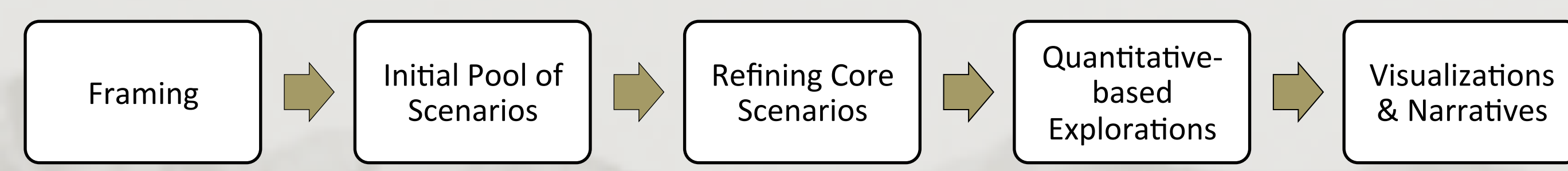


## Overview

- The Central-Arizona Phoenix region faces complex and changing interactions between people, infrastructure, land, water, energy, and climate
- Society struggles with long-range approaches to explore, anticipate, and plan for sustainability and resilience
- Advanced scenario development can provide use-inspired knowledge to transform, adapt, and preserve our current and future well-being
- Scenario processes that focus on the collaboration of researchers and practitioners as full partners can enhance research and decision-making capacity for long-range sustainability planning

