

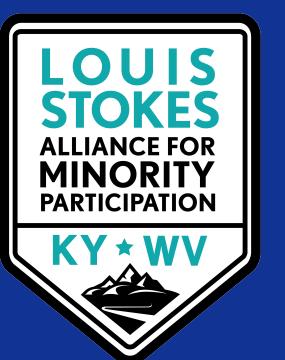


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Addressing the Need for Remote Patient Monitoring Applications in Appalachian Areas



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Network Reconnaissance Lab

Introduction

Distress

- An emotional, social, spiritual, or physical pain or suffering that may cause a person to feel sad, afraid, depressed, anxious, or lonely.
- It is highly prevalent in cancer patients regardless of disease-stage or modality¹
- The National Comprehensive Cancer Network (NCCN) designed the Distress Thermometer and Problem List (DT), a screening tool for recognizing distress in cancer patients; and has since been shown to accurately indicate distress²
- Studies have shown that routine distress screening is able to improve health outcomes including morbidity and mortality³

Appalachia

- Rural communities in the United States that are often medically underserved and medically disadvantaged⁴
- These communities also commonly have higher rates of chronic disease, reduced access to providers, and continue to experience a decline in hospitals^{5,6}
- The “digital divide” limits the ability for rural communities to benefit from Health Information Technologies (HIT)^{4,7}
- In addition, rural communities also have lower levels of overall technology adoption^{4,8}

