Sustainable Infrastructure Draft Recommendations

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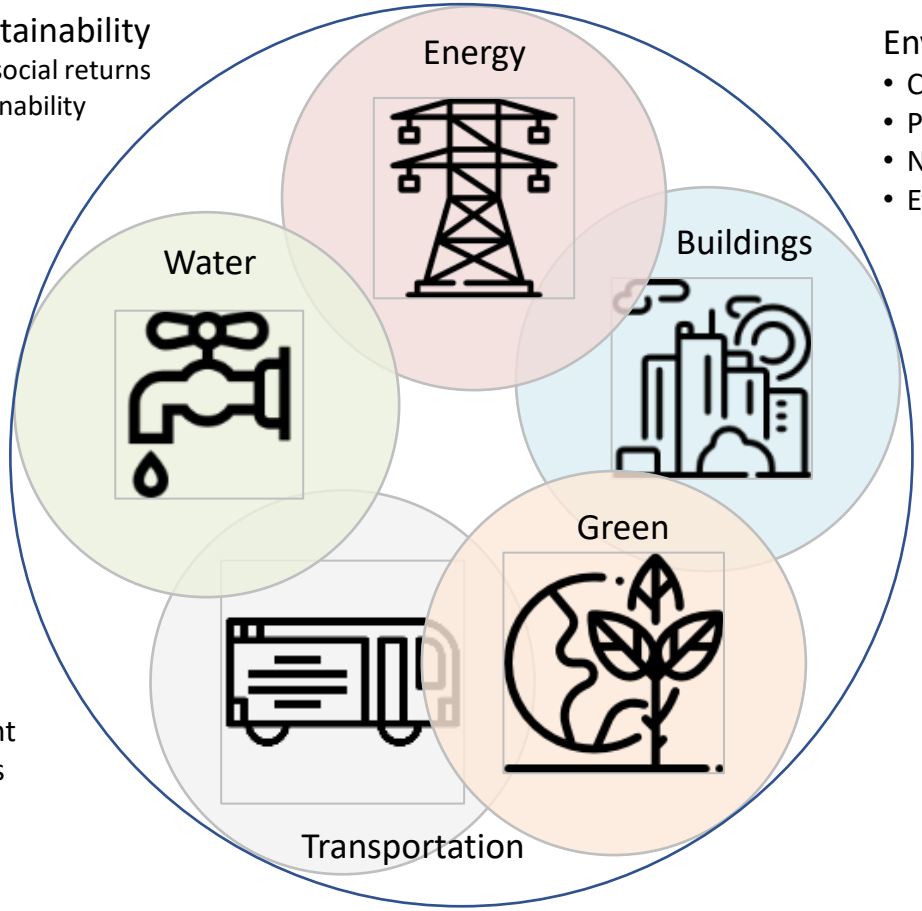
What is sustainable infrastructure?

Infrastructure projects that are planned, designed, constructed, operated, and decommissioned in a manner to ensure economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire life cycle of the project.

Source: "What is Sustainable Infrastructure?", Inter-American Development Bank, Technical Note IDB-TN-1388

Economic Sustainability
- Economic and social returns
- Financial sustainability
- Policy



Environmental Sustainability
- Climate and natural disasters
- Pollution
- Natural environment preservation
- Efficient use of resources

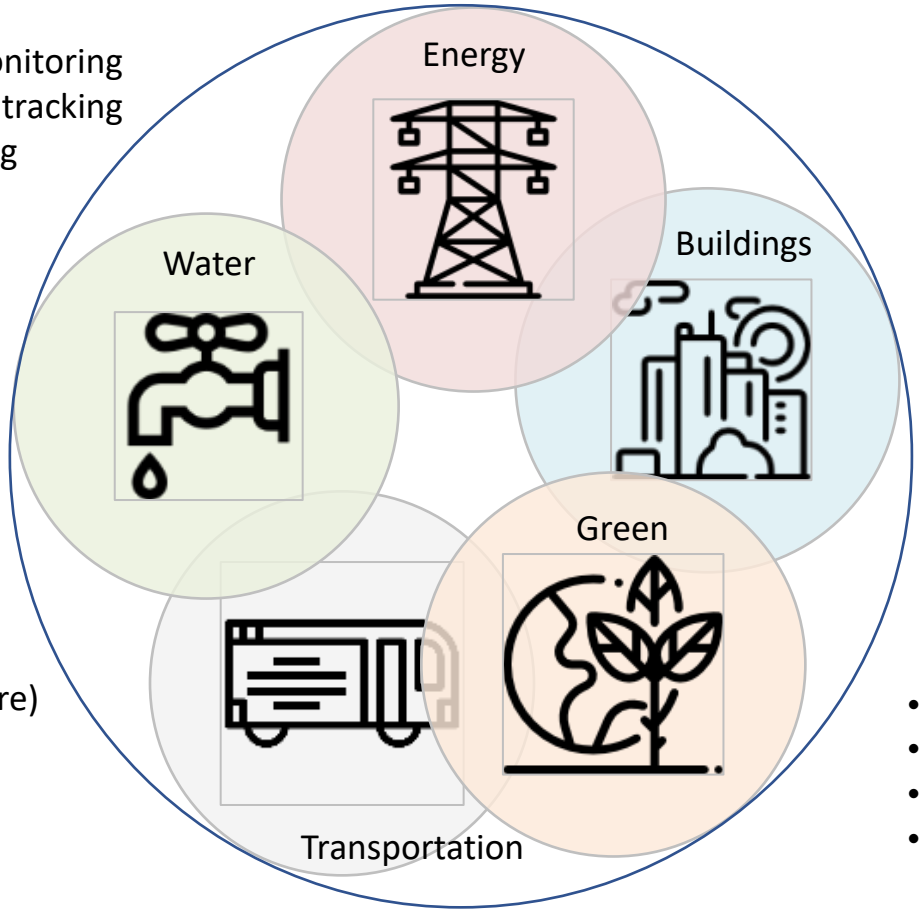
Social Sustainability
- Poverty, social impact, community engagement
- Human and labor rights
- Cultural preservation

Institutional Sustainability
- Global and national strategies
- Governance and systemic change
- Management systems and accountability
- Capacity building

Source: Iberdrola, (www.iberdrola.com/sustainability/sustainable-infrastructure)

Representative example opportunities (for IoT)

- Microgrids
- Distributed energy resources (panels, batteries)
- Smart inverters
- Wind turbine monitoring
- Solar farm panel tracking
- Power monitoring



- Connected lighting
- Building energy management
- Building environmental control
- Indoor air quality monitoring
- Automated demand response
- Access and security control
- Building automation and management
- Water leakage
- Safety (fire, evacuation, etc.)

- Storm drain monitoring
- Creek/river flood monitoring
- Water quality monitoring
- Flow monitoring
- Leak detection

- Smart parking
- Micro-mobility (scooters, bikeshare)
- EV charging
- Traffic and safety monitoring
- Public WiFi
- Drones (delivery, inspections)
- Autonomous Vehicles
- Road sensors
- Telematics and fleet management
- Asset tracking

- Connected streetlight lighting
- Wastebin monitoring
- Community outdoor AQ monitoring
- Intelligent irrigation

Common barriers

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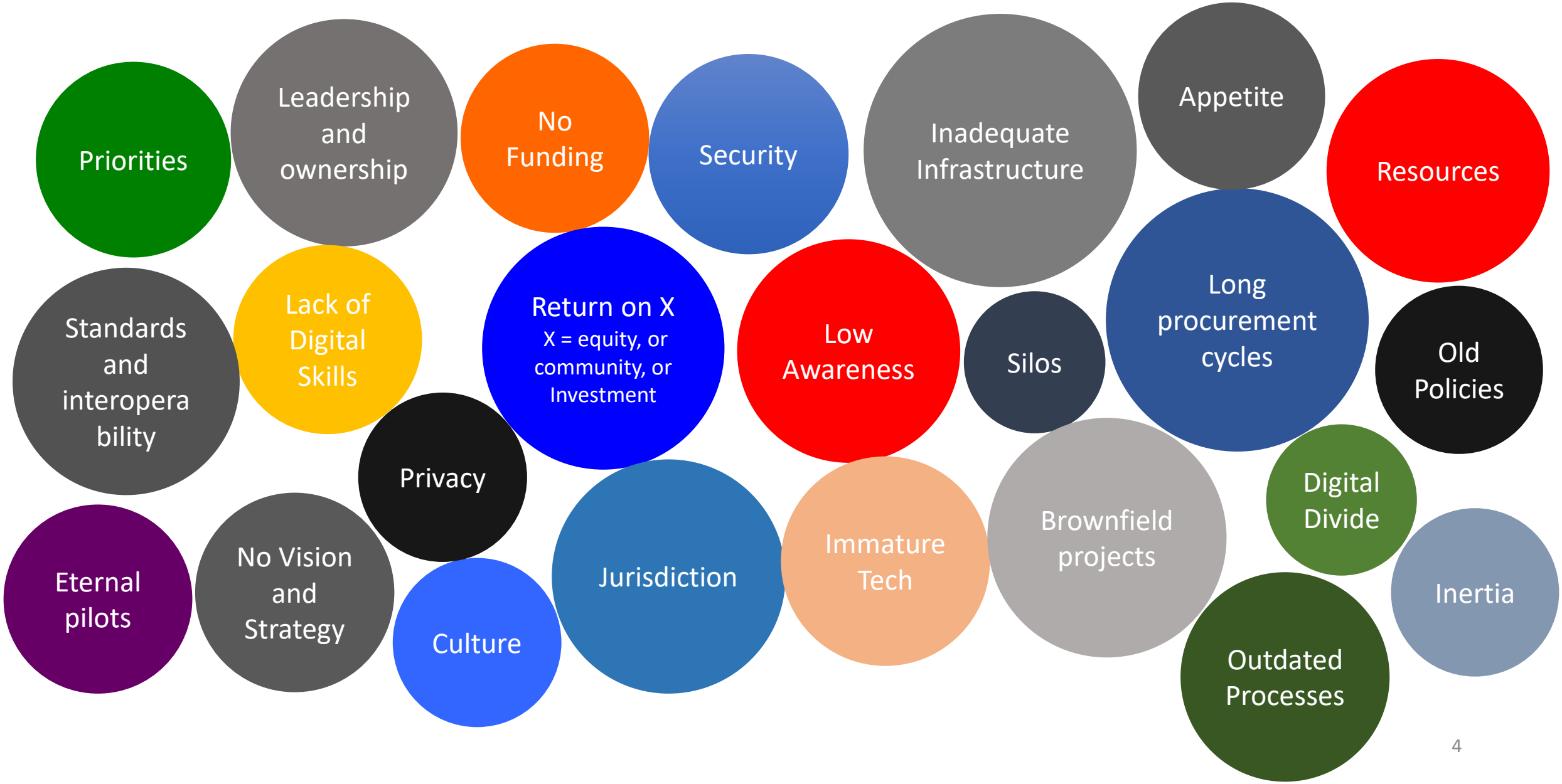
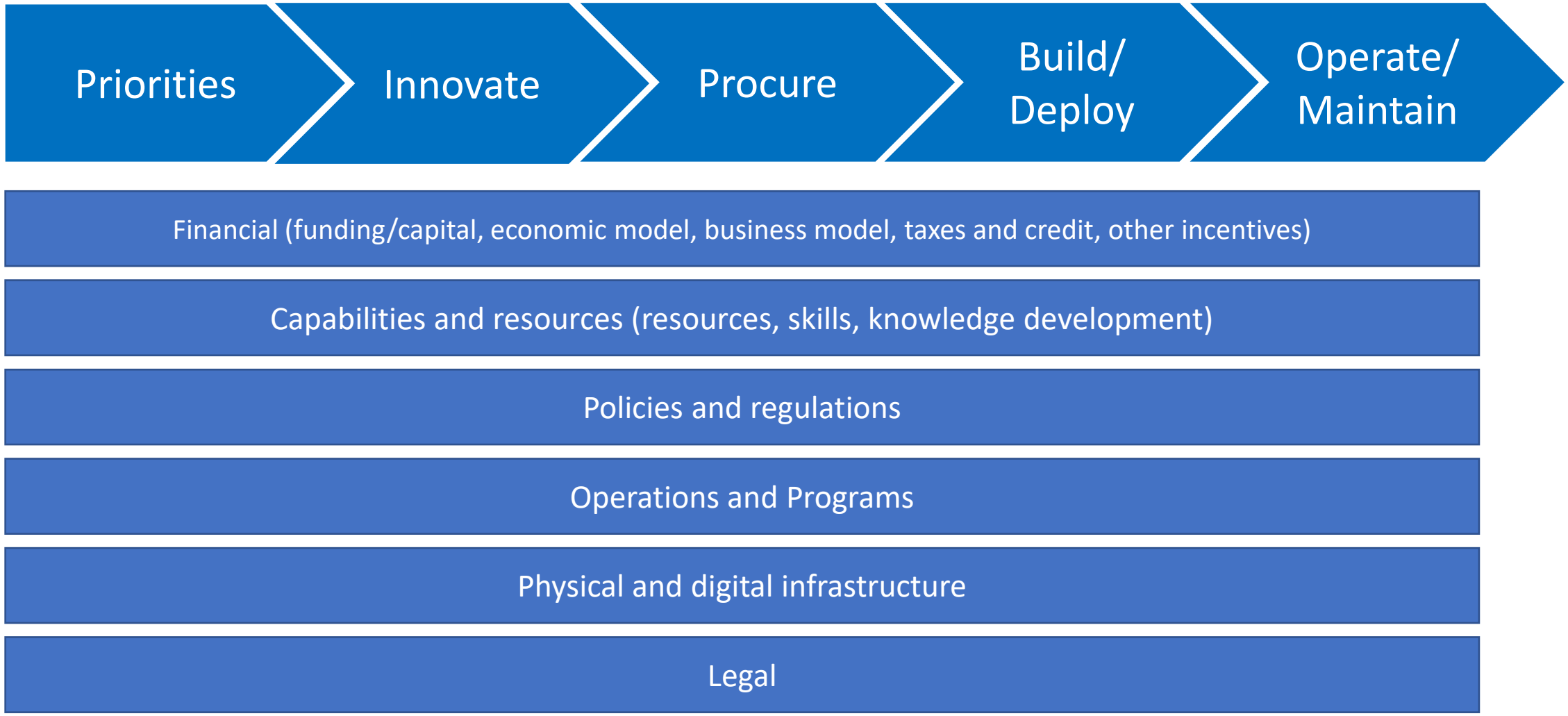


