IBM Studio Engagement **Cognitive Ear**

Our Team

The **Cognitive Ear team** consists of a diverse team from different teams and backgrounds. Our interdisciplinary group consists of **1 Master Inventor** + **Design Principle**, **1 UX Design Lead**, **3 UX designers**, **4 researchers**, and **4 developers**.

The **Design Team**

Tricia Garrett

PRINCIPLE + MATER INVENTOR

IBM INDUSTRY SOLUTIONS

Clara MacDonell

MOBILE UX DESIGNER

COLLABORATIVE SOLUTIONS

Steven Strouble

UX DESIGNER

HYBRID CLOUD

Kayla White

UX DESIGNER

BLOCKCHAIN

Patrick Nyeste

UX DESIGN LEAD

HYBRID CLOUD

The **Research Team**

Micheal Rowe
BUSINESS DEVELOPMENT

IBM RESEARCH

David Wood
SENIOR SOFTWARE ENGINEER

DISTRIBUTED COGNITIVE SYSTEMS
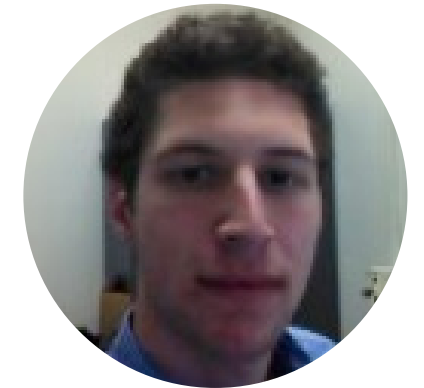
Shiqiang Wang
RESEARCH STAFF MEMEBER

IBM RESEARCH

Xiping Wang
MULTIMEDIA NETWORKING

IBM RESEARCH

Joshua Rosenkranz
RESEARCH SOFTWARE ENGINEER

IBM RESEARCH

Kieth Grueneberg
SENIOR SOFTWARE ENGINEER

CLOUD BASED NETWORKS

Jorge Ortiz
RESEARCH STAFF MEMBER

IBM RESEARCH

Dinesh Verma
IBM FELLOW

DISTRIBUTED COGNITIVE SYSTEMS

Bong Jun Ko
RESEARCH STAFF MEMBER

IBM RESEARCH

Our Goal

*From the **Design Team**...*

"We aim to **provide design expertise** for a MVP deliverable for IBM Research. Specifically, support Cognitive Ear's 1 billion **user adoption goal** by ensuring that its world class capability is showcased by (not limited by) its user experience. We also saw an opportunity to **design for emerging voice/sound technology**."

*From the **Research Team**...*

"Realizing that we can create a **world class capability**, we also wanted to ensure we have a world class design. After talking with Steve Kim (Studio Program Director, Head of Studio, IBM Studios RTP), we pulled together a team of **creative and experienced** designers."

Our **Conception**

So far...

In **3Q2016**, research leaders across IBM working on the Internet of Things met together in Zurich. As part of that meeting Harriet Green (General Manager, Watson Internet of Things, Customer Engagement & Education) put a challenge on the table for us to look at how could IBM reach 1 billion users.

Dario Gil (Vice President, Science and Solutions, IBM Research) posited the idea of a simple service that identified "Normal" and "Not Normal". Figuring out how to take these two ideas and introduce IBM to a consumer market, the idea of the Cognitive-Ear was born. Dinesh Verma (IBM Fellow, Distributed Cognitive Systems), Bong Jun Ko, and I realized **we could take a research project which was looking at the industrial setting, and improve our classifiers by creating a "simple" application for home users**. This idea has become known as the "Cognitive Ear".

The research team has received sponsorship from Sky Matthews (CTO - Internet of Things), Venkat Ragahaven (VP - Business Development, IBM Research) and Bijan Davari (VP - Next Generation Systems). The work is being done in coordination with the Watson Internet of Things business unit.

