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Te Roopu Wai Āwhātanga

Investigating an Early Warning System for Urban Flooding

Kaikōrero / Presenter

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Outline

1. Introduction
2. Flood warning in Auckland today
3. What might an Auckland flood warning system look like?
4. Lessons from elsewhere
5. Limitations and risks
6. Conclusion

Section 1

Introduction



Context – Flood Risk in Auckland



~55,000 (12%) of buildings in Auckland are exposed to floodplains in a 1% AEP event



~105,000 (21%) of buildings in Auckland intersect a flood hazard (floodplain, overland flow path or flood prone area)



~10,000 habitable floors are predicted to be below the flood level in the existing 1% AEP event (ED)

Context – Urban Auckland

- 16% of land area
- 88% of population – 1.5 million people
- ~80% of buildings exposed to flood hazards are in urban Auckland
- High gradients, cover a small area and drain to the coast
- Localised stormwater flooding rather than from rivers breaching their banks
- Flash flooding from streams and overland flow paths

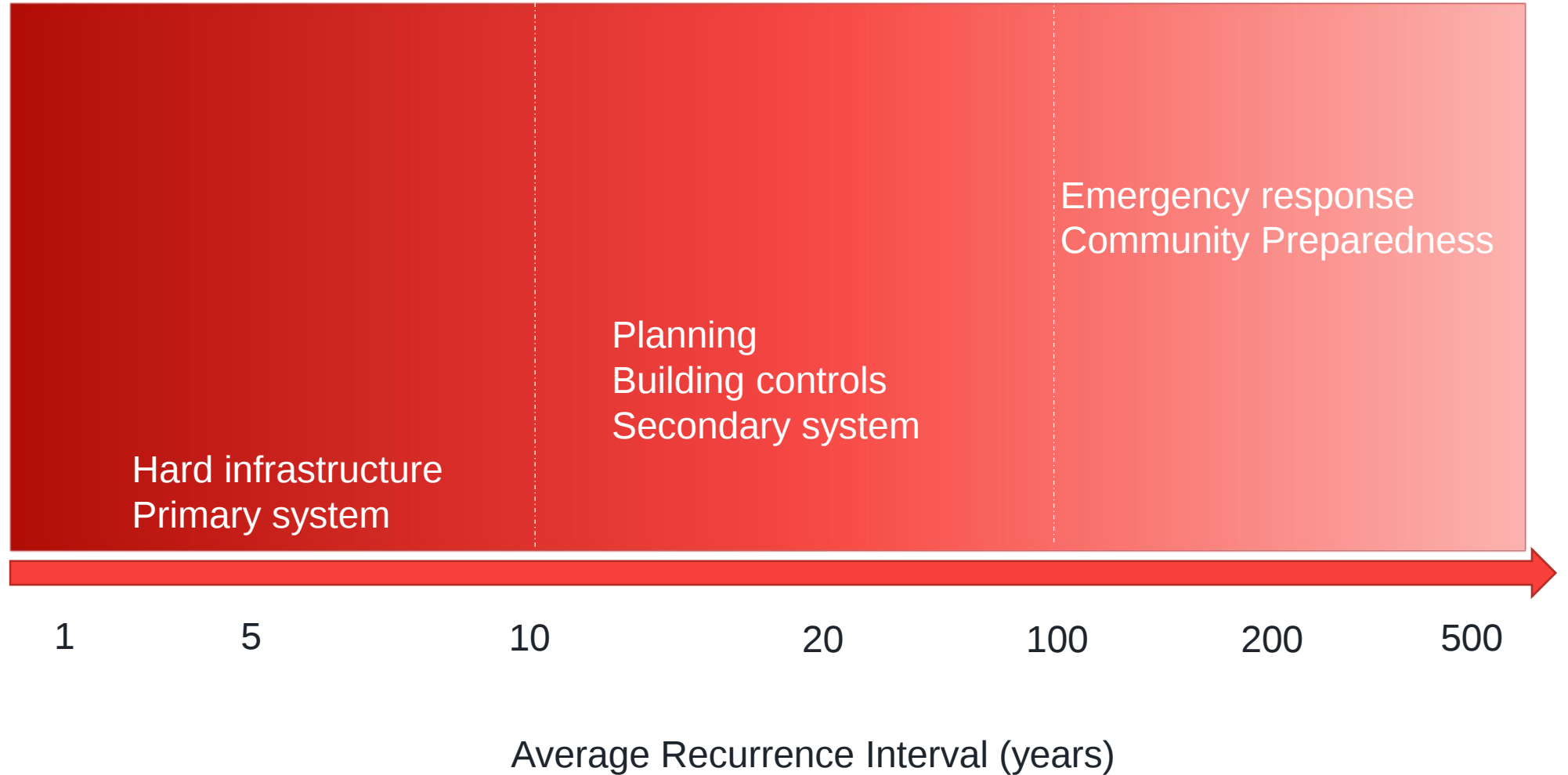


Context – Rural Auckland

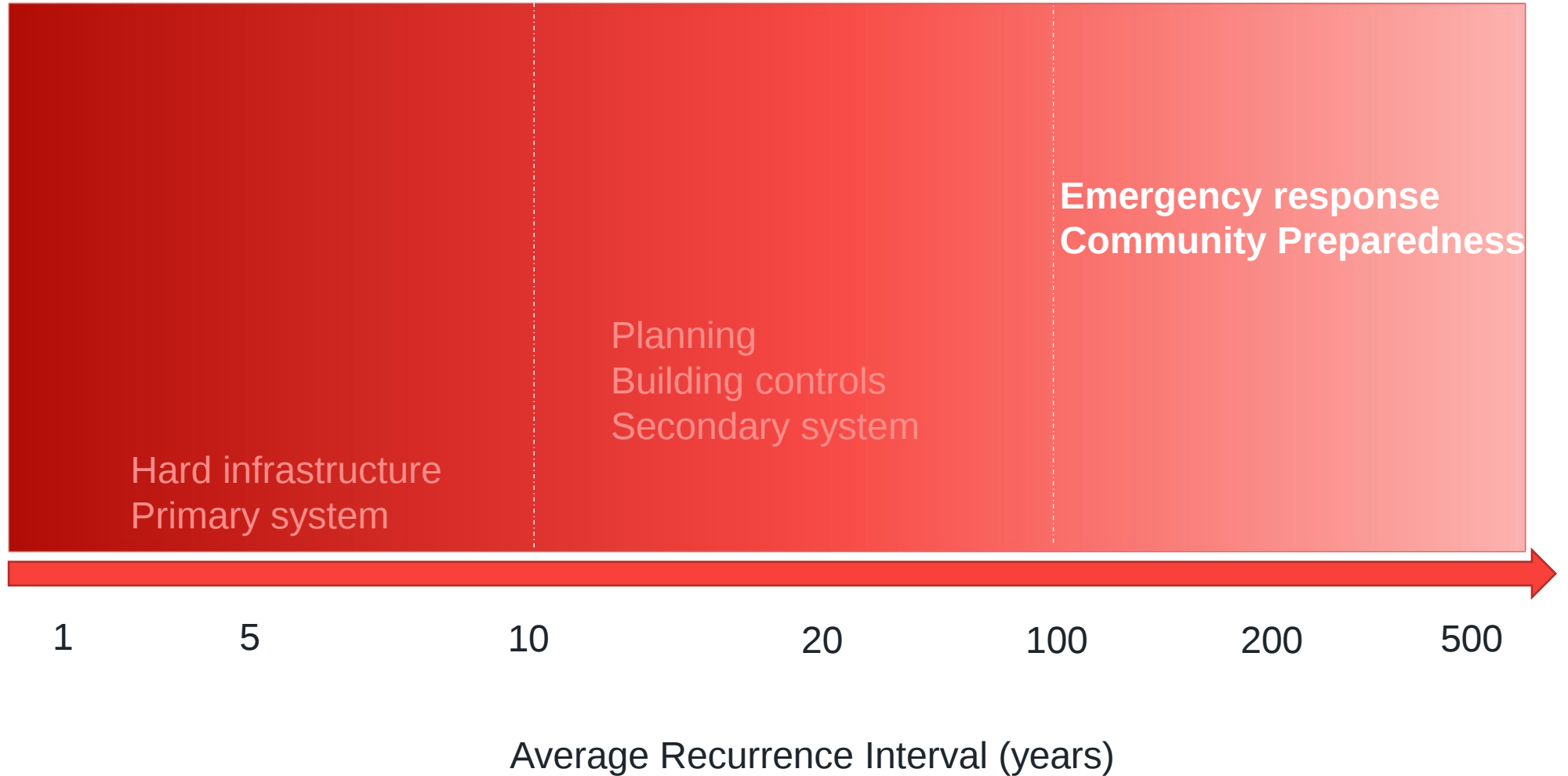
- 84% of land area
- 12% of population – 200,000 people
- Approximately 20% of buildings exposed to flood hazards are in rural Auckland
- Generally fluvial (streams or riverine) flooding
- Can be very flashy e.g. Piha or longer lead time e.g. Kumeū (3-4h)



Context – Flood Risk Management in Auckland



Context – Flood Risk Management in Auckland



A vertical decorative image on the left side of the slide showing dark water with many concentric ripples from raindrops.

Context – Project Need

- Project to investigate the place of early warning systems in flood risk management in the Auckland Region
- Healthy Waters and Auckland Emergency Management (AEM)
- The study was undertaken before the 2023 flood events in Auckland

Elements of a Flood Warning System



Section 2

Flood Warning in Auckland Today



A vertical decorative image on the left side of the slide showing water ripples from raindrops.

Current Approach to Flood Warning in Auckland

1. MetService heavy rainfall forecasts/warnings are issued to AEM.
2. AEM also monitors stream level and rain gauges.
3. AEM will review all intelligence to make a decision.
4. The Emergency Mobile Alert is available for major events.
5. Other channels such as news media, websites, social media are available for all events.