Possible areas for recommendations - framework



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Recommendations

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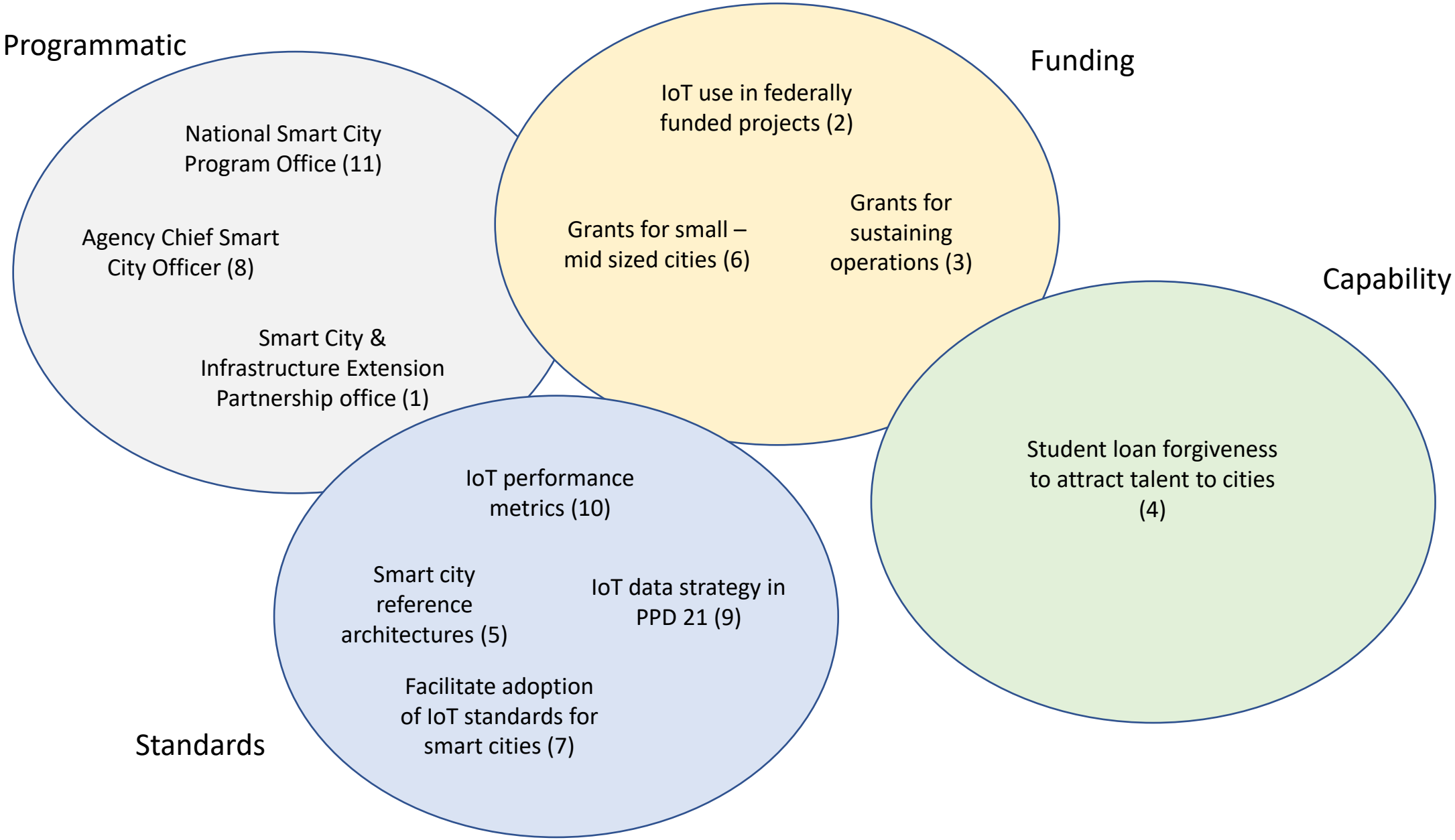

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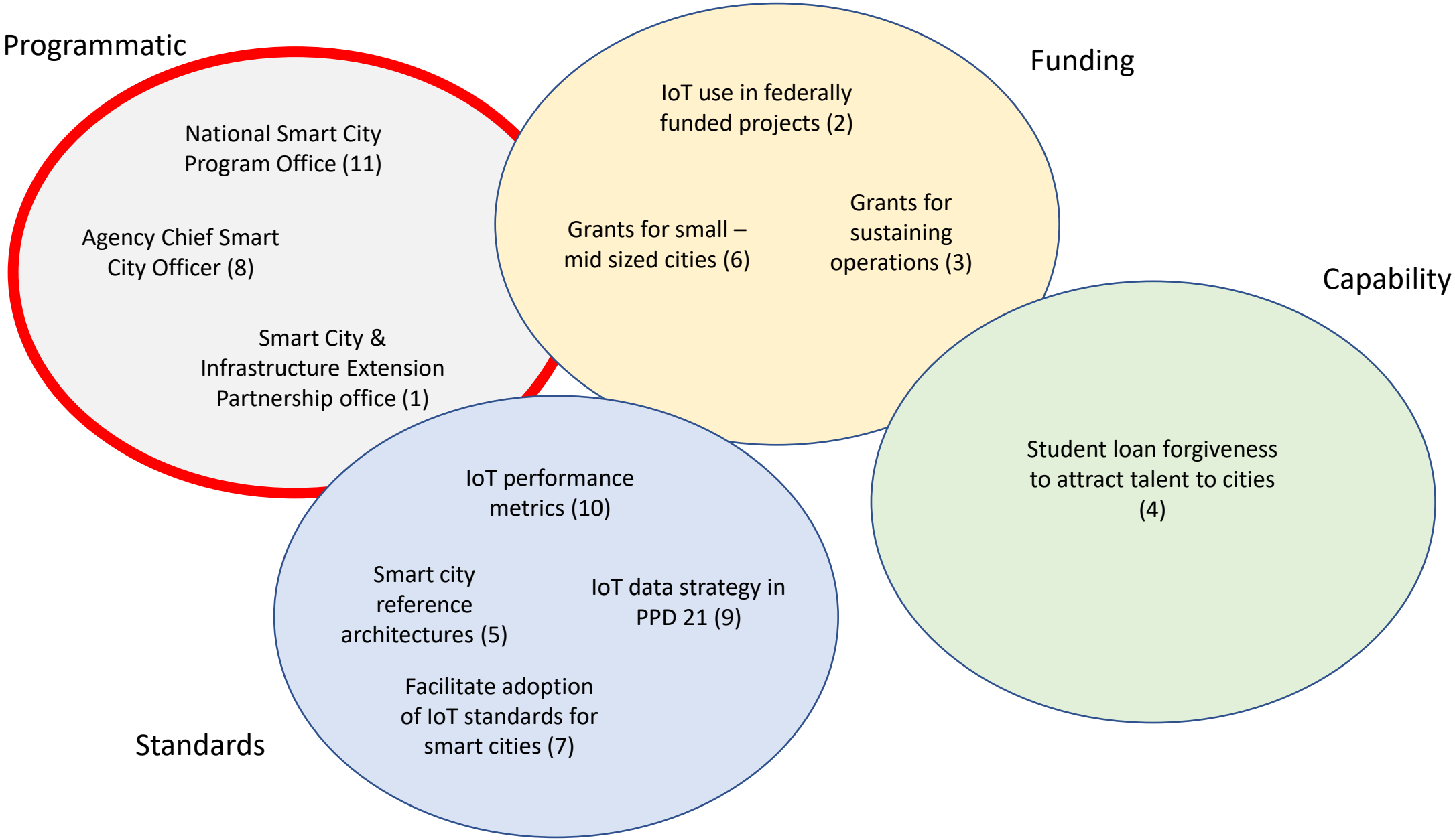

#1: Smart city & infrastructure extension partnership office

The federal government should consider the development of Smart City/Infrastructure Extension Partnerships (SCIEP).

