BeaMap
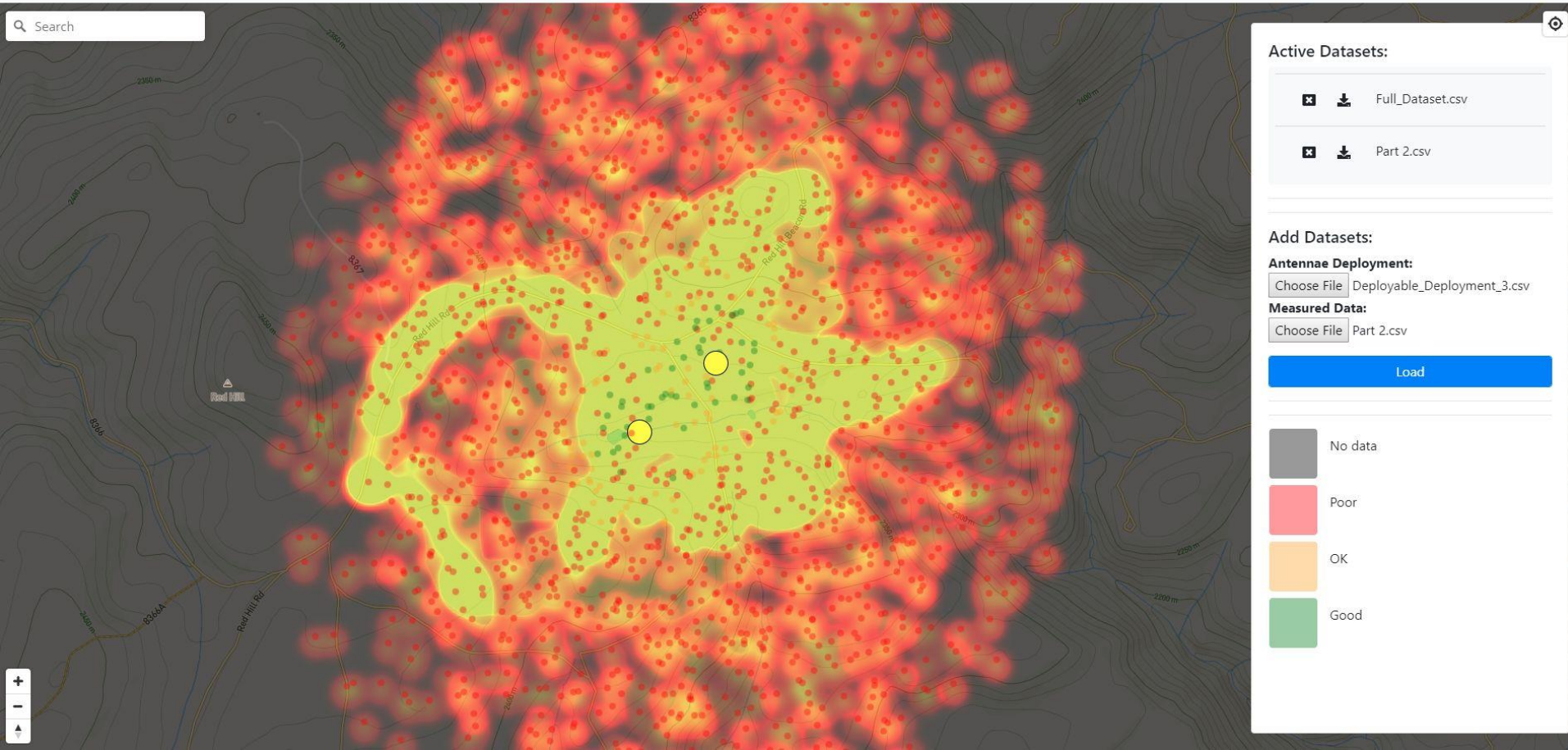
Mapping LTE networks for emergency responders

