



CML 96th Annual Conference

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Vail

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The A to Z of Smart Cities

Panelists

Aleta Jeffress, Aurora Chief Information Officer
Ken Price, Littleton Information Services Director
Julia Richman, Boulder Chief Innovation and Technology Officer
Dave Zelenok, HR Green Inc. Local Governmental Services Manager


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A to Z of Smart Cities

Julia Richman
Chief Innovation and Technology Officer
City of Boulder

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Problem Definition: Why does smart matter?

"The pace of technological development and the characteristics of technologies render previous policymaking cycles and processes inadequate. They are maturing at a pace and on a scale previously unseen and...irrespective of whether we develop new governance systems to manage their use."

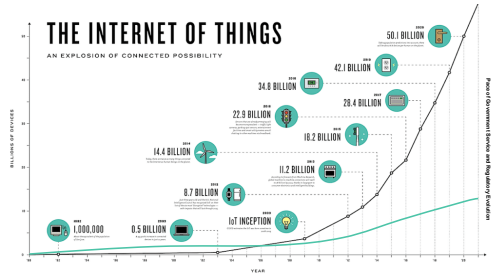


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Case for Change: You Have No Choice

Does it feel like the world is accelerating? It is, exponentially. But government is keeping pace with itself. What about Smart Cities?



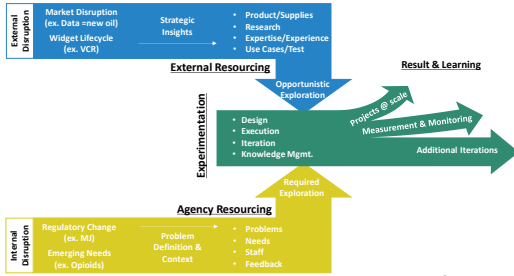
Source: National Cable & Telecommunications Association (NCTA), with speaker modifications

