

Multi-level social systems and social change

**Accelerating Engineering Research Center
Preparedness Workshop**
Arlington VA, Oct 2, 2018



**INSTITUTE FOR THE
BUILT ENVIRONMENT**
COLORADO STATE UNIVERSITY

“We can't impose our will on a system. We can listen to what the system tells us, and discover how its properties and our values can work together to bring forth something much better than could ever be produced by our will alone.”

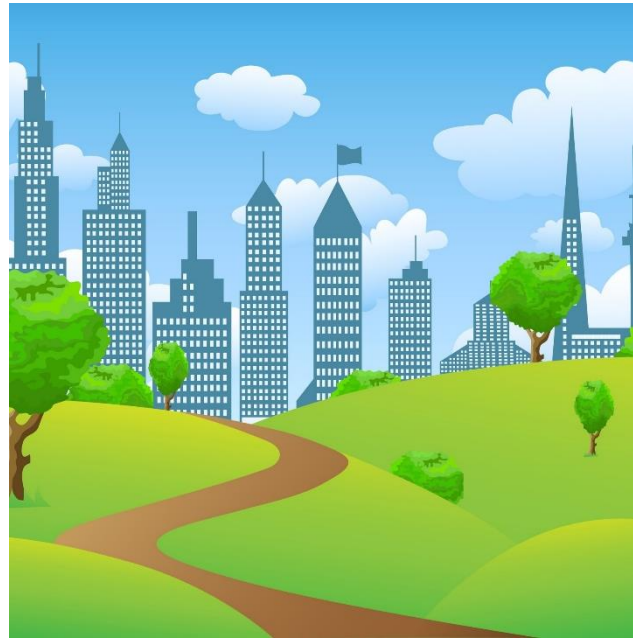
-Donella Meadows



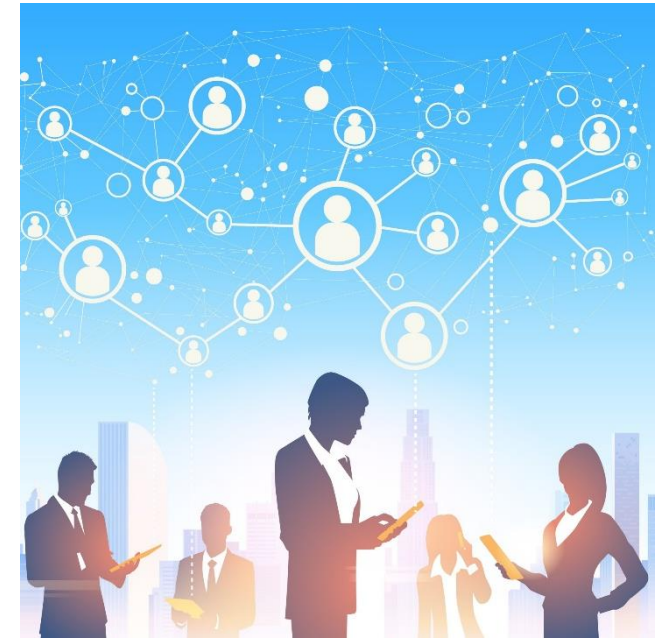
People are Nested in Systems & Places



Nature



Built Environment



Social Realms



Social Ecological Model

- Model of nested system
- Individuals and groups are agents of change
- Dynamic interrelations across levels

Health Promotion: creating change requires attention to the context of action beyond individual traits.

Use this tool to help you think more systemically!



EVENTS
What is happening?

PATTERNS OF BEHAVIOR
What trends are there over time?

SYSTEMS STRUCTURE
What influences the patterns?
How are the parts related?

MENTAL MODELS
What values, assumptions, and beliefs shape the system?

Increasing Leverage

PATTERNS of BEHAVIOR

Behaviors, Processes, Routines



Theory & Toolkits

- Each layer has unique influence
- Layers shape each other
- Multi-layer solutions

