Digital Health Humanities in Practice: An Open-Source Toolkit for Reimagining Pharmaceutical Archives Through Speculative Making

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This project, developed within the Advancing Digital Health Humanities Institute, emerges as a multisensory and practice-based inquiry into how pharmaceutical industry archives can be translated into public-facing pedagogical tools. Drawing on the UCSF–JHU Opioid Industry Documents Archive and the UCSF Opioid Crisis Community Archive, it reframes archives as dynamic epistemic sites where corporate strategy and community-led harm reduction can be materially and critically engaged. The central outcome is a speculative artifact: a prototype of the Cephalon Pharmaceutical's Actiq fentanyl lollipop handle paired with a placebo candy component, designed as part of an open-source pedagogical toolkit that makes otherwise opaque pharmaceutical systems legible through touch, making, and critical reflection.

The process began with close reading of internal pharmaceutical documents and patent filings, using archival keywords and regulatory framing (e.g., REMS programs, abuse deterrence, dosage control) to surface both explicit design features and embedded assumptions about safety, dependency, and risk. These materials were translated into digital form through 3D modeling software, where the Actiq handle was reconstructed from technical drawings in collaboration with design support though the UCSF Makers Lab. Slicing software and fabrication protocols were then used to prepare the object for 3D printing. The physical prototype was produced using food-safe methods, paired intentionally with a non-pharmaceutical candy component to maintain its status as a critical, non-clinical artifact.

A key contribution of this work is the How-To Guide: Open-Source Pharmaceutical Prototype, which formalizes the process of reverse engineering controlled pharmaceutical devices for educational use. It walks users through archival interpretation, digital reconstruction, fabrication constraints, and ethical framing. The toolkit positions “making” as a method of inquiry by asking what becomes visible when controlled pharmaceutical forms are opened to public reassembly and critique. The toolkit also incorporates a networked layer of engagement through QR-coded prompts attached to the object. It invites users to “trace,” “hack,” and “reverse” pharmaceutical systems. These prompts connect the material artifact to broader questions of corporate influence, invisible labor, harm reduction, and mutual aid. In doing so, it extends the object into a participatory epistemic network that situates it within broader fields of digital health humanities, Science and Technology Studies (STS), design research, critical public health, critical public pedagogy, medical anthropology, medical sociology, and related fields.

Across these stages, the project foregrounds translation as both methodological and ethical practice: moving between archive and object, technical documentation and sensory experience, corporate design and community critique. It ultimately proposes that digital health humanities can function as a space for co-producing knowledge where speculative making becomes a way to render structural harm perceptible, interrogate biomedical authority, and open possibilities for collective reflection and care.

How-To Guide: Open-Source Pharmaceutical Prototype

[Reverse Engineering and Repurposing the Actiq Handle]

1. Locate and Interpret the Original Design

Source Materials

- Search for the original **patent documentation** (via Opioid Industry Documents Archive)
- Use keywords such as:
    - "Actiq"
    - "fentanyl transmucosal"
    - "oral delivery system"
    - "REMS program"

Extract Key Information

- Dimensions and measurements
- Materials specified in design
- Functionality and form factor
- Regulatory framing (e.g., abuse deterrence, dosage control)

Interpret and Translate

- Read both technical and legal language critically
- Identify what is left unsaid—what assumptions are embedded?
- Begin to imagine how this object could be taken apart and remade

2. Create a Digital 3D Model

Software Options

- Tinkercad (beginner-friendly)
- Fusion 360 (more advanced, free for personal use)
- FreeCAD (open-source, parametric modeling)

Design Process

- Reconstruct the handle from extracted dimensions
- Focus on replicating the form and ergonomics, not pharmacological function
- Modify as needed for public use, safety, and fabrication feasibility

3. Verify for Fabrication

Use Slicing Software

- Cura, PrusaSlicer, or similar tools

Check for Printability

- Wall thickness: minimum ~1.2 mm for structural stability
- Detect and correct gaps, holes, or floating geometry
- Evaluate material compatibility with desired candy or food-grade use

Material Selection

- PLA filament (common, food-safe variants available)
- Food-safe resin (for higher-resolution prints, if needed)

4. Fabricate and Assemble the Object

3D Printing

- Use a standard FDM printer (e.g., Creality, Prusa)
- Layer height ~0.2 mm, standard infill (20–30%)
- Print the handle separately from the candy component

Candy Fabrication (Placebo Only)

- Use inert sugar-based recipes or agar
- Mold or attach lollipop head to printed handle
- Do not use active pharmaceutical ingredients under any circumstance

5. Document and Share Openly

Documentation

- Photograph each step of the process
- Write clear, reproducible instructions
- Include reflections on design choices, safety considerations, and speculative aims

Platforms for Sharing

- GitHub or GitLab (for files + documentation)
- Printables or Thingiverse (for 3D models)

- Hackaday.io or personal websites for narrative framing and outreach

What to Include

- STL or STEP files
- List of tools and materials
- Written guide (like this one)
- Context: what the object critiques, questions, or proposes

6. Frame the Practice as Inquiry

Tinkering as Method

- What happens when a tightly controlled pharmaceutical device is made open-source?
- How does this reframe drug delivery as a space of public speculation and critique?

Prompt Public Engagement

- Who gets to design for wellness or safety?
- Can end-users imagine or build alternative systems?
- What forms of knowledge (embodied, informal, communal) are made visible through this process?

Ethical Considerations

- This is a design and research practice, not a medical intervention
- Clearly label all outputs as non-functional, speculative artifacts
- Emphasize that no active substances are used or encouraged
- If exhibited or shared, provide clear signage to avoid misuse or misinterpretation

This project approaches tinkering as a situated critical method for interrogating the infrastructures through which pharmaceutical design, regulation, and innovation are produced and maintained. Tinkering is framed here as an analytical practice that operates by breaking open finished systems, reworking their logics, and exposing the assumptions embedded in their material forms. Applied to archives, tinkering becomes a way of reading and re-writing pharmaceutical objects as socio-technical constructs rather than fixed clinical tools. It attends to how design decisions are entangled with regulatory regimes, as well as with broader political economies of drug development and distribution. By reconstructing and modifying these objects outside their intended proprietary contexts, the practice makes visible the infrastructural conditions that typically remain hidden within sealed systems of medical authority. The act of opening, replicating, and altering pharmaceutical forms is aimed at generating interpretive friction. Through this friction, infrastructures of pharmaceutical governance become available for public questioning, critique, and reimagination.

7. Trace Pharmaceutical Networks

Each QR code has both a catchy STS label and a micro-prompt that invites the visitor to *engage with the network, follow facts, probe for concerns, or activate care*. Attached these to object prototype

Unwrap the Deception:
Trace the Web of Influence

Trace

Counterdose:
Imagine Naloxone as a Mutual Aid

Hack

Sugar-Coated Harm:
Matters of Concern Inside

Trace

Hack Pharmaceutical:
Turn corporate memo into civic knowledge tools

Hack

Actants in a Wrapper:
Unwrap the Network

Trace

Reverse the Flow:
Patient to Manufacturer

Trace

Trace the Invisible Labor:
doing unseen work

Trace