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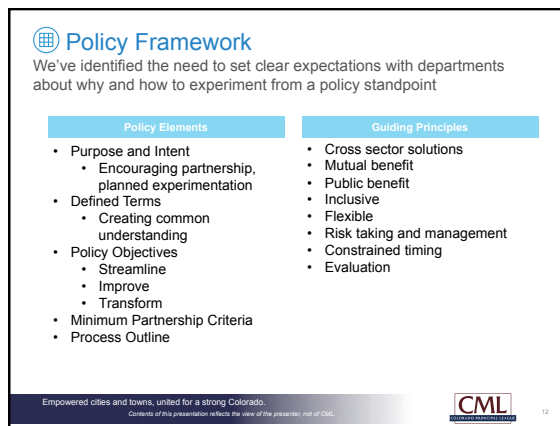
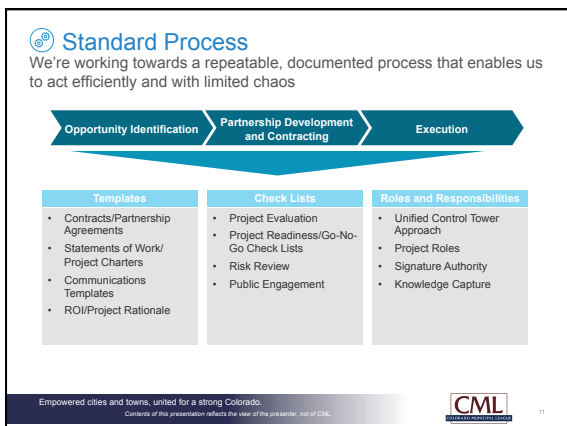
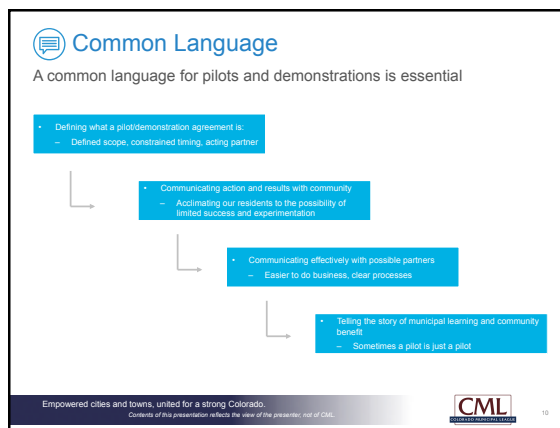
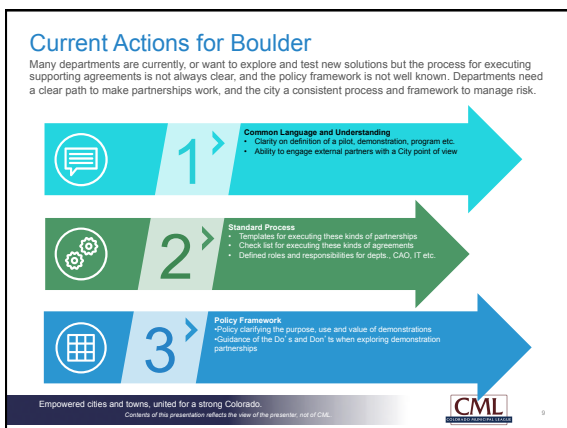
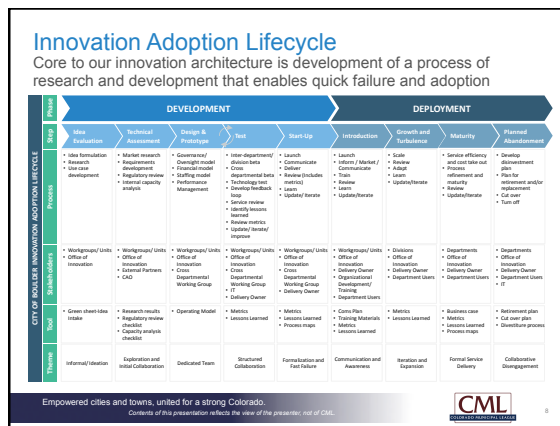
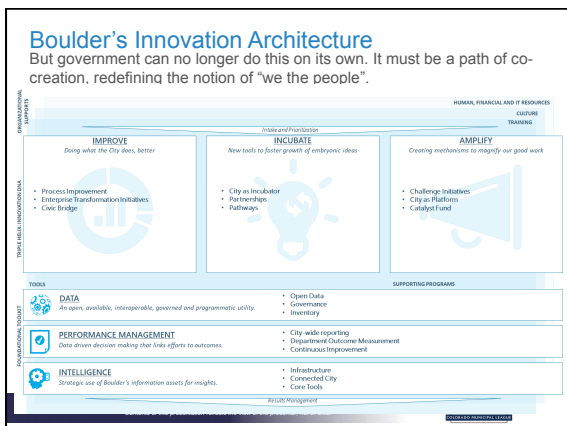
A Smart City has Catalytic Elements for Evolution

Innovation is not a place, it's a habit. It requires tools for rapid experimentation & evolution aligned to exponential change.



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Pressing Urgency: Accidental IoT

Everything is becoming connected in a city, whether you're ready for it or not. Sprinkler systems, gas tanks...all smart city opportunities and risks.



- Security:** Devices network enabled like never before
- Technical Sprawl:** Not yet to a point of standardization in IoT devices
- Data Driven Decisions:** Opportunities to leverage data effectively but little capacity
- Data as Commodity:** Data is the new oil (solar panel?), but big data is the new dinosaur

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Example Project: UAS

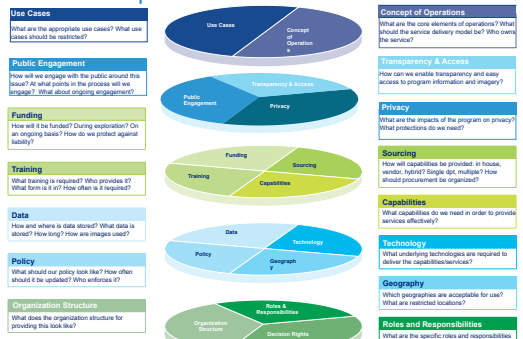
Our exploration of UAS is ongoing, structured along an additive continuum

	1. Evaluate current state situation	2. Conduct future state analysis	3. Formulate strategy	4. Plan operational transition
Objectives	Understand current uses, deployed tools and pilots	Understand future uses and needs	Build operational structures to support deployment	Translate plans into operations
Areas of Focus	Inventory current deployments in the city	Identify confirmed set of city use cases	Develop policy framework	Finalize materials
	Gather stories and lessons learned	Analyze market and industry trends	Develop concept of operations	Develop implementation plan
	Explore 3 rd party policy and operational guidance	Assess technology	Design delivery model	Build governance hooks
Stakeholder Engagement	Identify city staff, convene working group, ACLU	Engage residents in sensing	CMO, residents, ACLU	Delivery staff training, general city staff awareness