Justification

- Cities/agencies lack expertise, tools, resources
- Small cities/agencies even further behind
- IoT and smart city and infrastructure expertise in industry is limited and hard to get
- Public procurement process to engage private sector resources is challenging. New model is needed.

Implementation

- Multidisciplinary expertise from technical, ops, cybersecurity, etc.
- Public/private/university partnerships
- Collaboration with regional consortiums

Agencies

- Department of Energy (renewable energy, electrification, etc.)
- Department of Transportation (intelligent traffic, roads, highways, autonomous vehicles, etc.)
- Department of Commerce/NIST (standards, cybersecurity, GCTC, regulatory, etc.)
- Department of Homeland Security/CISA (cybersecurity, etc.)

Barriers

- Limited expertise in marketplace and resources and expertise may be difficult to get

Federal considerations

- SCIEP in place to support projects funded through BIL and IRA
- Define role of states in supporting and enabling SCIEPs

Barriers addressed

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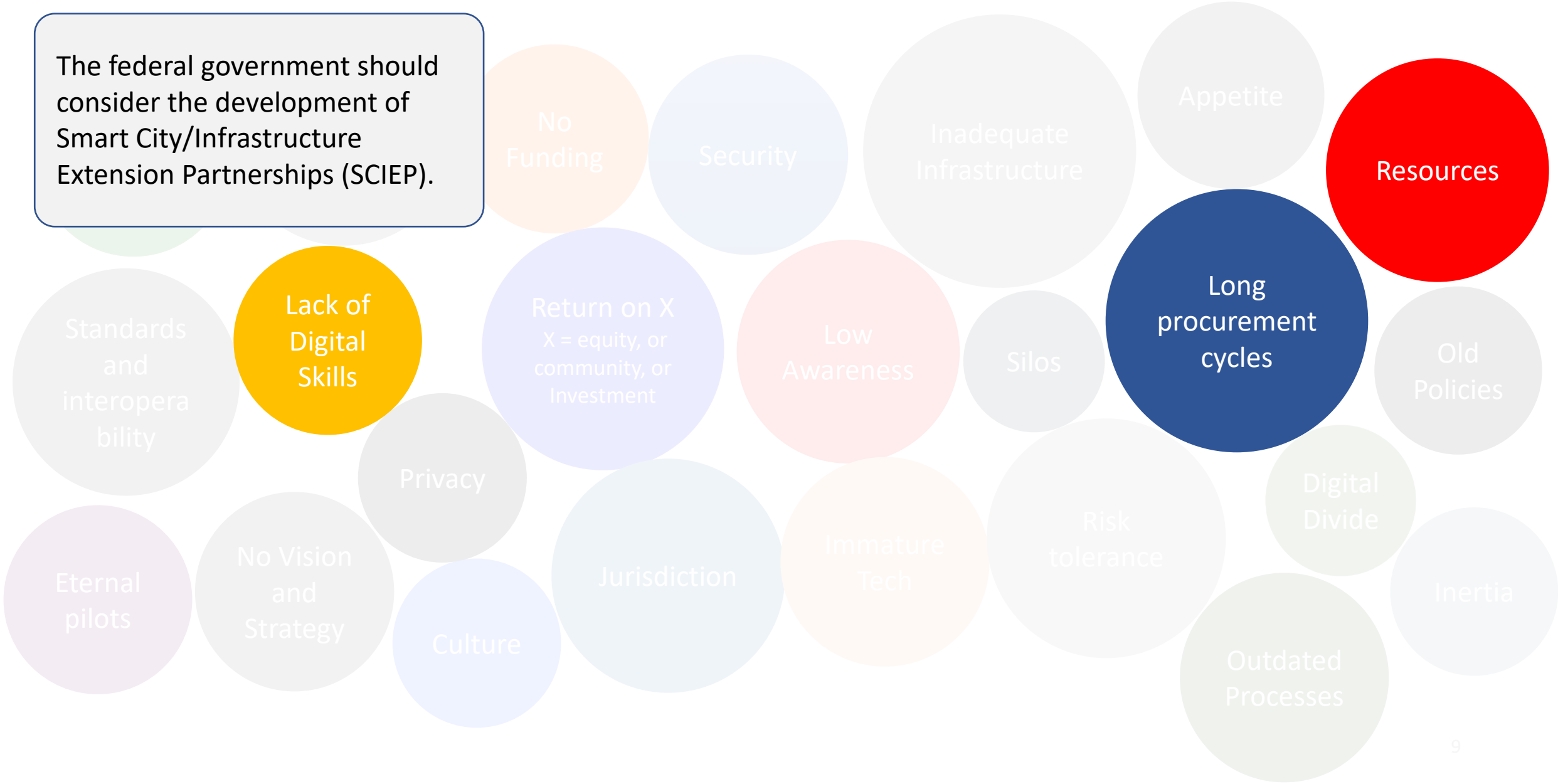

#8: Appoint Chief Smart City Officers in federal agencies

The Federal Government should establish a Smart City Officer (SCO) within each of the twenty-four (24) CFO Act agencies.

Justification

Implementation

Agencies

Barriers

Federal considerations

Barriers addressed

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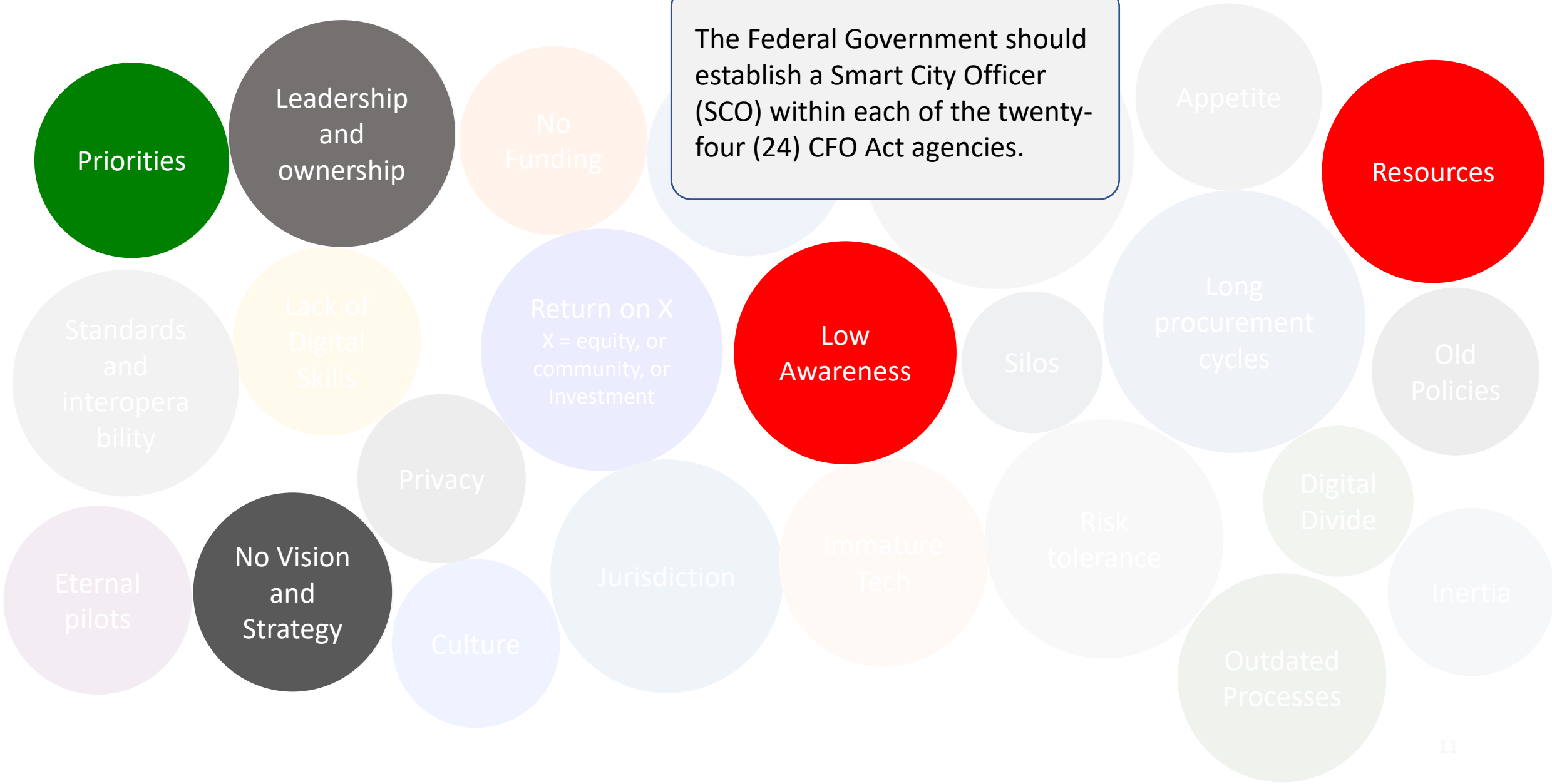

#11: Federal smart city program office

The Federal Government should establish a Smart Cities executive office of the President to ensure that the federal government, state, and local government entities can effectively plan, implement, and manage smart city initiatives across the United States.

