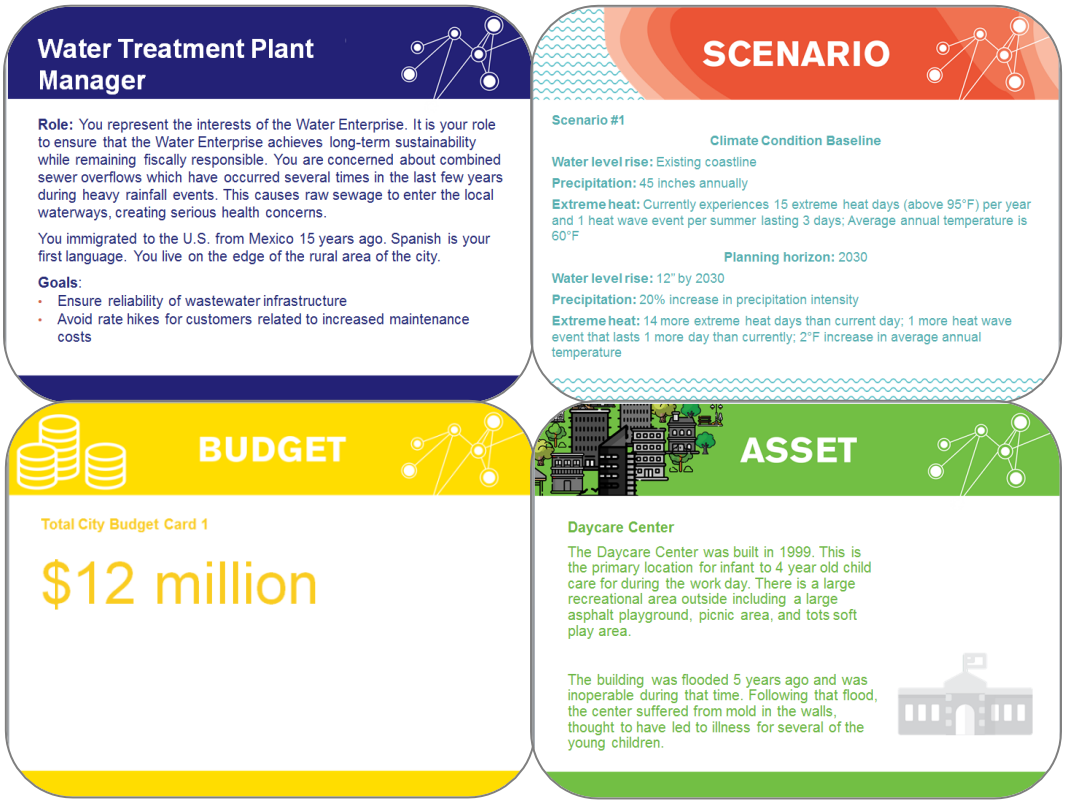
# Game of Extremes

# Facilitator Guidebook




USDN | urban sustainability directors network

## Remember the following as you facilitate the game:

<table>
<tr><td> </td><td>Guide the players through each exercise<ul><li>You may have to encourage conversation and idea-generation among participants.</li><li>Offer hints and tips throughout, especially when participants are stuck, but don’t play the game for them.</li></ul></td></tr>
<tr><td> </td><td>Manage participation<ul><li>Make sure everyone has a voice and has the opportunity to speak up.</li><li>Draw out the quieter participants by asking their opinions.</li><li>If one person is dominating the conversation, give them a task like writing notes on a flip chart or being a scribe or timekeeper.</li></ul></td></tr>
<tr><td> </td><td>Encourage players to stay in their "roles" during the exercises<ul><li>This will help them think outside their day to day and create a more diverse experience.</li></ul></td></tr>
<tr><td> </td><td>Remind players about additional impacts outside of those to hard infrastructure<ul><li>Bring up impacts to people (health, social structure, economic disparities), economy (businesses, tourism), etc. regularly throughout the game.</li><li>Keep vulnerable populations (elderly, low income, New Americans) in mind.</li></ul></td></tr>
<tr><td> </td><td>Keep the game moving through the suggested time schedule.<br>3 hours is the recommended minimum amount of time to play the game in its entirety, but the game can be shortened by omitting the sections described as optional below.<table><tr><td>PowerPoint Presentation</td><td>10-15 minutes</td></tr><tr><td>Climate Science Exercise</td><td>10 minutes</td></tr><tr><td>Asset Inventory Exercise</td><td>40 minutes</td></tr><tr><td>Vulnerability Exercise</td><td>30 minutes</td></tr><tr><td>Consequence Exercise (Optional)</td><td>20 minutes</td></tr><tr><td>Budget/Adaptation Exercise</td><td>45 minutes</td></tr><tr><td>Adaptation Implementation Exercise (Optional)</td><td>30 minutes</td></tr></table></td></tr>
<tr><td> </td><td>Give space for the participants to learn from each other<ul><li>Allow for time at the beginning and at the end for participants to share what they are doing in their own cities on the topics discussed in the game</li><li>Encourage connections between participants to keep talking after the game is over</li></ul></td></tr>
</table>