Some "findings" from our experience so far:

- In audio (non-speech) analysis, **"deep learning"** approaches alone do not necessarily give superior performance over traditional machine learning ones. Rather, it requires various combinations of feature extraction methods and **machine learning algorithms** to cope with a variety of the audio "domains".

- From research standpoint, there's a wide avenue of new innovation to take place, in terms of processing audio signals to achieve better analytics results. These include separation of multiple sound sources from mixed signals, automatically segmenting the signal to find out "meaningful" portion of the sounds, separating the true sound from the noise, etc. The team is actively looking to develop (and have developed) algorithms to address these issues.

- From an engineering standpoint, the "normal-not-normal" paradigm, which is at the core of Cognitive Ear service model, has proven a very promising approach to addressing the issues of lack of sufficient data and domain expertise to build the machine learning models from scratch.
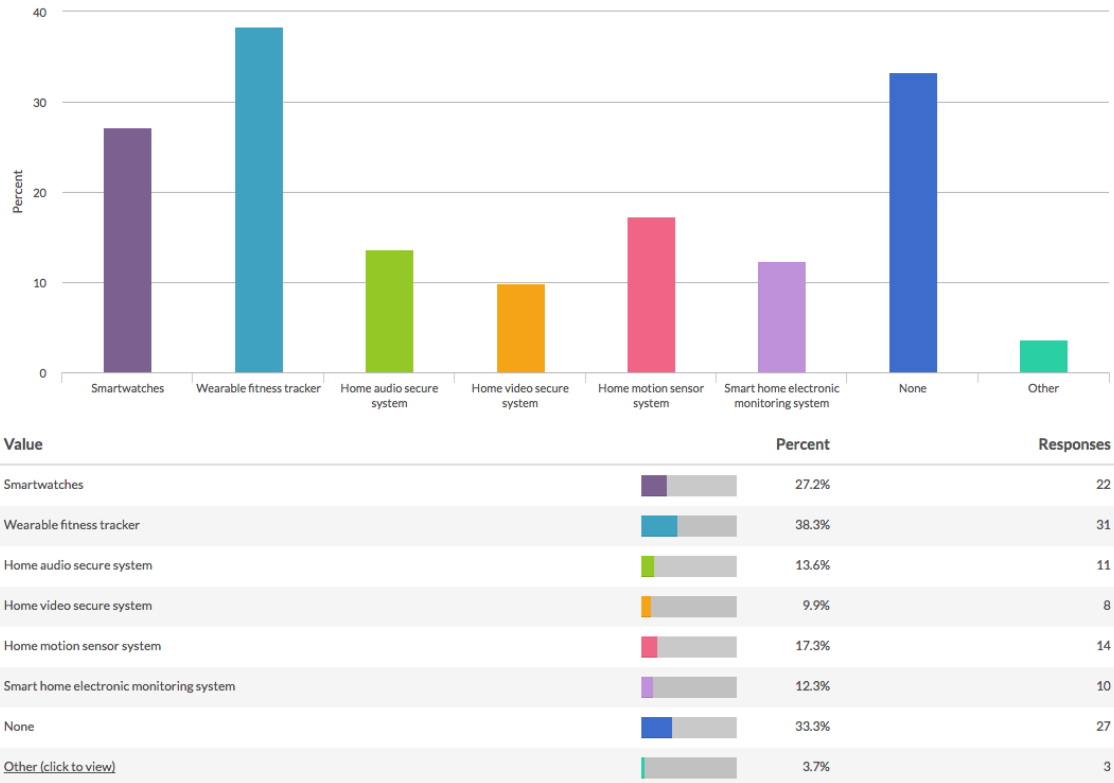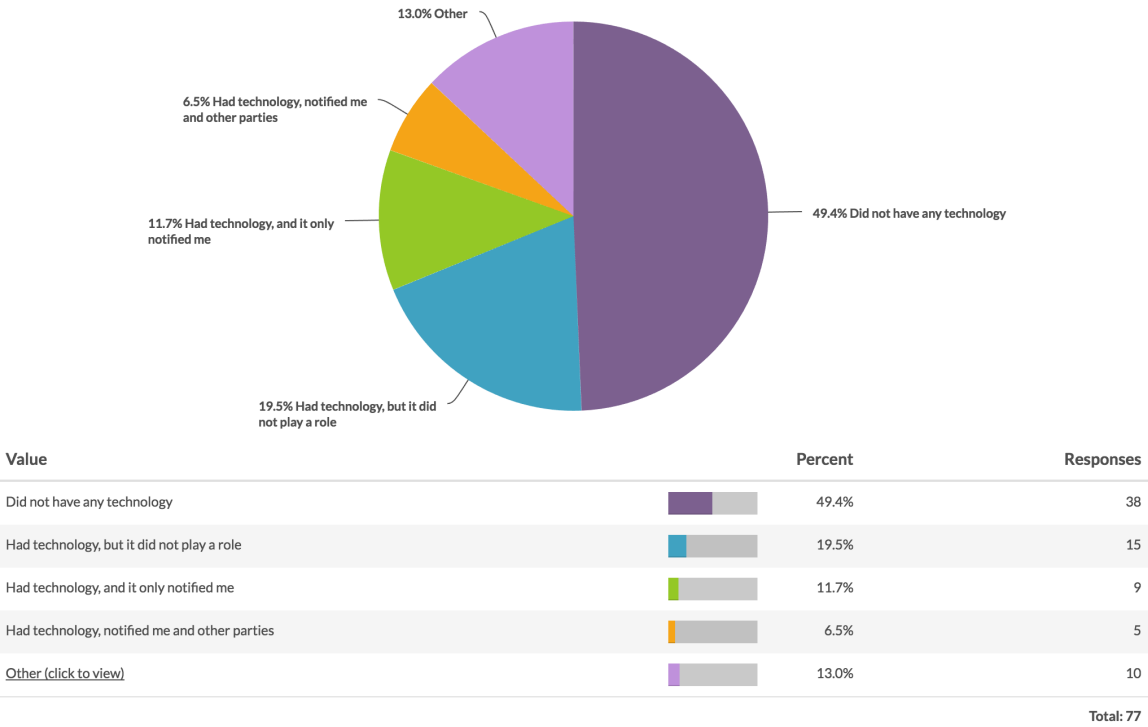
Our **Process**