Justification

Implementation

Agencies

Barriers

Federal considerations

Barriers addressed

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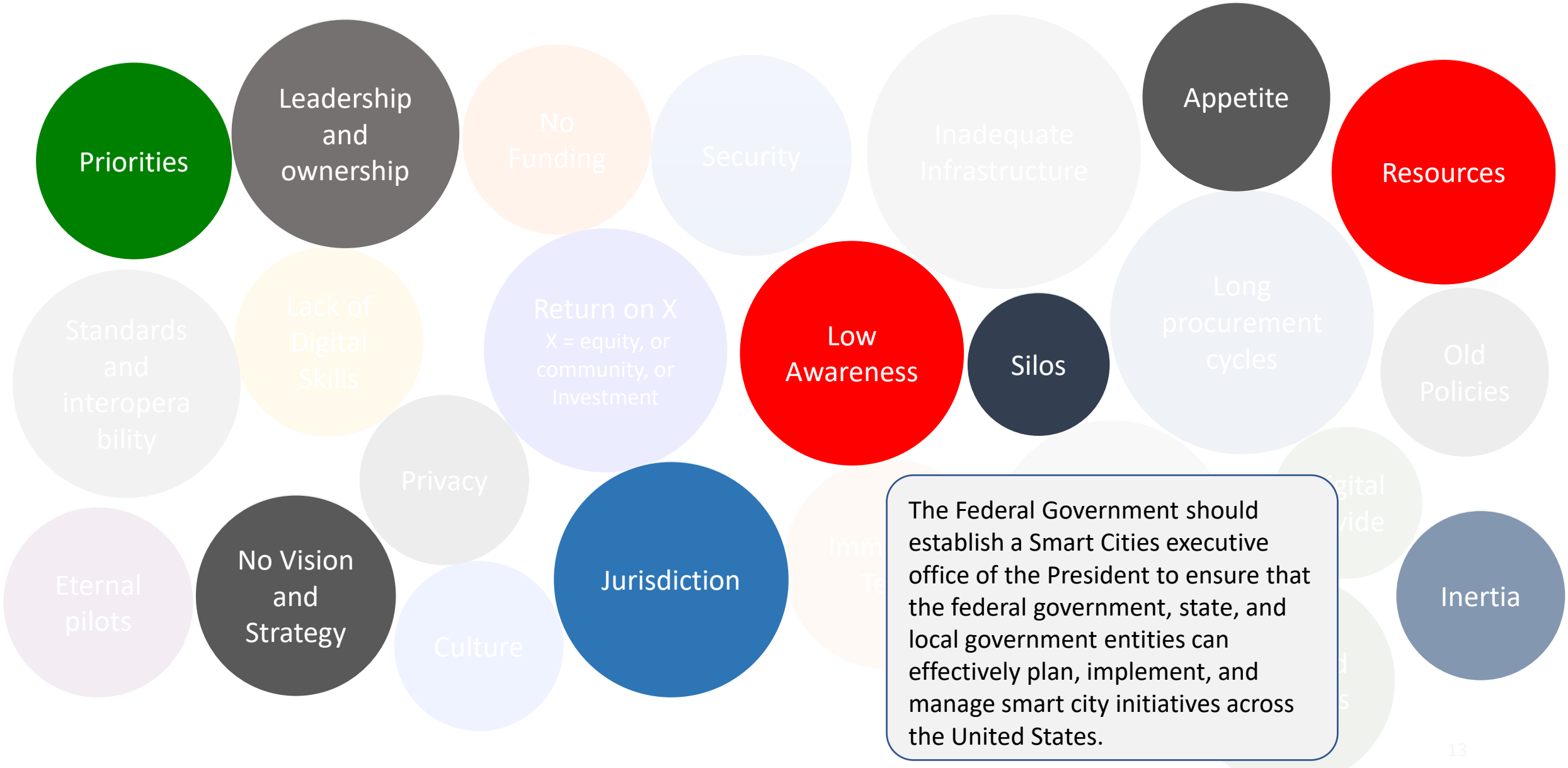

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Recommendations

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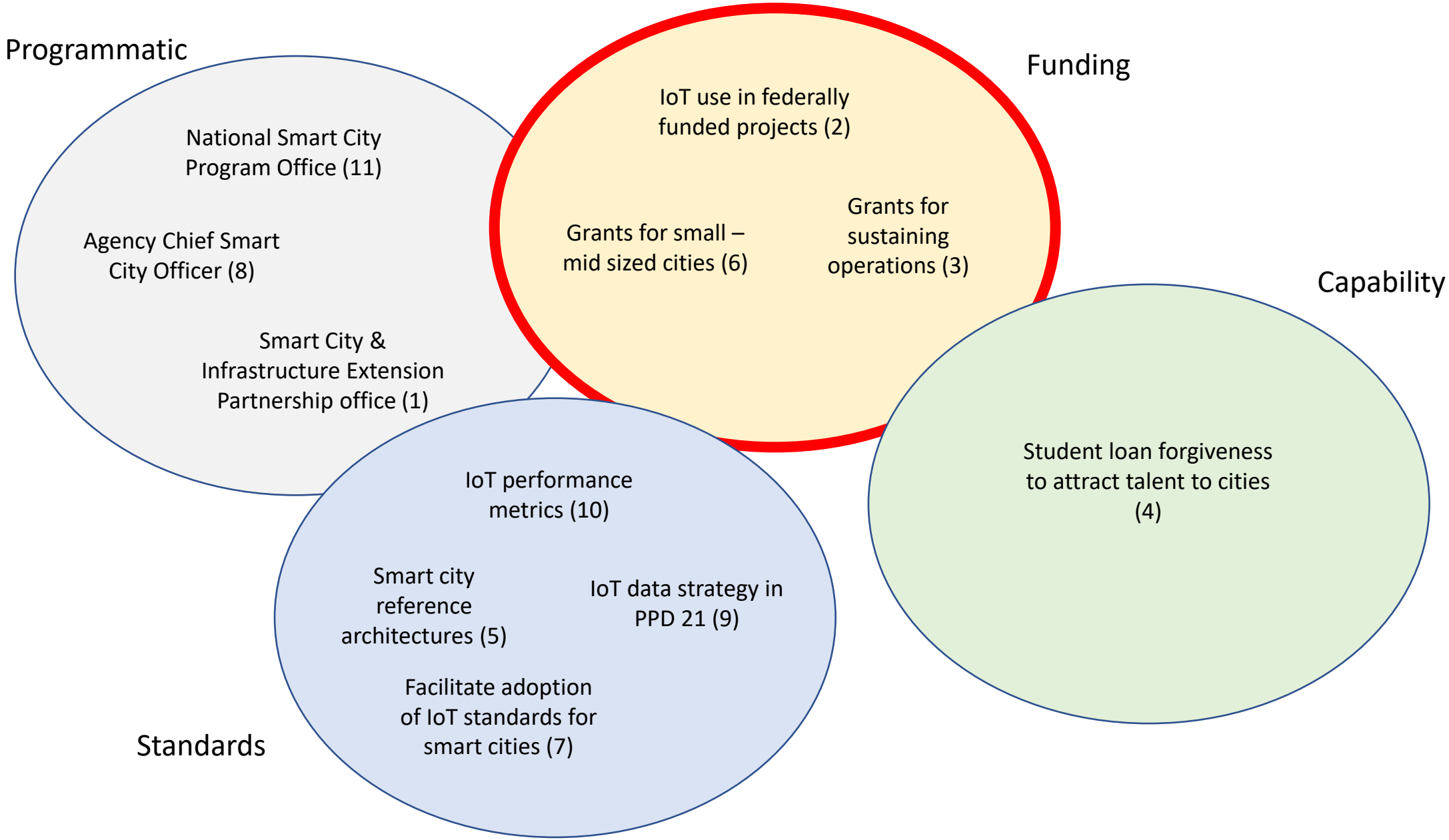

#2: Specify use of IoT in federally funded infrastructure projects

The federal government should consider the specification and utilization of IoT and "smart" technologies into infrastructure and other projects that are funded in full, or partially, with federal funding.

Justification

- No one will specify IoT on their own into infrastructure projects unless project owners demand it
- Examples
  - DoT specification of SBA 8a resources on projects
  - USACE and GSA specifying use of BIM on federal building construction projects

Implementation

- Easy to say "use IoT", but what IoT to be used?
- Some concrete and specific IoT applications should be defined for inclusion in the project ahead of time
- Coordination with other federal agencies in alignment with their objectives

Agencies

All federal agencies that provide grants and funding for projects where IoT may be incorporated

Barriers

- Project owners no knowledge of IoT
- Limited expertise and resources in marketplace to support IoT projects

Federal considerations

- SCIEP may be a resource
- IoT may introduce cybersecurity vulnerabilities to system. Some minimum cybersecurity requirements need to be imposed.

Barriers addressed

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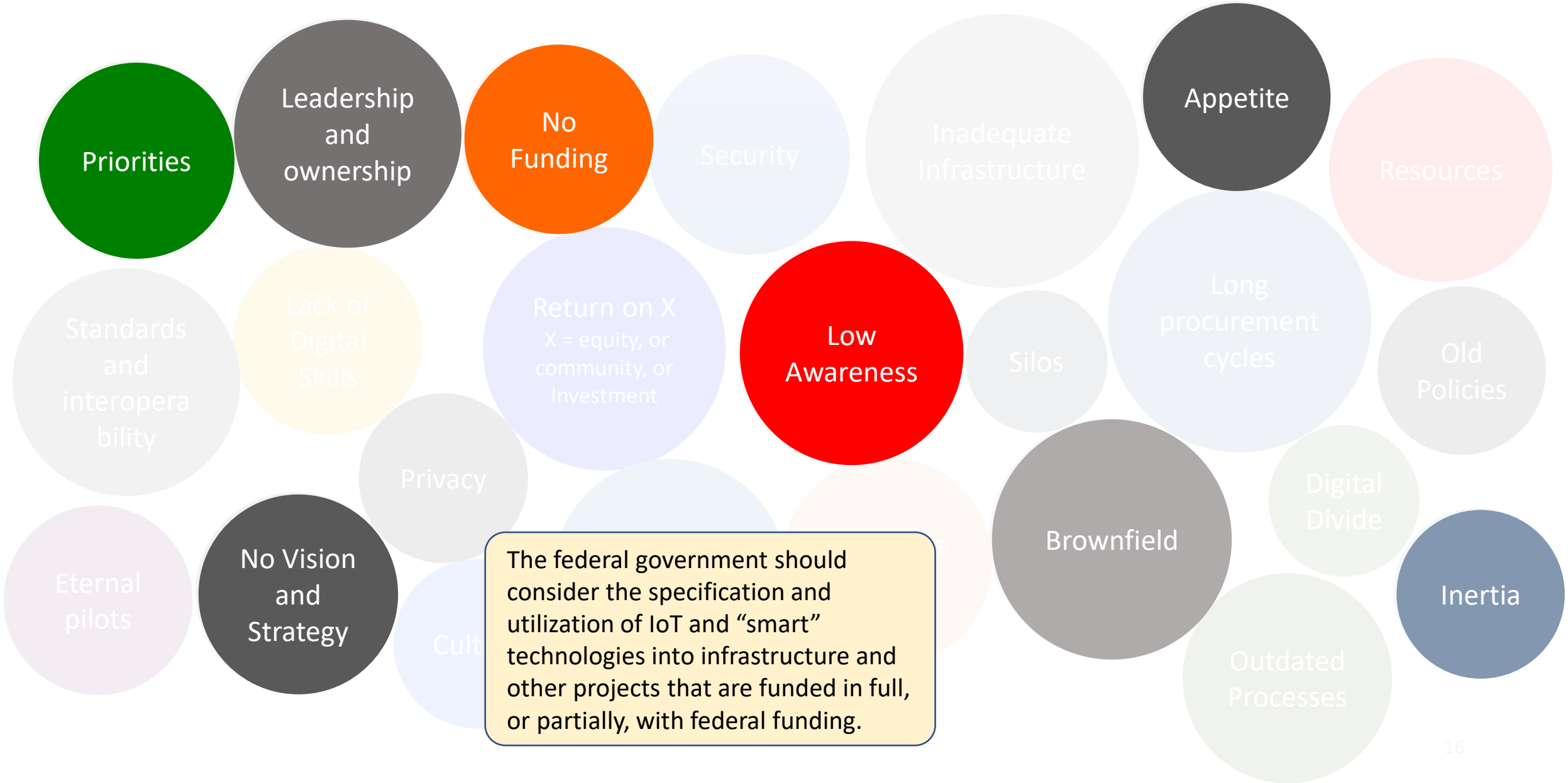

#3: Grants for sustaining and operation of IoT and smart projects

The federal government should consider funding models for sustaining and support beyond the initial acquisition and building of new projects.