Visualize broadband service as a heatmap
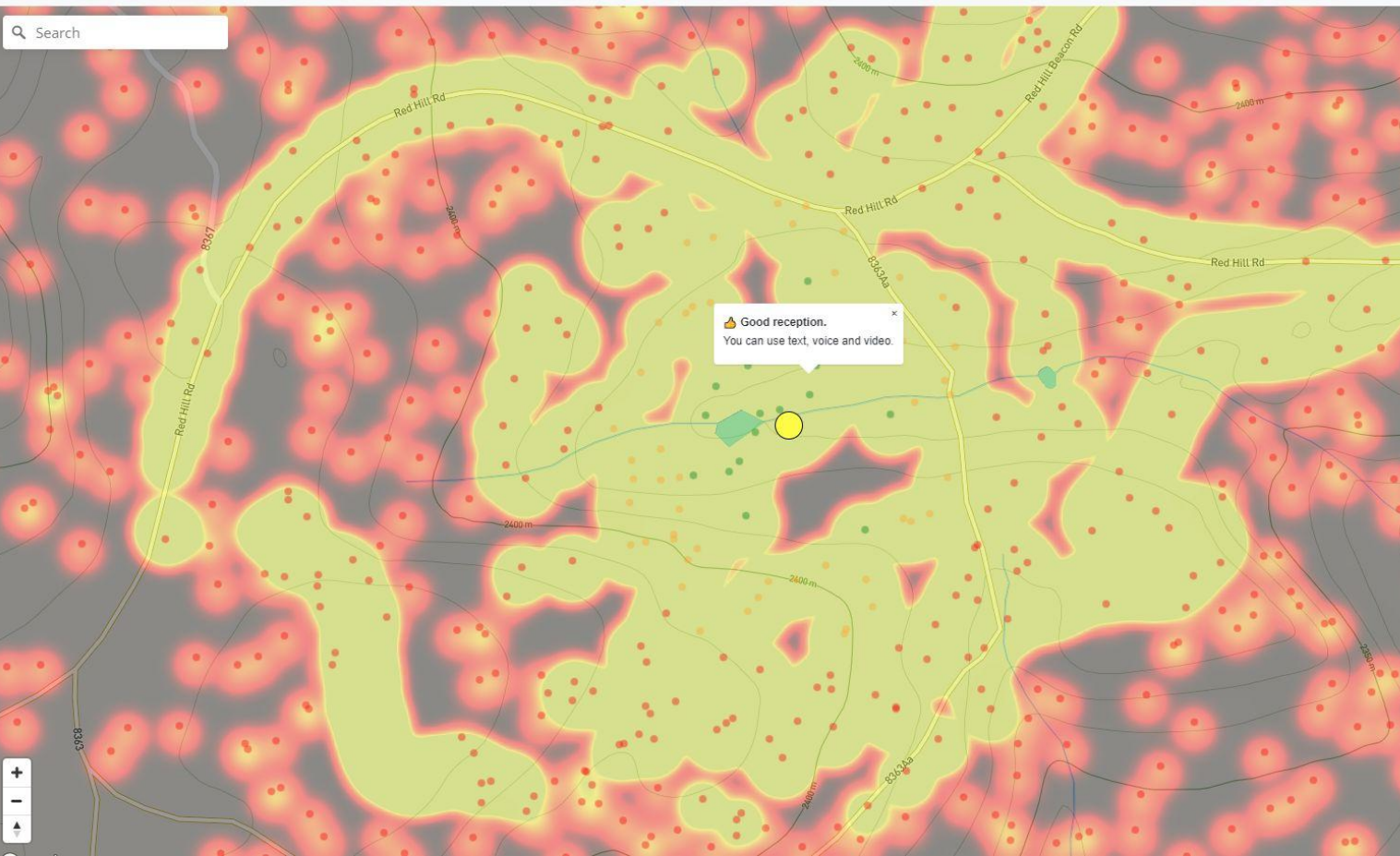
Rich interactive offline maps

Logic for Signal Strength: Link Budget Eqn

```
let Pt = parseFloat(params[2][1]) || 31 // Maximum output Power
let Gt = parseFloat(params[6][1]) || 3.5 // Antenna Gain
let Gr = 1.5 // Gain of the Antenna
let x1 = parseFloat(params[3][1]) || 39.61590167 // Lat
let y1 = parseFloat(params[4][1]) || -107.0154867 // Lon
let log_w_lambda = 20 * Math.log( ( 4 * Math.PI )/(0.39))
let cable_loss = 2.7
let calibration = -188.93903729454837


// returns power_received or RSRP
function link_budget(x2, y2) {
    let r = get_distance(x1, y1, x2, y2)

    if(r == 0) return -1

    let log_w_radius = 20 * Math.log(r)

    // same formula again with dynamic values of r
    let Pr = Pt + Gt + Gr - log_w_lambda - log_w_radius - cable_loss + calibration
    return Pr
}
```
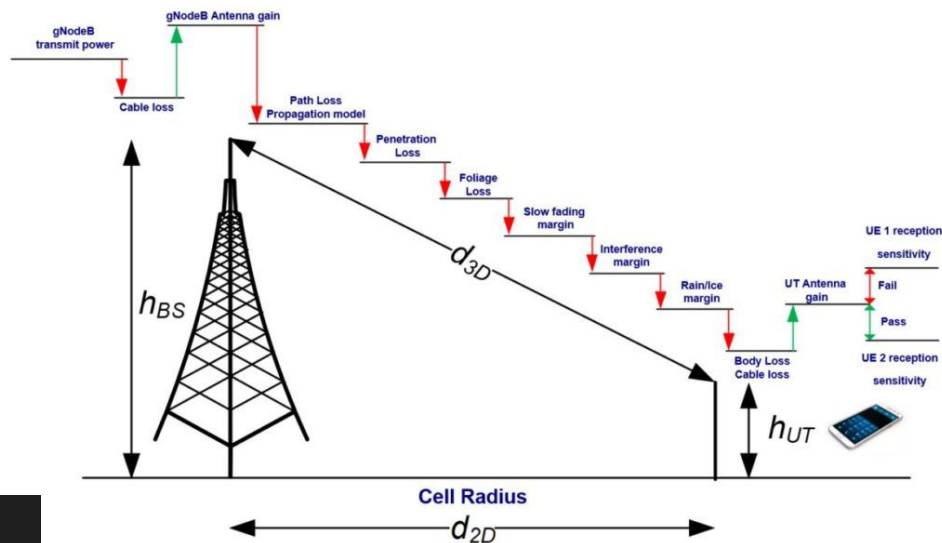
```
for(let i=1; i<data.length-1; i++) {
    let altitude = parseFloat(data[i][3])
    let x2 = parseFloat(data[i][1]);
    let y2 = parseFloat(data[i][2]);
    let semi_final_budget = link_budget(x2, y2)
    let isNoSignal = (data[i][4] === 'No Signal');
    let rsrp_original = parseFloat(data[i][4])
    let current_link_budget = (isNoSignal) ? null : (!Number.isNaN(rsrp_original)) ? rsrp_original : semi_final_budget;
    let text_qual = get_voice_quality(current_link_budget)
    let voice_qual = get_voice_quality(current_link_budget)
    let vid_qual = get_video_quality(current_link_budget)
    let dataPtStr = `${count},${x2},${y2},${altitude},${current_link_budget},${text_qual},${voice_qual},${vid_qual}`
    retStr += `${dataPtStr}\n`
    count++;
}
```