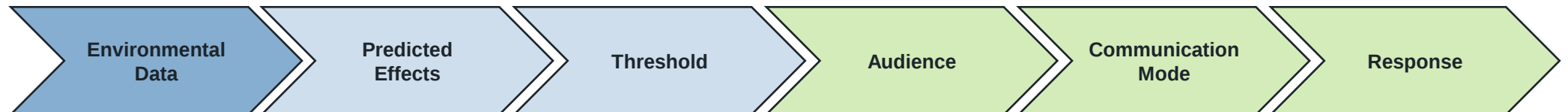
Section 3

What might an
Auckland Flood
Warning System
look like?



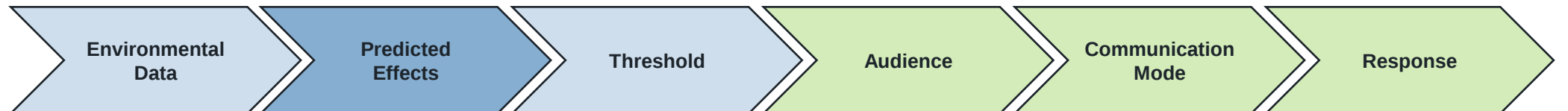
Environmental Data

- Weather forecasts
- Rain and river level monitoring
- Rain radar
- (Soil moisture, tide)



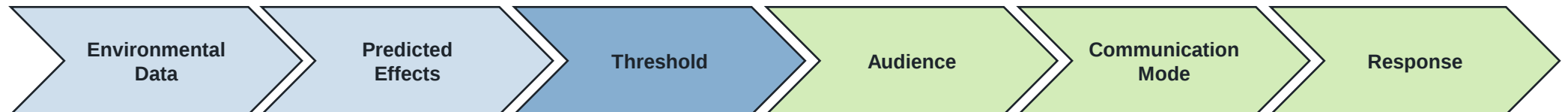
Predicted Effects

- Historic flood observations
- Hydraulic models
- AI



Flood Thresholds

- The river level or amount of rainfall where flooding starts to occur



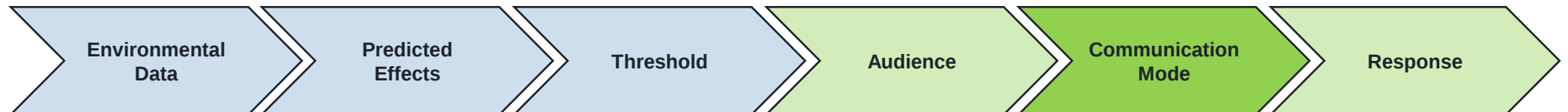
Audience

- Council/utilities/responders
- People whose homes/businesses may flood
- Those affected by transport/utility interruptions



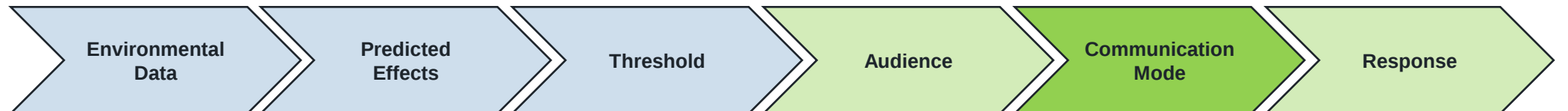
Messaging

- General alert for everyone
- Specific alert to flood-exposed citizens



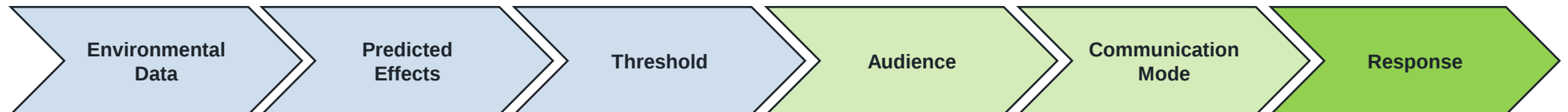
Communication Mode

• “Push” and “Pull” communications



Response

- PRIOR education is CRITICAL



Section 4

Flood Warning Systems Elsewhere





Lessons from the rest of the world

1. Clearly define roles and responsibilities
2. Emphasis on public education
3. No “silver bullet” proprietary package is available
4. The field is advancing rapidly. Much research world-wide and AI promises to make a valuable contribution
5. Some great examples of different elements

Section 5

Limitations and Risks





Limitations and Risks

1. **Warning credibility:** false alarms, low relevance alarms
2. **Timing:** trade-off between accuracy and warning time; too little warning
3. **Technology:** equipment failure; forecast inaccuracy
4. **Organisational:** Lack of role clarity; reform



Key Gaps to be Addressed / Next Steps

1. RELIABLE rain forecasts

2. Clear definition of roles and responsibilities

3. Suitable communication mode for ALL flood warning events

4. Public education

Section 6

Conclusion



Conclusion

There is a clear need, confirmed by recent events, for prior warning of flood events in Auckland



Thank you