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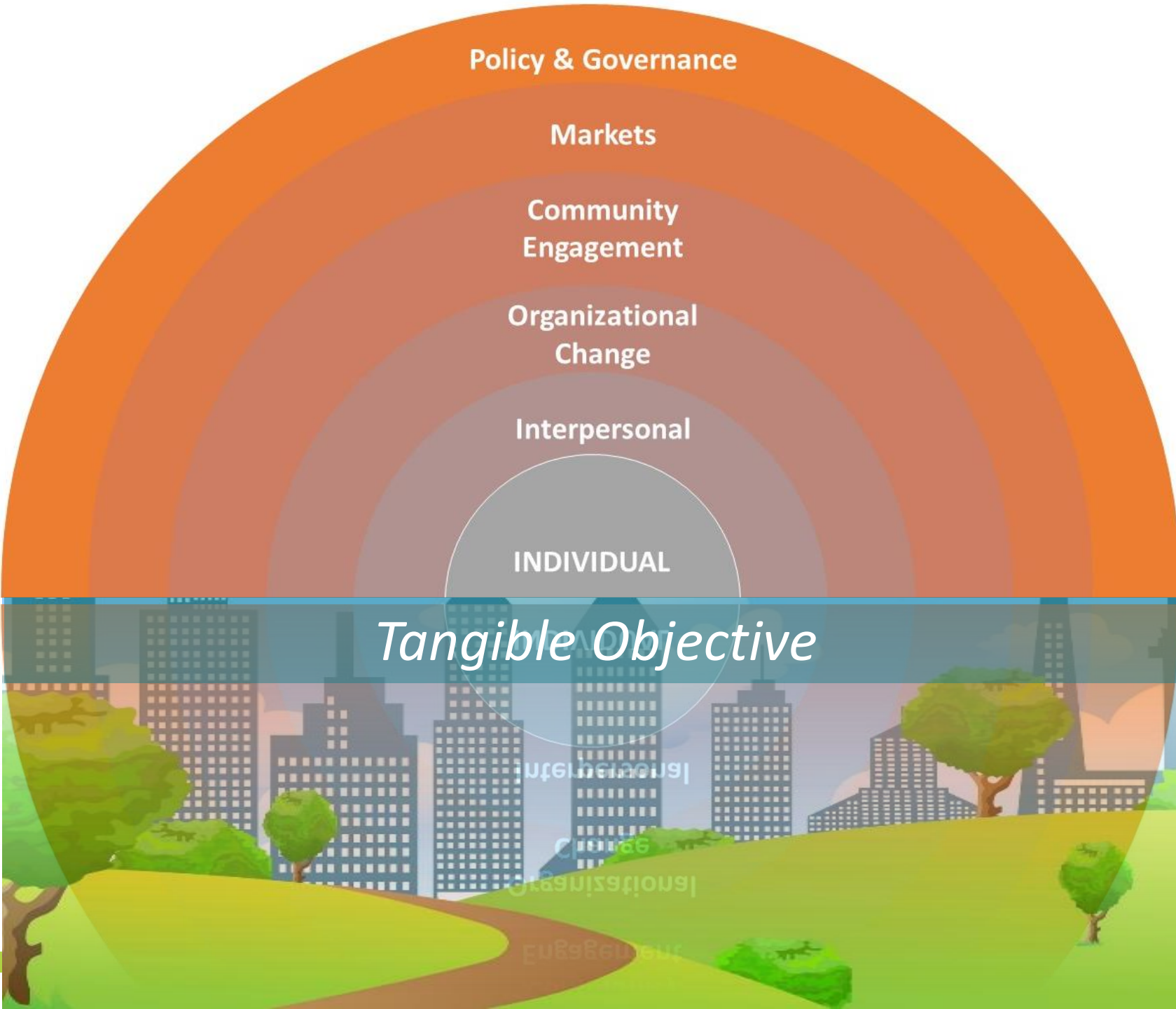
MENTAL MODELS

What values, assumptions, and beliefs shape the system?

Increasing Leverage

SYSTEM STRUCTURE

Regulations, Policies, Markets,
Organizations



Theory & Toolkits

- Each layer has unique influence
- Layers shape each other
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Integration of Tools for Change



A silver mountain bike is parked on a concrete surface in front of a white door with vertical panels. The bike features red handlebars, a black saddle with red accents, and a red water bottle mounted on the frame. The front wheel has a yellow 'CONTINENTAL' logo on the tire. A semi-transparent grey box is overlaid on the left side of the image, containing the text 'HOW DO WE BEGIN?'.

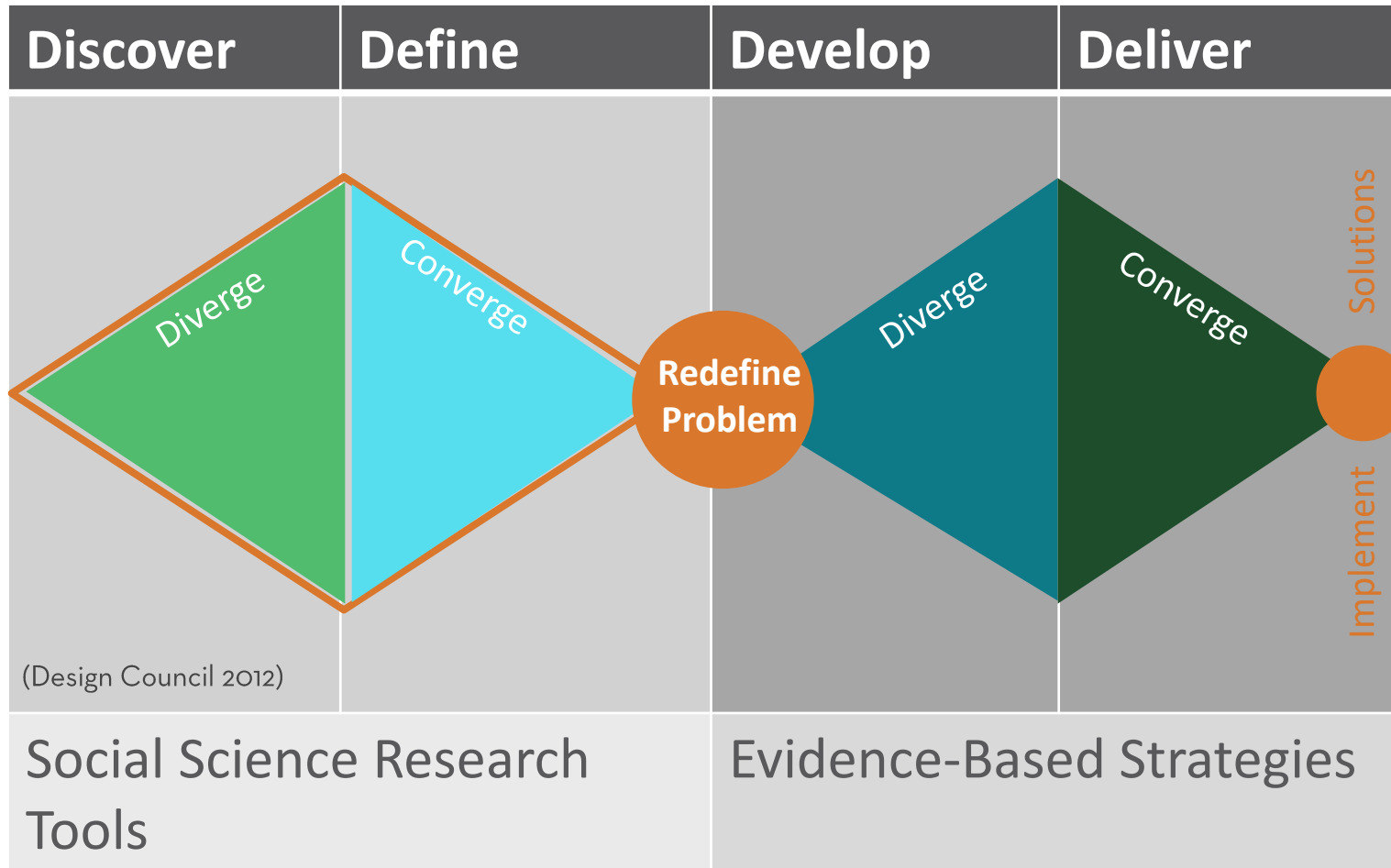
HOW DO WE
BEGIN?