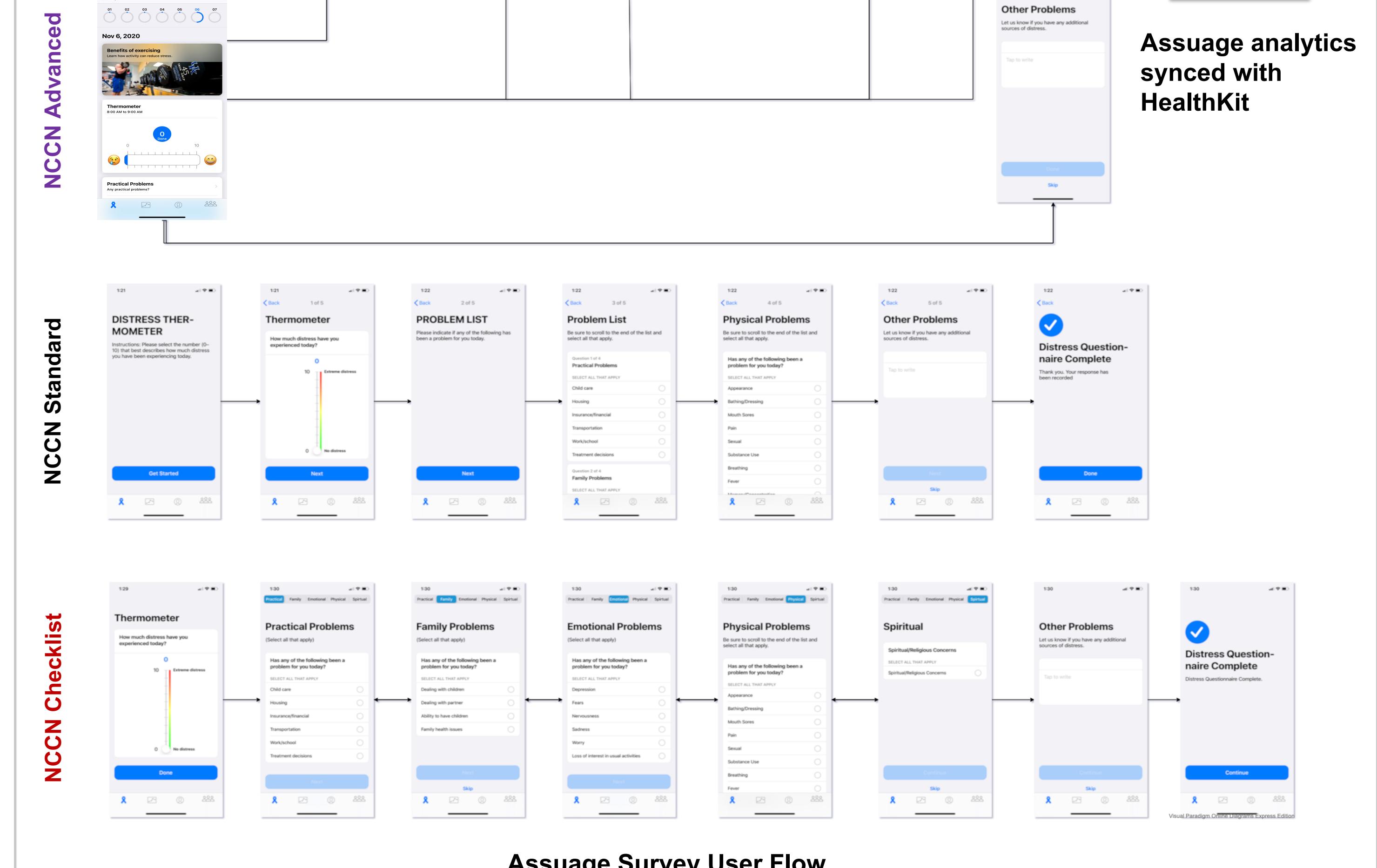
Methodology

Formative Studies

- Partnership with the *Linking and Amplifying User-Centered Networks through Connected Health (LAUNCH)*⁴ team
- Design experts worked directly with patients and caregivers through locally assembled “Innovation Studios”
- Community teams worked to identify the core functionalities of a redesigned symptom management healthcare service
- Determined workflows needed to tie assessments with action
- Identified ways in which broadband service could be extended to underserved areas in support of distress monitoring
- Assembled low-fidelity prototypes of proposed functional systems for symptom management

Insights & Initial Feedback

Patient Choice	Care Team Integration	Labels	Data Visualization	Other
<ul style="list-style-type: none"> Dashboard with survey categories Option to skip survey questions Control of “urgent” information 	<ul style="list-style-type: none"> Multiple app user roles Frame questions to reflect role Communication link 	<ul style="list-style-type: none"> Physical, emotional, daily life challenges Mind, body, life Smiley faces instead of thermometer 	<ul style="list-style-type: none"> Track issues over time Results displayed over time Adherence/completion statistics 	<ul style="list-style-type: none"> UK portal Integration Resources based on patient responses/scores EMR integration