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Model for Exploration




- Use Cases:** What are the appropriate use cases? What use cases should be searched?
- Public Engagement:** How will we engage with the public around this issue? At what points in the process will we engage? What about ongoing engagement?
- Funding:** How will it be funded? During exploration? On an ongoing basis? How do we protect against liability?
- Training:** What training is required? Who provides it? What form is it in? How often is it required?
- Data:** How and where is data stored? What data is stored? How long? How are images used?
- Policy:** What should our policy look like? How often should it be updated? Who enforces it?
- Organization Structure:** What does the organization structure for providing this look like?
- Decision Rights:** What responsibilities are distributed throughout the organization?

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The A to Z of Smart Cities

Aleta Jeffress
 Chief Information Officer
 City of Aurora



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Who is Aurora?

- Population: 360,000 - 3rd in state, 54th in US
- Growth: 2nd fastest in state, 5th in US
- Transportation:** 10 light rail stations
- Open Space:** 99 parks, 9,000 acres open space, 85 miles of trails and two large reservoirs
- Area: 155 Square Miles
- City budget: \$700 Million
- City employees: 4,000+


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Aurora Smart City Projects

- Street Lights
- Aurora Water Automated Metering Infrastructure
- Intelligent Transportation Systems

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Smart Street Lights



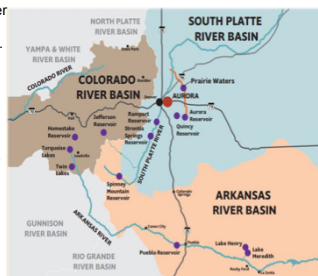
- In active negotiations with Xcel to purchase existing street lights.
- Leverage 20,000 Lights to enhance community quality of life.
- City owns several hundred lights now; began taking ownership of new lights in January 2017.

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Aurora Water

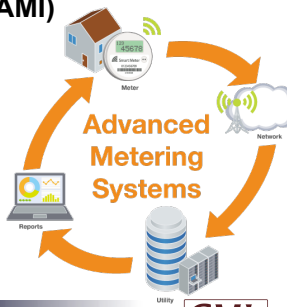
- Water supply comes from 3 river basins: the Colorado, the Arkansas, and the South Platte.
- 1,622 miles of pipe
- 40,721 valves
- 13,171 fire hydrants
- 12 potable water pump stations
- 8 potable water storage reservoirs
- 6 raw water pump stations
- 3 raw water storage tanks
- 12 reservoirs



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Automated Metering Infrastructure (AMI)



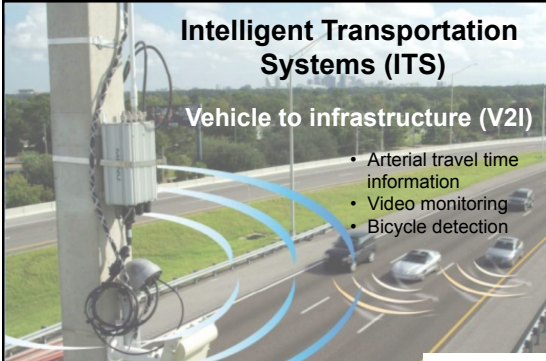
- Study completed for outdated hardware
- Smart Grid
- Two way meter communications
- Real-time data for consumer and utility company

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Intelligent Transportation Systems (ITS)

Vehicle to infrastructure (V2I)



- Arterial travel time information
- Video monitoring
- Bicycle detection


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Intelligent Transportation Systems (ITS)

Adaptive Signal Control Technology (ASCT)

- Automatically adapt to traffic changes
- Reduce congestion and fuel consumption
- Effectiveness of traffic signal timing

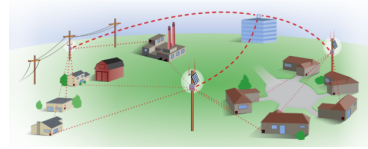


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Automated Metering Infrastructure Benefits

- Analyze water usage
- Remote monitoring
- Water conservation
- Time based pricing




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The A to Z of Smart Cities

Ken Price
Information Services Director
 City of Littleton



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Major technological, economic and environmental changes have generated interest in smart cities




- economic restructuring -
- online retail and entertainment -
- climate change -

- aging populations -
- urban population growth -
- pressures on public finances -


Source: "Smart city", definition from Wikipedia. (23 April 2017). Retrieved April 12, 2017 from https://en.wikipedia.org/wiki/Smart_city

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Littleton is impacted by changes such as the urbanization of the population





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A smart city is a community vision to integrate data and technology to improve the efficiency of services and manage city assets




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What makes smart cities smart?