Justification

- Initial procurement, acquisition and construction costs. But operating and maintaining an asset over its useful life can be expensive, and municipalities may not have resources and funds for this.
- Examples
  - CARES funding for 300 WiFi access points
  - USDA funding for fiber infrastructure buildout in rural area

Implementation

Agencies

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Barriers

Federal considerations

Barriers addressed

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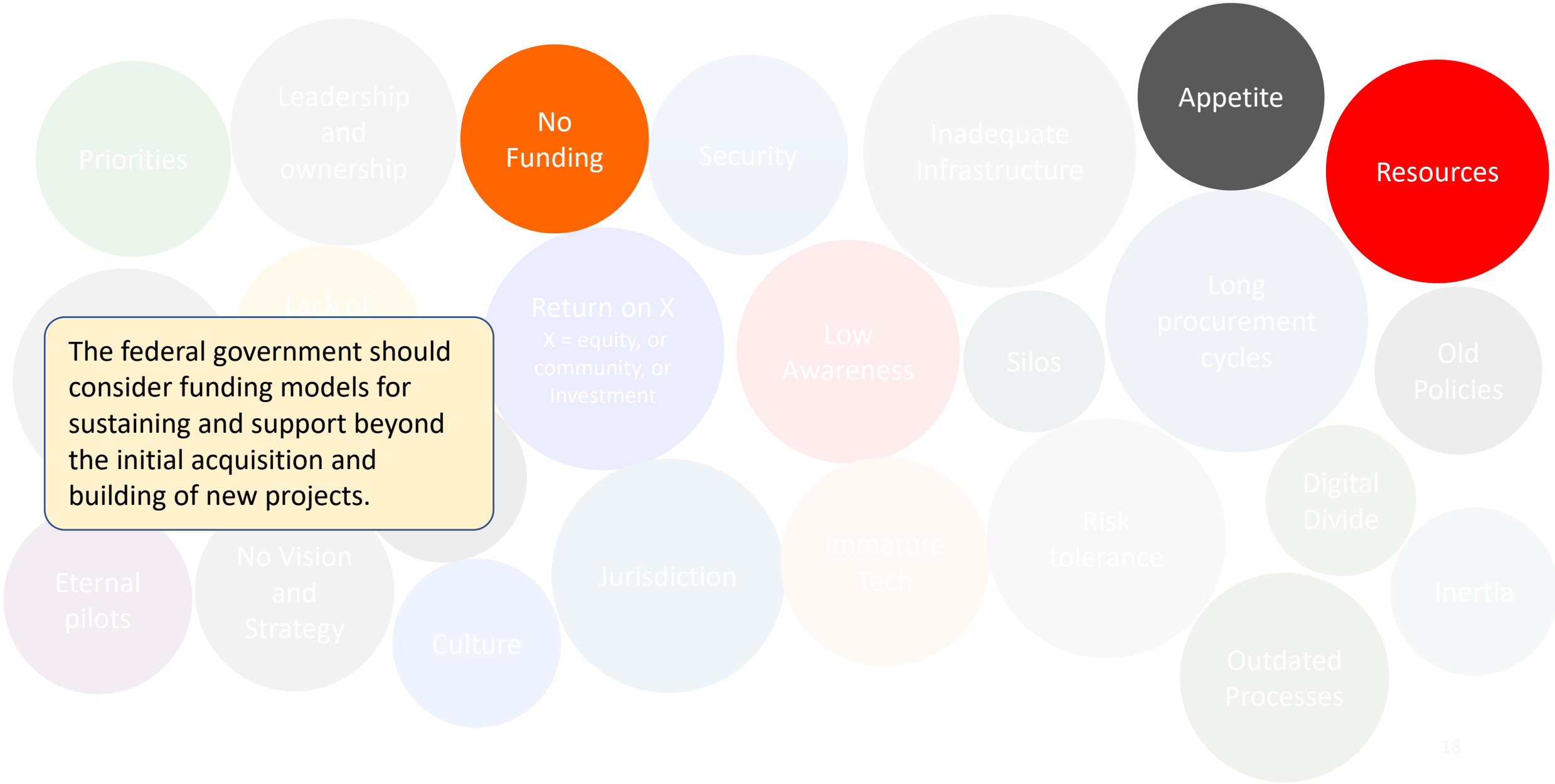

The federal government should consider funding models for sustaining and support beyond the initial acquisition and building of new projects.

#6: Grants for small and midsize cities/agencies

The federal government should consider offering grants to support smart city projects that target small and midsize cities and agencies.

Justification

- Most American cities are small.
  - 4,005 cities between 5K and 50K,
  - 476 cities between 50K and 100K
  - 238 cities between 100K and 250K
- Equitable access to benefits for smaller cities. Smaller cities are highly dependent on outside funding sources for many projects

Implementation

- Focus on regional projects that benefit multiple small cities (projects that cut across city borders)
- Smart city projects and outcomes different for smaller cities
- No one size fits all. Expect wide range of projects for funding

Agencies

All federal agencies that provide grants and funding for projects where IoT may be incorporated

Barriers

- ROI and feasibility criteria is different for smaller and rural areas
- Smaller cities lack pre-req digital and communications infrastructure to support smart city/region projects

Federal considerations

- SCIEP may be a resource to help smaller cities secure grants and implement projects
- BIL and IRA funding for grants
- Piggyback grants in those regions that have secured BIL broadband infrastructure investments

Barriers addressed

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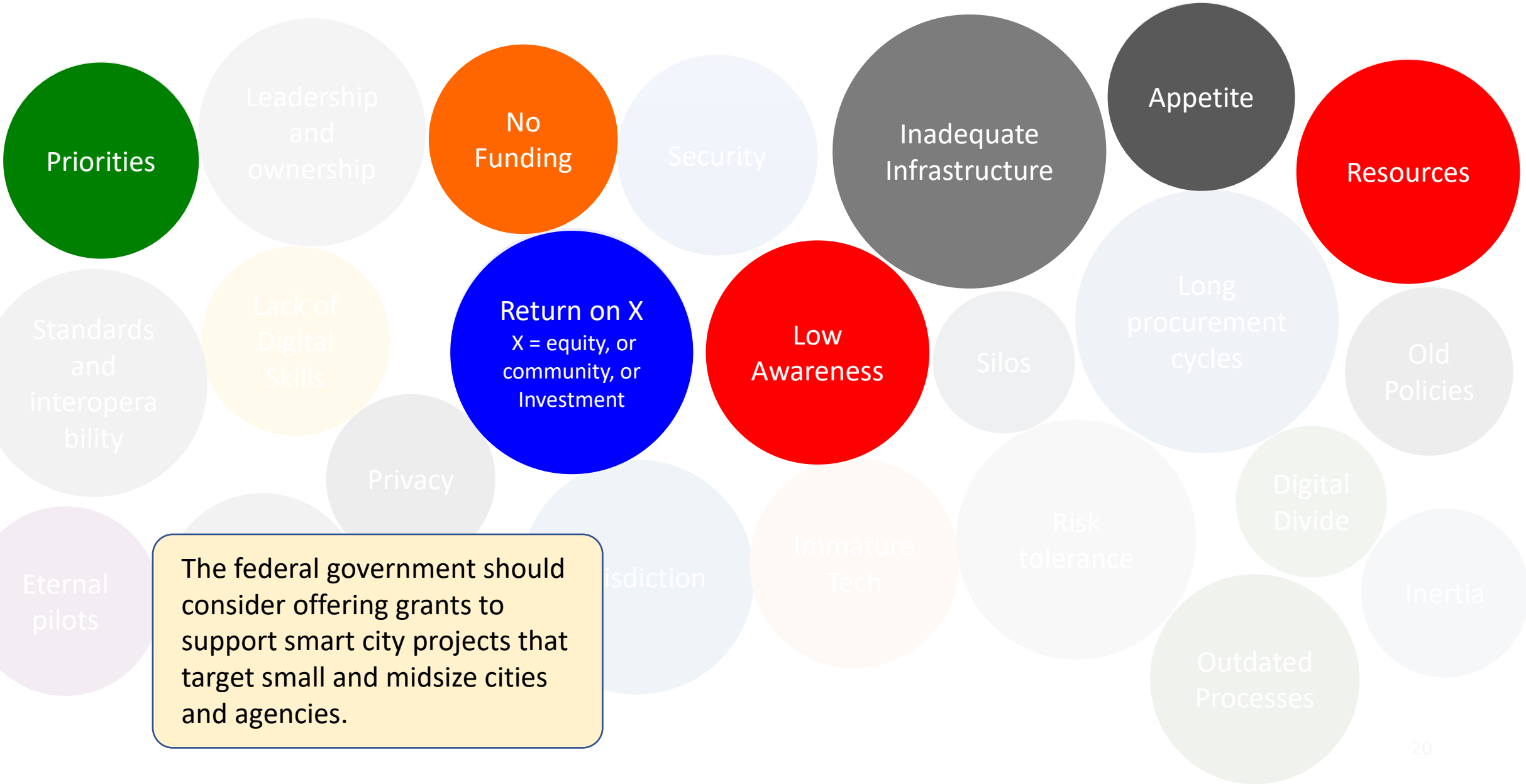

