CREATING VIVIBOT:

A Chatbot By Hopelab Supporting Mental Well-Being In Young People During The Period After Cancer Treatment

BOLD

DETERMINED

COMPASSIONATE

STRONG

SASSY

POSITIVE

VULNERABLE

RESILIENT

HOPELAB

Hopelab creates behavior-change tech to help teens and young adults live happier, healthier lives.

FORWARD

A resilience-building chatbot for young people living with cancer was not even a whisper of an idea when we started this work. We knew that there were a lot of unmet needs for adolescents and young adults (AYAs) with cancer. These young people have historically been overlooked, sandwiched between pediatric and adult oncology services. Since Hopelab's founding days creating the Re-Mission video game, we've worked in this community seeking to activate, support, and learn from them.

This retrospective will walk you through the innovation journey we took bringing this intervention to life. We hope it reflects the strength and inspiration we drew from the AYA community—including its struggles and resilience. These voices were present every step of the way, and they co-created a product that both works for them and "gets" them, and resulted in something we can all be proud of—the award-winning, anxiety-reducing resilience bot we lovingly call Vivibot.

Jana Haritatos, VP Research
Chris McCarthy, VP Strategy & Design

THANK YOU

A special thank you to our co-creators—the young people living with cancer and the organizations that serve them—and all those who gave their time, energy, and wisdom to build something truly remarkable.

- AYA Cancer Advisory Council
- Stanford Adolescent & Young Adult Cancer Program
- Other consented youth

IN MEMORIAM

Clarissa Conley

Dec. 6, 1995–Sep. 20, 2019

It is with deep gratitude that we remember those who are no longer with us. We especially remember Clarissa Conley who passed away on September 20, 2019. We met Clarissa through the Stanford Adolescent and Young Adult Cancer (SAYAC) Program and worked with her at the end of our Vivibot journey. Clarissa loved helping others, especially those experiencing similar situations to hers. Thank you for sharing so much, Clarissa. You are missed.

THE BEGINNING

IT WAS FALL 2015 when Pam Simon, Program Director for the Stanford Adolescent and Young Adult Cancer Program (SAYAC) asked Hopelab if we could help them and others better understand and meet the needs of adolescents and young adults (AYA) with cancer. It was great timing; Hopelab was already in the process of exploring how to leverage its deep cancer relationships built during the creation of video games Re-Mission and Re-Mission 2 to meet community needs in new ways. At the time they were created, those games met young people on platforms they were using. But in just a few years, a lot had changed, mainly that young people today are true digital natives. And so began our journey through Hopelab's three phases of our innovation framework—discover, build-test, and distribute—to understand how we might innovate with and for this group of young people.

DISCOVER

PAGE 2–9
Focus Groups
Expert Interviews

BUILD/TEST

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CancerCon Early Concepts
Advisory Council
Positive Psychology Deep Dive
Agile Research on Facebook
Refining the User Experience

DISTRIBUTE

PAGE 28–33
GRYT Health
Influencing the Field

DISCOVER

What are the key behavioral and psychological drivers of health outcomes we want to improve?

What are the needs and wants of adolescents and young adult (AYAs) with cancer today?

In order to begin to answer these initial questions, we used reverse engineering and design research to illuminate the path forward.

Reverse engineering better mental health for AYAs—working backwards, deconstructing the components that lead to health outcomes and reconstructing them to build more effective interventions—led us to boosting resilience. While only a hypothesis at this stage, it pointed the way forward as we considered what concepts to prototype. Feedback from our design research highlighted that AYAs wanted something they could initiate on their own when they wanted. Based on our conversations with young people, we developed an archetypical story centered around the needs of a young person awake at 2 a.m. with no one to talk to.

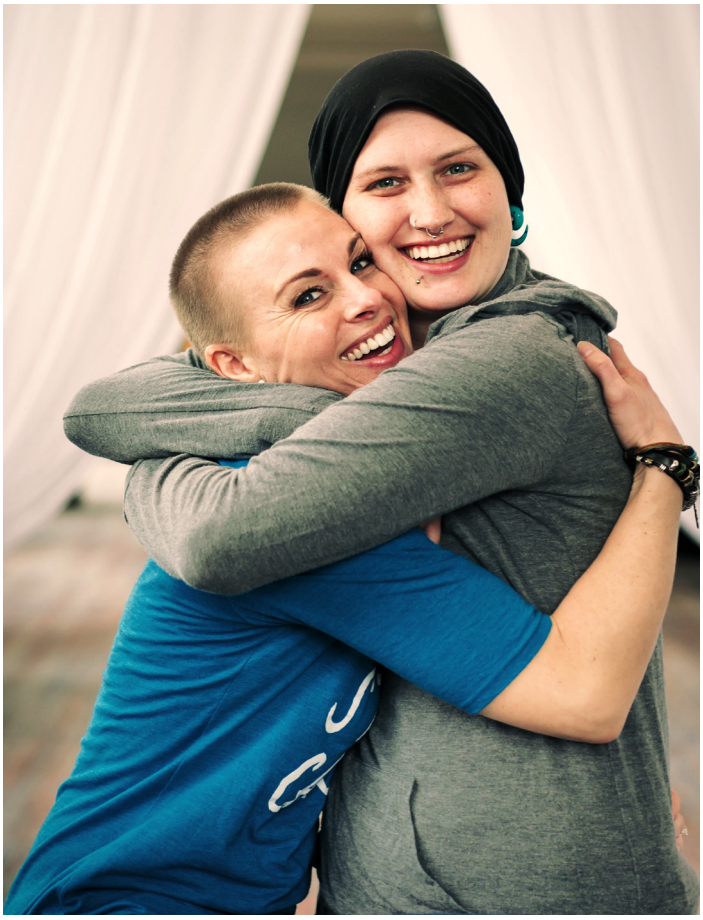
We talked to:

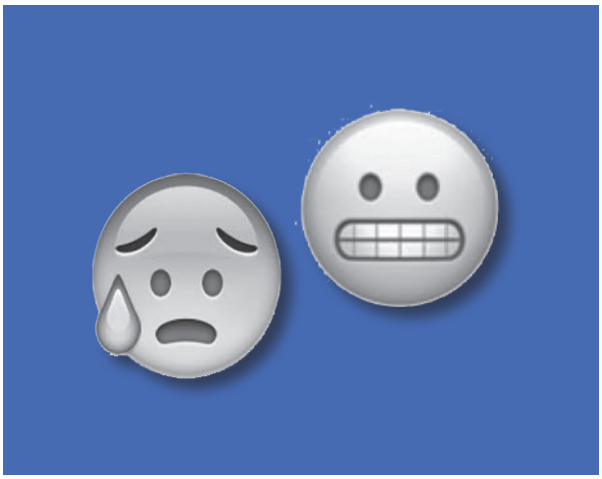
- ~130 young people aged 15-35
- ~15 experts in mental and behavioral health
- ~45 stakeholders in the AYA cancer community

THE NEED

A LOOK AT THE LANDSCAPE

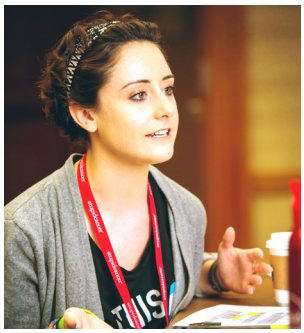
Adolescent and Young Adult (AYA) Cancer Population



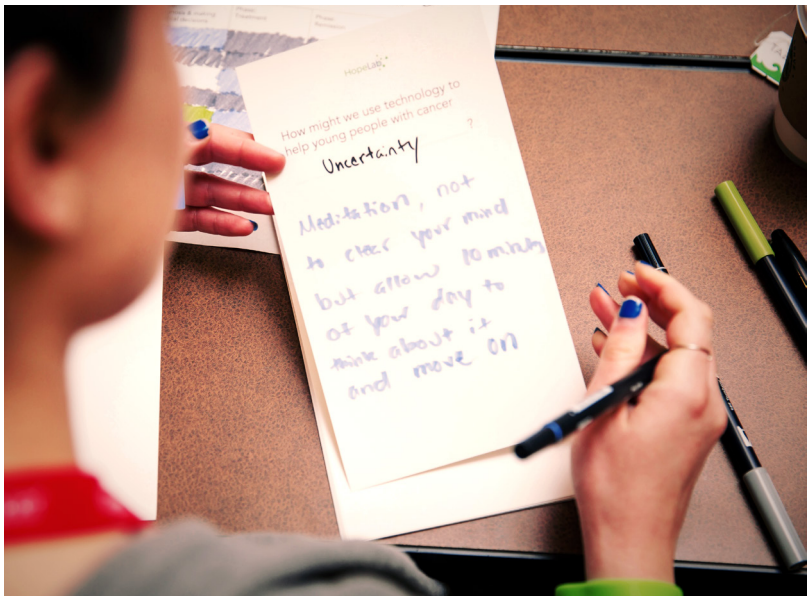


AYAs are more likely than older adults to experience depression, heightened anxiety, distress, and post traumatic stress following treatment.[1]

70,000 AYAs (ages 15–39) are diagnosed with cancer each year.[2]



Survival rates for childhood & older adult cancers have increased, while no significant survival improvements have been realized among AYAs over the past 30 years.[3]

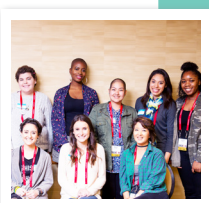


AYAs completing cancer treatment have psychological needs not met by programs designed for children or older adults.[4]

LISTENING

SEEKING UNDERSTANDING AND INSPIRATION

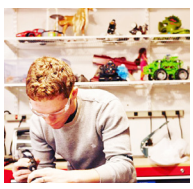
Listening. Deep listening. One-on-one interviews. Focus groups. These were all techniques we used to uncover some of the context and psychosocial factors influencing behaviors in young adults with cancer. Over the course of four months we spoke with:



A dozen young cancer survivors from across the country who helped us notice several recurring themes around identity, psychology, and technology use

Leadership at AYA Cancer Treatment Centers across the country as part of a landscape analysis to help us understand how products, technology, and other solutions are created and disseminated within hospital systems

A scientist who made us question our core assumption—that cancer is a unifying experience resulting in shared characteristics among the AYA population



IDEO's Toy Lab to understand how they design toys for children with widely ranging developmental needs

INSIGHTS

From these conversations, we surfaced three big, initial insights:

1 Building a Post-Cancer Identity*

Many AYAs feel like they're "different people" than they were before treatment. They want to build a new, post-cancer identity, but may be unsure of how to do so and might even find it difficult to communicate this desire to family and friends.

2 Uncertain Sense of the Future

Many AYAs don't want to get their hopes up about long-term survival; some even feel guilty for surviving treatment. Other AYAs express a desire to live in the present moment rather than rely on a future that may never come to pass.

3 Desire to Help Others through Sharing

Several AYAs express a desire to normalize their cancer experiences by hearing others' stories. At the same time, they express that they don't want to hear "sob stories from attention-seekers."

*During the course of this project work, we learned that the term "survivor," used to describe people living with and beyond cancer or post-treatment, is fraught with pitfalls, disagreements, and cliches. As an organization, we decided Vivibot would fully embrace person-first language to avoid labeling anyone by their illnesses or disabilities. Instead of "cancer survivor," Vivibot would say something like, "a person who has had cancer," or "a person dealing with life after cancer." As much as possible, we try to embrace this person-first language when talking about this population.

FROM DATA TO PERSONAS

Grounded in our conversations with survivors, we developed four personas that helped guide us as we developed ideas. These personas helped us clarify the different psychological needs of AYA survivors and where there might be opportunities to better support them.

DOUGLAS, 18

Needs help with feelings of uncertainty

"Life used to seem so beautiful in a way that I don't see now. There are days that are better but mostly it's just the same...can't help but think why me?"

KYOKO, 16

Needs help communicating desire for help

"I always say I'm good even when I'm not. I just don't want to worry people. Plus I wouldn't even know how to tell them how I'm really doing and help them understand."

AZAR, 20

Needs help pursuing her full potential

"Chemotherapy really fucks with your cognitive function. But what makes me happiest is doing things that make me feel normal, like dancing."