UI Description

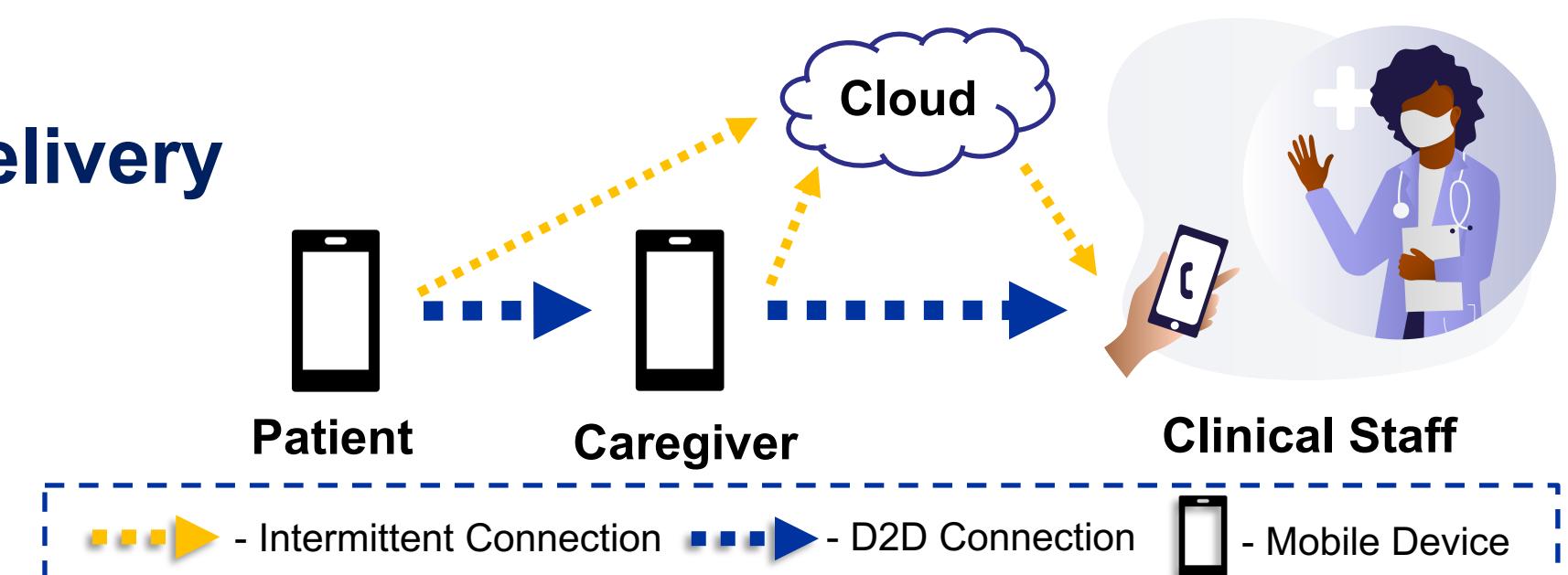
- A major difference in the UIs is how the user, in this case the patient, navigates the app
- NCCN Advanced** - dashboard style view, completion snapshots, and the most navigation freedom, patients choose surveys from dashboard
- NCCN Standard** - displays surveys sequentially, patients can skip surveys
- NCCN Checklist** - patients may complete survey sequentially or tap on survey labels to navigate
- Assuage offers a **fourth UI** where patients can choose to take a picture of their completed paper distress assessment* and then submit the picture

Wireless Capabilities

- Limited/ Nonexistent broadband in rural areas have posed barriers for people in rural areas who could benefit from connected health solutions
- Expanding broadband to rural areas has been limited due to financial and geographic concerns
- \$22 B in subsidies and grants has been provided by the FCC and USDA, yet broadband adoption has not significantly increased⁷
- Assuage will be functional in a fully connected and intermittently connected network
- Using device-to-device (D2D) communication, Assuage can utilize the mobility of rural residents to maximize data delivery⁸
- Note that all medical data is not emergency data requiring immediate attention; Assuage is for use regarding patient monitoring, feedback, and updates**

Network Nodes for Data Delivery

- Patient
- Caregiver
- Clinical Staff
- Community Points of Interest



Summary

- In this work, we discuss how knowledge gained from participatory design led to the underpinnings of developing a rural remote patient monitoring app that provides delightful and insightful experiences to users
- Mobile health applications, like Assuage, can be used as a tool to facilitate overcoming the urban-rural disparities in healthcare
- We hope that through studying user interaction with Assuage understanding will be gained on how to better adapt technology to rural areas leading to greater adoption of HIT
- Assuage also seeks to address the barriers of broadband connectivity in Appalachian Kentucky by utilizing D2D communication to deliver data when broadband connection is uncertain
- This study incorporates the NCCN DT into Assuage, but Assuage can measure any data meant to be survey based as well as connect to sensor information

Future Work

- Measure effectiveness, efficiency, and patient satisfaction of current iteration of UIs in Assuage
- Design interfaces for non-patient users; the priority being a care provider and doctor interface
- Conduct a feasibility study of Assuage with Appalachian patients
- Research should be done to understand the correlation between sensor data with patient recorded distress

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