Discover and Define Problem

★ Too many programs fail because they start here.



Evidence-Based Change Processes



1. Discover & Define
the Problem

Design Thinking
Double-Diamond

(Kaner 2014)



OBSERVATIONS

A teal-colored Bianchi bicycle is parked on a light-colored concrete sidewalk. The bicycle features a pink saddle, a wicker basket on the handlebars, and red-rimmed tires. The brand name 'Bianchi' is visible on the frame. A dark grey semi-transparent banner is overlaid across the middle of the image, containing the text 'REDEFINE the PROBLEM' in white. The background shows a residential street with a building and some greenery.

REDEFINE the PROBLEM

*WE RECOMMEND COLLECTING YOUR UTILITY (ELECTRIC AND GAS) BILLS FROM THE PREVIOUS YEAR TO MONITOR CHANGES IN YOUR MONTHLY ENERGY USE & TO IMPLEMENT YOUR CHECKLIST

PLEASE CHECK THE APPROPRIATE BOXES BELOW

- 1 REBATES AVAILABLE
- 2 TAX CREDITS AVAILABLE

FORT ZED COMMUNITY ENERGY Challenge

TAKE IT TO ZERO

000000

LEVEL ONE BEGINNER PLEDGE

COMPLETE AT LEAST 10 out of 15 ACTION ITEMS

- 1 INSTALL WEATHERSTRIPPING on exterior doors and windows
- 2 ADJUST THERMOSTAT to 78°F in summer and 68°F in winter
- 3 REPLACE incandescent LIGHTS with CFLs or LEDs
- 4 LOWER hot water HEATER TEMPERATURE to 110°F
- 5 CLEAN your REFRIGERATOR COILS
- 6 SET your REFRIGERATOR to no less than 38°F and the freezer to no less than 5°F
- 7 RUN your DISHWASHER only when full, turn off the heated dry cycle.
- 8 LET the SUN SHINE IN during winter, and use blinds or window coverings during summer
- 9 INSTALL MOTION SENSORS on outdoor porch lights
- 10 TURN OFF LIGHTS when not in use
- 11 OPEN WINDOWS at night and close during the day for natural cooling
- 12 USE a POWER STRIP when turning off computers, TV, stereos & appliances
- 13 ENABLE the POWER MANAGEMENT FEATURES on your computer
- 14 REPLACE -or- CLEAN the FILTER on your furnace monthly
- 15 SIGN UP a NEIGHBOR to take the FortZED Community Energy Challenge pledge.

To learn more about how to implement the actions on your checklist, and the rebates and incentives available, visit WWW.RECHARGECOLORADO.COM

LEVEL TWO INTERMEDIATE PLEDGE

COMPLETE AT LEAST 5 out of 11 ACTION ITEMS

- 1 SCHEDULE a low-cost HOME ENERGY AUDIT for only \$60, contact Fort Collins Utilities
- 2 INSTALL & ACTIVATE a PROGRAMMABLE THERMOSTAT
- 3 REPLACE an older COMPUTER, MONITOR or TELEVISION with an ENERGY STAR® qualified model
- 4 BUY ENERGY STAR REFRIGERATOR, CLOTHESWASHER or DISHWASHER 1
- 5 RECYCLE a second REFRIGERATOR or FREEZER 1
- 6 PLAN & MODIFY LANDSCAPING to shade home in summer
- 7 GET a "Check-ME" AIR CONDITIONING TUNE UP in the spring 1
- 8 CHECK OUT an ENERGY METER from the library to measure energy use of appliances and electronics +
- 9 AIR DRY CLOTHES on a line
- 10 PURCHASE LOCAL OFFSETS via the Colorado Carbon Fund
- 11 APPLY for an ENERGY STAR MORTGAGE or refinance

Take it TO ZERO

LEVEL THREE ADVANCED PLEDGE

COMPLETE AT LEAST 3 out of 14 ACTION ITEMS

- 1 INCREASE/IMPROVE your home's INSULATION 1+
- 2 HAVE your home professionally AIR SEALED to reduce infiltration 1+
- 3 INSTALL HIGH EFFICIENCY WINDOWS 1+
- 4 INSTALL a whole HOUSE FAN for summer cooling 1+
- 5 SEAL & INSULATE all AIR DUCTS 1+
- 6 INSTALL a tubular SKYLIGHT for natural day-lighting 1+
- 7 INSTALL ENERGY STAR or HIGH EFFICIENCY FURNACE 1+
- 8 INSTALL a HIGH EFFICIENCY FURNACE MOTOR 1+
- 9 INSTALL a HIGH EFFICIENCY HOT WATER HEATER 1+
- 10 INSTALL SOLAR THERMAL DOMESTIC HOT WATER SYSTEM 1+
- 11 INSTALL SOLAR SPACE HEATING SYSTEM 1+
- 12 INSTALL SOLAR ELECTRIC PHOTOVOLTAIC SYSTEM 1+
- 13 INSTALL ground source HEAT PUMP 1+
- 14 INSTALL small wind GENERATOR 1+