ZALE, 22

Needs help continuing to process & grow

"This is an experience I learned a lot from and hopefully I'll have made lots of improvements in my life as a result of it."


PORTUGAL.

BUILD/TEST

Can iterative cycles of data-driven development create tech that is engaging and efficacious?

Hopelab conducts rigorous experiments at every stage of product development, including randomized controlled trials to evaluate impact. The build-test phase of Vivibot was an even more iterative approach than usual, and pushed our research and product teams to be more agile.

In the days of Re-Mission – and with most of Hopelab's other products prior to Vivibot – we conducted painstakingly long randomized control trials before taking the product to market. As a research-based organization, holding our products to the industry gold standard has always been of the utmost importance to us. However, earlier work often took years to complete.

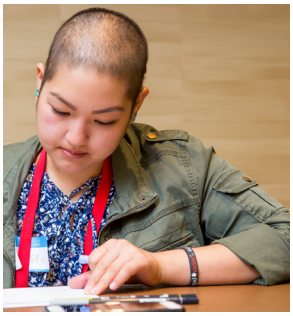
In a world where agile product development has disrupted the industry, we found a balance between getting products to market quickly while upholding our rigorous research standards. This project led us down a new path that brought us into a new era. Instead of building then testing—a long and arduous process— we began to simultaneously build *and* test, allowing for iterative changes to be made along the way. In the spirit of "failing fast" we embraced a growth mindset approach and accomplished the following:

- Mocked-up 15 concepts
- Built six low-fidelity prototypes
- Created an AYA council of advisors
- Launched the product and a research trial
- Validated a meaningful reduction in anxiety and depression

CONCEPTS

SIX CONCEPTS

Based on the needs we identified and through the lenses of our personas, we developed several concepts meant to build resilience by fostering purpose, connection, and control. Over a 90-day period, we conducted five focus groups and gathered feedback and ideas from participants at CancerCon* 2016 to evolve each of them. Six promising concepts emerged to test further.



***CancerCon:** An annual gathering for the young adult cancer community hosted by the advocacy organization Stupid Cancer. We conducted a small, intense workshop with 15 people, and then continued to get feedback and iterate on what we were learning over the next three days. Hundreds of young patients and survivors interacted with our ideas, and taught us a great deal.

Cancer Stories

Watch people describe how cancer has impacted their lives in good and bad ways.

Like a Boss

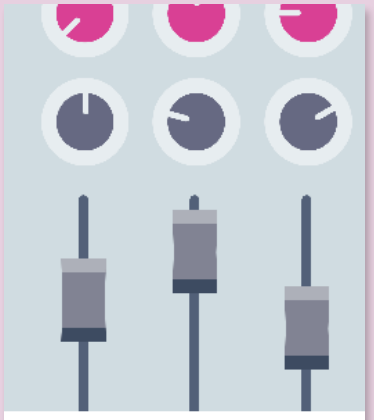
Learn new skills and pick up new hobbies by watching tutorials made by other young people with cancer.

ChemoBrain Buddy

When chemobrain hits, this tool will help you stay on top of treatment and its effects on you.

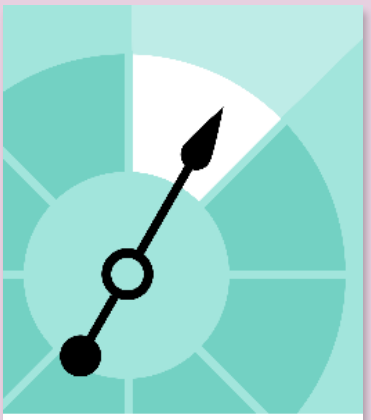
How to Deal

Learn how other young people manage those not-so-fun side effects of cancer.



Connection Control

Figure out how you want to interact with people in your life, and get ideas for how to talk to them about cancer.



Cancer Mindshift

A tool or game that helps you develop your own perspective and nudges you to do more of what makes you feel like yourself.

PROTOTYPING

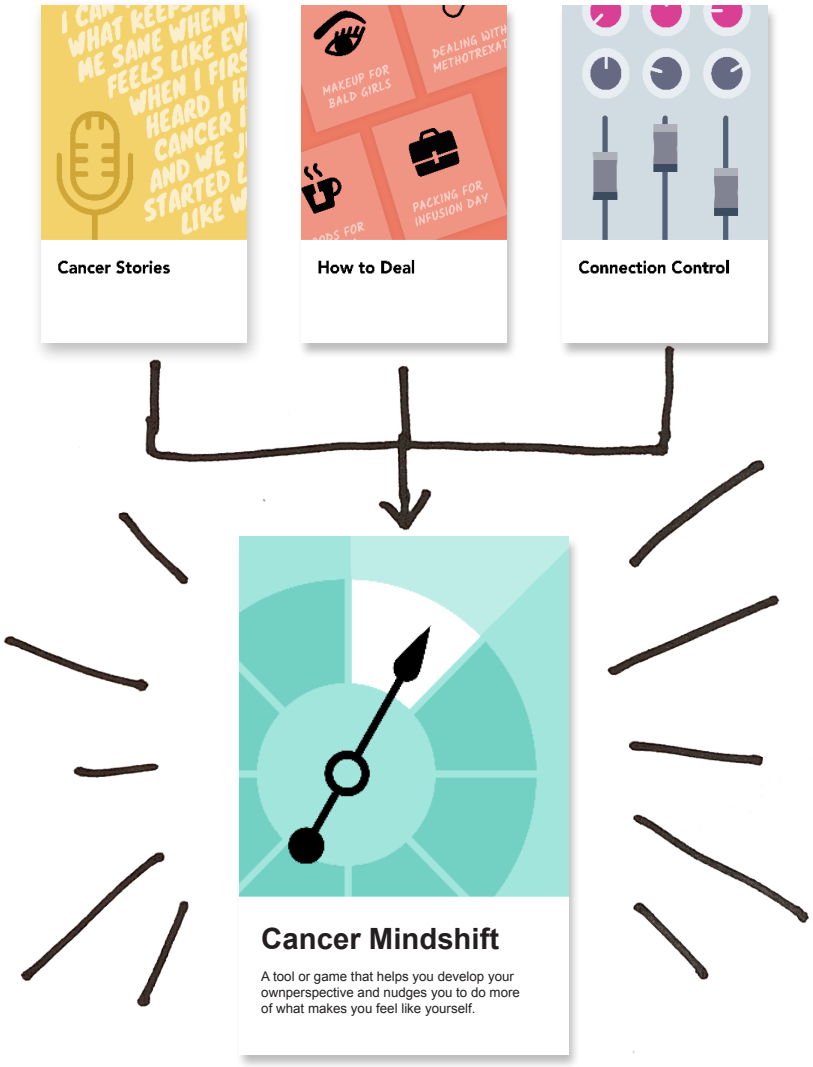
WHAT WE HEARD

As we shared these concepts, the following became clear—survivors wanted to gain a sense of control over their perspective. They realized while they may have little to no control over their uncertain future, they can learn to control how they react to certain situations.

