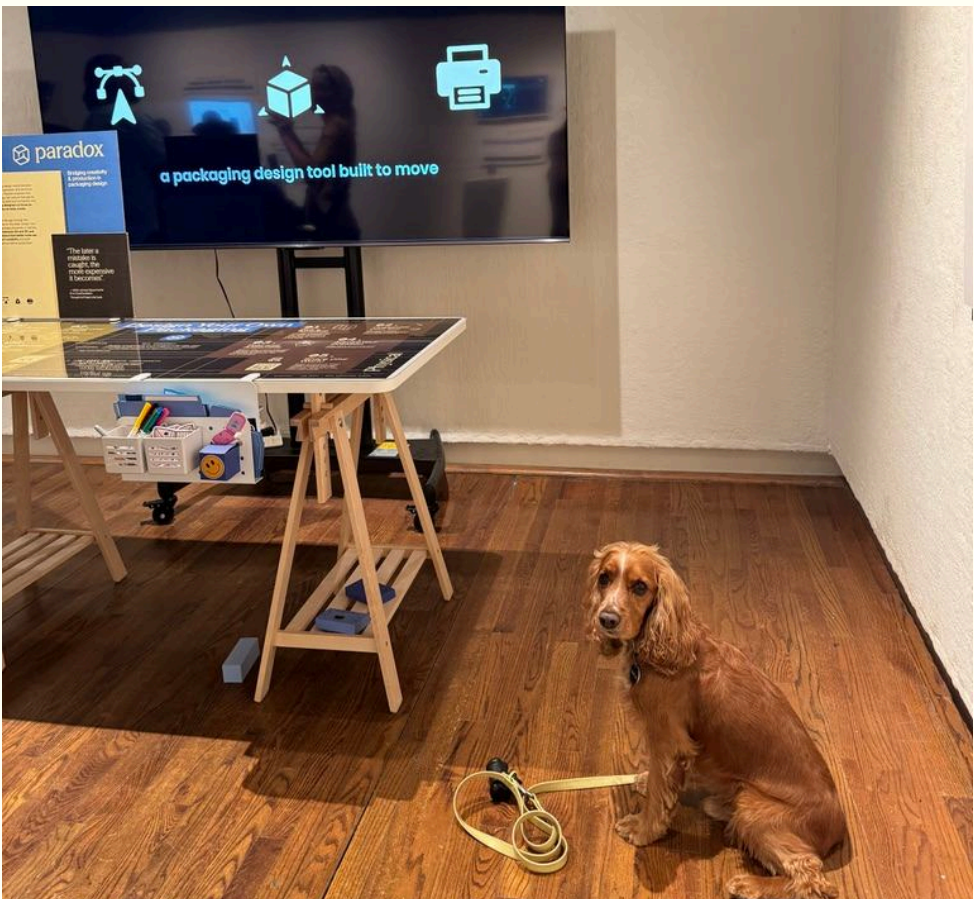
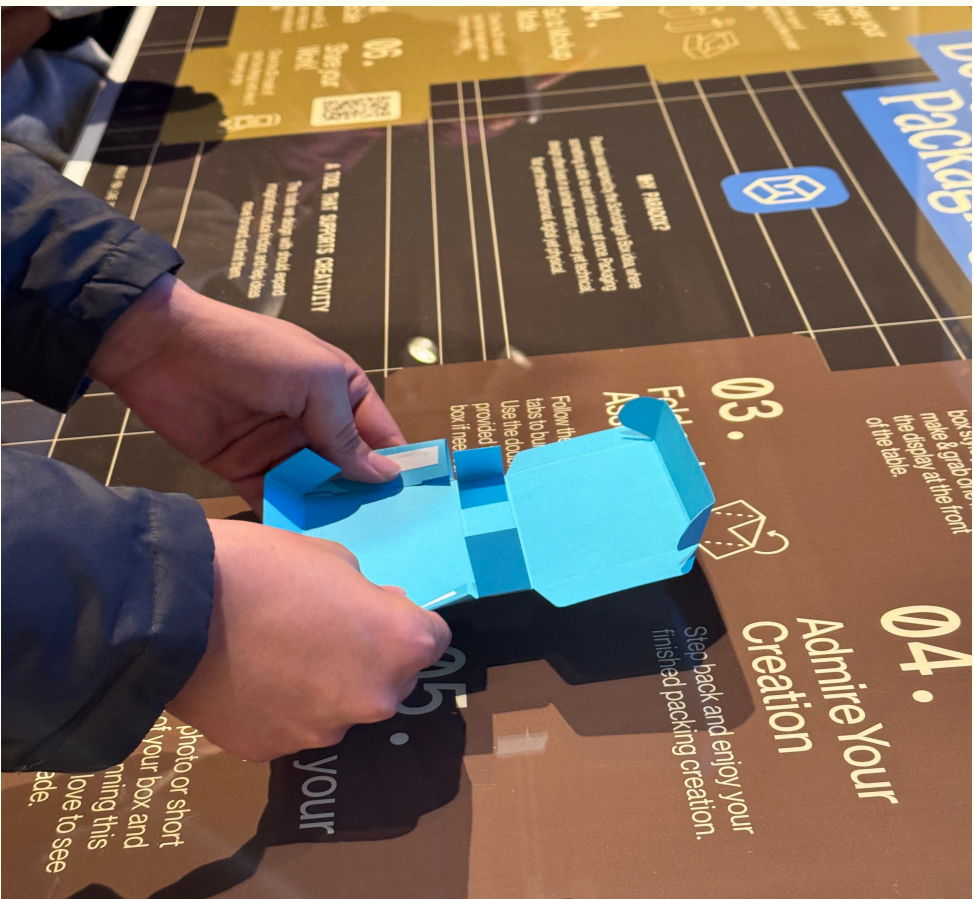
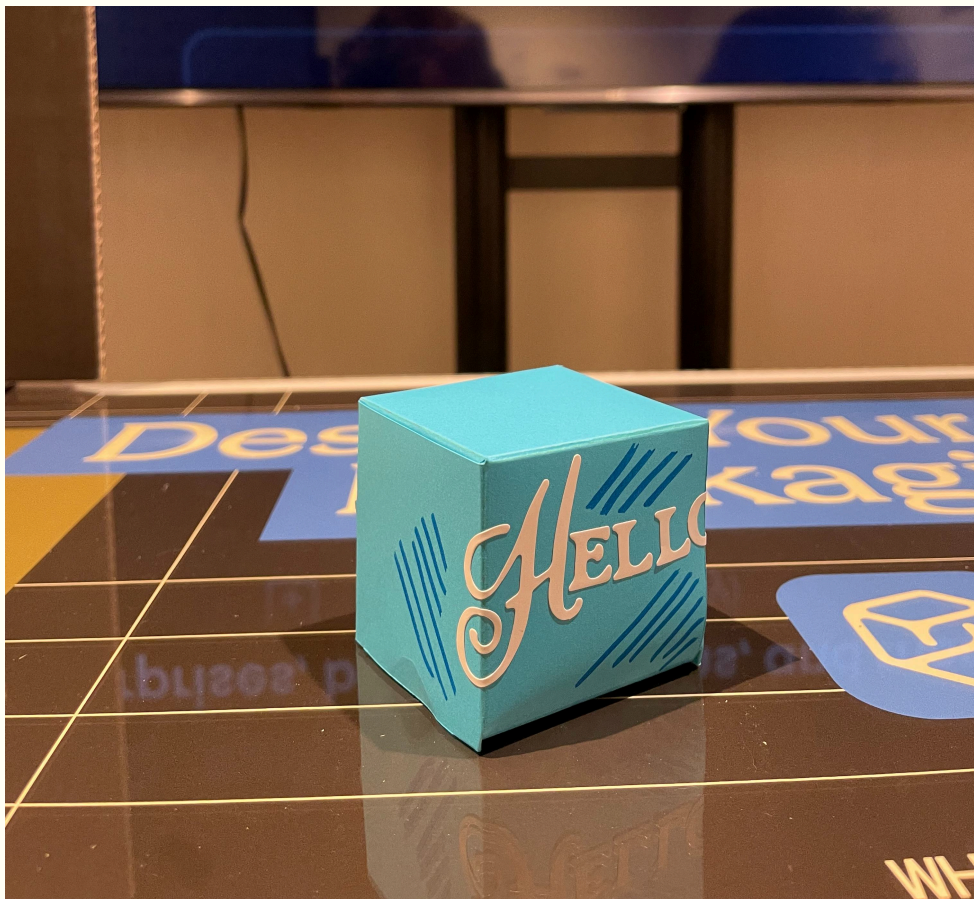
@LUACIEZA
LUA CIEZA — MDES EXPERIENCE DESIGN

Table Artwork custom made for the MDes Gallery Installation

MDes Gallery Exhibit

Connecting digital tools with physical creation.

