

# Next Generation Warning Systems: Integrated warnings over mobile devices for tornados and flash floods in DFW

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## Introduction

The Next Generation Warning Systems Project aims to create and test a new kind of integrated warning system (IWS) for tornadoes and flash floods based on the opportunities created by mobile technology. The research team will: utilize x-band radar networks in the Dallas-Fort Worth (DFW) Metroplex to create improved forecast products, will leverage new cell technology to improved warning delivery infrastructure, and will use social science to improved messaging through location and time sensitive warnings.

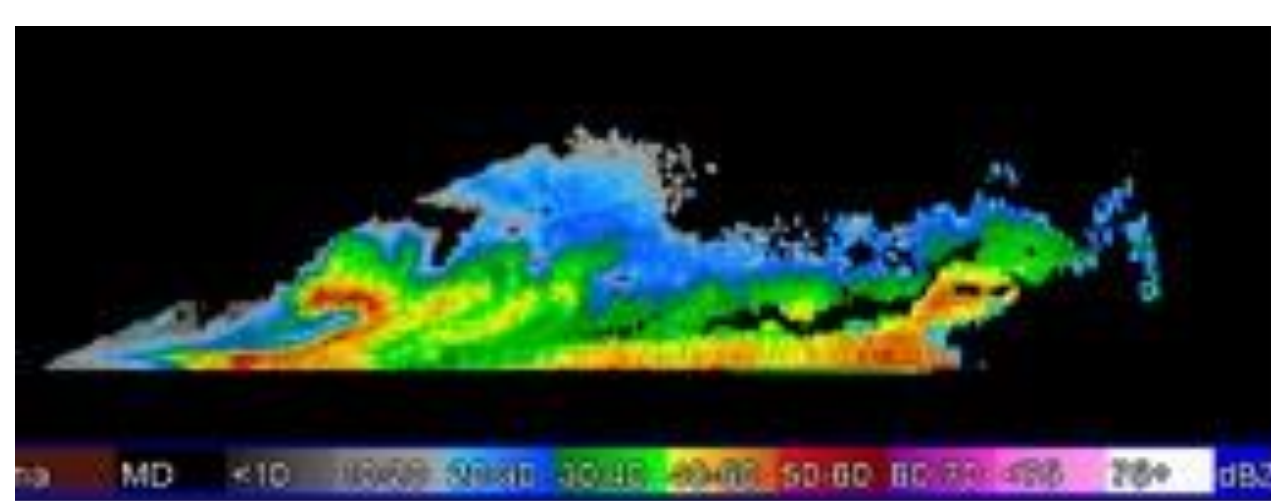


Fig. 1: Range Height Indicator scans

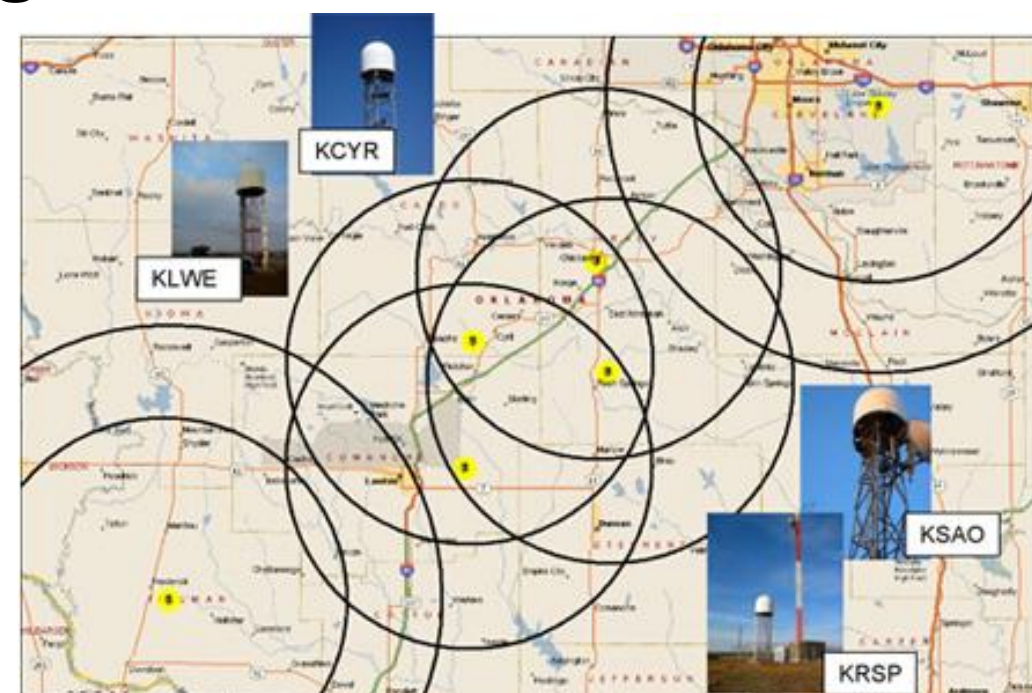