Design research findings...

The design team conducted research across ibmers (majority being at RTP).
Here are some things we drew from the responses...

1) Mostly the user was a millennial or generation Y
2) Living in a a suburban environment in a home or townhouse
3) Lives with other adults or (mobile) pets

4) Travels monthly for 2-7 days

MONITORING DEVICE TYPE

Value		Percent	Responses
Smartwatches		27.2%	22
Wearable fitness tracker		38.3%	31
Home audio secure system		13.6%	11
Home video secure system		9.9%	8
Home motion sensor system		17.3%	14
Smart home electronic monitoring system		12.3%	10
None		33.3%	27
Other (click to view)		3.7%	3

PRESENCE OF TECHNOLOGY

13.0% Other
6.5% Had technology, notified me and other parties
11.7% Had technology, and it only notified me
49.4% Did not have any technology
19.5% Had technology, but it did not play a role

| Value		Percent	Responses
Did not have any technology		49.4%	38
Had technology, but it did not play a role		19.5%	15
Had technology, and it only notified me		11.7%	9
Had technology, notified me and other parties		6.5%	5
Other (click to view)		13.0%	10
			Total: 77

Building personas

The design team spent a day building out our personas and their pain points.
We then mapped out the as is and to be scenarios.

Creating these scenarios helped lead into our wireframes.