The installation was designed to mirror the central idea behind the project: bridging the gap between two-dimensional structures and three-dimensional form. Large-format instructional graphics guided visitors through both digital and physical paths, demonstrating how packaging moves from flat dielines to tangible objects. By combining interface design, environmental graphics, and interactive participation, the exhibit made the research accessible to a broader audience and showed how Paradox can support creativity in a clear and engaging way.



Visitors at the MDes gallery interacting live with the installation

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06. Refine & Launch



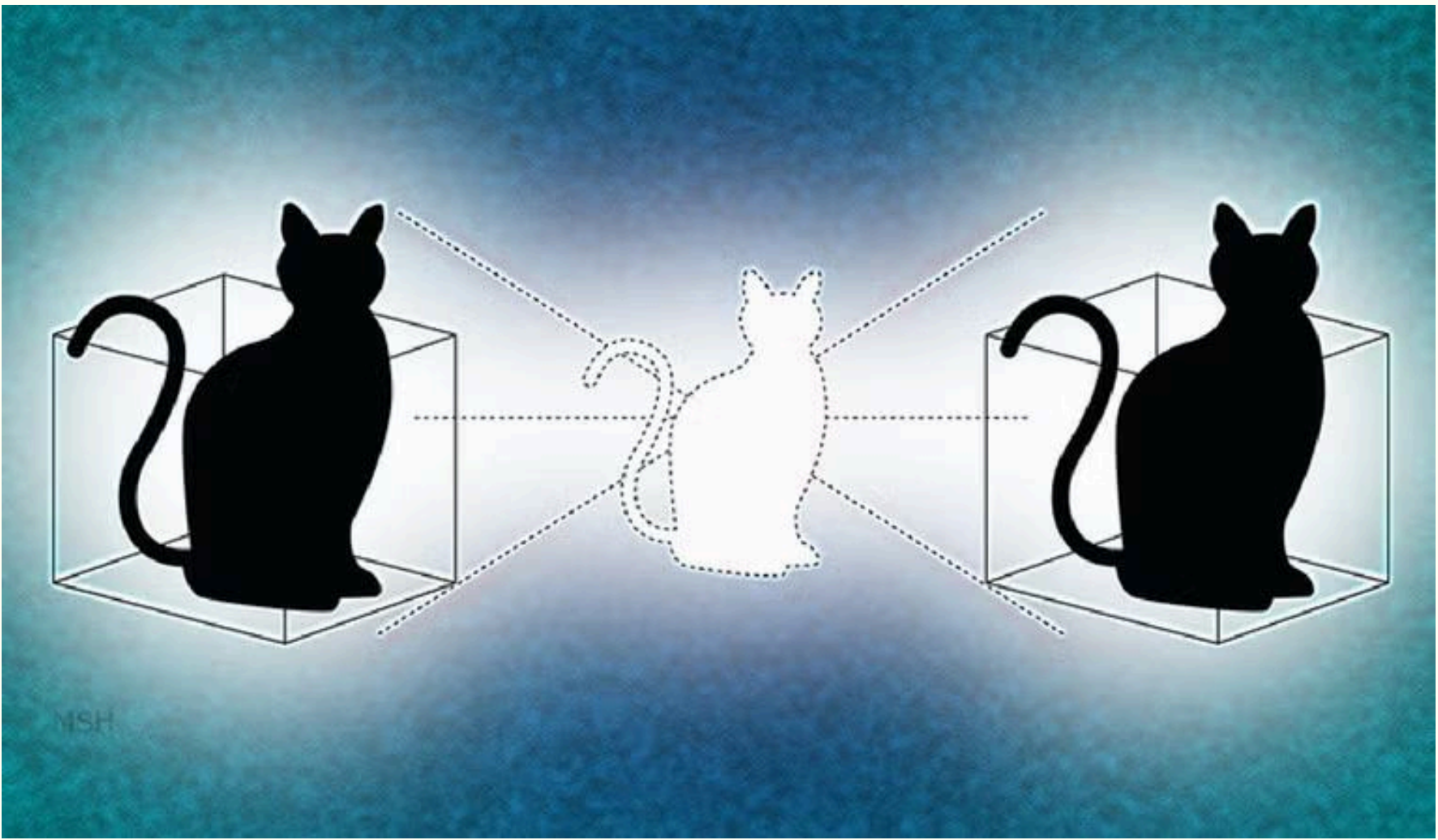
paradox

Introducing Paradox



Access the prototype
by scanning this QR
code or visiting:

[https://paradox-
demo.lovable.app](https://paradox-demo.lovable.app)



Schrödinger's cat Illustration by Michael S. Helfenbein.

Why Paradox?

The name Paradox is inspired by Schrödinger’s cat, the famous thought experiment in which a cat exists in two possible states at once, until the box is opened and the uncertainty is resolved.¹¹ Packaging design presents a similar condition. Until a package is prototyped, assembled, or printed, designers are often working with uncertainty. A flat dieline may appear correct on screen, yet structural flaws, layout issues, or production errors can remain hidden until much later in the process.

Paradox was created to reduce that uncertainty. By connecting dielines, 3D mockups, and print preparation in one integrated workflow, the tool allows designers to test ideas and validate technical decisions as they work. What was once uncertain becomes visible earlier, helping designers move forward with greater confidence and spend less time troubleshooting and more time creating.

A New End-to-End
Packaging Design Process

Paradox reimagines the packaging workflow as a continuous experience rather than a fragmented sequence of disconnected tools. Instead of moving between separate applications for dielines, mockups, and print preparation, designers can complete the entire process within one integrated system. The workflow begins with structure creation, continues through design and visualization, and ends with technical validation and final handoff.

Each step is designed to reduce manual work and provide confidence at key decision points. Designers can generate dielines using AI prompts or templates, customize the package in both 2D and 3D, run intelligent pre-flight checks, and deliver files that are ready for production. By consolidating these stages into one environment, Paradox helps designers spend less time troubleshooting and more time creating.