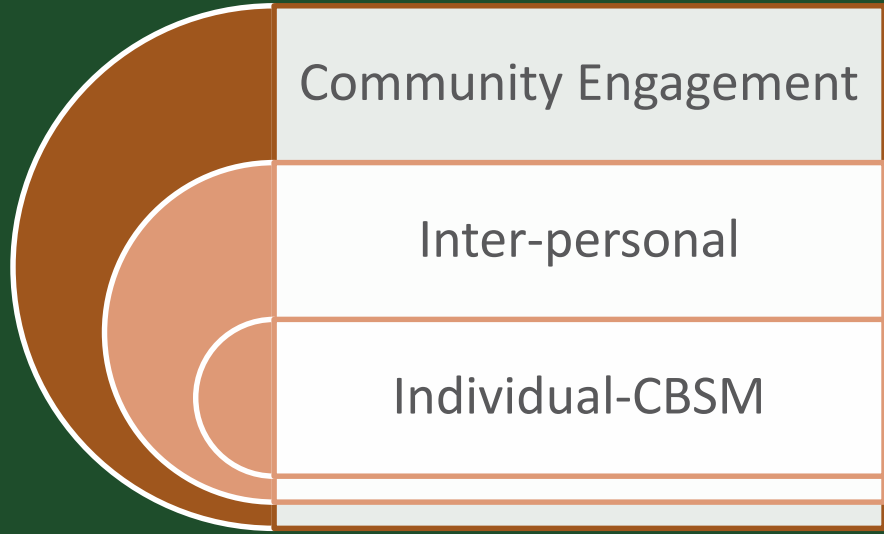
Join more than 6,200 households in the ultimate COMMUNITY ENERGY CHALLENGE. Your commitment will bolster the entire community's energy conservation and efficiency as Fort Collins seeks to establish a Zero Energy District. Find your habitat on the map, track down your pack leader, and take the pledge to help reduce your territory's net energy consumption.

WWW.FORTZEDCHALLENGE.COM

USERNAME

PASSWORD

Cautionary Tale



Block Leader Programs

Evidence-Based Strategies

- ✓ Leaders recruit peers
- ✓ Monthly education
- ✓ Public commitment
- ✓ Existing social networks
- ✓ Tailored Messaging
- ✓ Modelling

Fort ZED: Community Energy Challenge

- ✗ Individual sign up
- ✗ NO education
- ✗ Private commitment
- ✗ New networks
- ✗ No audience segmentation
- ✗ No peer mentoring