## Approaches



### Framing:

- Heat, drought, and flood (i.e., extreme events) were identified in early 2014 CAP-LTER Workshops (expert-based)
- Long-range governance planning documents were analyzed (content analysis) to identify stakeholder priorities (including goals for heat, drought, and flood; associated indicators, metrics, and normative qualifiers)
- Stakeholder priorities were then used as starting point to develop initial scenario logics

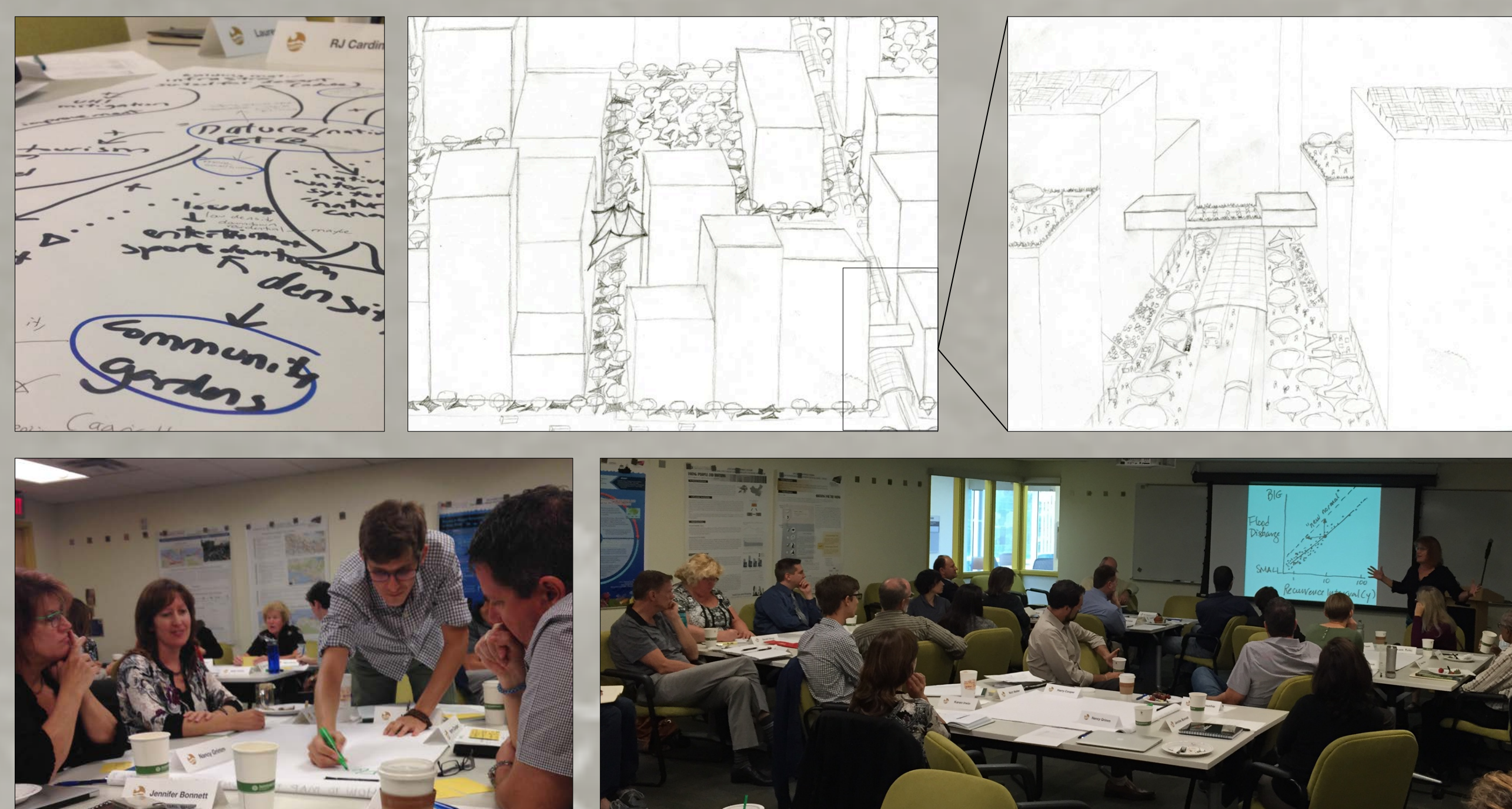
This provides us with an understanding of current governance planning for extreme events and a baseline for non-intervention scenarios.