11. Schrödinger's cat. Encyclopaedia Britannica. Accessed Mar , 2026.

Workflow Overview

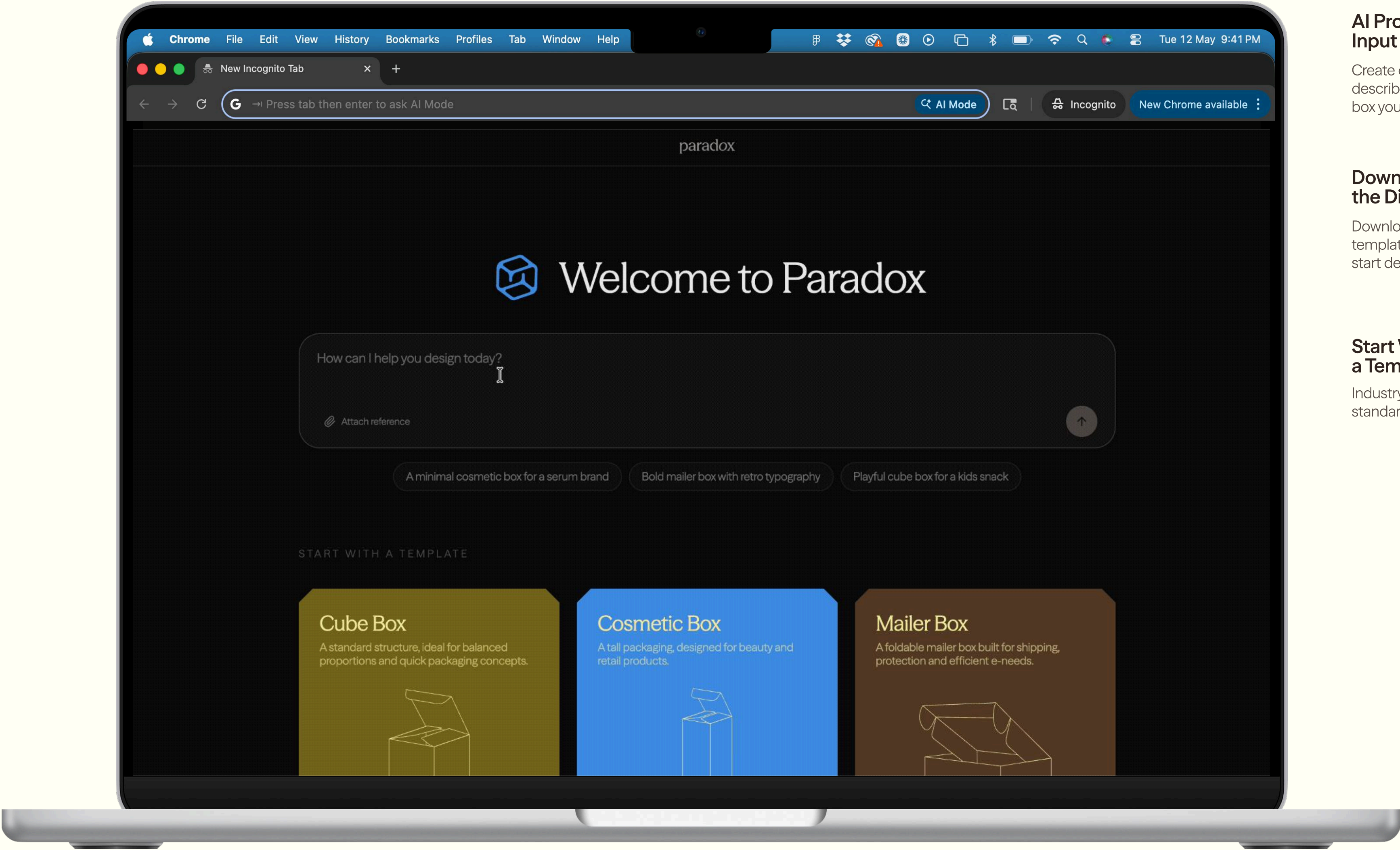
Key Features

- AI prompt input
- Template library
- Instant dieline download

1. Start with a Structure

The workflow begins by creating the packaging structure. Designers can describe the box they need using natural language or select from a library of industry-standard templates such as cosmetic boxes, cubes, and mailers. This approach reduces the time required to build dielines from scratch while still allowing full control over dimensions and structure.

By combining AI-assisted generation with proven templates, Paradox offers both speed and reliability. Designers can quickly establish a technically accurate foundation and move directly into creative development.



AI Prompt Input

Create dielines describing the box you want

Download the Dieline

Download the template to start designing!

Start With a Template

Industry standard dielines

Workflow Overview

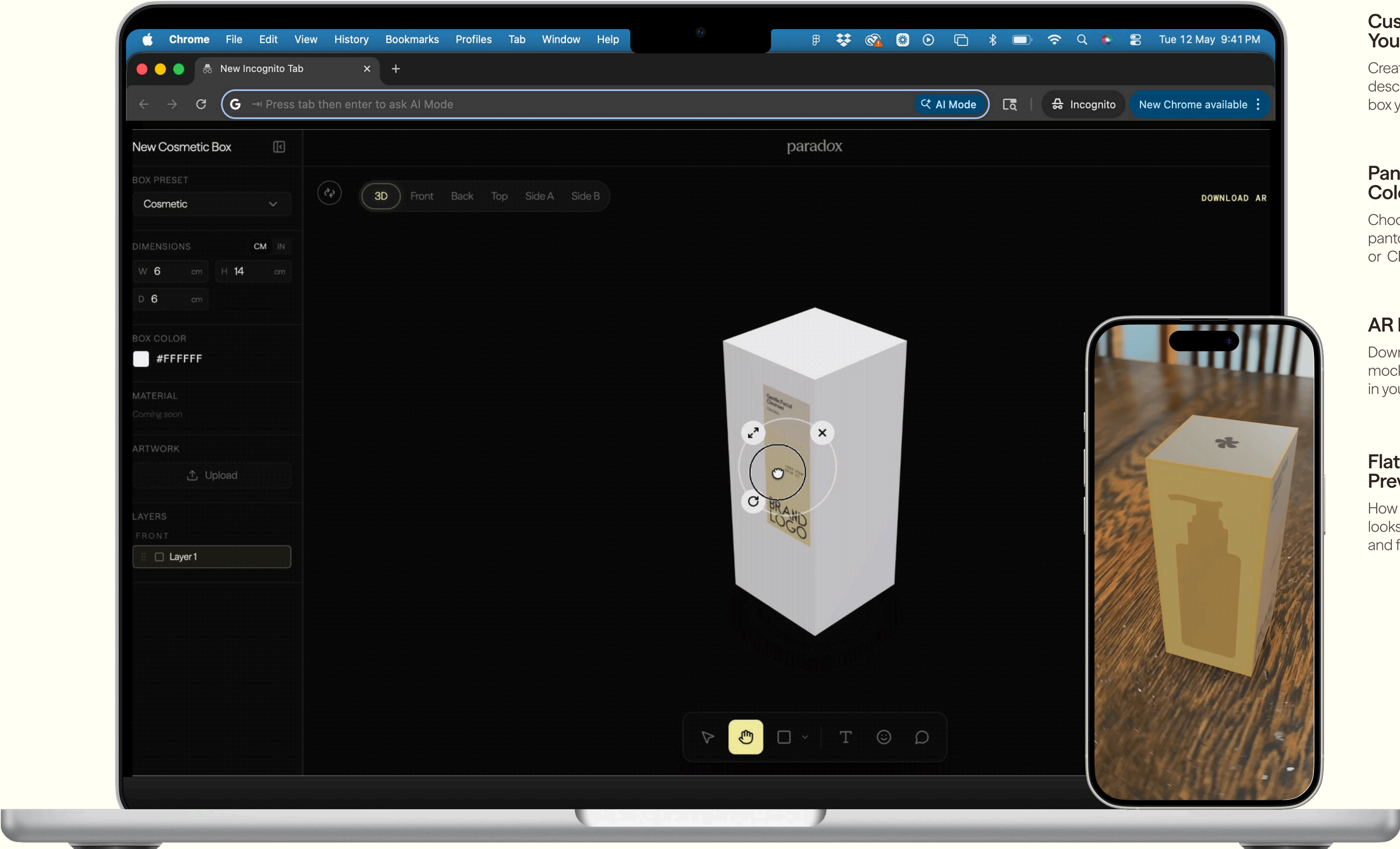
Key Features

- Artwork placement and editing
- Pantone and CMYK color selection
- 2D and 3D synchronized previews
- AR model export

2. Customize and Visualize

Once the structure is defined, designers can apply artwork, edit text, choose colors, and upload assets directly onto the package. Changes appear simultaneously in the flat dieline and the assembled 3D mockup, making it easier to evaluate how the design will look when folded.

This step bridges design and prototyping in one workspace. Designers can switch between flat and three-dimensional views, test Pantone or CMYK colors, and export a fully textured AR model for review in real-world environments.