MONITORING DEVICE TYPE
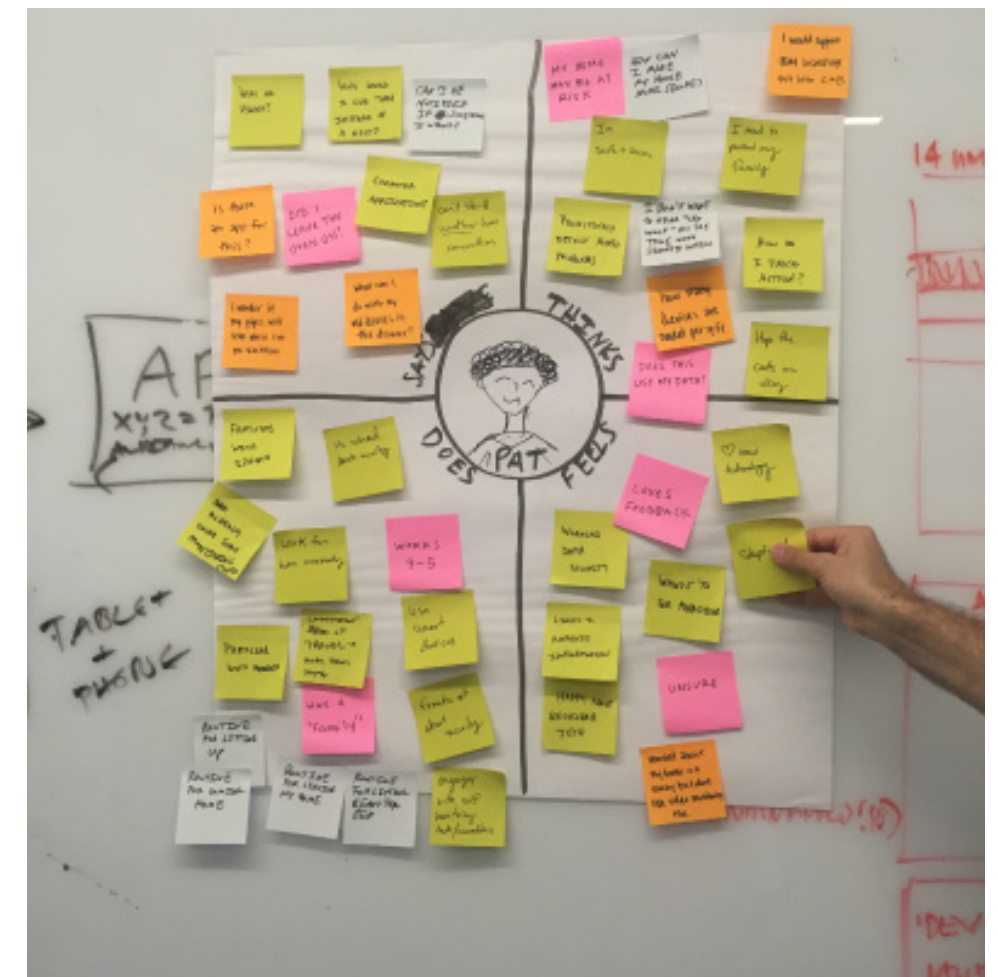
Creating wireframes