### Initial Pool of Scenarios:

- Working group of municipal, tribal, county, state, federal decision-makers, community group leaders and academic partners (36 partners)
- Background information was provided on: mega-trends, non-intervention trajectories, desirable possibilities, and unintended consequences
- Rapid prototyping the large pool of scenarios: (a) elicitation of key variables from scenario logics (adaptive, strategic, transformational scenarios); (b) develop systems maps; (c) sustainability and resilience appraisals; (d) craft actor-oriented narratives for each of the scenarios

This allowed us to build systems and future-oriented capacity among scenario partners, discuss project objectives and process with the team, and initiate scenario development activity.

\*See Next Steps section of poster for the remaining 3 phases of the scenario development and process



## Content Analysis & Baseline Scenario

Content analysis allowed us to explore the strategies and indicators associated with extreme events from existing plans (Fig 1). Coded documents were validated and refined through confirmation with each governance institution. We identified a total of 916 non-unique strategies and 750 indicators. The top 10 strategies accounted for 63.8% of the total and top 10 indicators for 55.3% of the total.

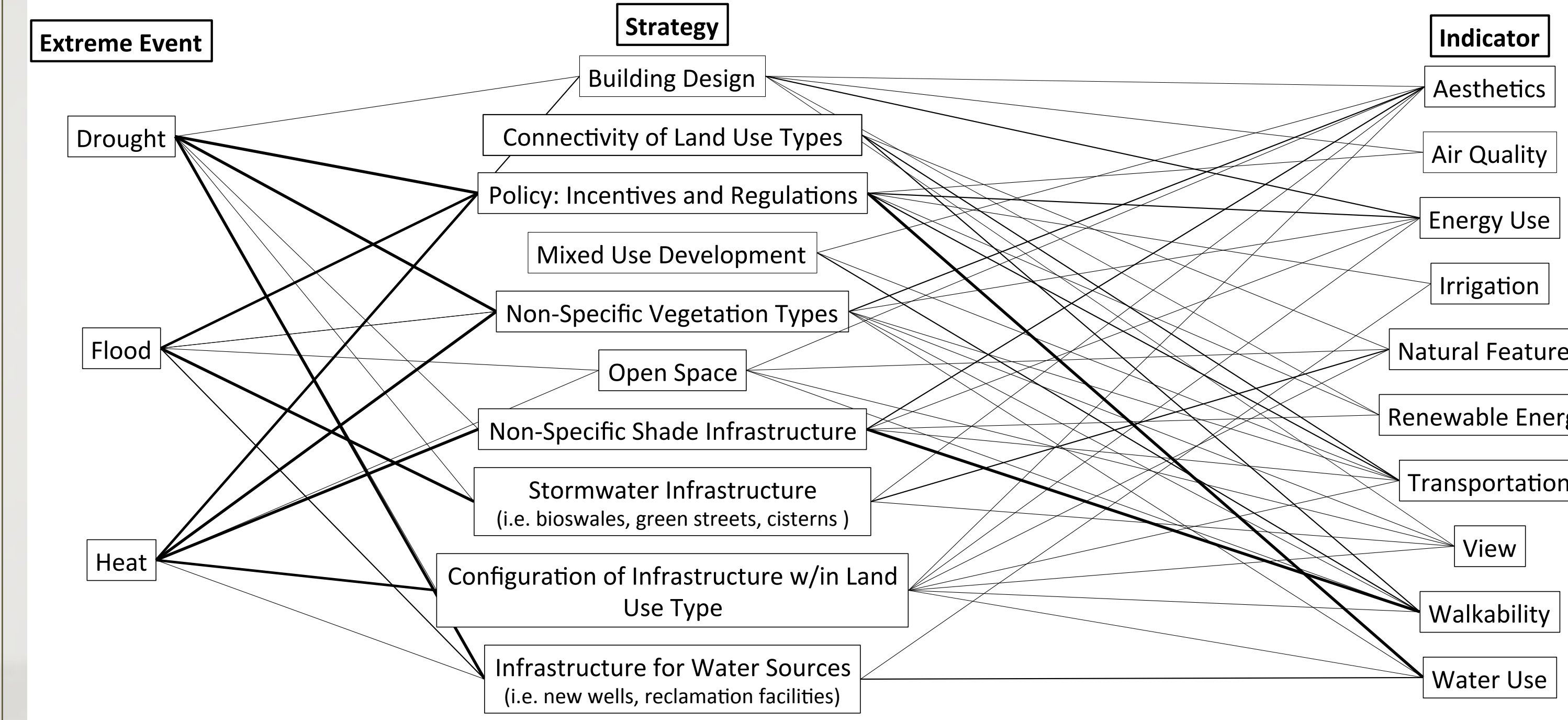


Fig 1: Relationships of Top Strategies and Indicators. Thicker lines indicate stronger relationships (counts). While not all strategies are explicitly linked to an extreme event they were identified as key strategies for future development.

While all documents did address heat, drought, and flood, they were prioritized differently among the different planning documents within an institution and among the different institutions (Fig 2).