# Facilitator Guide to Game of Extremes

Suggested tools needed for activity:

- Game materials (one set for each group): game board, game cards (roles, assets, climate scenario, budget cards, disruption cards), list of adaptation strategies and associated costs, participant workbooks, rulers.
- Writing utensils for each team.

Facilitators should use this guide to assist teams in completing the Game of Extremes[1]. Facilitators should serve as timekeeper per activity to ensure the teams can get to each part of the game within the recommended 3 hour allotted time. Suggested times per activity are described below. Each team will have a defined climate scenario, a set budget limit and game board, and will experience disruptions in their planning process, and teams should be encouraged to use creativity in addressing the constraints they face. As the Facilitator, you are also responsible for keeping the game moving and ensuring that all players have the opportunity to speak and contribute to the conversation and decisions. The Facilitator should use the Workbook Pages attached to this guide to record all team decisions and to report on how the teams developed their respective adaptation plans and implementation process (if played) at the end of the game.

[1] The Game of Extremes is derived from The Game of Floods created for the USDN in 2016. The Game of Floods was based on a planning tool originally developed for Marin County, California to assist community stakeholders in better understanding and prioritizing adaptation strategies needed to respond to sea level rise and coastal flood hazards. This interactive tool was leveraged and expanded by Kris May and Rebecca Verity at AECOM with permission from Marin County to include vulnerability analysis. Additional refinements to focus the game on city stakeholders were made in support of the 2016 USDN toolkit development, also with permission from Marin County.

## INTRODUCTORY POWERPOINT PRESENTATION [10-15 minutes]

**Facilitator Actions:**

1) **Use the accompanying PowerPoint** to briefly present to participants key information about extreme heat and flooding and the adaptation planning process, and to introduce participants to the steps in Game of Extremes, which they will play after the PowerPoint presentation.
2) At the end of the presentation,
    - **Encourage players to spend 5 minutes discussing their efforts** to address heat and flood risk in their respective cities.

## INTRODUCTION TO ROLES AND BOARD [10 minutes]

**Facilitator Actions:**

1) **Hand out** Game of Extremes **Board.**
2) **Assign "role cards"** to each participant that define the role the participant will play (appointed official, city staff, utility manager, community representative, etc.).
3) **Introduce the game** with the following background information:

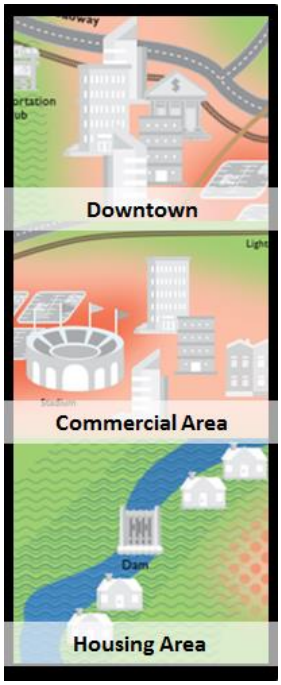
- **City Introduction**:

  *Muggytown was originally settled by Native peoples, who were drawn to the rich and fertile soils and pushed out by colonization that started in the late 1700s. Given its proximity to the coast and, thus, easy access to export markets, the city's economy boomed in the early 1900's resulting in both additional farmland development as well as rapid urbanization. The city's economy still has a strong agriculture focus, but it has also expanded to include technology, tourism, and healthcare industries. The city's population is currently 422,000 and the demographic makeup is 50% White, 30% Black or African American, 14% Hispanic or Latino, 5% Asian American, and 1% Native American. 20% of Muggytown residents live below the poverty line and the city has a homeless population of roughly 4,000 people. A large percentage of the low-income population lives in or around the Townhomes public housing complex in the southeast area of the city.*