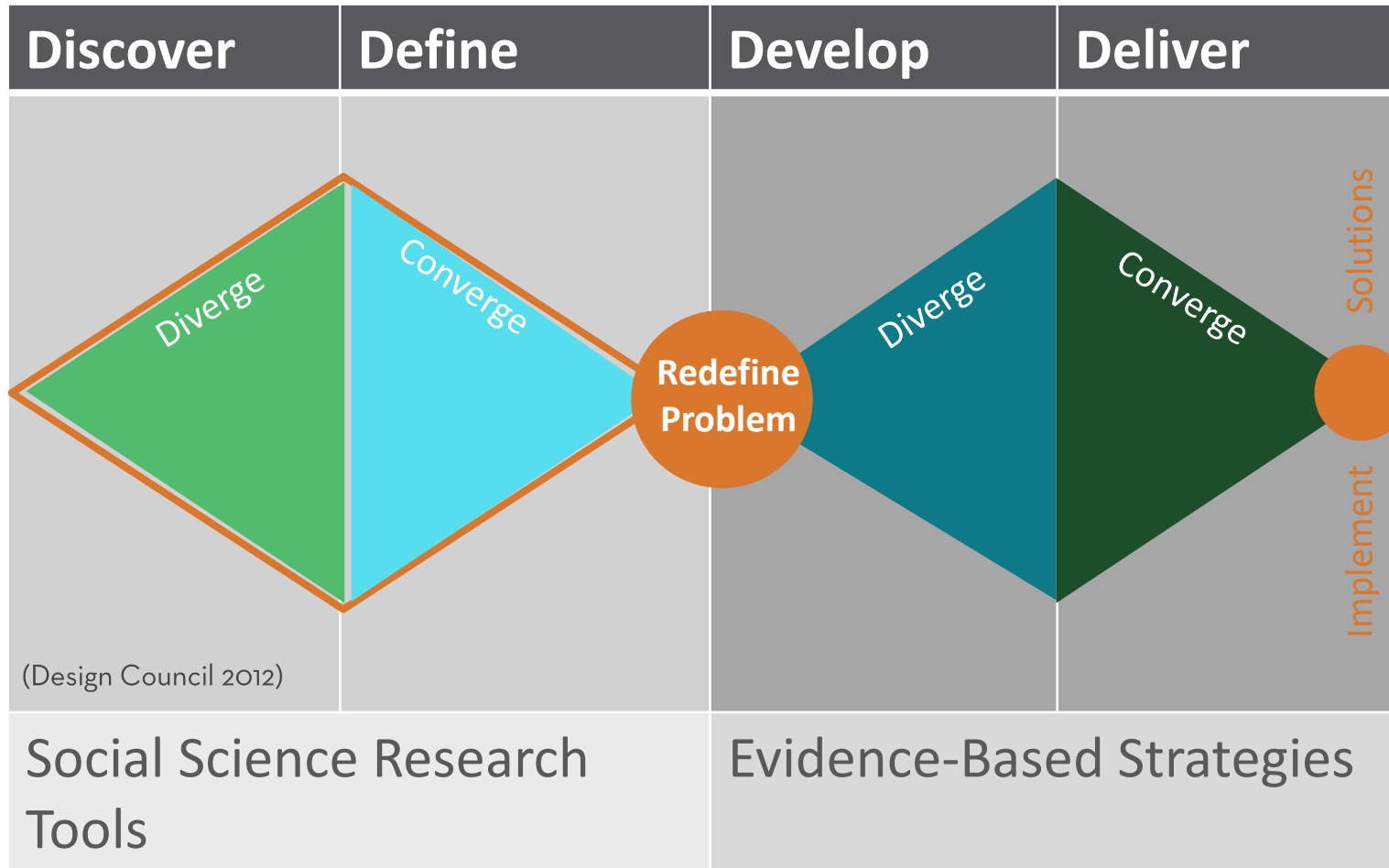
Skipping Steps Creates Failed Efforts



Evidence-Based Change Processes



WATER
CONSERVATION



1. Discover & Define the Problem

Design Thinking
Double-Diamond

(Kaner 2014)