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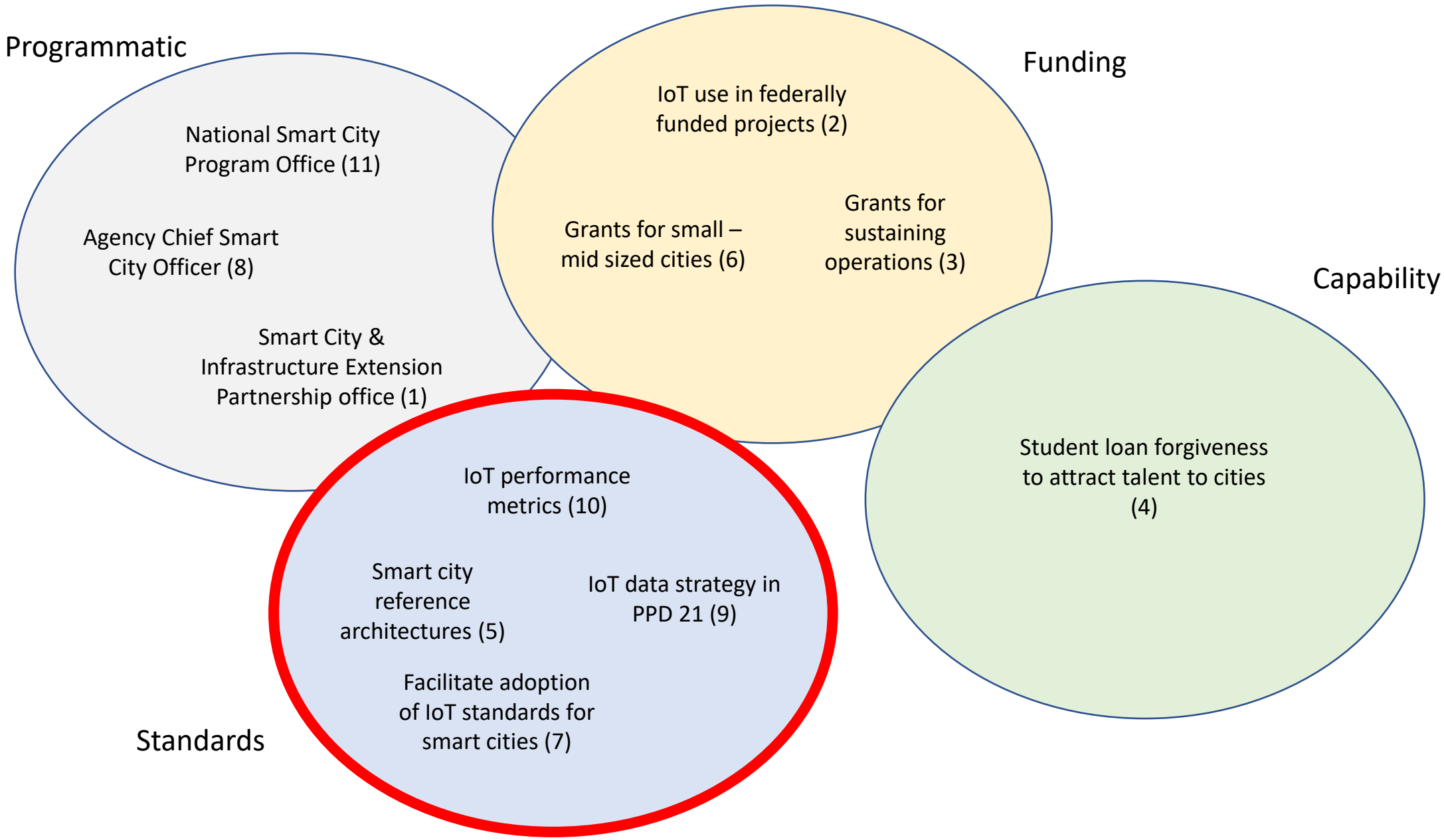

#5: Develop integrated smart city reference architectures

The federal government should facilitate and support the development of smart city and sustainable infrastructure reference architectures.

Justification

- No standard definition of smart city. Most models include city only.
- Smaller smart cities different from larger ones
- No integrated model across cities, regions, states, utilities (smart cities not just “cities” only)
- Most smart cities today are just silos of smart technology that don’t integrate
- Collaboration between cities, regions, states

Implementation

- NIST GCTC has existing structure and model to engage industry, academia, and government
- Consider inclusion of counties, states, regional agencies, utilities, etc.

Agencies

- NIST - GCTC
- NSF - Smart and connected communities
- DOE
- DOT
- DHS/CISA

Barriers

Federal considerations

- Build on initial efforts by NIST to define smart city framework
- Consider building on reference models from private and non-profit entities

Barriers addressed

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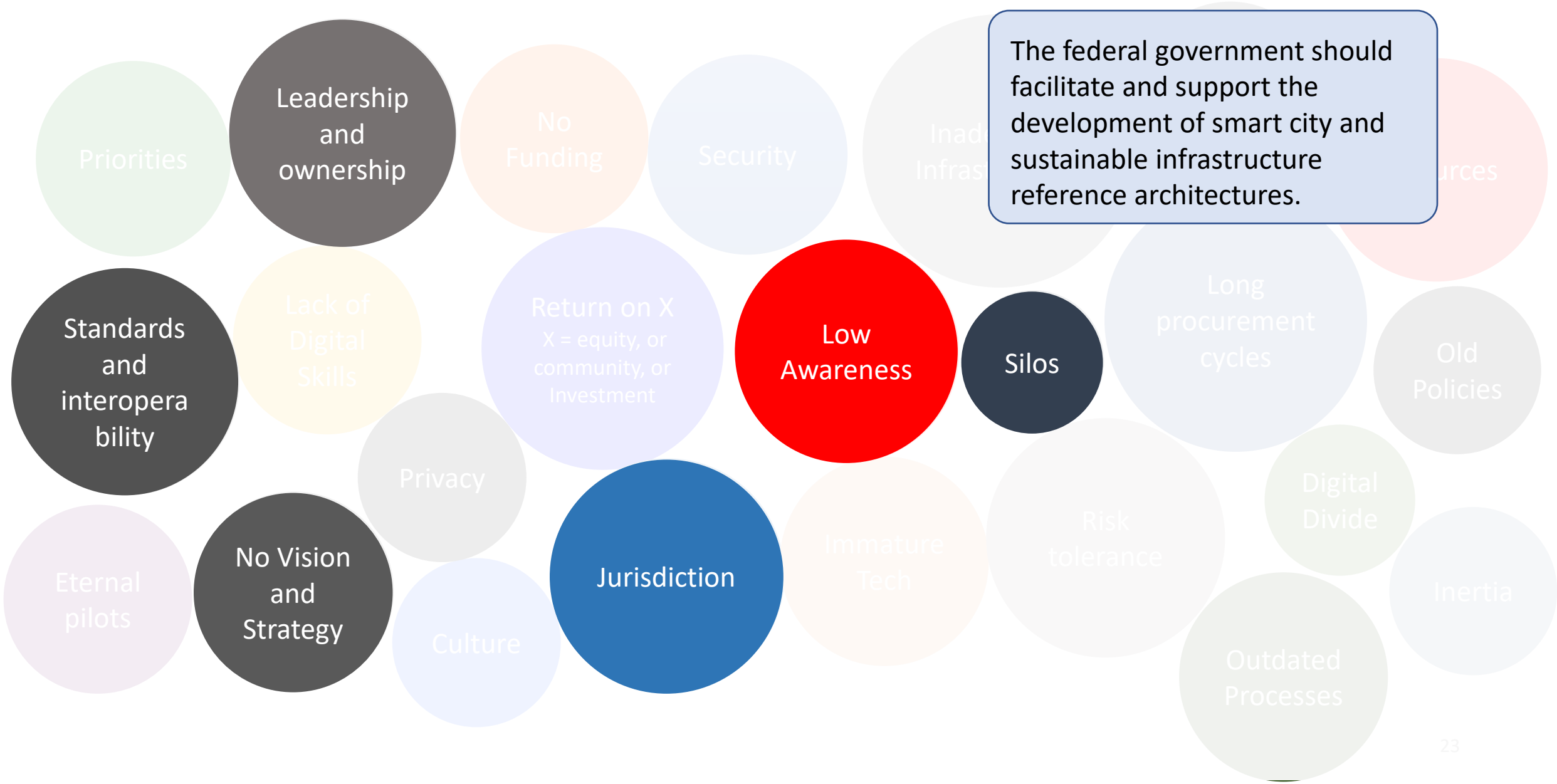

The federal government should facilitate and support the development of smart city and sustainable infrastructure reference architectures.

#7: Facilitate adoption of smart city standards

The federal government should facilitate and support the adoption of smart city and sustainable infrastructure standards.

Justification

- Technologies which may incorporate different standards, and create issues around interoperability. For example, traffic systems
- SCADA systems may not easily integrate with other systems, including more modern IoT solutions.
- Municipalities do not have budgets to change out systems. The solutions they procure need to be futureproofed.

Implementation

Agencies

All federal agencies that provide grants and funding for projects where IoT may be incorporated

Barriers

Federal considerations

- Consider doing this in conjunction with recommendation 2 (federal funding) and 6 (grants for small cities)

Barriers addressed

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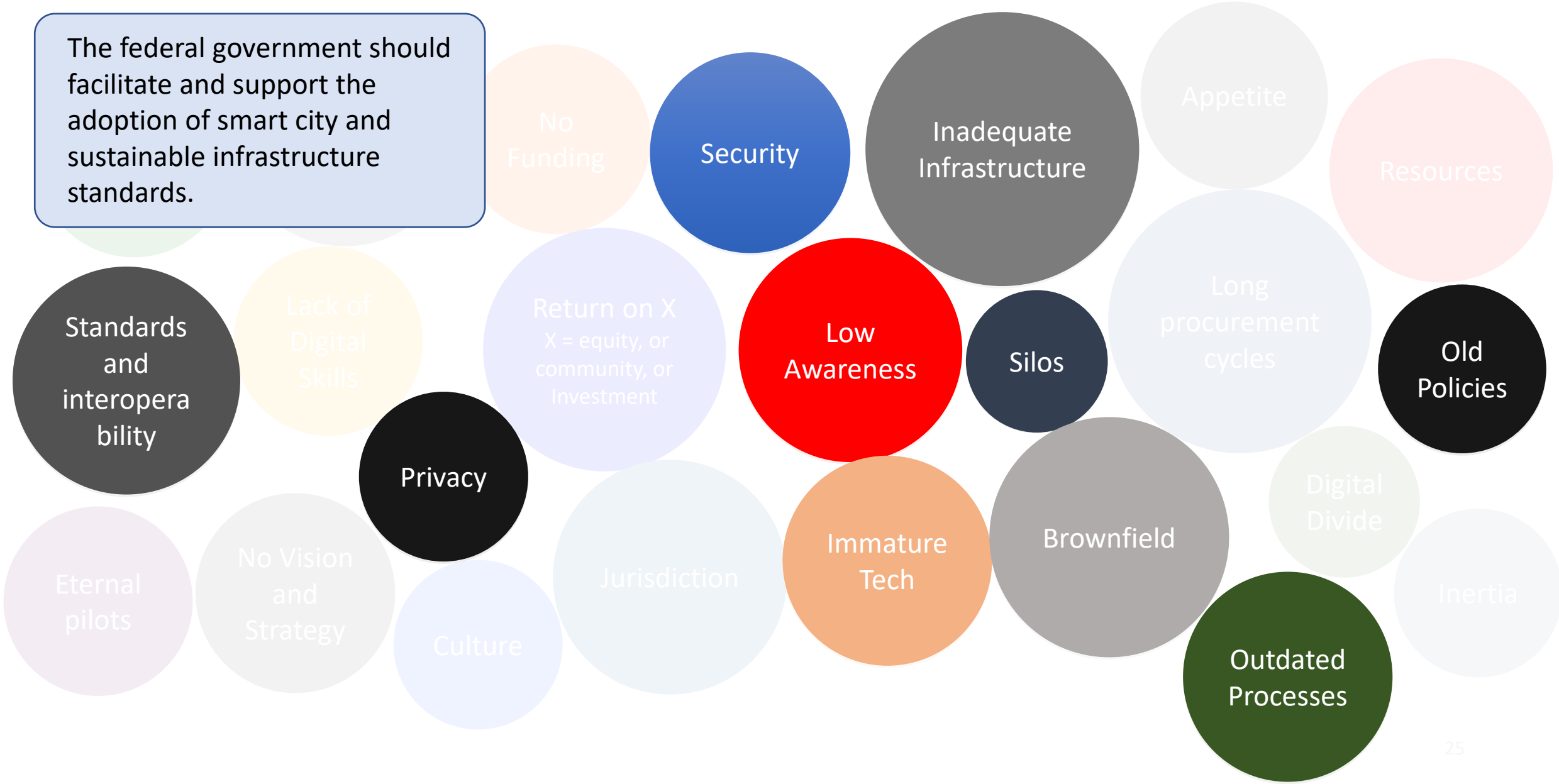

#9: Update PPD 21 to include sector specific IoT data strategy

The Federal Government should update Presidential Policy Directive 21 (PPD-21): Critical Infrastructure Security and Resilience requiring a sector-specific Internet of Things (IoT) data strategy.