  *Due to the rapid urbanization of Muggytown, the downtown area is made up of many impervious surfaces such as roadways, buildings, and parking lots. This has resulted in major urban heat island issues in the city. In the past decade, the city has experienced three heat waves lasting longer than three days which have claimed at least 10 lives. The area of the city around the river is a mix of farmland and industrial*

*parks, both of which have experienced damaging precipitation-related flooding several times in the past decade. In addition, because of water level rise (WLR), the part of the city along the coast, with both transportation and tourism infrastructure, is increasingly experiencing king tide flooding and will be susceptible to permanent inundation from water level rise.*

4) **Familiarize participants** with the board using the following key points:




- Tell the participants to imagine the board is a dense city, with buildings, streets, homes and assets throughout. Point out the downtown area (dense area with larger buildings), the commercial area near the stadium and the housing near the dam. Note these are unlabeled icons on the board, included to give the board more a city feel even though they are not assets in the game.
- Note the **flood sources** (riverine and coastal) and **heat exposure differentials**, e.g., inside or outside a heat island, as well as the various asset types. Specifically point out that the **dotted lines denote flood zones**, even when the color between dotted lines is a red or pink as this is just showing the overlap between flood and heat zones. The **flood zone bands** represent specific increases in water level rise (see map legend). The **transparent dots** represent areas of exposure to both heat and flood impacts.
- Assume that affected assets within water level rise hazard zones are **permanently inundated**, or damaged, unless otherwise protected. Assume that affected assets within the riverine floodplain are exposed to **temporary flooding** during riverine flood events related to increased precipitation.
- Reiterate information about **temperature differences inside vs outside of a heat island,** noting that air temperatures in different parts of the same city, particularly after sunset, can be as much as 22°F different depending on amount of impervious covering and density of greenery. Highlight that the colors on the board represent different baseline temperatures (red = +10°F; pink = +5°F; green / white = +0°F). Note that, aside from the UHI differential, **all assets will experience increases in extreme heat over time** (X% increase in extreme heat days by 2030 or 2050, and increased average temperatures)**.**
- Highlight that the location of the graphic, not the text, determines whether or not an asset is within a heat island.
- If rulers are not provided, and if game board and game cards are printed as specified in the *Trainer How-to Guide*, note that the horizontal length of any game card can be used as a ruler, as it aligns with the scale on the map.
- Ask team members to briefly introduce themselves to their group based on their assigned role, highlighting just 1-2 details about their role.

## ASSET INVENTORY EXERCISE [40 minutes]

Before a climate adaptation strategy can be developed, we need to understand which assets are at risk. In this section of the game, the Facilitator will lead participants through an activity to identify assets critical for the resilience of the city, including the functioning of the city and the needs of the residents.

**Facilitator Actions:**

1) Provide **climate scenario card** to the players to give them context for climate projections in the game and their decision-making related to assets, noting that this scenario card is essentially the end result of the "Review Climate Science" step listed in the generic adaptation planning process described in the PowerPoint presentation. As such, the "Review Climate Science" step has already been completed for the game.
2) **Provide set of asset cards** to the players. Have them review the assets on the board, and the details on the cards of the assets their role is interested in, e.g., transportation role should be sure to review transportation related asset cards).
3) Encourage the players to consider their role carefully and get into character to advocate for the assets they find most critical.
4) Guide the team to work together to **develop a list of 10 assets** they agree are critical for the resilience of the city, taking into account economic, social, and environmental concerns. Encourage the participants to think about how people, especially vulnerable people, are dependent on or relate to the assets in question.
5) **Maintain master list of prioritized assets** in the Asset Inventory, Vulnerability Assessment, and Risk Assessment Table below (also provided as a separate 11"x17" file in game materials).