MENTAL HEALTH problems are pervasive among young survivors following treatment. This population has different needs than those in active treatment. The concept of “Cancer Mindshift” kept emerging in our prototyping sessions. The idea was that if given the right tools, you can control your perspective on cancer and the outlook you have about your present and future.

THE WINNING IDEA: CANCER MINDSHIFT

The idea with the most promise began to emerge—a chatbot to address the psychological resiliency needs of young cancer survivors. With such a small, diverse, fragmented target population, one of our biggest barriers to product adoption and scale would be downloading and using a mobile app. We hoped to capitalize on broader reach and impact if we met this population with a different type of technology on a platform they already used. Developing a chatbot on Facebook Messenger allowed us to be agile with product development and with research. Other early concepts could be incorporated into this larger idea of how to help survivors move forward in their lives, adjusting their mindset as they go.



"It made me recall/relive positive moments from the week and made me feel lifted."

THE SCIENCE

DIGGING DEEPER INTO THE SCIENCE + DEFINING THE IMPACT PATHWAY

The common threads that ran through each concept were a focus on positive psychology skills, increasing positive emotions, and decreasing stress and anxiety. Whichever concept moved forward, we knew we needed an intervention to address those unmet needs. So we turned to the science experts:

Dr. Bradley Zebrack, PHD, MPH, MSW, whose work with cancer survivors informed how we think about the trajectory of their mental health outcomes

Dr. Sonja Lyubomirsky, PHD, a researcher whose Kindness in the Blood study examines the biological impact of doing kind things for other people

Judith Moskowitz, PHD, who has been instrumental in pulling together a health adversity intervention that combines seven specific positive psychology skills that we feature in the chatbot

"Vivibot is a way you can help your patients to change their mindsets from cancer treatment to survivorship."

POSITIVE PSYCHOLOGY SKILLS

We drew upon the following seven positive psychology skills as we developed the chatbot:

1 Positive Reappraisal

This skill focuses on acknowledging that we can control how we think and feel about a situation and can reorient our thinking to see the positive side of things.

2 Acts Of Kindness

Doing kind things for others can improve your physical health. Even small acts of kindness, such as "paying it forward" can increase positive emotion.

3 Practicing Gratitude

Gratitude is another way to savor a positive event. Think about things for which you are genuinely grateful, and not things for which you think you should be grateful.

4 Mindfulness

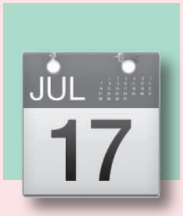
Mindfulness is paying attention, on purpose, in the present moment, with a non-judgmental and accepting attitude. Mindfulness can make things seem less overwhelming and allows you to put more mental energy towards taking action.

5 Attainable Goals

Setting and achieving goals makes us feel good, and short-term, modest goals are the ones that are likely to help us experience positive emotions on a daily basis.

6 Personal Strengths

Everyone has a unique set of strengths, talents, skills and positive qualities. Recognizing your own strengths can help you better cope with stressful things in your life.



7 Noticing and Savoring Positive Events

It's important to recognize and acknowledge positive events that happen each day. Even small events can have a positive impact on mood and the ability to handle stress.

CO-CREATION

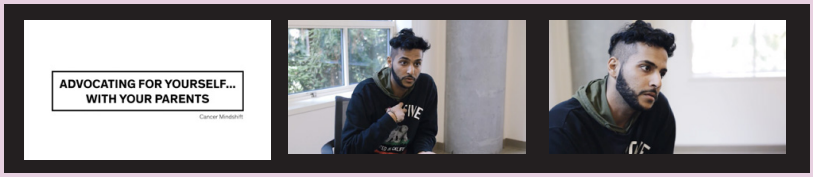
DESIGNING FOR SURVIVORS, WITH SURVIVORS

In July 2017, Hopelab convened nine young adult cancer survivors, ages 16-26, for a weekend retreat with our newly formed AYA Cancer Advisory Council. Their mission: build content for the chatbot that would feel natural and compelling to users. They wanted a bot voice that was empathetic, warm, rooted in real experience, and sometimes even humorous. Council members shared their cancer journey stories, raw emotions, and how they were able to shift their mindsets via filmed interviews.

VIDEO INTERVIEWS FROM THE AYA COUNCIL

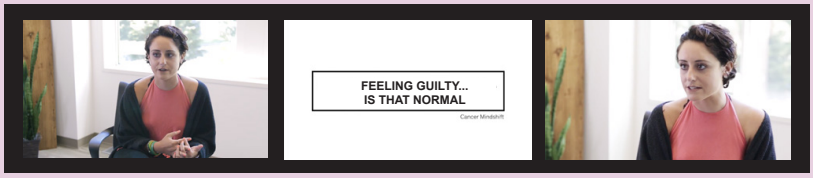
1 Advocating For Yourself... With Your Parents

Mouhammad (26) shares his story about overcoming self-esteem issues and how he dealt with a tricky relationship with his parents as he transitioned from cancer patient to survivor.



2 Feeling Guilty... Is That Normal?

Lenny (23) shares, “Nobody tells you that you’re going to feel guilty.” Survivor’s guilt can manifest at all different times during and after treatment.

