# Modern snapshots in the crafting of a medical illustration

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## Abstract

The time-honored practice of medical illustration and visualization, has, like nearly all other disciplines, seen changes in its tooling and development pipeline in step with technological and societal developments. At its core, however, medical visualization remains a discipline focused on telling stories about biology and medicine. The story we tell in this work assumes a more distant vantage point to tell a story about the biomedical storytellers themselves. Our story peers over the shoulders of two medical illustrators in the middle of a project to illustrate a procedure in one of the small blood vessels around the heart, and through the medium of an online chat explores the dialogue, tensions, and goals of such projects in the digital age. We adopt the two-column format of the CHI template, as it is more reminiscent of the width of our usual messaging windows while working. The second part of our submission reflects on these tensions and modes of storytelling from an HCI and Visualization-situated perspective.

## CCS Concepts

• **Human-centered computing** → **Scientific visualization**.

## Keywords

Medical illustration, medical visualization, data storytelling, knowledge work

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*Both authors contributed equally to this research.

## 1 Step into our (digital) collaboration space

**1 February at 8:00**

**Laura**: ok, I'm finally done with the sketches. Are you ready for this??
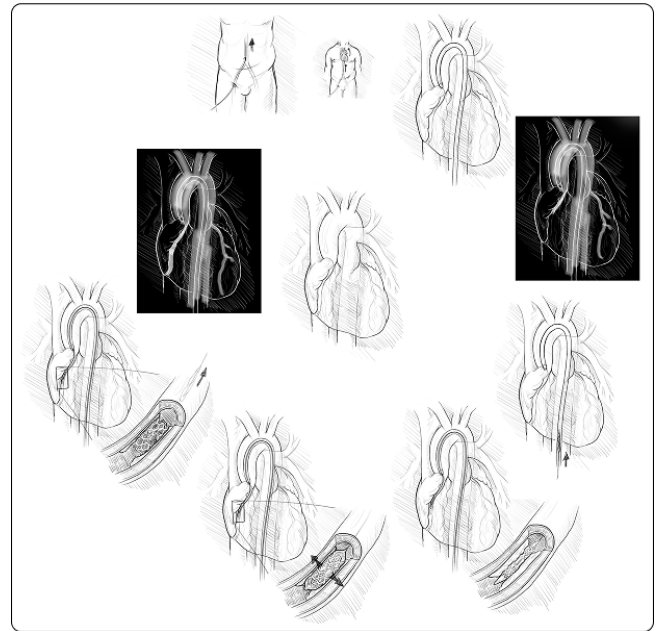


**Amy**: coolio! 🫀

**Laura:** I sketched out the whole cycle of the angioplasty

**Laura:** or at least what I could gather from the client materials, including a close-up of the stent insertion

**Laura:** also, this is probably obv but the imaging steps are black bg instead of white. It looks super strange with the white canvas, so I'm not sure how much we want to keep these in the end if we're going for a cohesive visual look…the imaging steps are necessary checks, but they're not, I guess, "official" steps in the process…

**Laura:** maybe I've just been staring at this for too long 🙃

**Amy:** okay gotcha, let me take a closer look now…and also get back to you on how long it'll take to color

**1 February at 8:21**

**Amy:** so I checked our brief again and see we need to make a single page layout of the surgical process – there's not a lot of room, should we trim the # of sketches down?

**Laura:** yeah, we should. What's here is a bit much, I think, and there's also the heart repeating over and over, can probs consolidate that

**Amy:** right – the stent insertion and expansion are the key actions, how about we focus on those?

**Amy:** and yes, I agree, the heart can be consolidated and placed centrally…maybe this could be the structure that the feature stent insets revolve around?

**Amy:** what do you think?

**Laura:** I like that. Does the heart then have the guidewire in it, or is it just the orienting shot for the insets?

**Laura:** maybe it's obvious enough without the guidewire being actually depicted in the aorta up through to the coronary

**Laura:** some sort of inset indicator should be enough. I trust your judgement, you're great at this layout stuff 🙂

**Amy:** coolio, I'll try some things out and come back with a couple of options 👍

**1 February at 8:43**

**Amy:** …when do you need this by again? end of next week?

**Laura:** yeah by next week is good, the earlier the better honestly

**Laura:** in case we need to make any changes, possibly another iteration/draft

**Amy:** yup that has never not happened haha

**Laura:** hopes and dreams?

**Amy:** then next week it is. I'll ping you with some colors and layout comps then 🙂

**Laura:** cool, thanks!

**Amy:** 👍

**5 February at 16:45**

**Laura:** hey, how's it going?

**6 February at 11:53**

**Amy:** it's moving along. I need one more day to wrap up rendering, should be good for a discussion tomorrow

**Laura:** ok great, thanks, looking forward! 🙂

**7 February at 14:53**

**Amy:** hey! I'm back with a few options for color and layout. I don't see any mention in the brief for a specific style or color preference, so I tried out a few options – we could go for something more realistic like the first one? or schematic like the second?
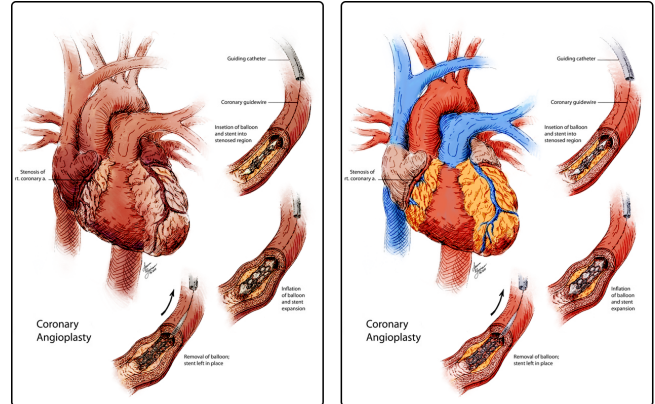


**Laura:** ooh nice! I REALLY like the schematic one. It feels like a good blend of both of our styles

**Laura:** and remember how the client was showing us some of their inspo images? Loads of those were more on the schematic side of things…I can't remember us discussing many of the more hyperrealistic work, do you?