## Asset Inventory, Vulnerability Assessment, and Risk Assessment Table

| | Asset Inventory | | | | Vulnerability Assessment | | | | | | | | | Risk Assessment | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Asset** | **Year Built** | **Condition (Poor, Moderate, Good)** | **Prior Damage History (Y/N)** | **WLR Exposure Score** | **Riverine Flood Exposure Score** | **Flood Sensitivity Score** | **Flood Adaptive Capacity Score** | **Heat Exposure Score** | **Heat Sensitivity Score** | **Heat Adaptive Capacity Score** | **Total Score (E+S+AC)** | **Ranking (1 to 10)** | **Potential Consequence of Flooding** | **Potential Consequence of Extreme Heat** |
| **Ex** | Public School | 2016 | Good | N | 2 | 0 | 1 | 2 | 1 | 1 | 2 | **9** | | School closure; Evacuation of vulnerable population; Perpetuation of mold problems and associated illness; | Power outage causing closure of facility; Lack of air conditioning with vulnerable population; |
| **1** | | | | | | | | | | | | | | | |
| **2** | | | | | | | | | | | | | | | |
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## VULNERABILITY ASSESSMENT EXERCISE [30 minutes]

Vulnerability for each asset is calculated based on its exposure, sensitivity, and adaptive capacity.

- The **exposure** of an asset is determined by what climate change scenario it is subject to and where it is located.
- The **sensitivity** of an asset relates to its uses and physical characteristics and condition.
- The **adaptive capacity** of an asset relates to the ease or difficulty of modifying, relocating or repairing it in the face of a climate hazard.

**Facilitator Actions:**

1) Have participants **review the climate scenario card** presented during the Asset Inventory exercise.
2) Lead teams through the process of **defining high, medium and low exposure, sensitivity and adaptive capacity**, noting that teams are free to choose from the list of definitional criteria provided below and in the participant guidebook or develop their own. Participant guidebooks provide a suggested definition for high exposure, and this guidebook provides suggested definitions for all categories and levels below. If participants need help, the Facilitator is free to suggest the definitions provided below.

**SAMPLE DEFINITIONAL CRITERIA**

**Exposure Definition Criteria:**

- Water level rise by 12”
- Water level rise by 24”
- Water level rise by 36”
- 20% increase in precipitation intensity
- No change in precipitation intensity
- In riverine flood zone
- Not in riverine flood zone
- +29 days extreme heat
- +55 days extreme heat
- +68 days extreme heat
- +1 heat wave /year
- +2 heat waves/ year
- Location in reddest part of heat island
- Location in pink part of heat island
- Not located in heat island

**Sensitivity Definition Criteria:**

- Infrastructure over 30 years old
- Infrastructure 10-30 years old
- Infrastructure less than 10 years old
- Became completely unusable during recent heat and/or flood events
- Was only slightly affected by past heat and/or flood events
- Has never been affected by past heat and/or flood events
- Impacts the city’s vulnerable populations

**Adaptive Capacity Criteria:**

- Easily repaired, relocated, or modified
- Inexpensive to repair, relocate, or modify
- Moderately difficult to repair, relocate, or modify
- Moderately expensive to repair, relocate, or modify
- Very difficult to repair, relocate, or modify
- Very expensive to repair, relocate, or modify

**EXAMPLE Exposure Rating Definition Utilizing the Criteria Above:**

**High (3):**
- Located in reddest part of heat island; will experience 68 more days of extreme heat; will experience 2 more heat waves per year;
- Water level rise by 12"; In riverine flood zone;
- 20% increase in precipitation intensity

**Med (2):**
- Located in pink part of heat island; will experience 55 more days of extreme heat; will experience 1 more heat waves per year;
- Water level rise by 24"

**Low (1):**
- Not located in part of heat island; will experience 29 more days of extreme heat;
- Water level rise by 36"

**EXAMPLE Sensitivity Rating Definition Utilizing the Criteria Above:**

**High (3):**
- Over 30 years old;
- Became completely unusable during recent heat or flood event;
- Impact negatively affected 100% of the population

**Med (2):**
- Over 10 years old;
- Was only slightly affected by past heat or flood event;
- Impact negatively affected 50% of the population