$$P_{rx}(dB) = P_{tx} + G_{tx} + G_{rx} + 20 \log_{10}\left(\frac{\lambda}{4\pi D_r}\right)$$

1: https://5g-tools.com/5g-nr-link-budget-calculator/
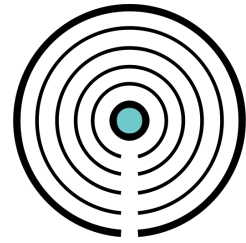2: https://www.pasternack.com/t-calculator-friis.aspx

Progressive Web App

- Reliable - Load instantly and works offline.
- Fast - Respond quickly to user interactions with silky smooth animations and no janky scrolling.
- Engaging - Feel like a natural app any device, with an immersive user experience.
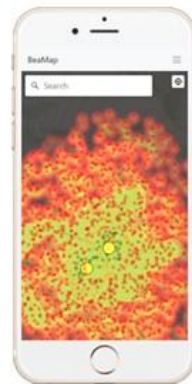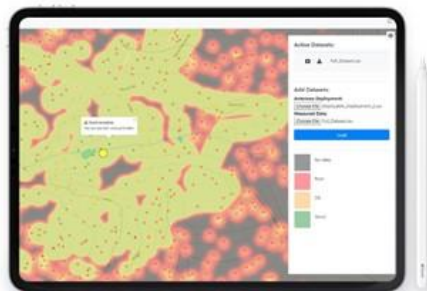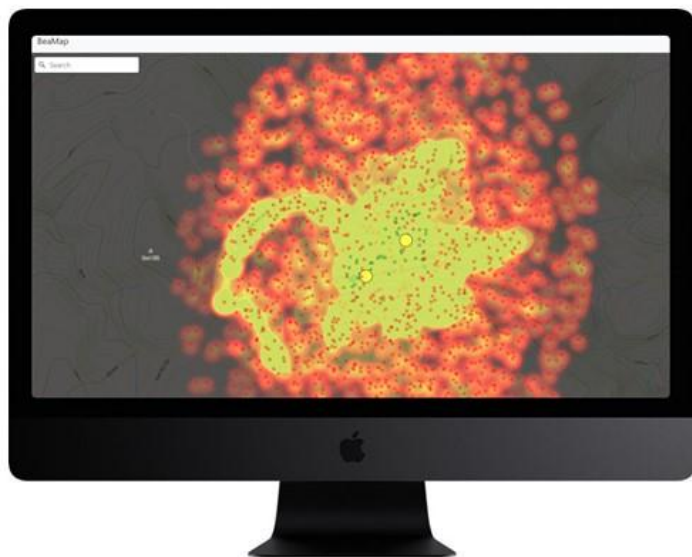
Team

- Amit Nambiar
  - Amit is an architect turned computational designer who works at the intersection of digital and design practices.
  - His work focuses on harnessing web technologies and practices to create seamless digital artwork.
- Mia Tsiamis
  - With a combined background in structural engineering and architecture, Mia enjoys exploring the intersection of these two fields through her work as a computational designer and BIM specialist.
  - Adjunct professor at The New School – Parsons School of Design, New York.

BeaMap

https://beamap.herokuapp.com/