We began to map out the to be scenarios to help guide our wireframes for the cognitive ear application.
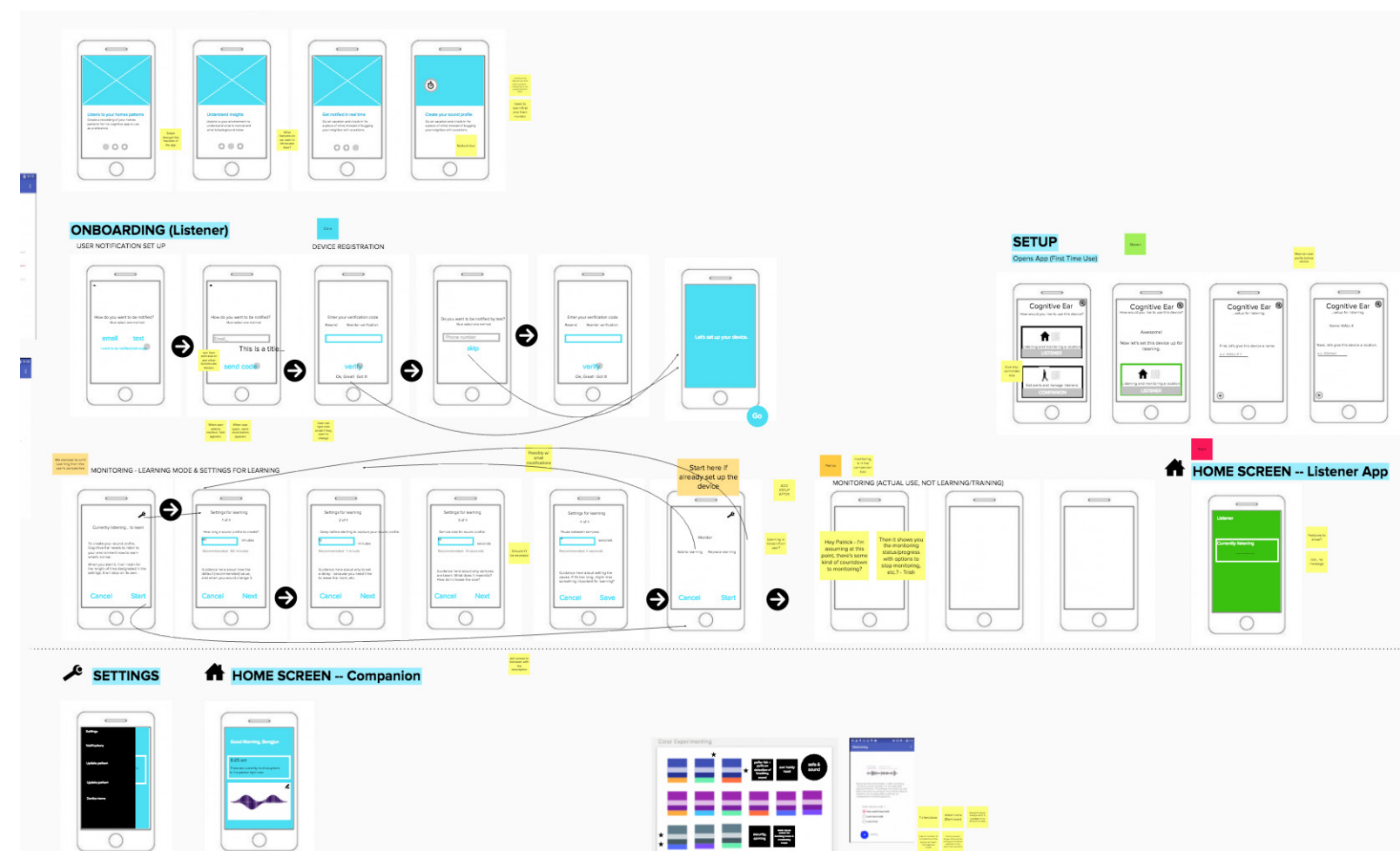
AS IS TO BE