**Low (1):**
- Less than 10 years old;
- Has never been affected by a past heat or flood event

**EXAMPLE Adaptive Capacity Rating Definition[2] Utilizing the Criteria Above:**

**Good (1):**
- Easily repaired, relocated, or modified;
- Inexpensive to repair, relocate, or modify

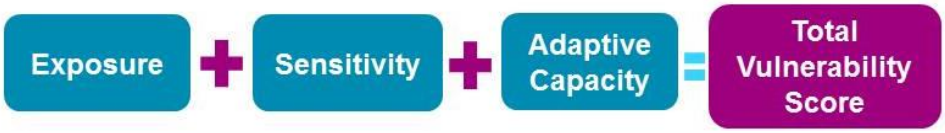
**Med (2):**
- Moderately difficult to repair, relocate, or modify;
- Moderately expensive to repair, relocate, or modify

**Poor (3):**
- Very difficult to repair, relocate, or modify;
- Very expensive to repair, relocate, or modify

[2] Adaptive Capacity ratings are the inverse of Exposure and Sensitivity ratings; if an asset has low adaptive capacity, it is more vulnerable and, therefore, has a higher vulnerability score.

3) **Introduce the scoring process** based on a 3 point scale: Low (1 point), Medium (2 points), and High (3 points) for Exposure and Sensitivity. For example, assets that are highly exposed or sensitive, based on the team's definition, would receive a High (3 point) rating. For Adaptive Capacity, scoring is inverted, i.e., Poor Adaptive Capacity (3 points), Medium (2 points), Good (1 point). An asset's vulnerability score is calculated by simply summing scores for exposure, sensitivity and adaptive capacity. Note that water level rise, riverine and heat exposure, as well as flooding and heat sensitivity and adaptive capacity are scored individually in the table even though high, medium and low definitions for the three stressors may be combined.

4) Using their definitions, **ask the teams to calculate the total vulnerability score for each of their 10 selected assets and then assign a vulnerability ranking to each** using the Vulnerability Assessment section of the included table. Teams should use the descriptions on the asset cards, the locations on the game board and the climate scenario card to develop these scores.




5) **Maintain master list** of vulnerability scores in Vulnerability Assessment section of the Asset Inventory, Vulnerability Assessment, and Risk Assessment Table

## RISKS/IMPACTS (OPTIONAL) [20 minutes]

Risk is typically assessed by evaluating the **probability (or *likelihood*)** that climate impacts would occur and the ***consequence* of these impacts**. Since likelihood has often been accounted for through the selection of the climate scenarios for the assessment (the climate scenario card in this game), potential consequence is often the primary consideration of risk to an asset. Consequence considers the magnitude of the impact that would occur under the selected climate change scenario. During this optional section of the game, the Facilitator leads participants through an exercise to develop qualitative statements describing the consequence to the city and its people of impacts on a given asset. These statements should be recorded in the Asset Inventory, Vulnerability Assessment, and Risk Assessment Table.

**Facilitator Actions:**

1. **Present the following categories and questions** to participants as key considerations of the consequence of an extreme heat impact on an asset.

- **Damage:**
  - What is the level of damage to the asset?
  - Can the asset be repaired, or would the asset require complete replacement?
- **Disruption:**
  - Is there a disruption in service?
  - What is the length of disruption, i.e., hours, days, weeks? Does the disruption threaten public health and safety?
  - Will disruption at this asset have cumulative effects throughout an interconnected system (e.g. failure due to overheating of a signal box due for a light rail station will cause delays throughout the rail network)?
- **Cost:**
  - What is the cost to repair or replace the asset?
  - What are the economic (or health and safety) costs associated with the disruption?
  - Are there secondary impacts that need to be considered (i.e., potential impacts to human health and safety, or costs to other sectors, such as the environment and public recreation)?

## BUDGET/ADAPTATION PLANNING EXERCISE

### [45 minutes]

Based on available funding, adaptation strategies can be implemented to reduce the vulnerability of selected assets. In this section of the game, each table will be given a budget to use to select adaptation strategies to protect their prioritized assets.

**Facilitator Actions:**

1) **Provide each team with copies of the list of potential Adaptation Strategies and associated costs,** such that no more than two people have to share a copy.
2) **Ask teams to** review their completed Asset Inventory table and the Vulnerability Assessment and **strategize on how best to adapt assets based on their allotted budget.** Participants, as a team, may choose from the strategies described in the provided list or develop their own based on their personal experience or creativity.
    a. Highlight for the participants that, **where relevant e.g., tree planting, strategies include Operations and Maintenance costs,** as these costs are critical to the functioning of the adaptation strategy beyond the initial investment.
3) Instruct participants to **categorize their selections as short-term (within 5 years) or long- term (beyond 5 years)** priorities and to note these strategies in the appropriate table in their workbook (included on next page). Encourage players to think about the short- and long-term benefits of each action, regardless of which table they put the strategy in.