Customize Your Box

Create dielines describing the box you want

Pantone Color Picker

Choose between pantone codes or CMYK

AR Model

Download your 3D mockup to see it in your space

Flat or 3D Preview

How the design looks assembled and flat

Workflow Overview

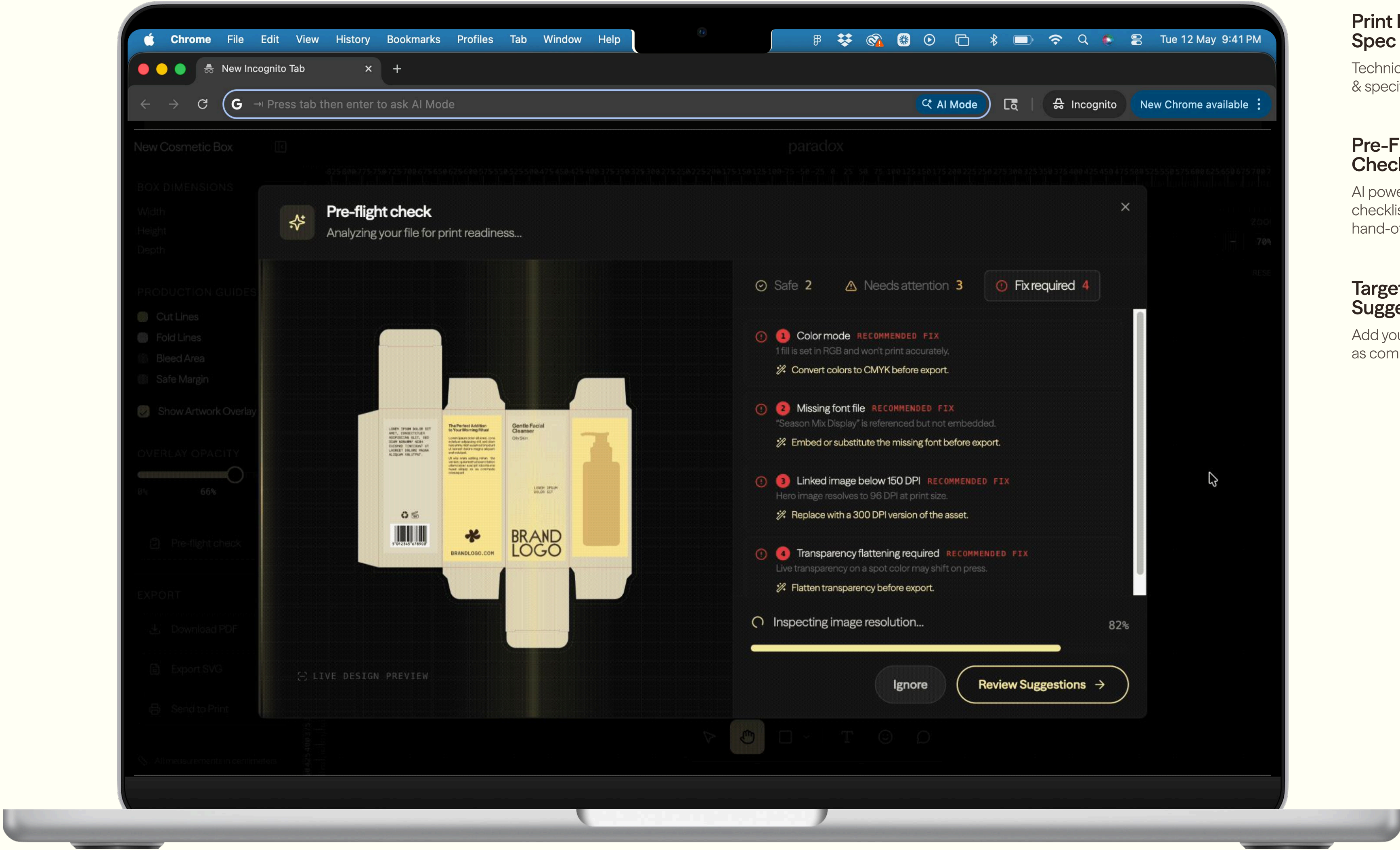
Key Features

- AI-assisted pre-flight checks
- Technical specification review
- Actionable comments and suggestions

3. Validate Before Production

Before the file is shared, Paradox performs an automated pre-flight check to identify potential issues. The system reviews technical details such as missing fonts, low-resolution images, color inconsistencies, and other common production errors.

Rather than making changes automatically, the tool presents targeted suggestions that can be added as comments directly onto the design. This preserves creative control while providing an additional layer of technical assurance.



Print Mode Spec

Technical details & specifics

Pre-Flight Checks

AI powered checklist before hand-off

Targeted Suggestions

Add your results as comments

Workflow Overview

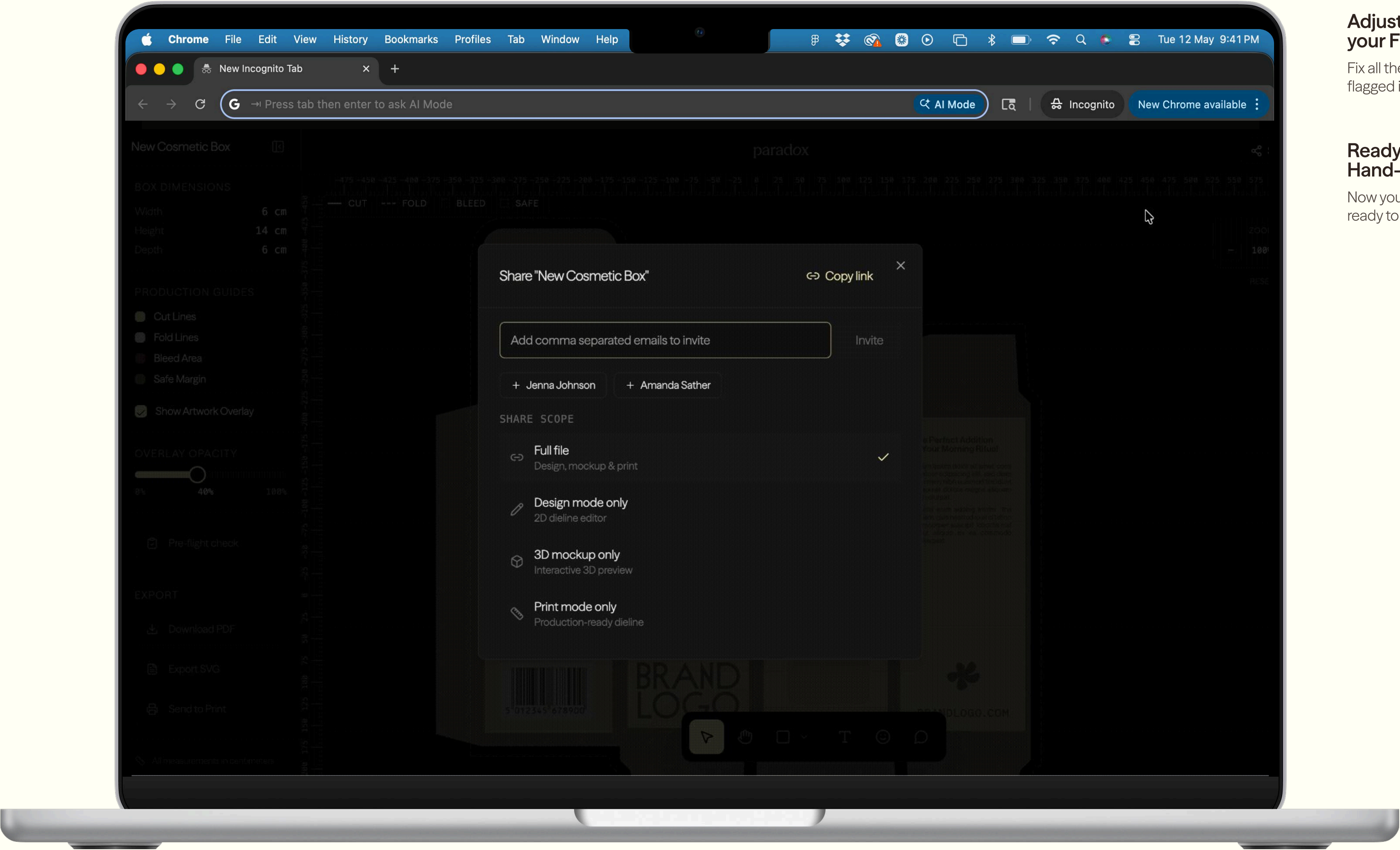
Key Features

- Final adjustments
- Production-ready export
- Ready for supplier handoff

4. Finalize and Hand Off

After reviewing and resolving flagged issues, the project is ready for production. The final file can be exported and shared with print suppliers along with confidence that both the visual design and technical requirements have been verified.