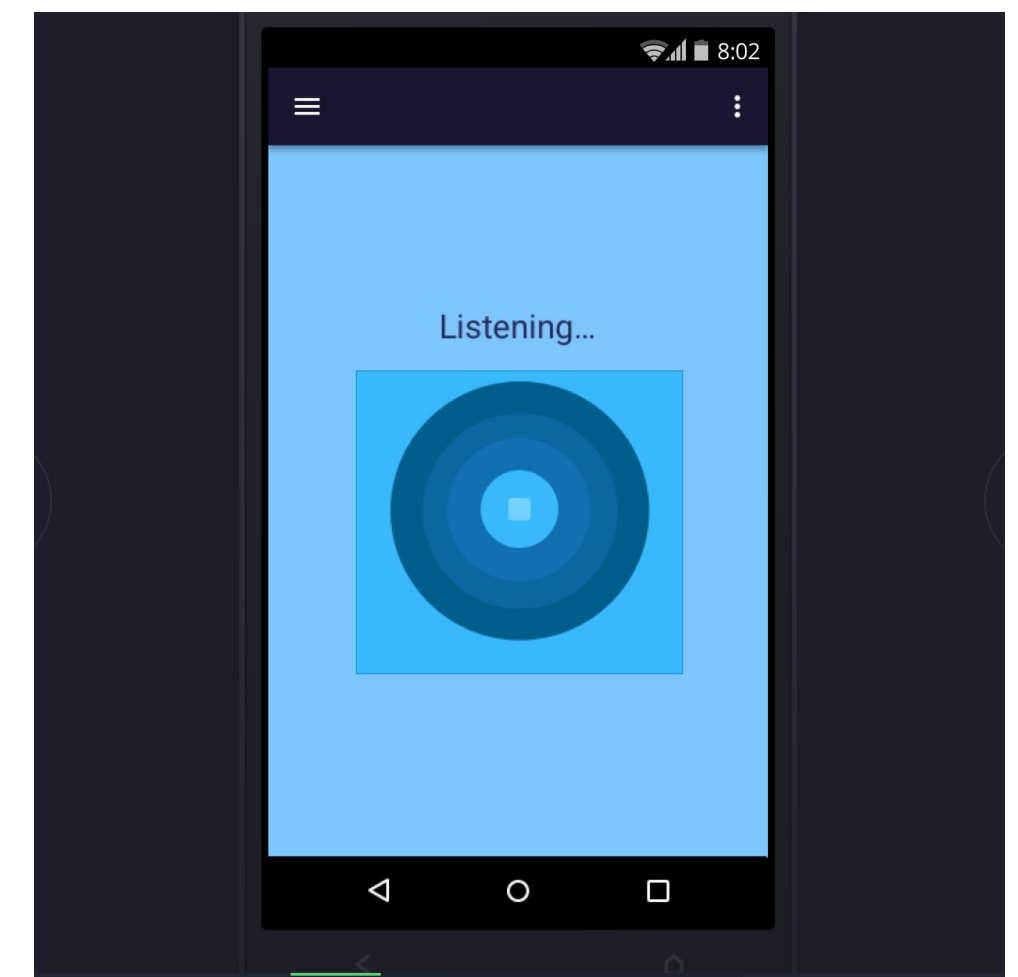GETTING TO WORK.

Creating the app

After working with the research team on our lofi wireframe, the design team began building out the hifi prototype for android.

We are continuing to work on the mobile app and website.

LOFI WIREFRAMING

HIFI INVISION PROTOTYPE

Our **Plan**

Project timeline

30 September - kickoff

10 October - research (Blythe w/ Steve, Steven, Patrick, Clara)

- 91 IBM participants
- Findings:

1) Mostly the user was a millennial or generation Y
2) Living in a a suburban environment in a home or townhouse
3) Lives with other adults or (mobile) pets
4) Travels monthly for 2-7 days

26 October - Scenario maps (Patrick drafted, w/ Kayla, Clara, Steven, Patrick)

1 November - Run through as-is and to-be scenario http://mur.al/vXL2ZMKg

7 November - Material design investigation for Android (Steven)

11 November - Mural - Companion App Workflow http://mur.al/vOz9DwR7 (Clara)
14 November - Wearables discussion (by Patrick, Steven)

22 November - Development demo from research team

6 December - Voice API investigation (Kayla)

13 December - internal pilot with Android device (Research team)

18 January - set goal

1Q - put listener app in IBM app store, listener to send SMS notifications
2Q - goal for MVP companion app

8 February - Companion app work flow (Clara)

15 Feb - visual design (Kayla + Clara)

keeping you **safe** & **sound**