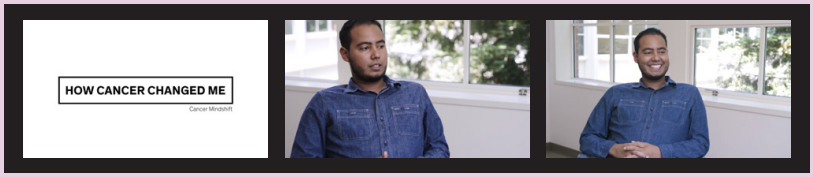


3 Looking ‘Sick’ And How To Deal

Asia (19), Eden (16), and Elizabeth (20), share their advice about how to deal with looking sick — embrace the ‘cancer look’ or draw on those full eyebrows every single day?

4 How Cancer Changed Me

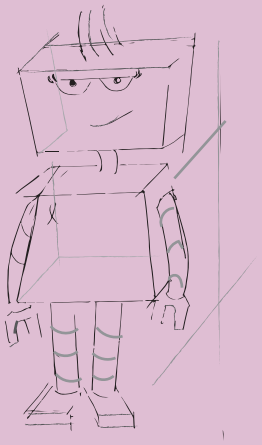
Martin (24) didn’t use to care about a lot of stuff before cancer, but now he cherishes the little things—helping others, listening, appreciating small moments.

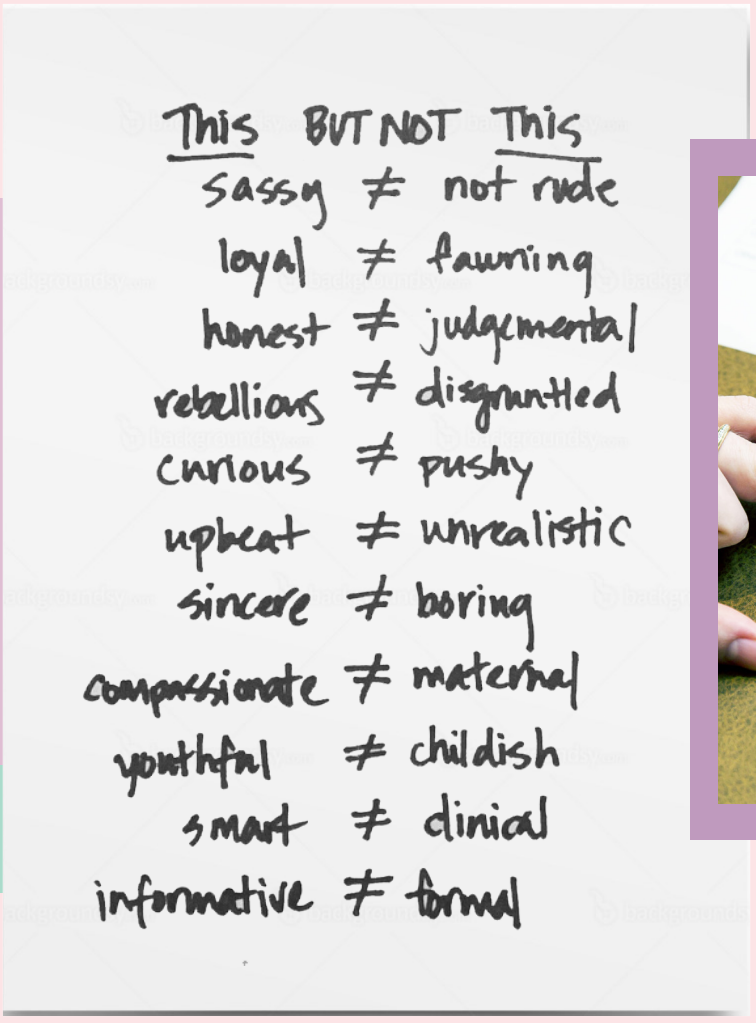


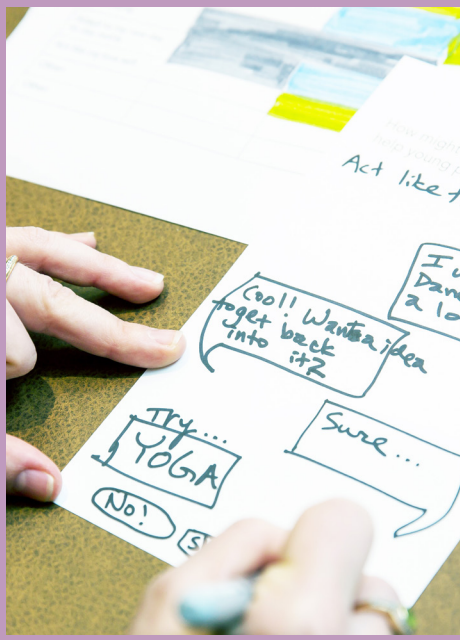
AN AUTHENTIC BOT

VIVIBOT

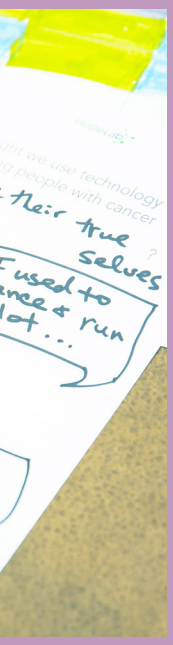
As we developed the content and flow of the chatbot with the AYA Cancer Advisory Council, we also sought to craft a personality that would resonate. Here's who emerged: Vivibot — also called Vivi — is a sassy-yet-loyal friend to adolescents and young adults (AYAs) ages 15–29 who are dealing with life beyond cancer. Vivibot speaks to these users (in a way that many of their "real-life" friends can't), as a different kind of friend who deeply understands what life with and beyond cancer is all about.







VIVI'S VOICE is empathetic and understanding by being curious, acknowledging pain (but not over-doing it), and by not constantly trying to make users see the bright side. She speaks in a natural and friendly way, filled with emotional cues and interjections.



some people are good at doling out self-love 😍 others not so much. How do you feel about it?

eeek! 🙈

lol I get it, self-love can be awkward

cancer brings up a lot of feelings. like, a lot a lot 😳😑😭🙃😂😶😟😱😡

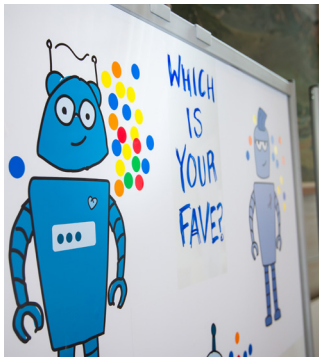
DICTION including word choices and the rhythm of the conversation, was important to get right for our young audience. Being clear, direct, and casual worked. But when Vivibot inserted too much slang, users would tell us she was trying too hard.