Discover and Define Problem



Evidence-Based Change Processes

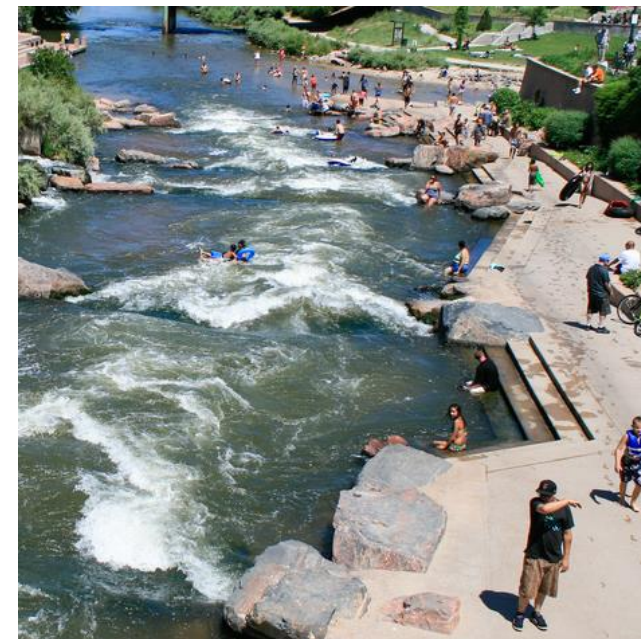
1. OBSERVE



Nature



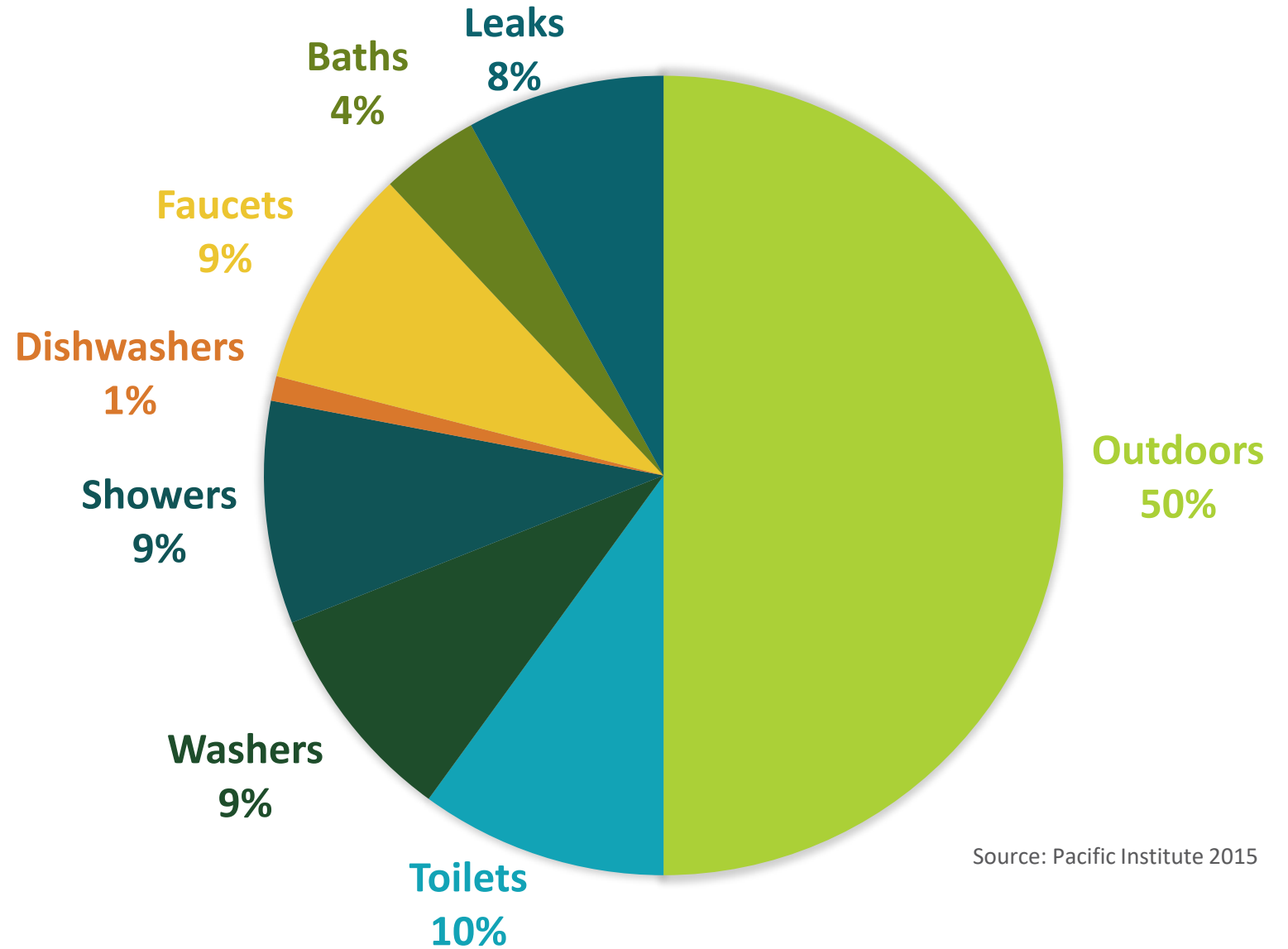
Social Realm



Built Environment

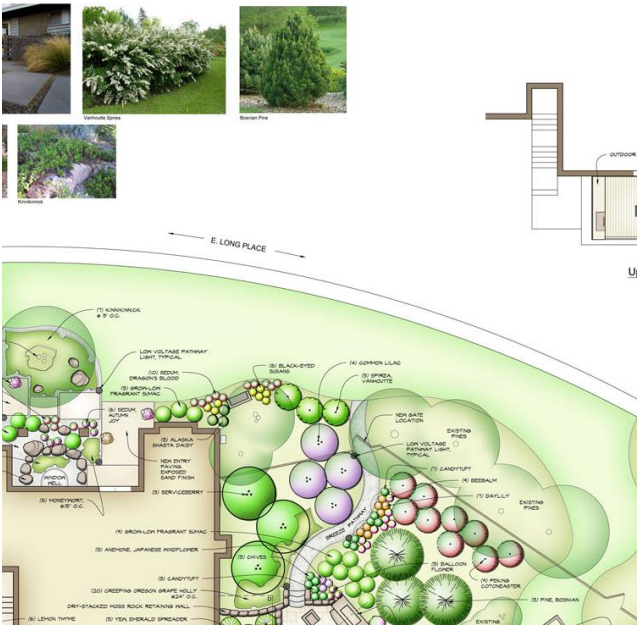
California Residential Water Use

2. ASSESS POTENTIAL IMPACT



Source: Pacific Institute 2015

BARRIERS & BENEFITS



MULTI-STEP ACTIONS



SOCIAL NORMS



INERTIA

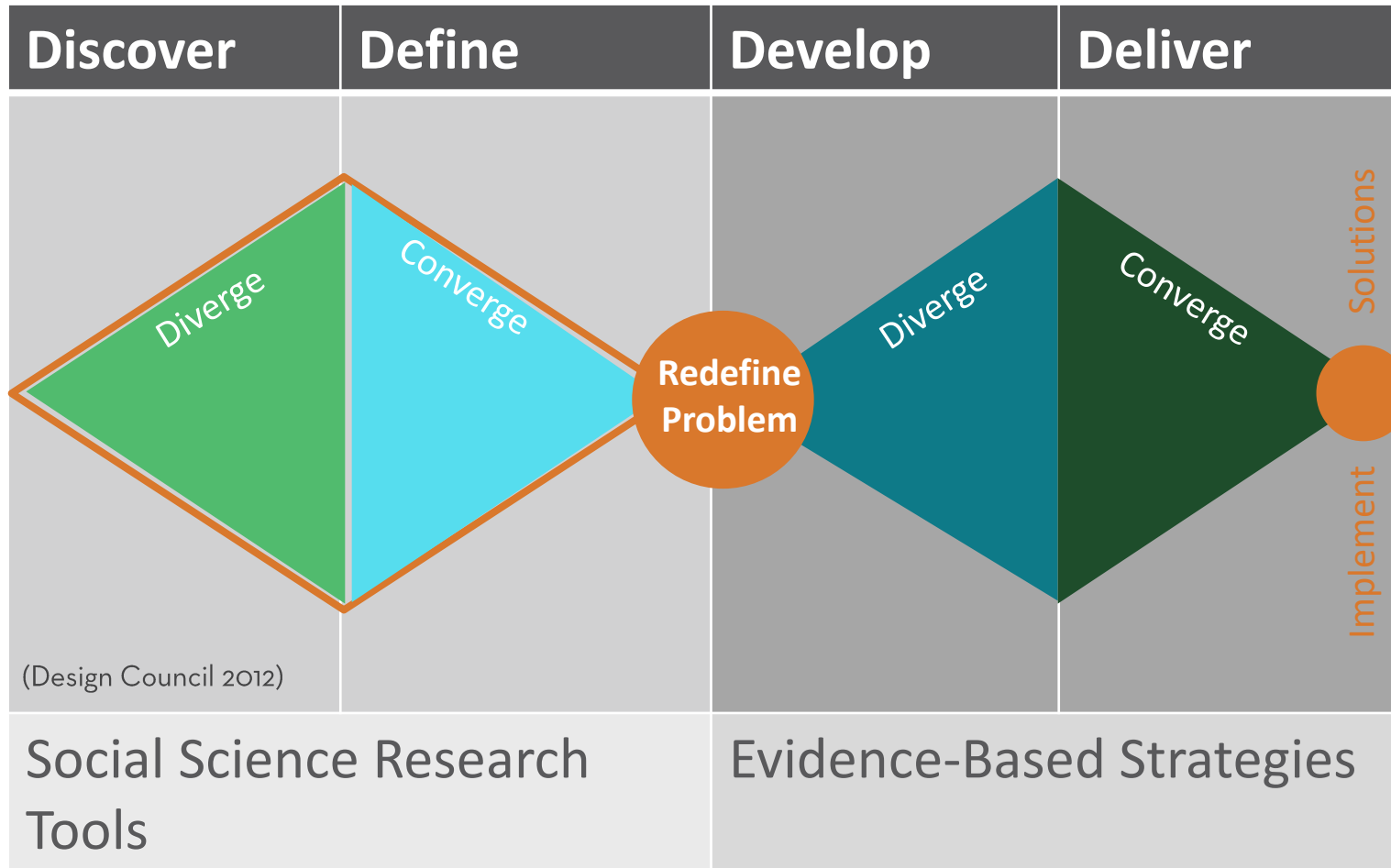
How much water does the average San Diegan use per day?