This final step transforms handoff from a stressful process into a more predictable and reliable one. Designers can deliver files with fewer revisions, fewer surprises, and greater confidence.

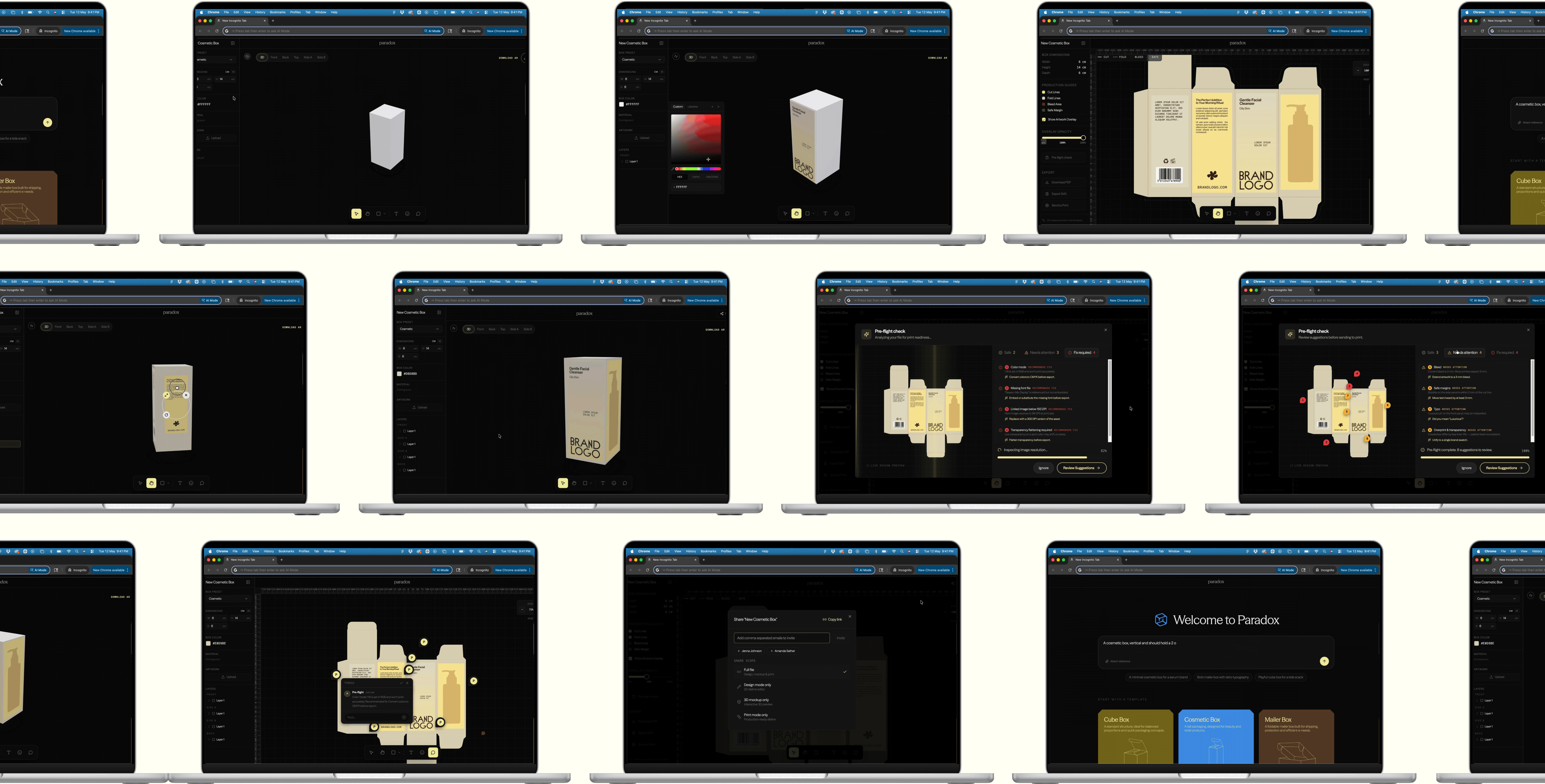


Adjust your File

Fix all the flagged issues

Ready for Hand-off!