Fig. 2: Networked X-band radars in Oklahoma v. WSR-88D

## Research Questions

The public response thrust focuses on how the public receives, interprets and responds to targeted warnings on mobile devices – in particular smartphone users. The following research questions drive the work:

- Do warnings delivered on mobile phones facilitate message reception during different socially relevant times of day and in socially relevant categories of space?
- At what temporal and spatial thresholds do short fuse hazards typically elicit different behavioral responses?
- To what degree do varied temporal and spatial resolutions in cellular based warnings affect the sequence and pace of behavioral patterns?

Changes in smartphone ownership, 2011–2013  
% of all U.S. adults who own...

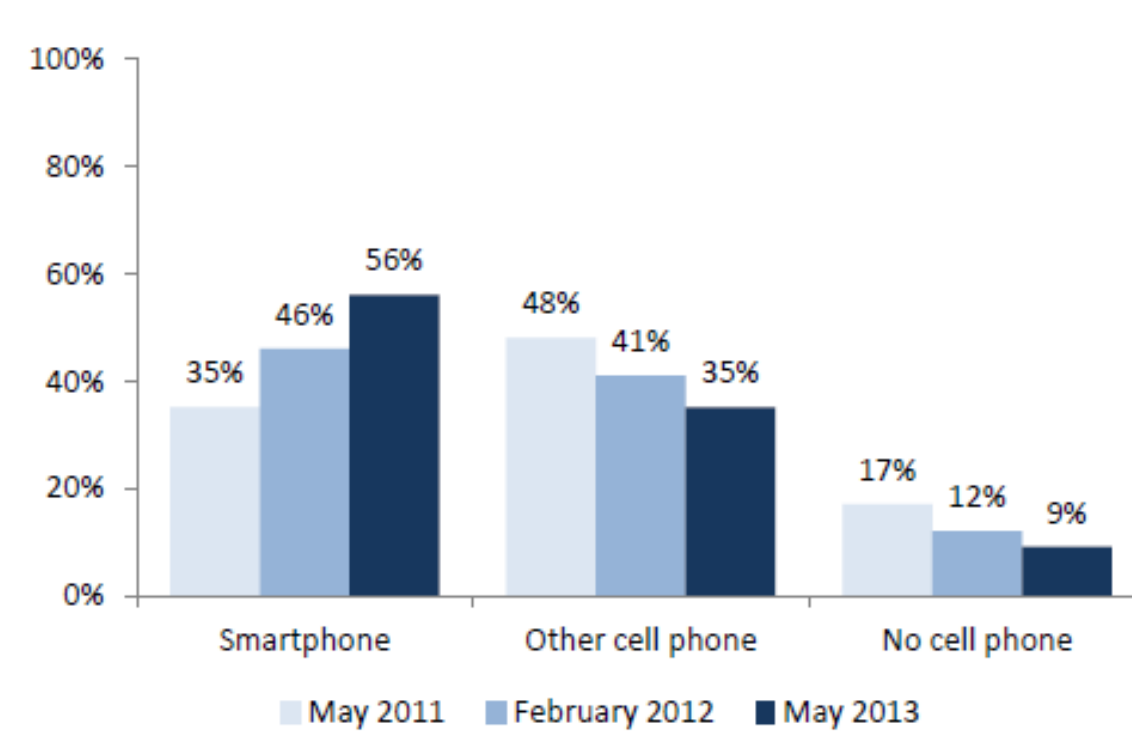


Fig. 3: (PEW Smartphone Ownership, 2013)