108 =
gallons

San Diego residential water use per capita for fiscal year 2014.

California cities' per capita residential water usage range from 82 to 176 gallons per day





WHAT IS THE OPPORTUNITY FOR WATER CONSERVATION?

(Kaner 2014)

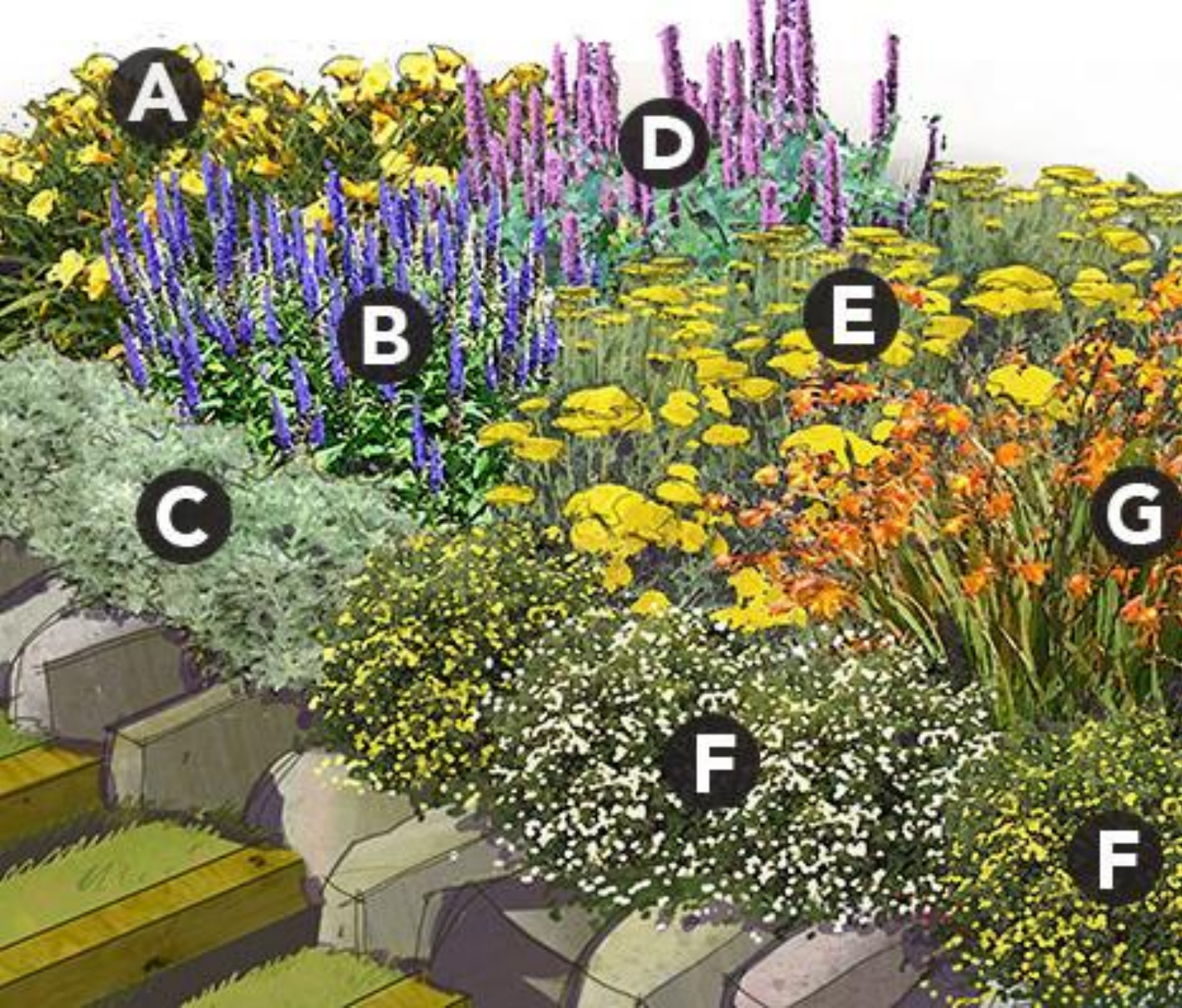


CASH for GRASS



ELIMINATE BARRIER: INERTIA

1. Commit to square footage to remove
2. PAID GRASS REMOVAL



INCREASE BENEFITS

Garden Plans

Workshops

Develop Strategies Across Layers





Image by Elizabeth Catt

Municipal Policy

- water use
- plantings
- lawn
- herbicide use



HOA Policy

Allowing non-grass
plantings



Organizations & Markets

Cultivating

Stocking

Marketing

Educating

Labelling



Adult Programs

Education for the ever-inquisitive gardener, artist, and crafter

The spring season is filled at The Gardens with opportunities to learn and explore different aspects of horticulture. From diverse classes to many volunteer opportunities, there is certainly something for everyone to enjoy at The Gardens.