Now your file is ready to share



One Connected Environment



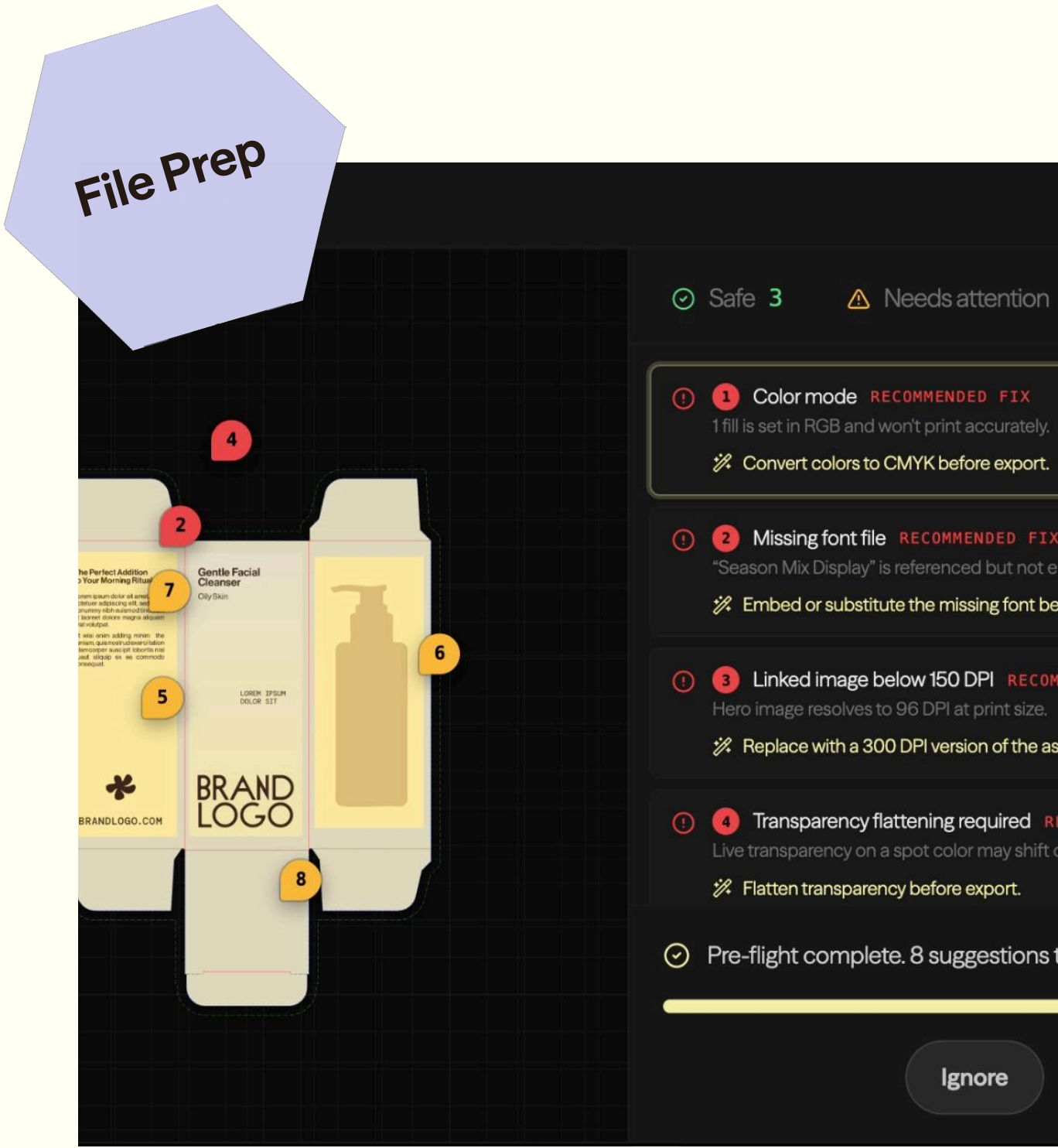
Design Mode

Design Mode transforms dieline creation from a manual and often intimidating task into a more intuitive process. Designers can generate structures using AI prompts or start from proven templates, then refine dimensions, artwork, and structural details directly within the same 2D workspace.



Mockup Mode

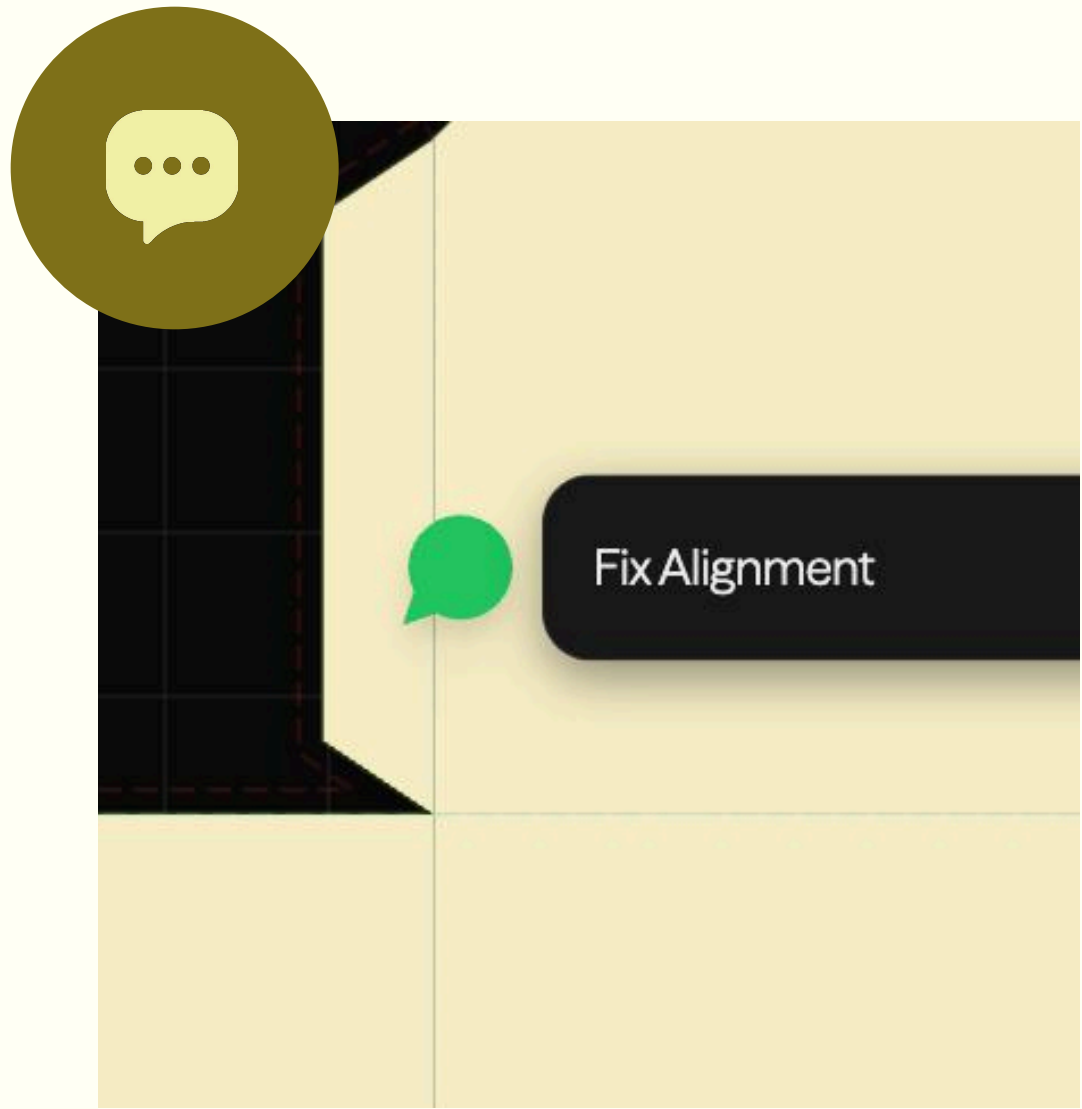
Mockup Mode converts the flat dieline into a live 3D preview, allowing designers to evaluate scale, composition, and overall presentation in real time. Changes made to the artwork are reflected instantly, making it easier to test ideas and communicate design intent with clients and stakeholders.



Print Mode

Print Mode streamlines final file preparation by automatically checking for technical issues such as missing fonts, incorrect color modes, and low-resolution images. Instead of discovering errors at the handoff stage, designers receive targeted suggestions earlier, increasing confidence before sending files to production.