HUMOR Vivibot is never funny for the sake of funny. She uses humor at the right time in the right way. Vivibot never ever makes jokes about the user. She also does not tell jokes that make her seem uncaring, dismissive, or judgmental, or that trivialize a person's feelings or experiences.

PILOT

TESTING AT CANCERCON 2017

In the middle of a snowstorm in Denver Colorado, we sought out user feedback on our newly-named and freshly refined product–Vivibot. We understood early on that Vivibot's first few text messages would make or break the conversation. They needed to establish a clear value proposition that explained why someone would want to talk to her, introduce her personality, and set an expectation that would entice the user to keep coming back. We wrote several variations of the opening messages, each with a distinctly different value proposition.



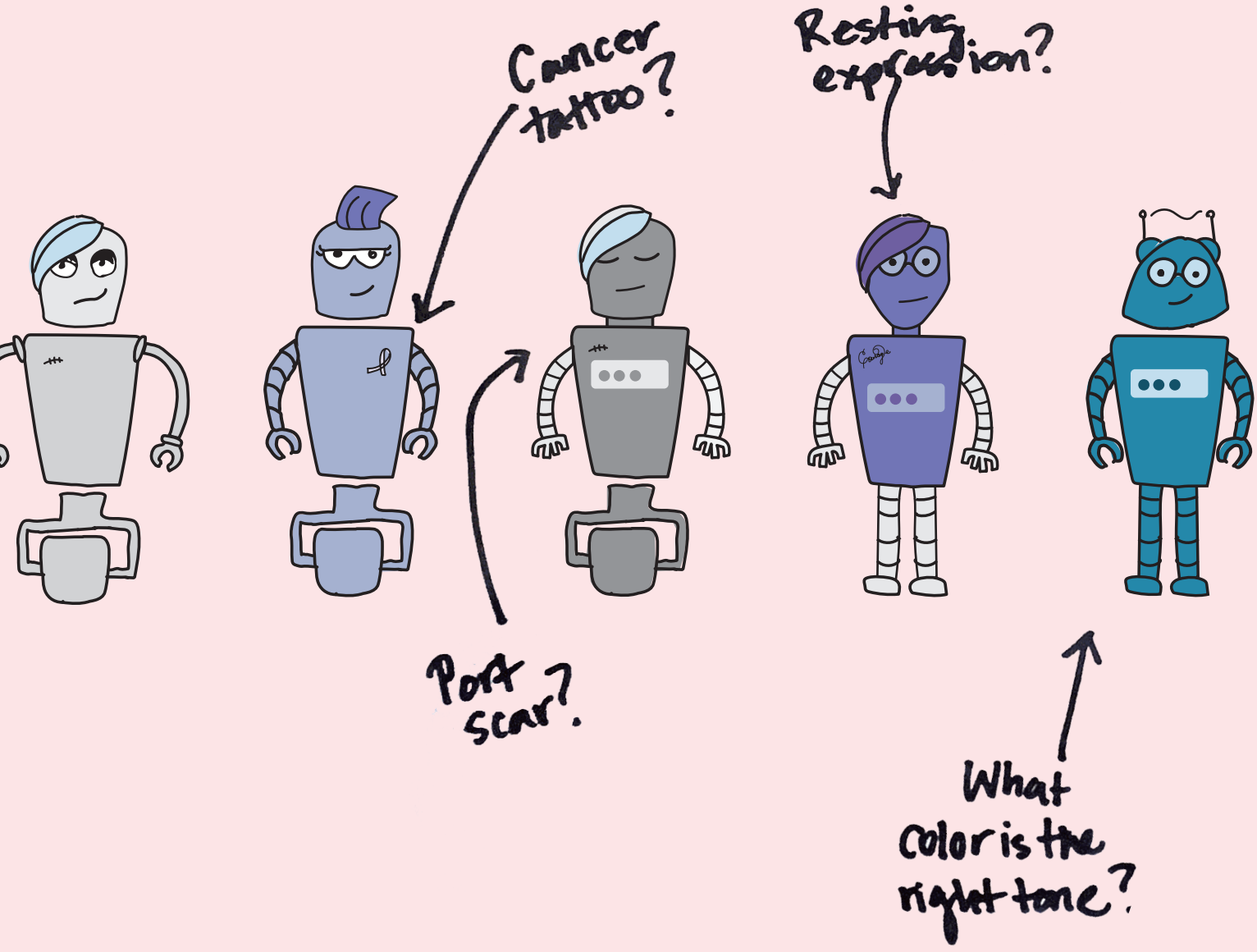
"I feel better and more positive after the demo."