Take time out to engage, learn something new, and enjoy:

- [Fall Classes \(September-December\)](#)
- [Volunteer Opportunities](#)

Classes are filling up fast! To REGISTER: Call us at 970-416-2486 or follow the link for more information.

Adult classes are geared for those 18 years and up, unless otherwise noted.



[Refund Policy](#)

[Special Events](#)

[Spring Plant Sale](#)

[NoCo Urban Homestead Tour](#)

[Garden aFare](#)

[Nature's Harvest Fest](#)

[Nature's Harvest Fest Schedule](#)

[Halloween Enchanted Garden](#)

[Garden of Lights](#)

[Garden of Lights Entertainment Schedule](#)

[Adult Education](#)

[Fall Classes](#)

[Youth Programs](#)

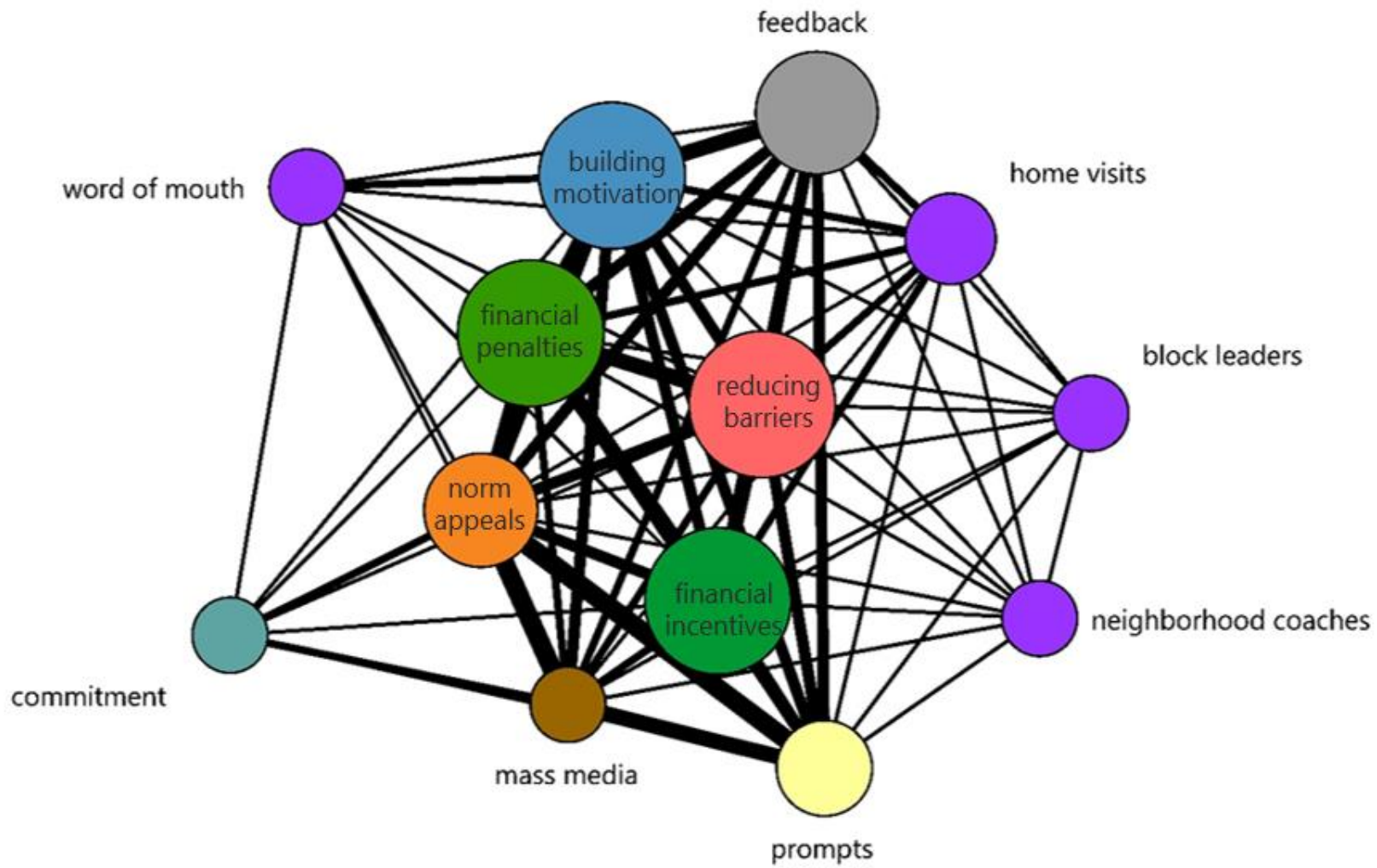
[Read & Seed](#)

[Youth Birthday Parties](#)

[Youth Tours](#)

Community
Engagement

Gardening Courses
Workshops



Evidence Based Tools

Tools of change are never used alone

Tools Used to Reduce Urban Residential Pesticide Use

([ToolsofChange.com/Case Studies](http://ToolsofChange.com/Case%20Studies))



Removing Turf

- Municipal & HOA Policy
- Native Plant Nurseries
- Workshops
- Neighborhood Interactions
- Choice Architecture
- Financial Levers



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References

Design Council 2012: <http://www.designcouncil.org.uk/news-opinion/design-process-what-double-diamond>

Kaner, S. (2014). *Facilitator's guide to participatory decision-making*. John Wiley & Sons.

Tools of Change. 2017. <http://www.toolsofchange.com/en/case-studies/>