- Collect data (facts, truth, evidence) – real-time
- Analyze data (automation) – real-time
- Modify service delivery – real-time

Real-time data-driven decision making!



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Six Components found in most Smart Cities

- Smarter Transportation -
- Smart Digital Infrastructure -
- Citizen Engagement - Smart & Big Data -
- Data Visualization - Leadership & Vision -

Source: Shank, A. R., Toporkoff, S., and Levy, S. (2014). Smarter Cities for a Bright Sustainable Future: A Global Perspective. (pp. 3 – 9).

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Digital Strategy Vision
Build, maintain, and enhance multidirectional digital connections amongst city employees, citizens, business, and government

Littleton

Source: City of Vancouver Digital Strategy. (2013). Retrieved April 20, 2018, from http://vancouver.ca/files/cov/City_of_Vancouver_Digital_Strategy.pdf

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Digital Strategy Pillars
Engagement + Access
Infrastructure + Assets
Economy
Organizational Digital Maturity

Littleton

Source: City of Vancouver Digital Strategy. (2013). Retrieved April 20, 2018, from http://vancouver.ca/files/cov/City_of_Vancouver_Digital_Strategy.pdf

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Click & Fix Littleton
Online Payments
City of Littleton - Development Activity Log (Project Activity Log)
Citizens' Working Tool of Development Estimates
Computers & Wi-Fi

Completed Engagement + Access Initiatives

Littleton

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Public Records Search
Storm allows city to launch snow removal app for first time
Intelligent Transportation System (ITS)
Storage Full

Potential Engagement + Access Initiatives

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Information Services

The Big Picture

Government operates on information, particularly digital information, arguably its most important resource other than its human resources.

Government information must be systematically and efficiently managed, just as other key resources are managed, in the interest of economical government and responsive public service.

Source: Dr. Bruce W. Shouride, DDC Leadership for Cities and Counties: Emerging Trends and Practices (Public Technology System) 2010, 23

Department Mission

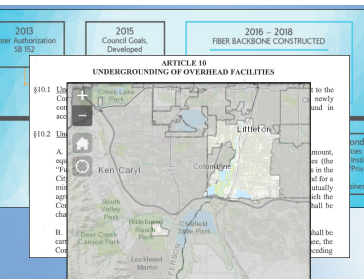
Responsible for technology and communication systems used to collect, manage, store, and deliver information that supports the operations, management, and decision-making of the City of Littleton.

Completed Infrastructure & Assets Initiatives

Littleton

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2013
Vote Authorization
SB 152

2015
Council Goals
Developed

2016 - 2018
FIBER BACKBONE CONSTRUCTED

**ARTICLE 10
UNDERGROUNDING OF OVERHEAD FACILITIES**

Ken Caryl


Potential Infrastructure & Assets Initiatives

Littleton

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Has This Ever Happened Before - ?



Complete Modal Transformation: 12 Years Infrastructure – Catching up 100 years



Cell Phone – SMART Phone 10th Anniversary – June 2017

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The END of the LINE... Say GOODBYE to:

- Fortress Malls?
- Road Widening Projects (I-25 “Gap”)?
- Privately Owned Vehicles?
- Car Ownership - Car Dealers?
- Parking Garages?
- Parking Lots / Re-purposing (?)
- Mass Transit (Yes, \$1B Light Rails)?
- Gasoline Stations?
- Gas Tax (Electrification – Full Adoption: 2040)?
- Three-car garages?
- Congestion – Up AND down – profound changes

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But - Say Hello To:

- Electric & Self driving CARS
- Sensors: “V2V” & “V2I” EVERYWHERE
- Fiber: Streetlight transmitters (300’ spacing) Utility meters - Fiber to the Home As the **SENSOR Itself**






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What’s Driving the Change?