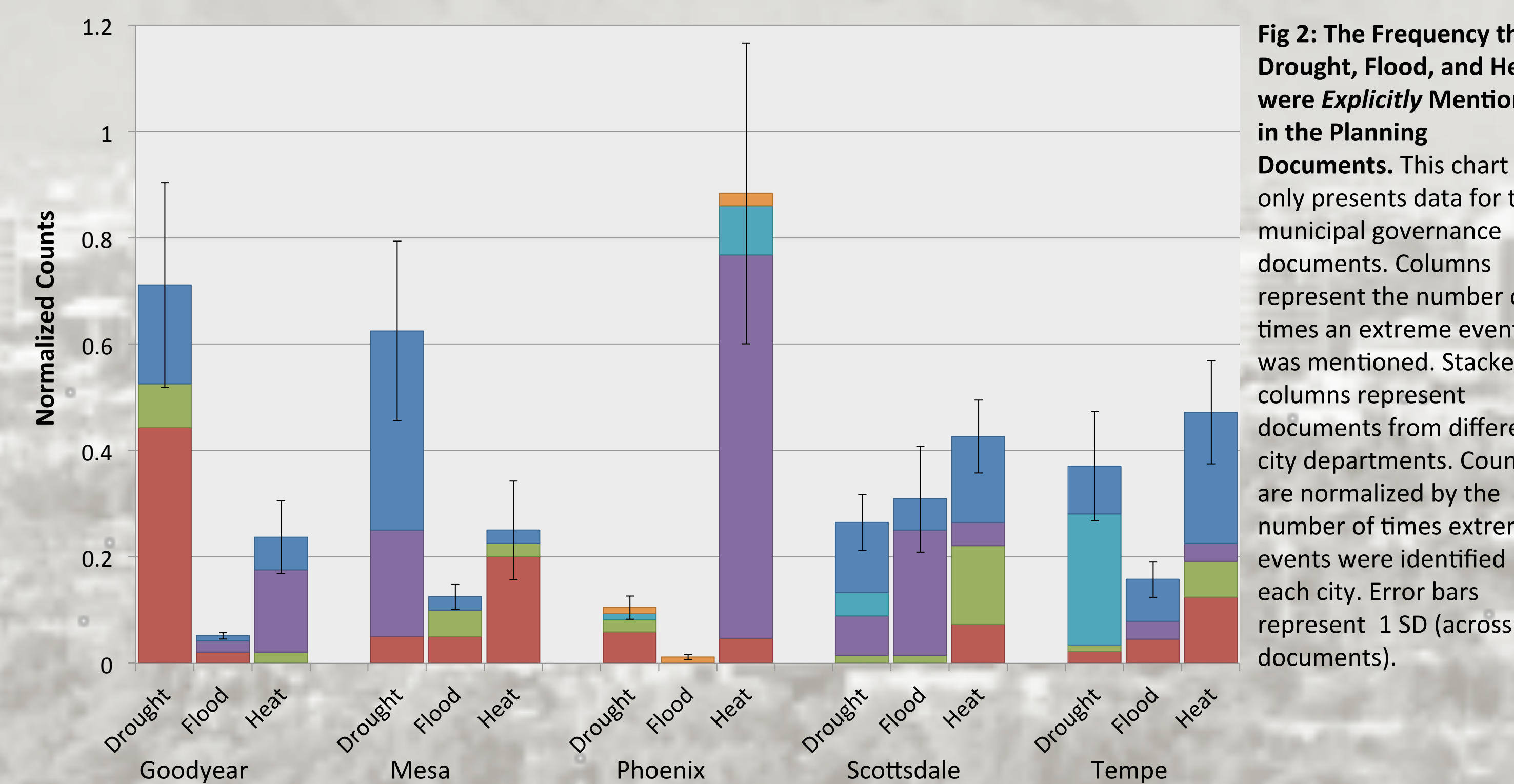


Fig 2: The Frequency that Drought, Flood, and Heat were Explicitly Mentioned in the Planning Documents. This chart only presents data for the municipal governance documents. Columns represent the number of times an extreme event was mentioned. Stacked columns represent documents from different city departments. Counts are normalized by the number of times extreme events were identified by each city. Error bars represent 1 SD (across documents).

Even among the most commonly identified strategies there is a lot of heterogeneity among documented goals (Fig 3). These results will be used to co-explore with participants: key differences, similarities, and core features among their plans. Information from existing goals will be used to develop the baseline (status quo) scenario (See section Scenario Development).