Justification

Implementation

Agencies

Barriers

Federal considerations

Barriers addressed

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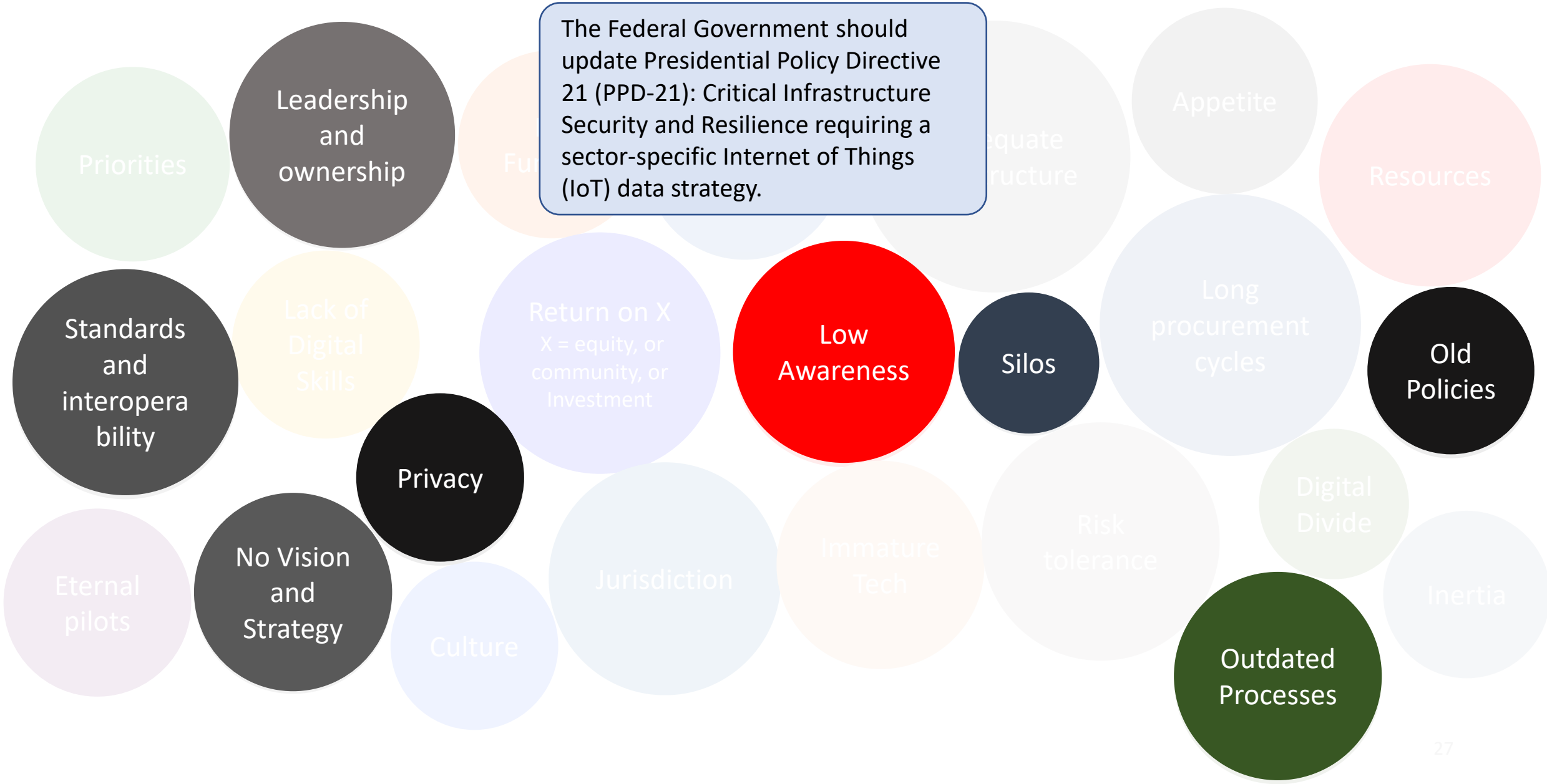

#10: IoT performance metrics

The Sector Risk Management Agencies (SRMAs) shall consider collaborating with sector partners and develop IoT performance metrics intended to strengthen critical infrastructure security and resilience.

Justification

Implementation

Agencies

Barriers

Federal considerations

Barriers addressed

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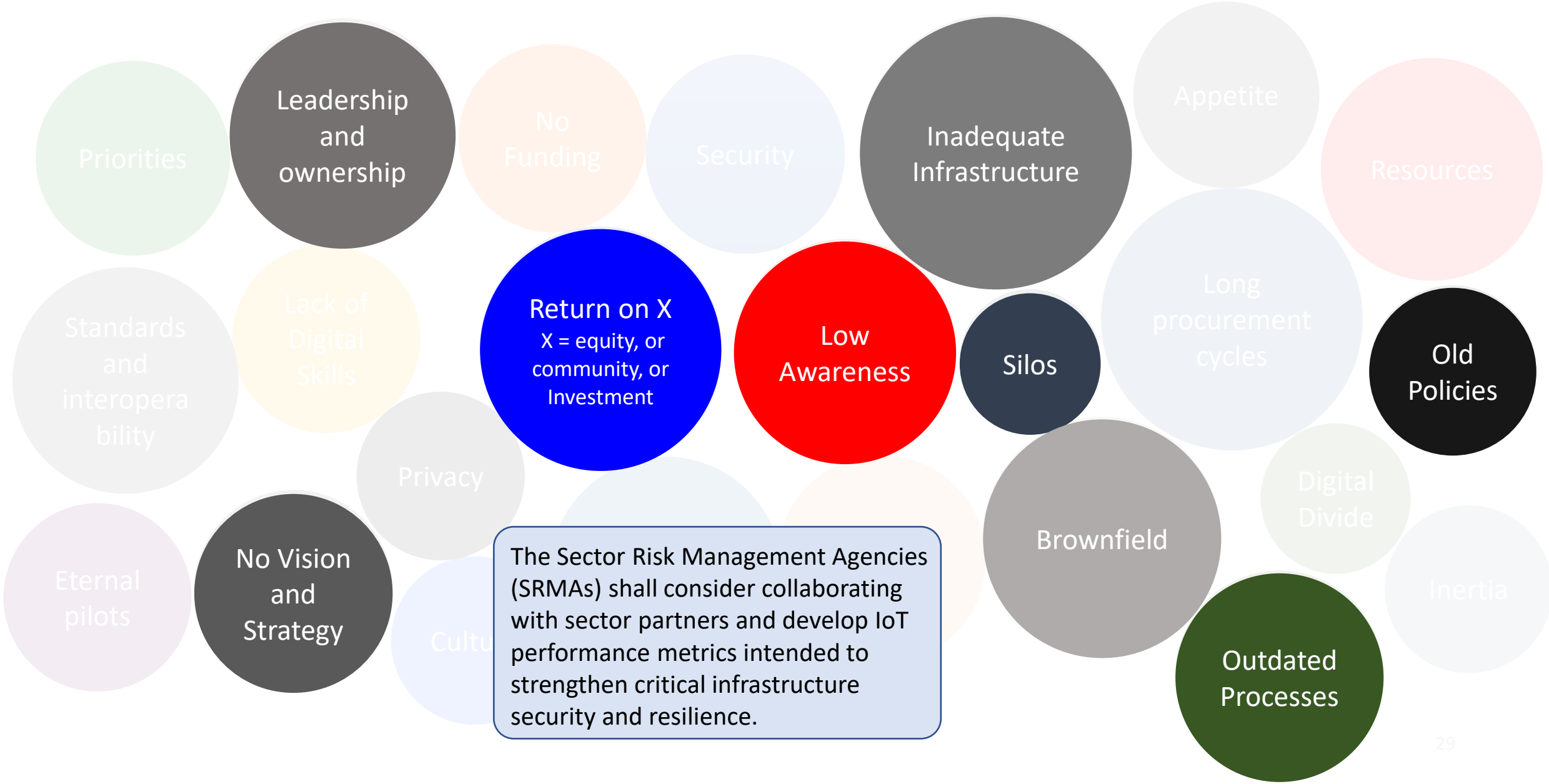

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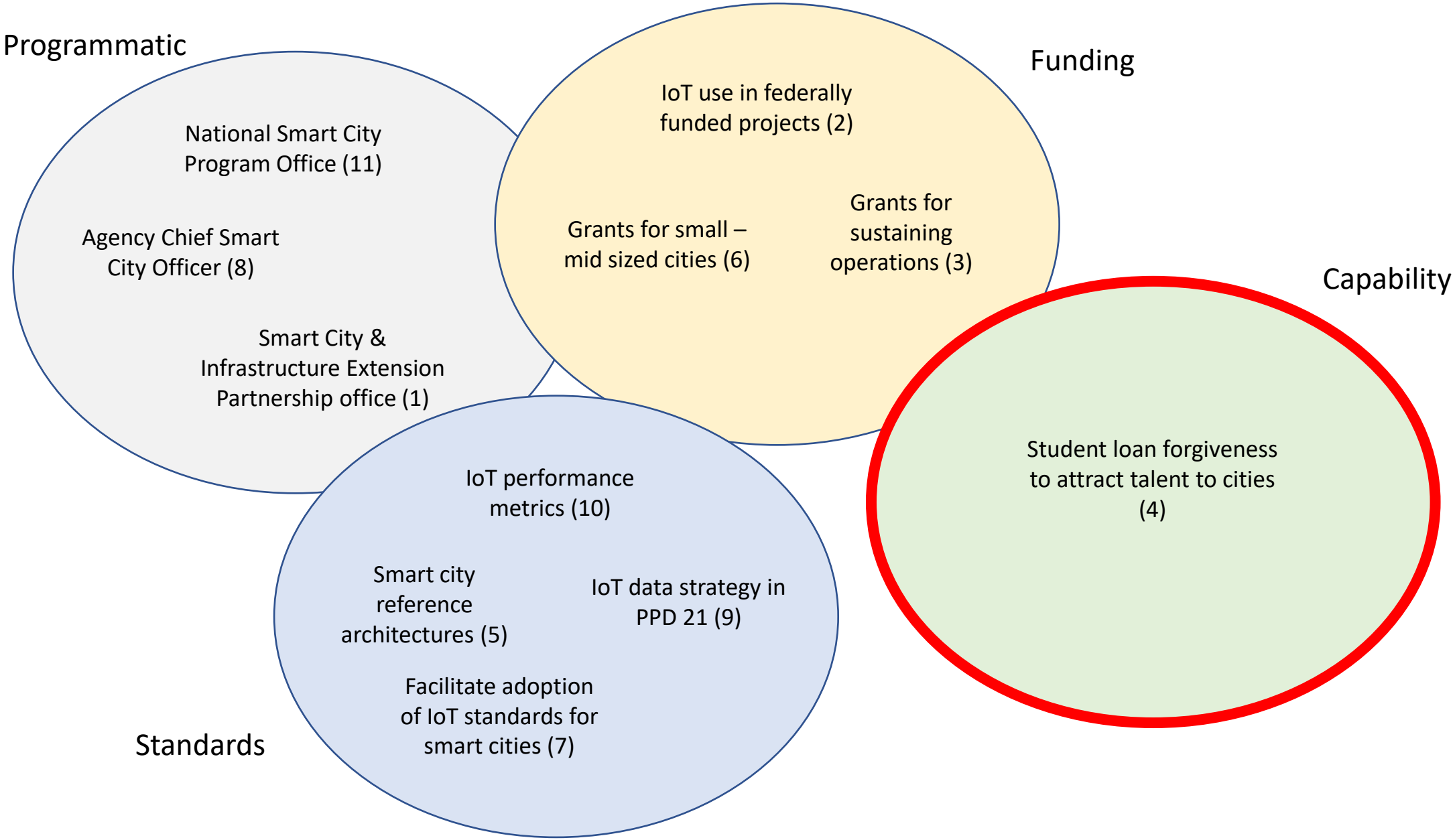