- ✓ #1: People as **Sensors** (WAZE)
- ✓ **Uberization & Urbanization**
- ✓ Willingness to share data
- ✓ Ubiquity of sensors
- ✓ **Big Data is the New Bacon**
- ✓ **30% ANNUAL** increase in data
- ✓ **Business sector dynamics**
- ✓ Increasing expectations




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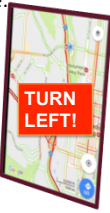


Future: Sensors & Dashboards


Crowd Sourcing – “WAZE” App (Google owns)

PEOPLE AS SENSORS: Data Sources Include:

- In Pavement
- Bluetooth – O & D (if discoverable)
- Wi-fi (more granular)
- Overhead / Microwave: DOT
- On-STAR (GM – 12% Samples)
- Cell Phones
- Users (Citizen Tweets)
- FIRST:** City-Reported: WAZE Colorado Springs –
- Re-routing around tomorrow’s cone zones**
- Q: Cell Phone Messages Big Deal? (Ask Hawaii)




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FUTURE: Cellular Trends

- A Transmitter on Every Block (300 Feet vs. 3 Miles)
- 5G will require fiber feeds to each transmitter
- Fiber solutions can **create revenue**
- **Control Aesthetics**



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FUTURE: It's "Just" a Streetlight

- **Municipalized Lighting**
 - Utility-owned lights \$20/mo cost
 - Owning infrastructure can reduce cost to ~\$2/mo
 - 5-10 Year Payback
 - Even more savings with smart streetlights
- **Smart Streetlights**
 - Cellular Enabled
 - Digital Signage
 - Sensors & Counters

Be Very, Very Wary About Offers to Upgrade Your Streetlights!



* Graphic by IntelliStreets, Inc.



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FUTURE: What About Water? :RS

Water Departments: AMR to AMI's


- Millions of WATER Meters
- Wireless AMR System: 7-9 years


Replacement Scenario

- \$220/Meter Replaced
- 2 Additional Replacements over 20 years

Smarter Approach

- Integrate Community Fiber needs
- Benefits multiple departments, P2's, P3's, P4's






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What Do These Have In Common?

- High speed **telecommunications** is the **SINGLE** common thread
- Often **underbuilt**
- Value **underestimated**
- **Under** your control
- Cities: **underway** TODAY
- Low cost, high impact
- **Millions** in New Revenues!



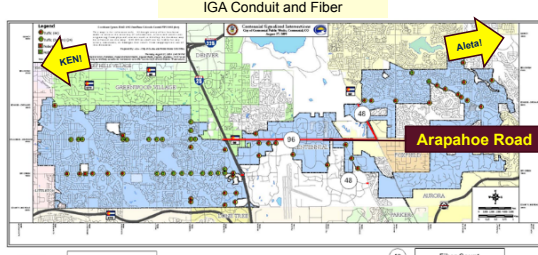



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Case Study – Centennial

City paid to upgrade 1 – 24 CDOT fiber cable to 2 – 96 fibers, sharing 50/50

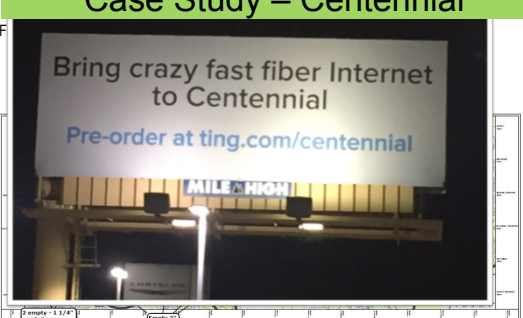
City of Centennial
IGA Conduit and Fiber






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Case Study – Centennial





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What Can We Do NOW?

- ✓ Create Strategic Plan/Vision
- ✓ Identify fiber-related assets:
 - GIS layers, records, conduits, strands, agreements, splice points, vaults, etc.
 - Look for abandoned infrastructure
 - Identify underutilized capacity
- ✓ Public Policy: "Cost Causers!"
 - Develop Fiber Friendly Policies
 - Update Management Systems
 - Create revenue recovery systems
- ✓ **SHARE** existing public fiber
- ✓ Identify **Partners** (public and private sector)
- ✓ Identify and **Internal Champion** and a
- ✓ **Trusted Advisor**





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Questions & Discussion



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