Almost two-thirds of cell owners go online using their phones  
Among cell phone owners, the % who use the internet or email on their phone

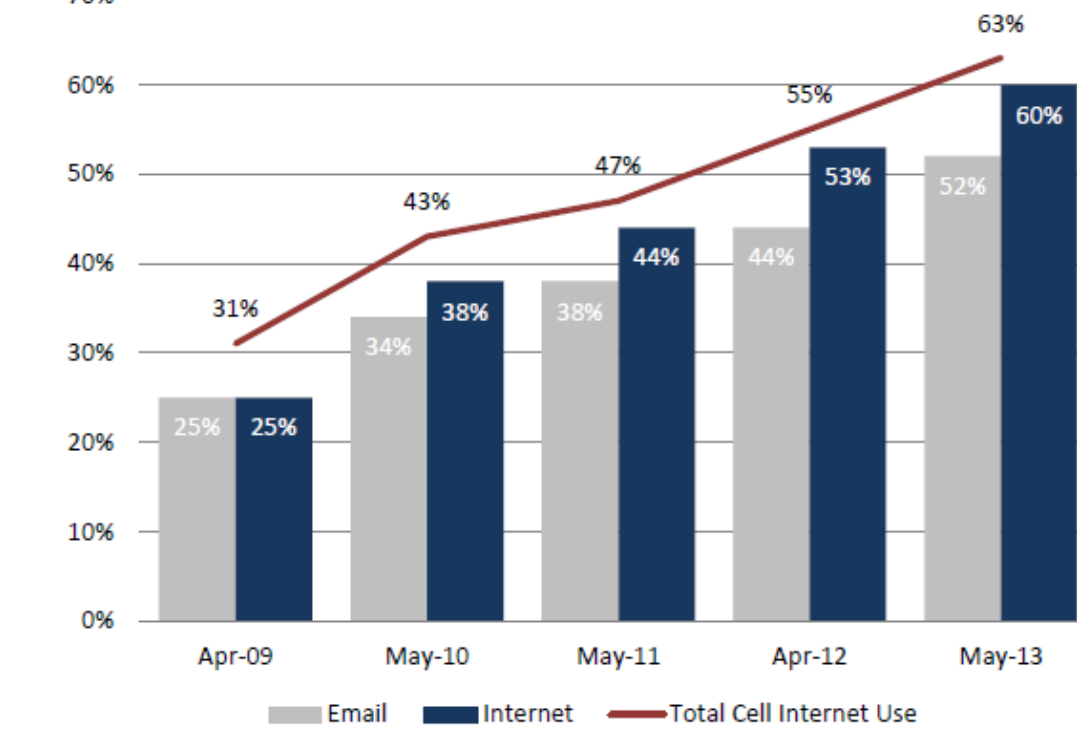


Fig. 4: (PEW Cell Internet Use, 2013)

## Literature

Warning models (Mileti and Sorenson, 1990) and decision models (Lindell and Perry, 1992; 2004; 2012) guide our interpretation of human behavior and risk communication.

Additionally, debates about the nature of time and space that date back to antiquity have also influenced our approach to this topic. For example, our basic approach also explores both concepts of time employed by the Ancient Greeks. Namely 'chronos' (chronological or clock time) and 'kairos' (kairological or conceptual time) to describe how people experience warnings.

Our research focuses primarily on exploring how these ideas of time and space might inform warnings for short fuse events.

## Methods

The DRC will conduct three different types of data collection activities for this project – focus groups, live experiments over a mobile application, and in-depth follow-up interviews of participants.