#4: Student loan forgiveness programs to attract students to smart city projects

The federal government should consider "student loan forgiveness" programs in exchange for providing critical emerging technology (IoT, data science, cybersecurity, etc.) skills to municipalities and agencies.

Justification

- Cities lack critical digital talent needed
- Small cities and rural areas face brain drain
- Cities (large and small) unable to attract future digital talent at scale to make impact

Implementation

- Resources can work directly with cities and agencies
- Resources can work in the SCIEPs

Agencies

- Department of Energy (renewable energy, electrification, etc.)
- Department of Transportation (intelligent traffic, roads, highways, autonomous vehicles, etc.)
- Department of Commerce/NIST (standards, cybersecurity, GCTC, regulatory, etc.)
- Department of Homeland Security/CISA (cybersecurity, etc.)

Barriers

- Certain critical skills like cybersecurity and data science may still be hard to get
- There may not be sufficient numbers of skilled resources to make this work

Federal considerations

- Consider doing this in conjunction with recommendation 1 (SCIEP) and 2 (federally funded projects)

Barriers addressed

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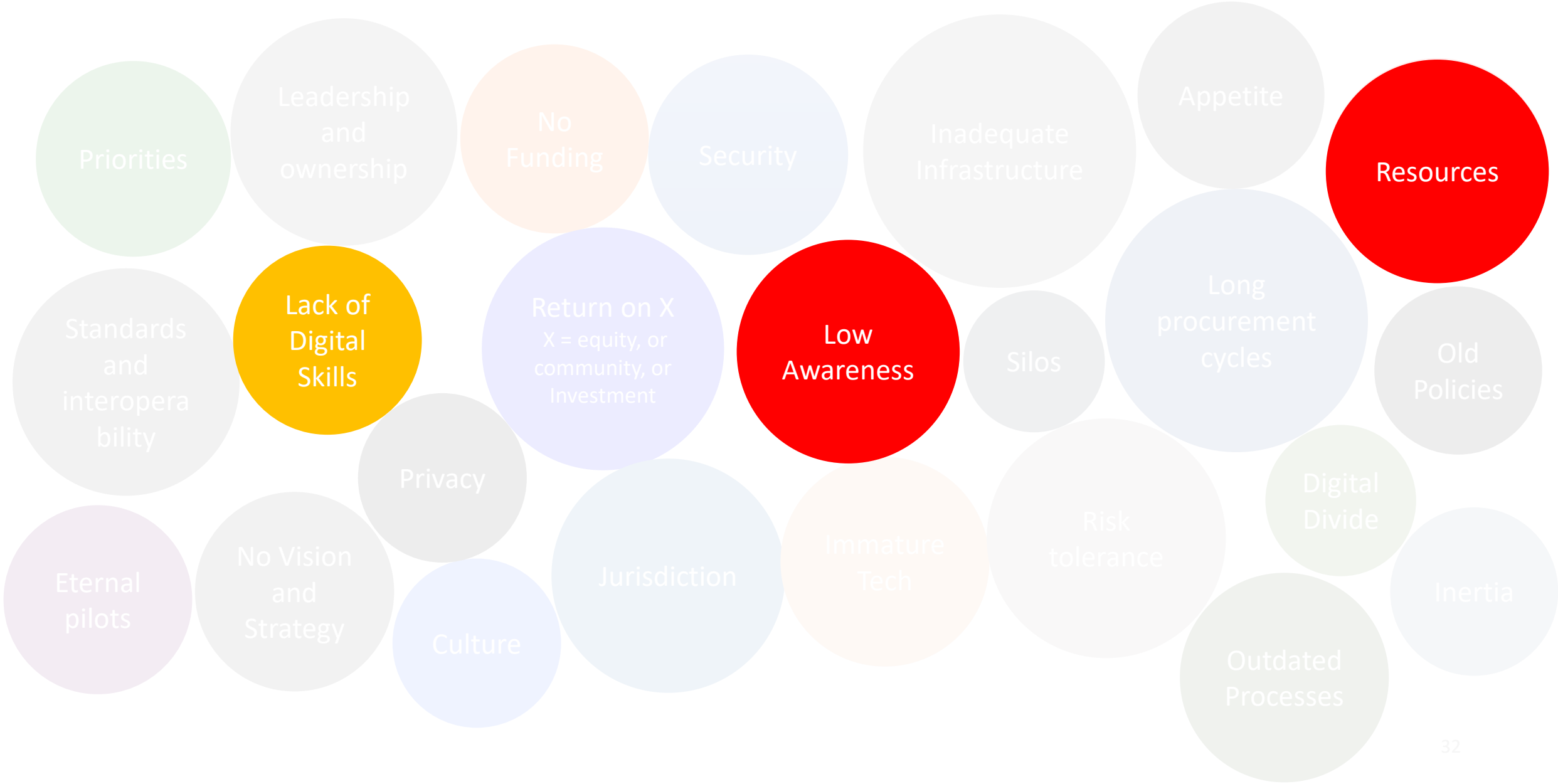

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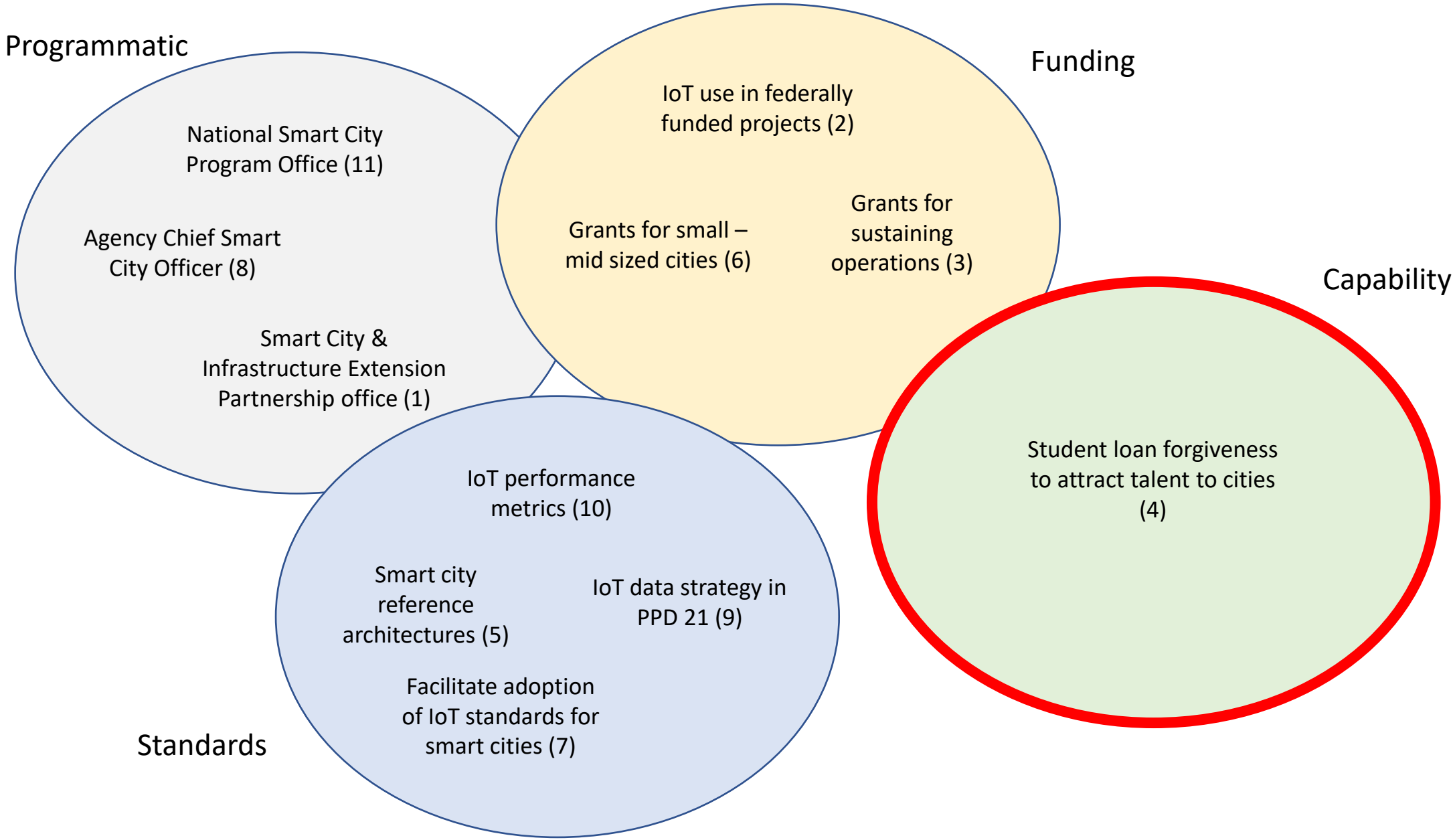

Prioritization

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Recommendations	
R1	Smart City & Infrastructure Extension Partnership office
R2	IoT use in federally funded projects
R3	Grants for sustaining operations
R4	Student loan forgiveness to attract talent to cities
R5	Smart city reference architectures
R6	Grants for small – mid sized cities
R7	Facilitate adoption of IoT standards for smart cities
R8	Agency Chief Smart City Officer
R9	IoT data strategy in PPD 21
R10	IoT performance metrics
R11	National Smart City Program Office