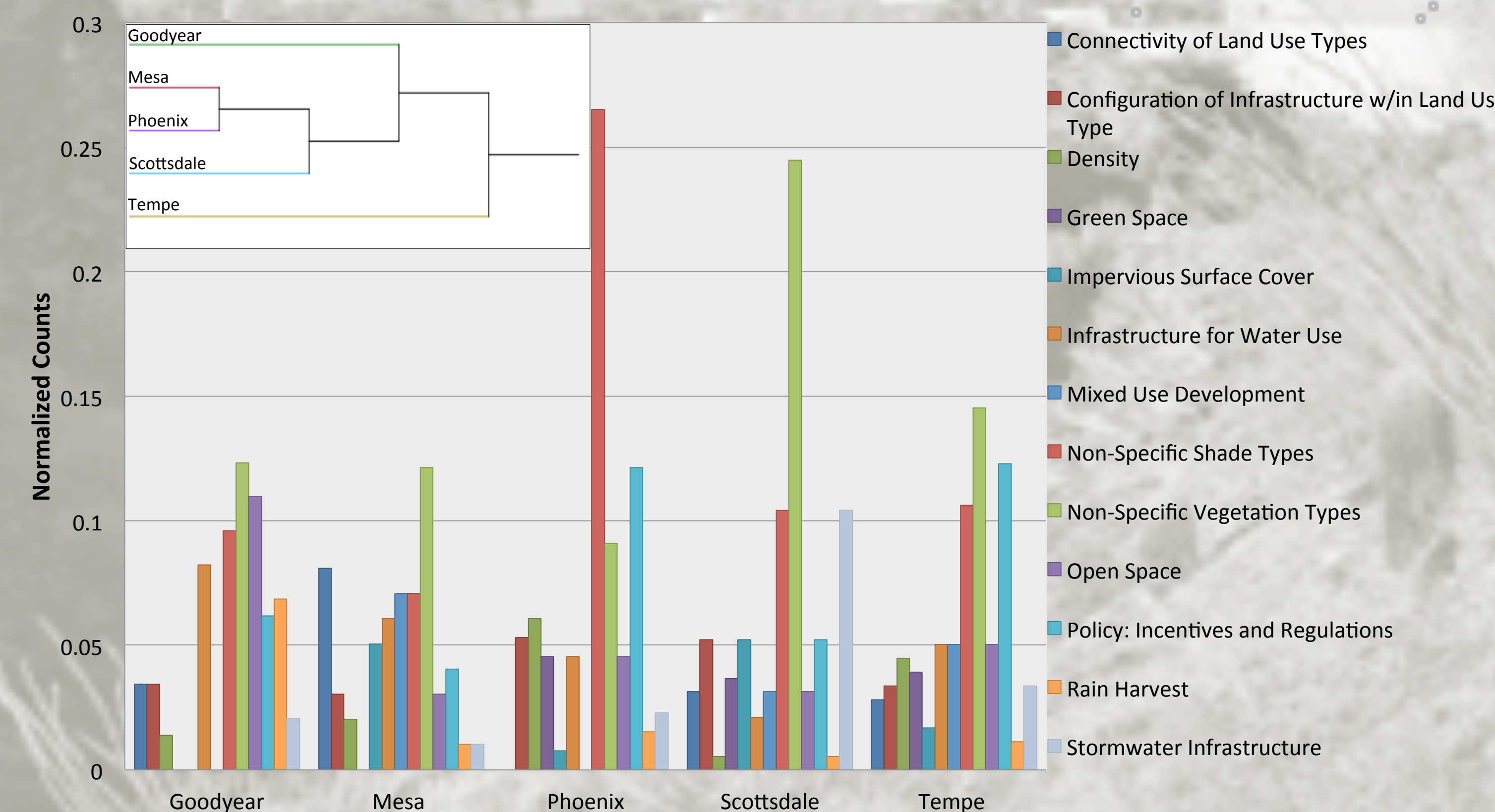


Fig 3: Top Municipal Strategies. Strategies were selected by taking the top 5 from each city. Counts are normalized for the total number of strategies by city. Inset dendrogram shows potential clusters based on all coded strategies.

## Scenario Development

A small number of core scenarios were used to contrast different types and amounts of change (see diagram below). **Adaptive Scenarios** were developed in response to extreme events. **Strategic Scenarios** considered outcomes and trade-offs of interventions currently being considered by governance institutions. **Transformational Scenarios** explored normative futures based on sustainability goals and radically transformed futures.



Distinct scenarios were evaluated based on measures of plausibility, desirability, and transformation (see Fig 4). Adaptive scenarios heavily emphasized policy (through incentives and regulations) as a way to achieve the described future. Strategic scenarios often had a strong community-oriented theme. Transformational scenarios reflected either very technological or environmental futures. Across all scenarios, the sustainability and resilience appraisal activities were important for addressing social equity concerns.