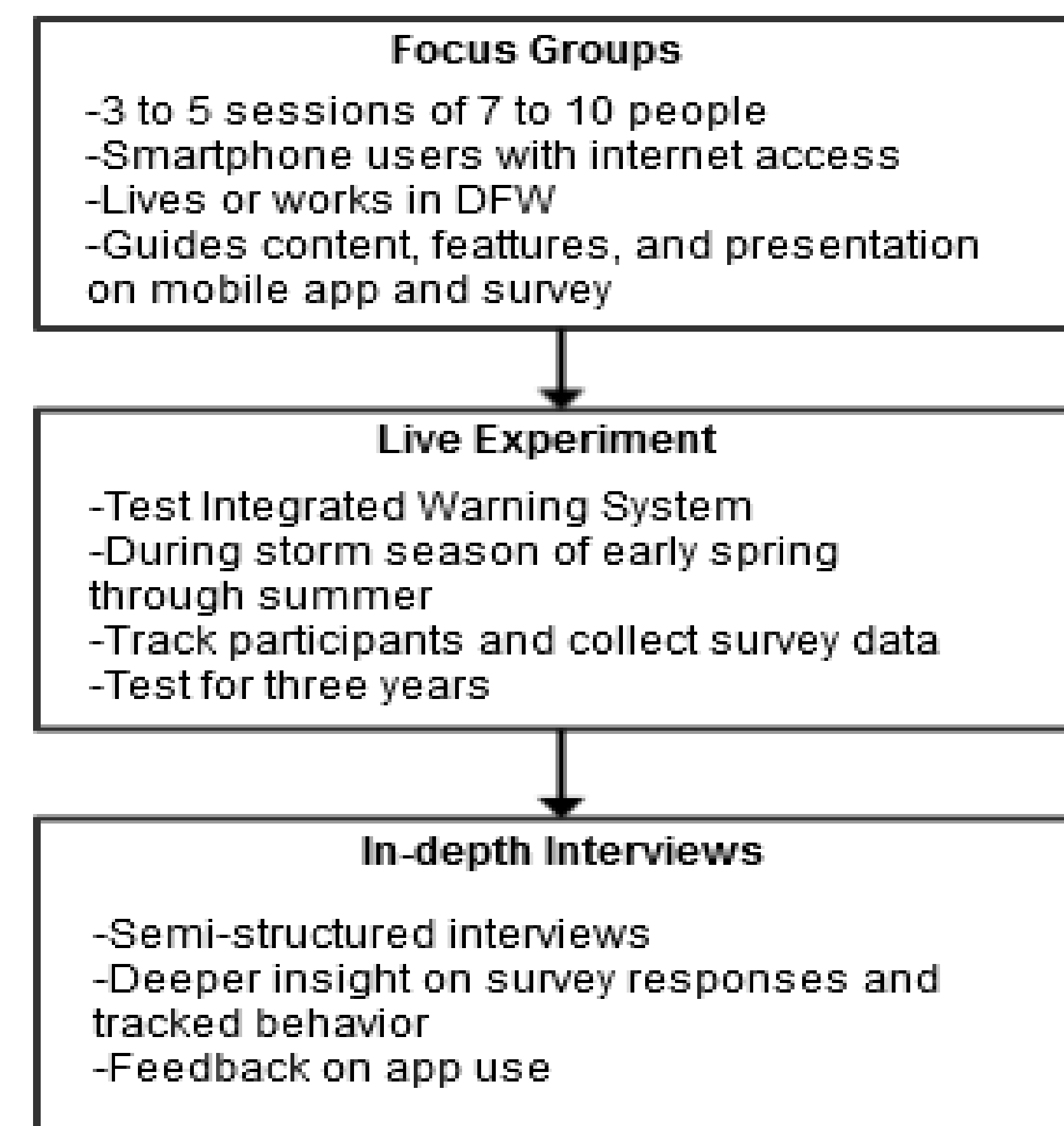


Fig. 5: Data collection activities

## Future Research

The diagram below illustrates the collaborative and evolving nature of the project. Over the life of the project, feedback from participants results refine the mobile app to better fit user needs and better collect the data.