**Amy:** no, me neither. This schematic version was fun also for getting a bit more clarity on the anatomical structures - we know that was something they were excited about

**Laura:** ok, then I think we're set to go with the schematic opt 🥳

**Amy:** sweet! and in terms of color palette, I think the colors in option 2 fit schematic rendering the best.

**Amy:** what do you think?

**Laura:** agree. Maybe we can bring in some peach tones from option 1 for rendering out the fat. And bring in some subsurface scattering effect?

**Amy:** I defs plan on adding that for next steps!

**Amy:** so we are good to go you think? I'll need about a week to finish this off

**Laura:** yeah I think so

**Laura:** perf

**17 February at 16:48**

**Amy:** aaand I'm back! Super late at the end of the day but the illustration is done, I hope 🙂

**Amy:** I added the files to our drive, feel free to take a look when you get the chance

**18 February at 08:25**

**Laura:** wow, it looks awesome!

**Laura:** ok, I just finished checking everything against the brief - I think we are all good to send it on! 😊

**Amy:** bless, one project down 💯💯💯

**Laura:** 🥳🥳🥳

## 2 Reflection

This autobiography, written in the form of a multi-day online chat, explores the process of crafting a single medical illustration. The story begins when sketches of a surgical procedure are passed from one illustrator to another, and unfolds as the illustrators discuss design decisions about the final illustration with respect to the client's needs, best practices for visual science storytelling, as well as stylistic ownership of the illustration between two practitioners. Despite the unconventional form of an online conversation, the story follows a classic structure in Western plot-driven narrative canon based on Aristotle's Three Act Structure [6]. In five acts, the story is introduced (the illustrators connect to discuss the sketches), follows a rising action (the second illustrator works on the initial color compositions while the first illustrator waits for updates) that peaks at a climax (the color compositions arrive with agreement on the next steps, but the main thinking work is largely behind them), before tension tapers in a falling action (the second illustrator finalizes the rendering) with an ultimate resolution (the illustrators discuss the final work and, satisfied, agree to send the work on to the client). Biomedical visual stories from the Western world tend towards this structure [5, 7], although this is not the only possibility. The Hero's Journey, which follows a central character through their trials and encounters with the unknown before emerging changed–and often improved for their experience–back into a normal life [8, 10], is another relatively common Western narrative structure.

Through this narrative design exercise, we reflected on how modern stories, taking the form of digital conversations, can serve as unstable and situated knowledge objects. Stories-in-progress, such as an unfolding text conversation, can instantiate as *epistemic objects* (objects of inquiry used to define knowledge) and become *boundary objects* (objects communicating a particular interpretation of reality) once the conversation is archived in time. The epistemic quality of narratives tends to be overlooked due to the privileging of logical reasoning and empirical evidence in the sciences (i.e., logico-scientific modes of thought) [2]. Yet, narrative modes intentionally acknowledge situational and contextual knowledge, which can add depth and color to otherwise positivist constructions of reality [1].

In our story, craft-based knowledge is being constructed, evolved, and negotiated with whilst the conversation unfolds between the two medical illustrators and a shared understanding of the project develops. Incomplete visual representations of knowledge (i.e., work-in-progress illustrations attached to chat messages) reinforce the dynamic nature of knowledge production and development in our story. These incomplete visual knowledge representations are, themselves, epistemic objects [4]. When it comes to digital conversations, one person's subjective interpretation of a particular situation is also captured through their use of text-based slang or "textisms" [3]. Textisms, such as emojis or non-standard grammar and syntax, are able to convey relational meaning, personality, beliefs, and emotion in lieu of non-verbal social context cues (e.g., facial expressions) [9]. While textisms were in use before the pandemic, writing this story led us to anecdotally reflect on our experiences through the pandemic, where lack of physical interaction resulted in more abundant emoji use that has persisted post-lockdown.

When digital conversations are timestamped and stored in the messaging system, they are then able to serve as boundary objects that archive collaborative knowledge. Creative practitioners and their stakeholders (e.g., clients, trainees) often refer back to chat conversations and email exchanges to recall the decisions they have made together. Technology, however, simultaneously disrupts the stability of these knowledge objects. Textisms and other linguistic norms evolve rapidly across generations [11], changing the interpretation of dialogue. Even the domain-specific language shared between these two illustrators–in this case medical and creative terminology–is situational. Take *"rendering"* for instance: this is a term whose semantic meaning has evolved with technological advancements to signify different concepts, even within the same field. Rendering (by hand) can signify traditional illustration techniques such as carbon dust, while rendering (by digital means) can signify colorizing an illustration in a raster graphics software such as Adobe Photoshop[1]. Within the field, rendering can also signify "frame rendering" for a medical animation, or "web rendering" for an interactive project. When digital conversations are treated as knowledge objects, they are highly embedded within a particular interaction between people. By preserving knowledge in the form of stories, we have access to the context required to decode the reality of practices such as medical illustration.

## Acknowledgments

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