*Disruption!*

1) Once the teams have chosen their short-term and long-term strategies, **introduce a set of disruption cards**, e.g., a disruption and its impact on 5 key assets. Instruct the team to read through the cards, which describe the impact to the asset as well as the cascading impacts to other assets and the city at large.
    a. Game of Extremes Disruptions include a 7-day heatwave, a riverine flooding event, and a king tide event.
2) Instruct teams to identify whether they have **protected in the short-term the assets that have been impacted by the disruption**. The table's original budget will be augmented or reduced by the amounts listed on the asset disruption cards depending on whether or not the team has chosen a short-term strategy that protects the asset on the card. Note that the choice to protect an asset in the long-term but not short-term is penalized just as if the asset hasn't been protected at all. Have the team calculate their new budget based on the original budget +/- amounts gained or lost through the disruption process.
3) Using the blank (unlabeled) column on the right side of the same short- and long-term tables, **instruct the team to use their new budget to adjust their selections**, if at all, based on the impacts and cascading effects caused by the disruption.
4) Emphasize that although protection of an asset in the long-term but not short-term is penalized for game-play reasons, in real life, protection of an asset in the long-term may

be the only option.

5) In addition, emphasize that a decision to not protect at all (short- or long-term) an asset on the disruption cards is very problematic, as the assets chosen for the disruption cards are the ones that people tend to depend on the most.

Adaptation Planning

**Short-Term Adaptation Plan** (within 5 years)

| | **Adaptation Strategy** | **Asset(s) Protected** | **Cost** | |
|---|---|---|---|---|
| **1** | | | | |
| **2** | | | | |
| **3** | | | | |
| **4** | | | | |
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| **9** | | | | |
| **10** | | | | |

**Long-Term Adaptation Plan** (beyond 5 years)

| | **Adaptation Strategy** | **Asset(s) Protected** | **Cost** | |
|---|---|---|---|---|
| **1** | | | | |
| **2** | | | | |
| **3** | | | | |
| **4** | | | | |
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## ADAPTATION IMPLEMENTATION EXERCISE (OPTIONAL) [30 minutes]

Once adaptation strategies are chosen, the process of implementing the strategy begins. This part of the game is recommended as an "optional add-on" for participants who are city employees and those who have interest in city processes of implementing adaptation options. In this optional section of the game, the Facilitator will walk participants through a series of discussion prompts to help them think through how they might implement one of their selected adaptation strategies in their own city.

**Facilitator Actions:**

**Prompting questions include:**

- Choose one of the planning, budgeting or programs strategies from the previous section of the game.
    - Which city agencies would lead the effort to implement the strategy?
    - Who else would need to be involved or engaged (City departments, leadership, additional stakeholders, citizens, consultants, etc.)?
    - What are the main barriers to implementing the strategy, e.g., funding, political will (or political opposition), lack of data, permitting, and how would you overcome these barriers?
    - What additional climate change data is needed, if any, and where would it come from?
    - What are the key opportunities for integrating climate adaptation considerations into standard city decision-making processes, e.g., budgeting, planning, program development, etc.?

## DEBRIEF [20 minutes]

**Facilitator Actions:**

In this wrap-up section, the Facilitator will **lead participants through a short debrief** about lessons learned from this game. Prompts include:

- What criteria would your city use to prioritize assets in its asset inventory?
- How might your city define exposure, sensitivity and adaptive capacity of an asset?
- Why did you choose certain adaptation strategies for the short-term vs. the long-term strategy tables?
- Which assets did you not protect at all and why?
- How might not protecting those assets be problematic, especially if people depend heavily on them?
- What were the major challenges you and your team encountered in playing the game, and how do they relate to the challenges you face or would face in your city?
- Who wasn't represented but should have been?
- What went well? Why?
- How can you apply what you've learned today in your own city?
- How would this training be more useful to you and your team?