Beyond the Core Workflow

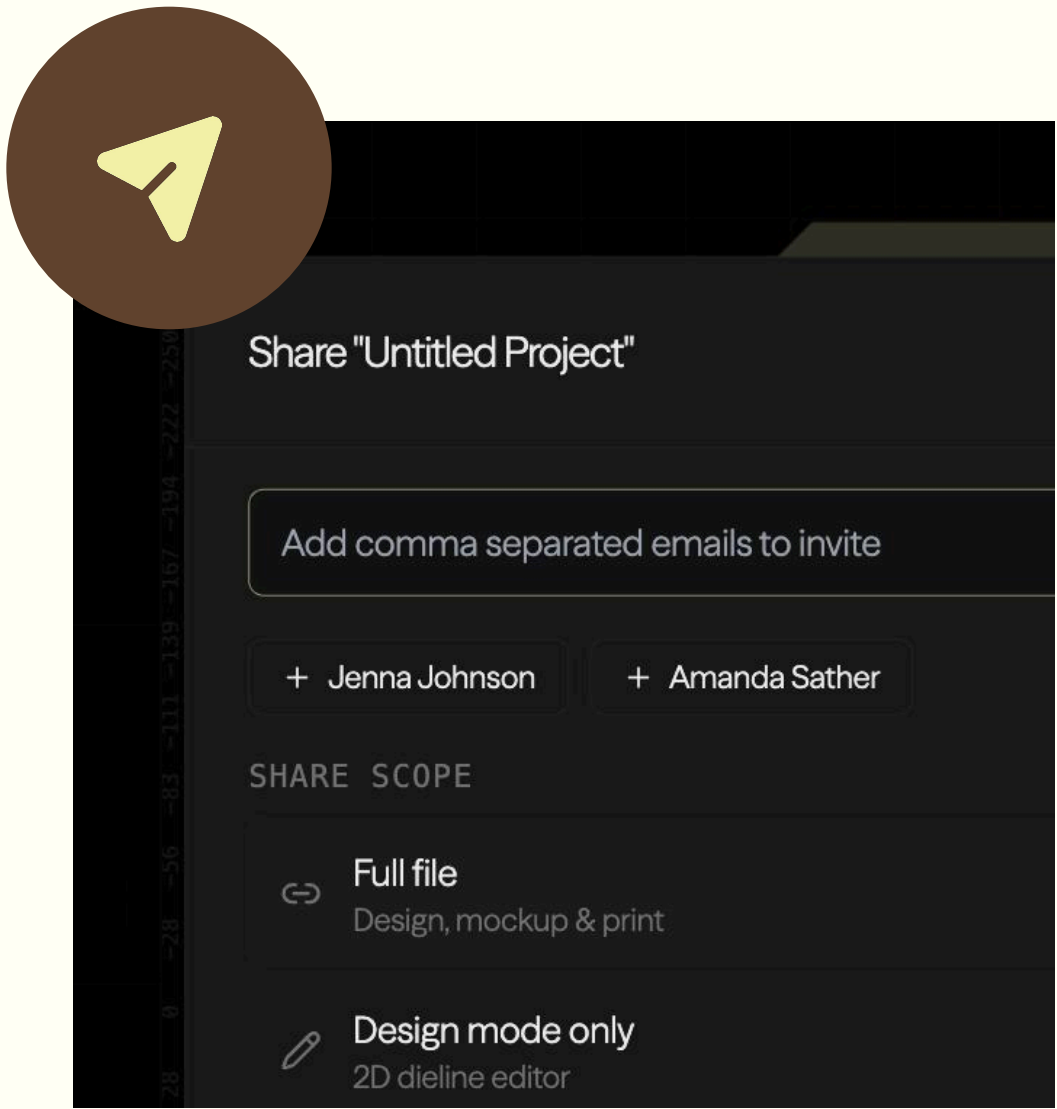


While integrating dielines, mockups, and file preparation addressed the most significant technical pain points, research also revealed broader needs around communication, collaboration, and authorship. Designers described frustration with fragmented feedback, cumbersome file sharing, and automation tools that risked taking too much control away from the creative process. These informed a second layer of functionality that extends Paradox beyond production efficiency.

Together, these features reinforce the central goal of Paradox: to create a more connected, collaborative, and designer-centered packaging workflow. By combining technical precision with modern interaction patterns, the tool supports not only the production process but also the human relationships and creative judgment that shape successful packaging design.

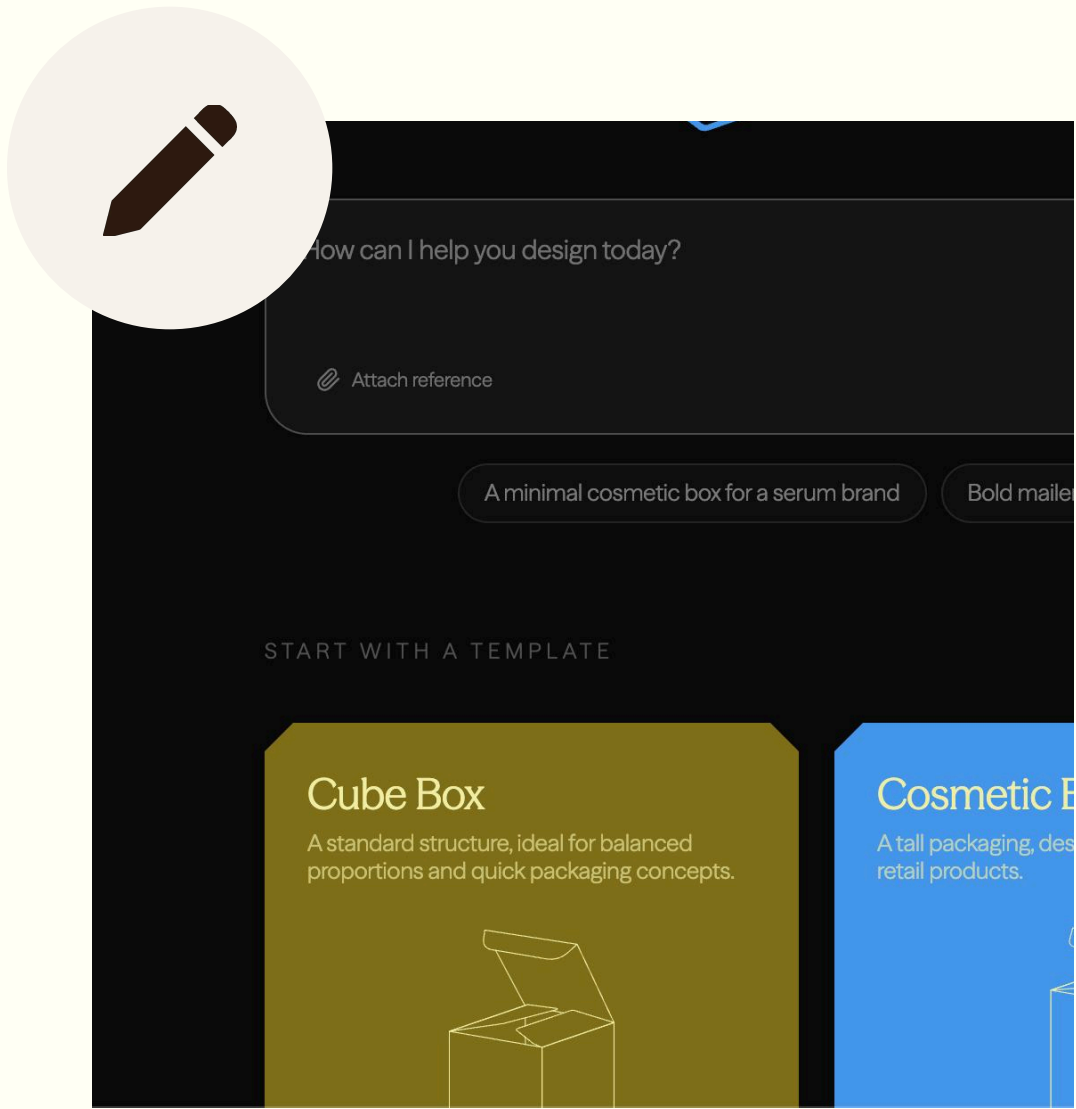
Preparing for Production

Paradox allows comments and suggested fixes to be attached directly to specific areas of the dieline, similar to collaborative design tools such as Figma. Instead of relying on disconnected email threads or annotated PDFs, designers, clients, and print suppliers can discuss issues in context. This makes feedback clearer, reduces misunderstandings, and shortens revision cycles.