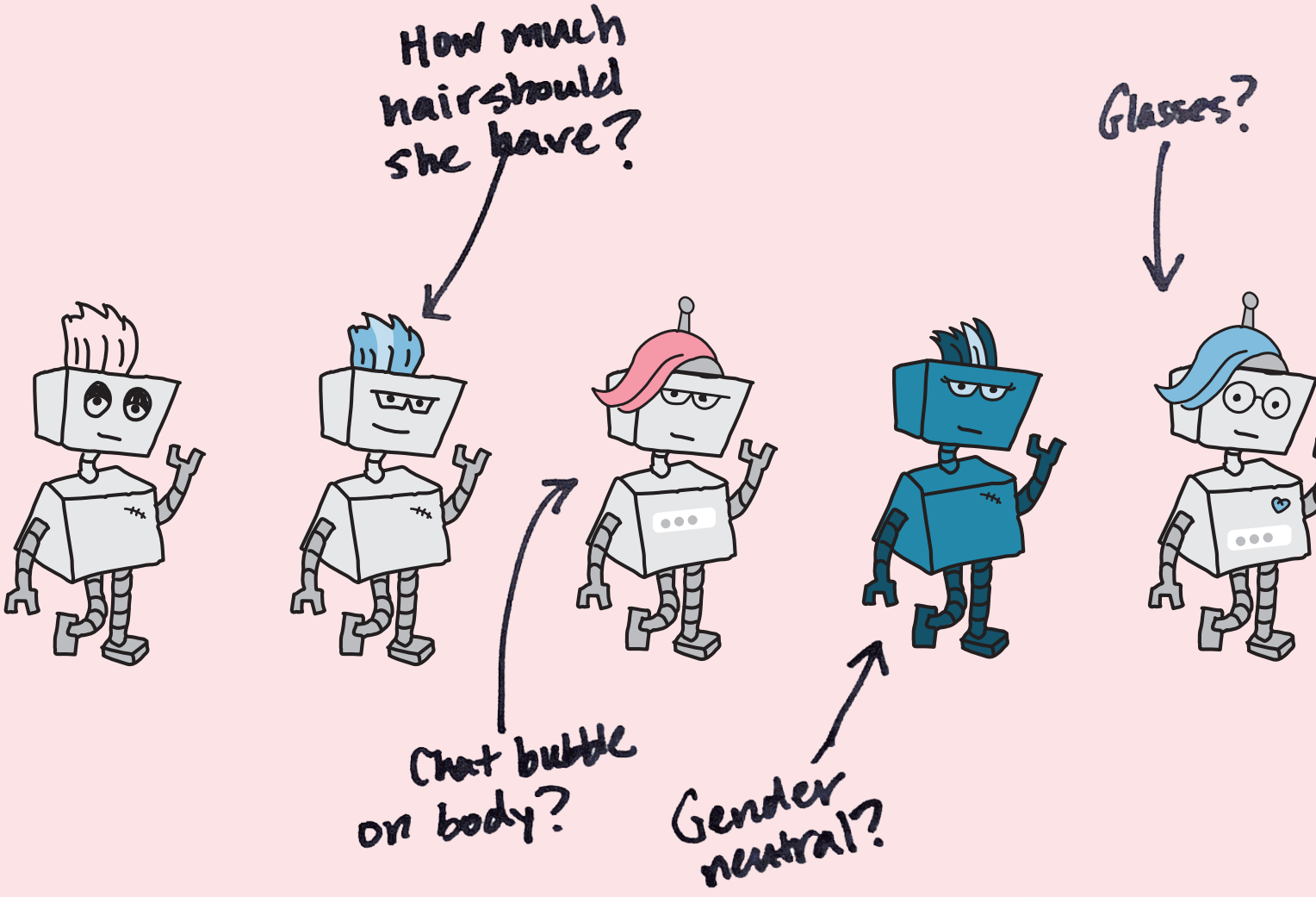
VIVIBOT BRAND

FIRST IMPRESSIONS

To build out the brand personality of Vivibot, we asked conference-goers to help us decide on Vivibot's look by dot-voting on several aspects of her persona—hair style, body shape, port scar, tattoo, eye shape, and gender.

Over the next seven months, we re-evaluated every word, emoji, and image, which gave us the "Vivibot Product Design Guidelines." It's part style guide, part decision documentation on everything from word choice to emoji skin tones.




How much hair should she have?
Glasses?
Chat bubble on body?
Gender neutral?

RESULTS

IT WORKS!

With Vivibot refined and ready for more rigorous field testing, we conducted a scientific study to see how the chatbot worked in real life. A study published in the October 2019 issue of the peer-reviewed *Journal of Medical Internet Research* showed that Vivibot is helpful and relevant to young people dealing with cancer and can improve anxiety after a month of use. A sample of 51 young adults who had completed cancer treatment within the past five years were randomized to either engage with Vivibot for a month or, in the control group, to simply rate their feelings for a month.

After four weeks, participants who had interacted with Vivibot reported a reduction in anxiety as measured by the NIH-sponsored Patient-Reported Outcomes Measurement Information System (PROMIS) anxiety scale, while those in the control group who had only rated their mood had slightly increased anxiety.

Users who interacted with Vivibot found the chatbot helpful, would recommend it to friends, and noted its tone and disposition as a particular benefit.[5]

JMIR Publications

Advancing Digital Health Research

Article | Cited By (0) | Tweetations (22) | Metrics

Original Paper

Use of the Chatbot "Vivibot" to Deliver Positive Psychology Skills and Promote Well-Being Among Young People After Cancer Treatment: Randomized Controlled Feasibility Trial

Stephanie Greer[1], PhD ; Danielle Ramo[1,2], PhD ; Yin-Juei Chang[1], PhD ; Michael Fu[1], MD ; Judith Moskowitz[3], PhD ; Jana Haritatos[1], PhD

ABSTRACT

Background: Positive psychology interventions show promise for reducing psychosocial distress associated with health adversity and have the potential to be widely disseminated to young adults through technology.

Objective: This pilot randomized controlled trial examined the feasibility of delivering positive psychology skills via the *Vivibot* chatbot and its effects on key psychosocial well-being outcomes in young adults treated for cancer.


love
YOUR
melon

DISTRIBUTE

How do we get our solution in to the hands of young people who need it most?

Distribution is where our mission is realized—getting an evidence-based solution into the hands of young people who need it most AND realizing the health and well-being benefit of that interaction. For Vivibot, the road to and through this phase was turbulent, sometimes unclear, but worth every ambiguous moment.

For all our projects, this phase begins the moment the project starts asking two simple questions: Who might be our partner on this journey? And how might they help us distribute a solution to the intended population?

In the early stages of the Vivibot project and throughout the discovery phase, we attempted, but failed to find a partner with a clear distribution channel. But we were encouraged by each partner conversation to keep going. And the same was true throughout the build-test phase with an additional mantra from many potential partners: “Come back when there is evidence.”

When we were at the scale-gate, the point in our process when we hope to make decisions about how best to scale, we made the organizational decision to treat Vivibot as an “orphan product.” Because it was efficacious, Hopelab would be the distributor while continuing the hunt for the partner who could be the right long-term home. Soon after, in April 2019, at CancerCon, the distribution stars aligned and partner talks with GRYT Health that had been ongoing throughout the project turned from “a crush” into something more serious.