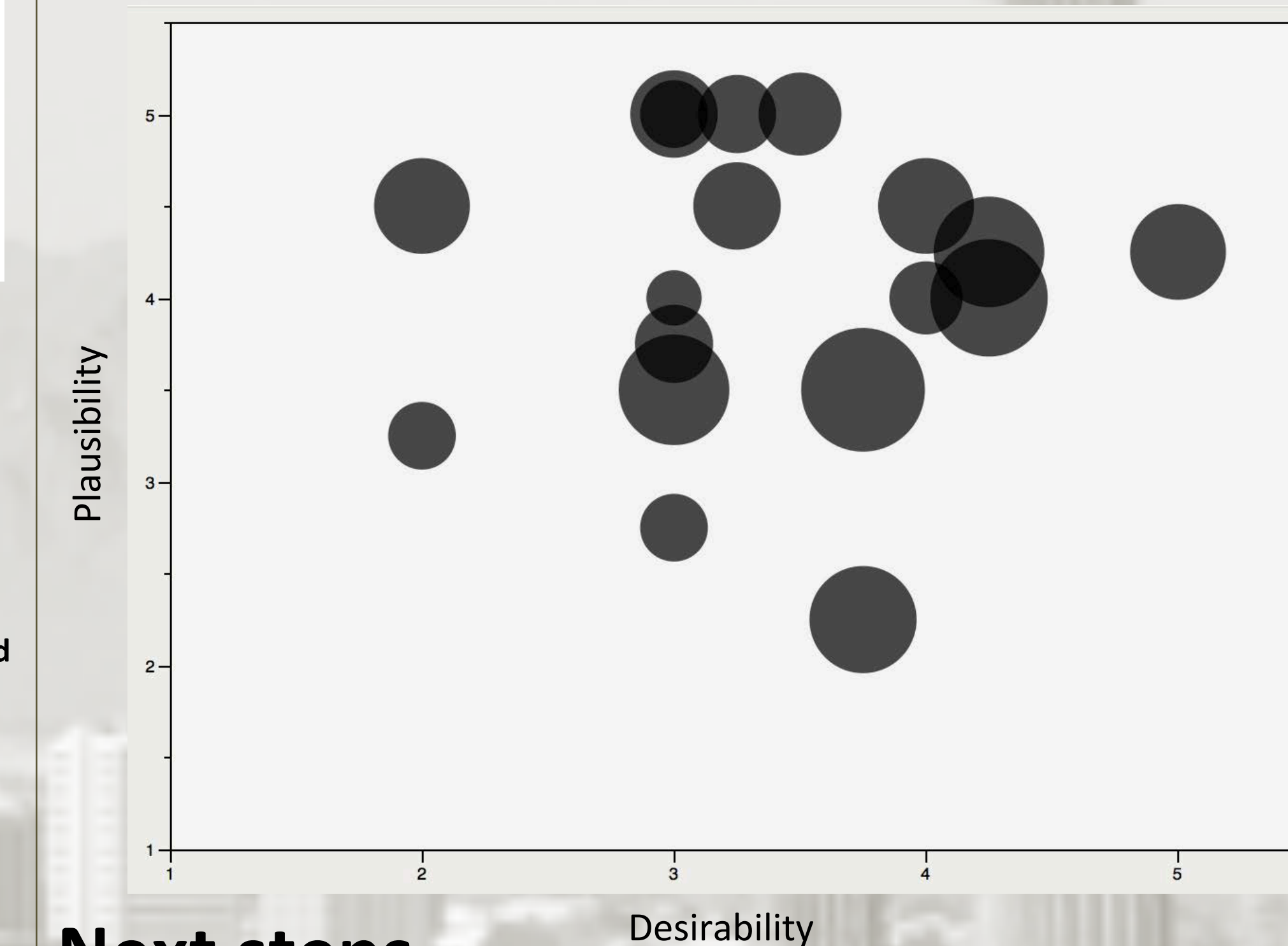


Fig 4: Evaluation of Desirability, Plausibility, and Transformative Nature of the Initial Pool of Scenarios. Bubble size indicates how transformative the scenario was, larger bubbles are more transformative. A 1-5 Likert scale was used for all elicitations. Desirability was evaluated from the participants' perspective and gauged on the language used to describe the future. Plausibility was evaluated based on two criteria: system-level conflicts within the described future and evidence-based support for the described future. Transformation was evaluated on a spectrum of non-intervention to radically transformed.

## Next steps

### Refining Core Scenarios (Early 2015):

- Along with the baseline scenario, the working group will select 3-4 additional core scenarios from the Initial Pool of Scenarios (by contrasting and combining scenarios) for further development
- The focus will be to enhance the specificity for all components of the core scenarios. These components will serve as model inputs

This provides us with the opportunity to fully develop and contrast the first iteration of our core scenarios.

### Quantitative Explorations (Mid 2015):

- Simulation-based exploration of the main trends, potential outcomes, and uncertainties of each scenario storyline (including sensitivity analysis and stress tests under extreme events)
- Sustainability and resilience multi-criteria assessments of scenarios
- Further scenario refinement (based on projected land use / land cover change maps, model outputs, and multi-criteria assessments)

Quantitative exploration and assessments allow us to further refine the core scenarios.

### Visualizations & Narratives (Late 2015):

- Visualizations and narratives in this phase will be used for a final normative refinement of the scenarios and serve as one of the product outputs for use in broader engagement

This is a local "end point" but we are planning for much more...

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