Easy to Share

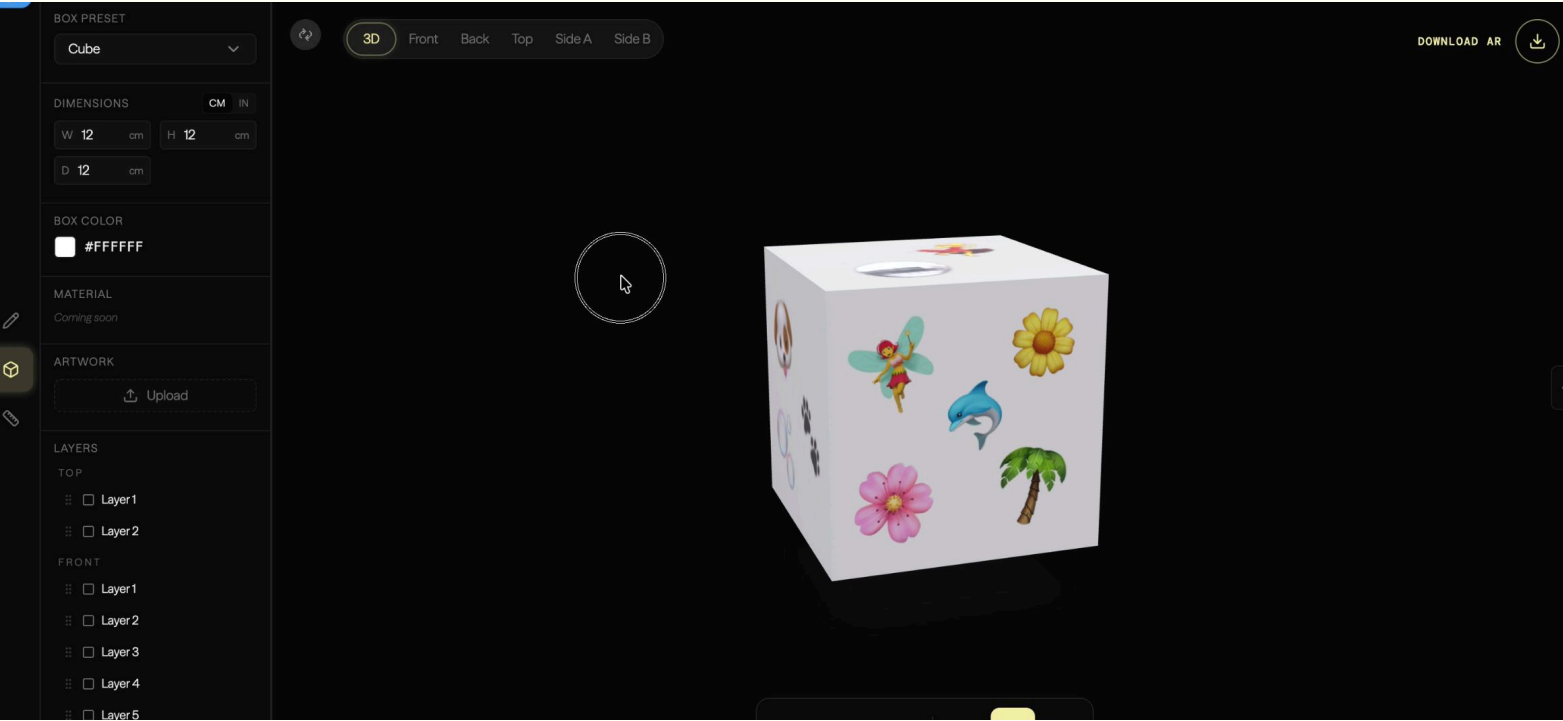
Projects can be shared selectively depending on the needs of each stakeholder. A client may receive only the interactive 3D mockup, while a print supplier can access the production-ready file and technical specifications. This flexible sharing system helps ensure that each collaborator sees the most relevant information without unnecessary complexity.



Keeps the Designer in Control

Artificial intelligence is used to assist rather than replace. The system can generate dielines, identify technical issues, and suggest corrections, but all decisions remain in the hands of the designer. Recommendations can be accepted, modified, or ignored, preserving creative authorship while reducing repetitive work.

Conclusion



Paradox 3D Feature with Square Box.

Paradox began with a simple question: how might packaging designers spend less time troubleshooting and more time creating? Through a long research process this project revealed that much of the friction is concentrated around three critical stages: dieline creation, mockup development, and final file preparation.

These stages require designers to balance creativity with technical precision, often across disconnected tools and workflows. As a result, repetitive manual work, communication gaps, and late-stage production issues can consume a significant portion of the design process. Participants consistently expressed a desire for tools that reduce technical complexity, improve collaboration, and provide intelligent assistance without taking away creative control.

Paradox responds to these needs by bringing structure, visualization, and production into one connected environment. Designers can create and edit dielines, preview packages in 3D, and run technical pre-flight checks within a single workflow. Features such as contextual comments, flexible sharing, and designer-controlled automation further support the collaborative nature of real-world packaging projects.

Beyond the prototype itself, this thesis demonstrates how experience design can be applied to specialized professional tools. It highlights an opportunity to rethink packaging software not as a collection of disconnected utilities, but as a more intuitive and creative system that supports both technical accuracy and human judgment.

Paradox proposes a future in which technology acts as a creative partner rather than a replacement, helping designers work with greater confidence, efficiency, and freedom. In doing so, it offers a new vision for packaging design, one where creativity and production are fully connected.

Future Development



Pacdora Mokups

Paradox was developed as a high-fidelity prototype and conceptual proof of concept. While the project demonstrates a compelling vision for the future of packaging design, there are several opportunities for further development and implementation.

● Expanded Structural Library

Future versions could include a larger collection of packaging templates, ranging from folding cartons and mailers to more complex structures such as blister packs, display units, and flexible packaging.

● Advanced 3D Simulation

Additional capabilities could simulate folding behavior, material thickness, lighting, and surface finishes such as embossing, foil stamping, varnishes, and specialty coatings.

● Real-Time Supplier Validation

Integration with print suppliers could enable live verification against manufacturing constraints, including substrate specifications, minimum tolerances, and finishing requirements.

● Team Workspaces and Version Control

Collaborative features could be expanded to include approval workflows, revision history, branching, and role-based permissions for designers, clients, and production teams.

● Intelligent Design Assistance

Future AI features could suggest optimized panel layouts, identify accessibility issues, recommend material options, or compare designs against established packaging best practices.

● Production and Cost Estimation

The platform could estimate material usage, production costs, and environmental impact in real time, helping teams make informed decisions earlier in the design process.

Together, these opportunities suggest that Paradox could evolve from a conceptual prototype into a fully realized design platform capable of transforming the packaging industry.

Acknowledgements

This project would not have been possible without the support, generosity, and insights of many individuals who contributed their time, expertise, and encouragement throughout this journey.

First, I would like to thank my thesis chair, Connie, and advisors Alexis and Jenna, for their thoughtful guidance, critical feedback, and continuous support throughout the development of this project. Their encouragement helped me shape both the research and the final design direction.

I am also deeply grateful to the faculty and staff of the Master of Design program at San José State University, and all the professors who challenged me to think more critically, design more intentionally, and approach complex problems with curiosity and rigor.

Special thanks to the packaging designers, print specialists, and industry experts who generously shared their experiences and perspectives through interviews and surveys. Your insights formed the foundation of this project and made it possible to ground the work in real-world challenges and opportunities.

Thank you to my classmates and peers for their feedback, and encouragement, throughout the entire program. The conversations, critiques, and shared experiences made this process both more meaningful and more enjoyable.

I am especially grateful to my family for their unwavering love and support, and for always encouraging me to pursue ambitious ideas. Finally, thank you to my husband for the love, patience, encouragement, and support that sustained me through every stage of this project.

This project marks the beginning of my exploration at the intersection of packaging design, experience design, and emerging technology. While Paradox is still a conceptual prototype, it opens the door to new possibilities for how creative tools can better support designers and transform the packaging workflow. This work would not exist without the generosity, insights, and support of everyone who contributed to its development.



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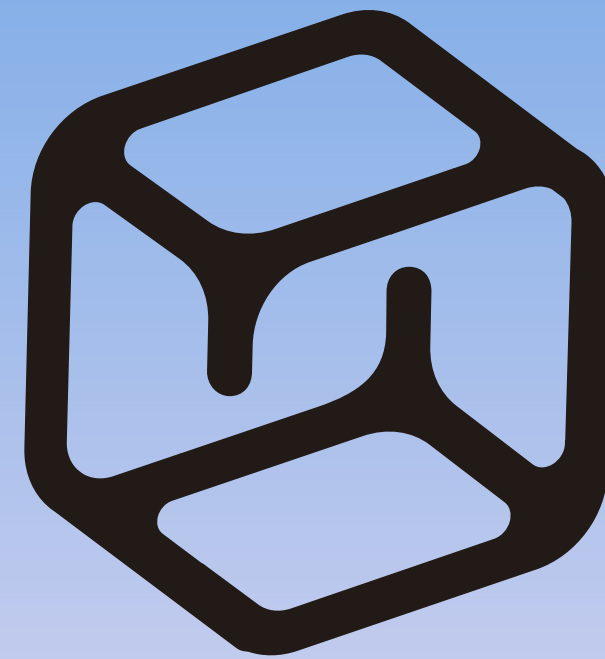
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