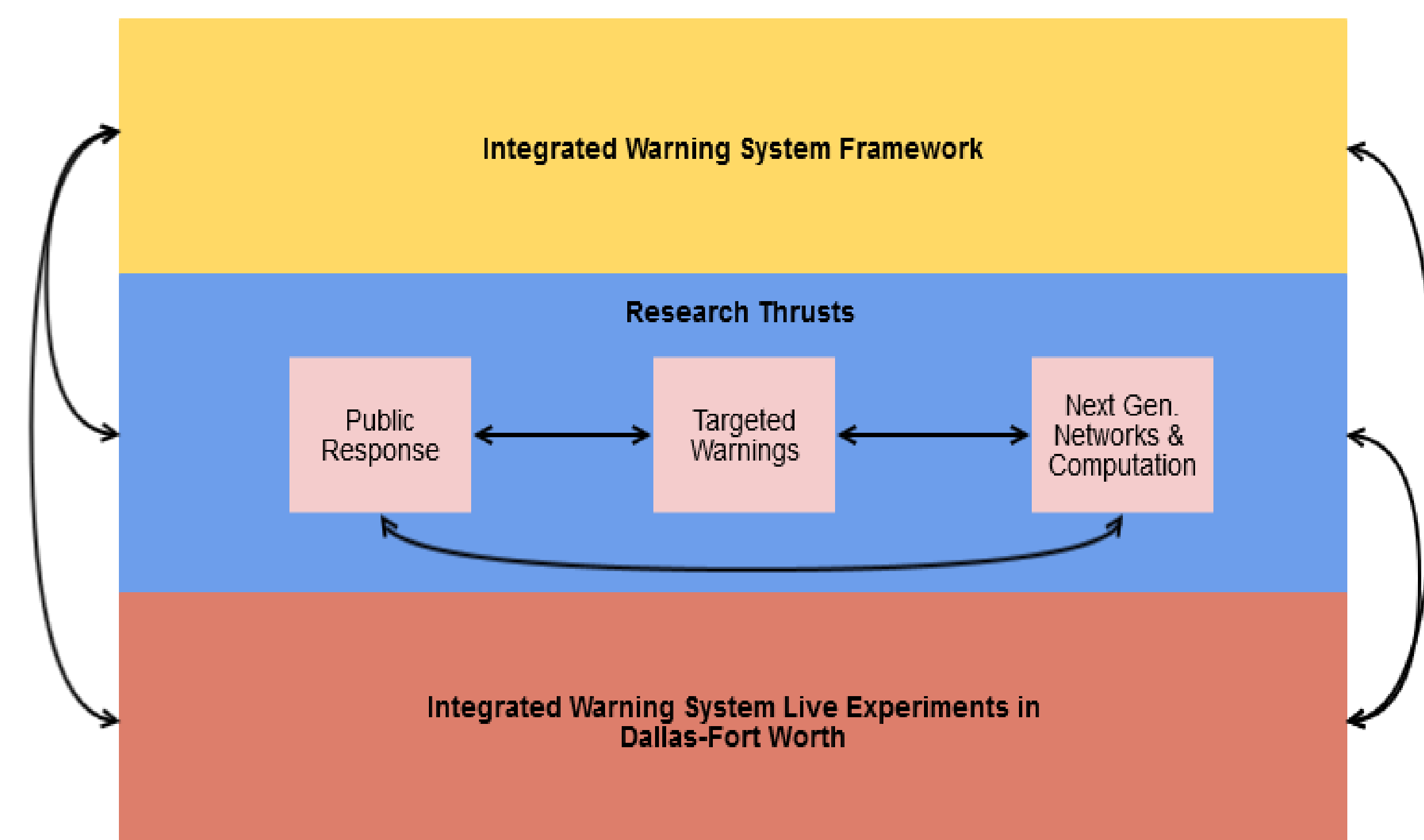


Fig. 6: Integrated Warning System process



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