

# The Role of Gamification in Medical Device Development

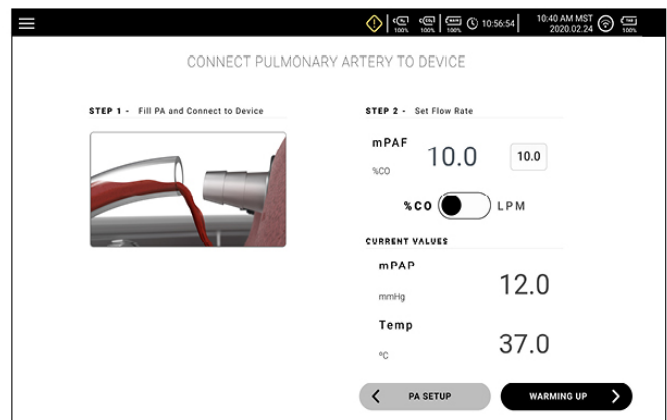
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*Gamification techniques allow designers to more effectively curate exchanges with users.*

Medical device development has changed significantly in recent years as requirements around complexity, connectivity, and cybersecurity increase. As regulatory bodies catch up to accelerating medical and technological breakthroughs, the pathway to product certification and commercialization has grown much more challenging—one area that’s highly impacted is UX design.

For obvious reasons, medical device development is among the most heavily regulated design activities out there. But it’s still far from precise, which is why errors and recalls remain commonplace. Designers must deal with a host of challenges—for instance, evolution in the usage environment. While some medical devices continue to be used in a controlled, sterile environment, others have moved out into the field. That means designers must account for new conditions that the user can’t necessarily control. The full array of these conditions is very difficult to plan for—and therefore test—providing what gamers would refer to as a “difficulty multiplier” for design teams.

At the same time, patients have grown more knowledgeable and become more active



*This screen reflects a step-based setup process designed to help the user focus on the current step by obscuring the rest of the workflow until needed. Showing proactive alerts when the flow rate is within non-optimal ranges directs the user toward desired actions and outcomes, and educates them along the way.*

participants in their own health and wellness. This has driven demand for quicker and more convenient communication with care providers, greater access to health information, increased interest in self-administered tests and treatments, and a proliferation of health and fitness apps and devices.

Significantly, it also has given rise to a general expectation that modern medical devices address all of these desires, delivering an elevated standard of care and a more complete view of a person's health and wellbeing. But how can designers create devices and apps that meet these lofty expectations? That’s where gamification can help.

## What Is Gamification?

Gamification describes the application of game elements, such as competition and point scoring, into non-gaming environments to encourage engagement with a product or service. The practice of gamification is founded on three key academic principles: Self-Determination Theory, which suggests that autonomy, competence, and relatedness are universal human needs; Flow Theory, which posits that flow can be achieved when a balance is struck between an individual's skill level and the level of challenge presented by the task; and Self-Efficacy Theory, which suggests that a person's confidence in his abilities can determine his drives and decisions.

How does this relate to medical device development? The process of medical device design is fairly prescribed, varying little across organizations. Gamification is one tool designers can use to enhance this process. For instance, when creating medical devices, an important element of the design process involves product definition, which is built upon essential information. To extract necessary information about the products and their users, designers employ specific techniques.

During the early phases of most projects, when available documentation lacks many critical details, designers rely on input from project stakeholders and partners to fill in the gaps, and allow capture and validation of the product vision. Designers then document in a way that's tangible and specific, and can be applied by the entire product team.

There are many other UX techniques for capturing critical details, such as user interviews, personas, and use cases. However, these techniques only work as long as the

information gleaned is accurate. This is why there should be a push early on in a project to engage certain users, specifically customer collaborators and subject matter experts, and other key stakeholders, on a level they personally find comfortable and informative.

Gamification ties users closer to the product and the development processes, which leads to better products.

Gamification techniques allow designers to more effectively curate exchanges with these users in a way that's acceptable to all relevant contributors, including doctors, nurses, patients, caregivers, and emergency responders. Gamification also allows designers to easily transfer this knowledge from subject matter experts to the consulting design team, which is critical for the creation of successful products.

But there is a caveat: Project teams often think of this knowledge transfer process as a straight line and focus solely on concrete project deliverables. But any details glazed over or forgotten during the transfer process can lead to additional hours of work further down the timeline. To transfer knowledge most effectively, here are some ways to apply gamification laws toward data collection from users.

- Structure user research sessions around familiar and non-threatening patterns.
- Validate bite-sized workflows and actions to keep focus on a particular path and not allow the user to become distracted or discouraged.
- Opportunistically alter the "best practice" model for any UX deliverable around the particularities of a specific user, rather than insisting on orthodoxy in order to obtain the necessary information.

## Gamification Helps Designers Manage Complexity

You can't wish complexity away. A device does what it's intended to do, and while clever UX design can, for example, decrease the number of screens necessary to complete an action, it does not actually alter the action itself. Tesler's Law teaches us that if this complexity is not dealt with in the design, it is simply transferred to the end user.

That's why it's essential to at least manage the "appearance of complexity" even if complexity itself can't be altered. Contextualizing information based on understanding of user needs and current workflows helps prevent users from becoming overwhelmed or discouraged. This can be achieved by using advanced vs. simple modes, different user type-specific workflows and layouts, and/or gradual introduction of more intricate features as the user gains momentum with the UI.

Obviously, if designers simply kick complexity to the end user, they're increasing the strain and cognitive load of the users. In other words, designers are failing to do their jobs. The results can be disastrous. Tesla recalled 2.2 million vehicles because messaging on instrument panel warning lights was designed in a way that appeared in a smaller font size than required by federal safety standards—just one example of how UI errors can be devastating to an organization and potentially catastrophic to users.

## Aspects of Gamification Applicable to Medical Device Development

There are many aspects of gamification that can be applied to medical device development. Among those we've found most useful are:

- Leveraging familiar UX/UI patterns from common non-medical devices such as smartphones and tablets to decrease training and onboarding time. This allows users to anticipate desired actions and shrink decision times.
- Using familiar form factor and button/control layouts from gaming systems and other popular personal electronic devices.
- Incentivizing user participation by using tried-and-true techniques learned from gaming to spark and sustain user interest. These include things like avatars, badges, and personal records—elements people are exposed to in other aspects of their lives.
- Leveraging advances in machine learning and automation to gather key feedback from users and shortening the overall feedback loop. This gives the device the ability to learn the user and the ability of the UI to use that knowledge to inform and incentivize the user. This includes curating workflows and the general surface-complexity of the UI to avoid discouraging the user early on—a direct nod to Flow Theory.
- Providing ability to calculate and preview results of possible actions to inform the user's actions and, at times, prevent adverse or even catastrophic outcomes.

## The Takeaway

Product development success demands that designers absolutely, unequivocally understand their target audience or risk creating products that are difficult or downright impossible to use. Gamification is one important way designers can tie users to the product and the development processes, as it encourages a feedback loop that can lead to dramatic product improvements and allows designers to fully transfer the ownership of the solution to the customer's full-time product team. This knowledge makes them better custodians of the product and its design system and empowers them to continue to leverage and enhance the design system designers create.

By applying gamification laws carefully and systematically, designers can not only make medical devices that are better, more intuitive, and more accessible to the intended user but also foster a truly collaborative process that yields the best possible results during product definition and design.

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