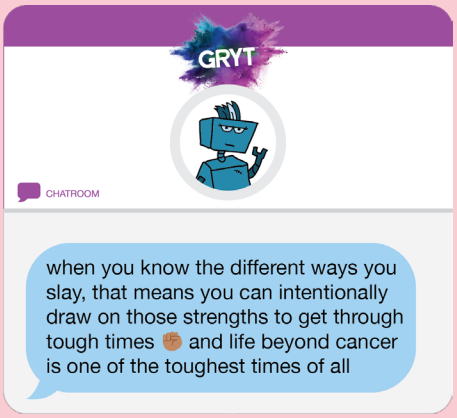
- October 5, 2019 Hopelab and GRYT Health announce official partnership
- Vivibot moves off Facebook Messenger and exclusively onto GRYT platform

A HOME

VIVIBOT'S GOT GRYT

GRYT is a social community founded by cancer survivors and caregivers who wanted to create a more human approach to helping people live on their own terms. The GRYT app is a platform for people affected by cancer to connect with others with similar experiences and empowers them to make choices that are right for them.

In 2019, GRYT had approximately 17K registered users. Nearly 2K are between the ages of 15-29 years, and we are optimistic that GRYT has the ability to get Vivibot into the hands of many, many more AYAs.



PARTNER VISION

"We are honored to have Vivibot and the desktop version of GRYT for everyone facing the 'two-in-the-morning moments.' It's then when everyone is asleep and you are facing battles no one else sees—when the real feelings sink in and the mask of 'I'm fine' or 'I'm good' comes off and your inner strength is tested. Being able to connect others to an easy-to-use, evidence-based, judgment-free place where they can share what's on their mind and knowing that their information is always safe-guarded, anonymous and private—this is why GRYT exists."

–David Fuehrer, CEO of GRYT Health

IMPACT

IMPACT, EXPECTATIONS, & RESULTS

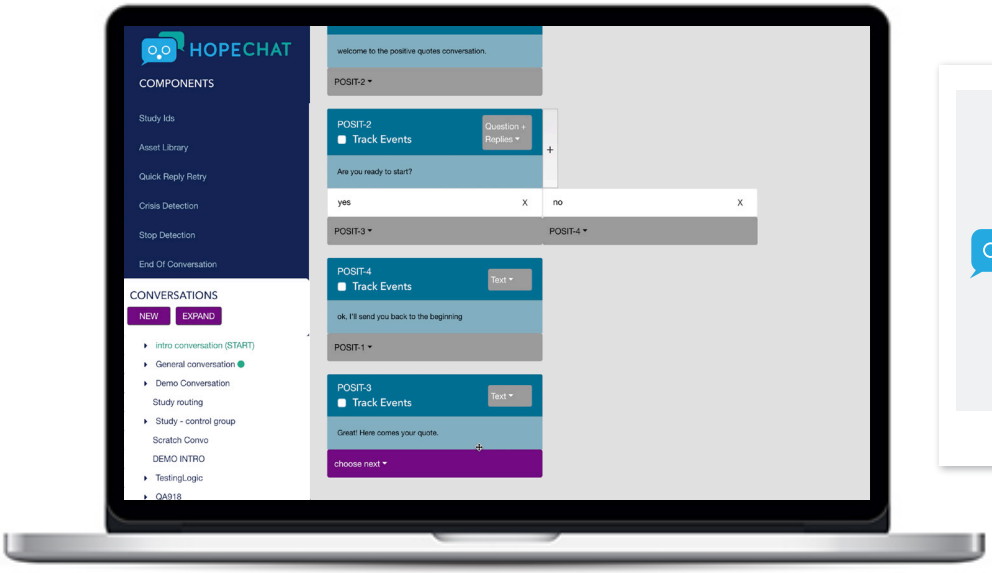
Hopelab is committed to developing interventions and partnering with other like-minded organizations to maximize social and health impact. For Vivibot, it's Hopelab and GRYT's shared goal to reach:

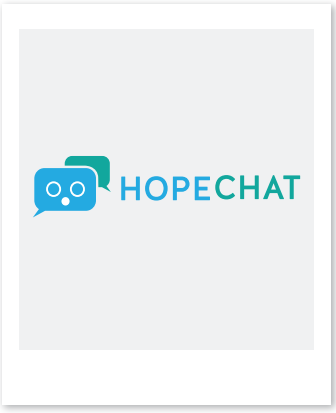
6,000 AYAs BY 2021

HOPECHAT: IMPACT BEYOND VIVIBOT

If the content of Vivibot is the heart and brain of the tool, Hopechat is the skeleton holding it all together. Hopechat is a content management system designed to allow for easy administration of a daily skills-based chatbot deployed to any number of interaction points.

Hopechat is designed not only to support Vivibot on both Facebook Messenger and GRYT, it is also designed to be offered as an open source chatbot tool for others to use and build upon. It is able to be tied into a variety of platforms, using an API, and developed for enabling clinical trial testing and experimentation. The interface, while simple, is a powerful tool for developing conversational chatbots.





TEAM

THANKS to the Hopelab team that has worked on Vivibot over the years, has sought to understand young cancer patient and survivor needs, and has experimented with new ways to meet survivors on their own terms.

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HOPELAB

Inspired by Hope. Realized by Science.

PARTNERS

ALSO, THANKS to all our partners who helped us create and deliver Vivibot to the young cancer survivors we serve and learned with us along the way.

DISTRIBUTION PARTNER:
GRYT Health

OTHER PARTNERS:
Grio
Presence
Round Barn Labs

LEARNING & EXPERIMENTATION PARTNERS:
Cancer 4 College
Cancer Support Community / Gilda's Clubs
Camp-Mak-A-Dream
Cassie Hines Shoes Cancer Foundation
Cervivor
Children's Brain Tumor Foundation
CHLA LIFE Cancer Survivorship & Transition Service
Lacuna Loft
Roswell Park Cancer Center
Stanford Adolescent and Young Adult Cancer Program
Stupid Cancer
Teen Cancer America
True North Treks

CITATIONS

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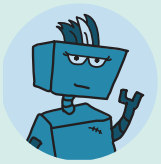

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