# Exploring Changes in Disease Surveillance Data in Massachusetts

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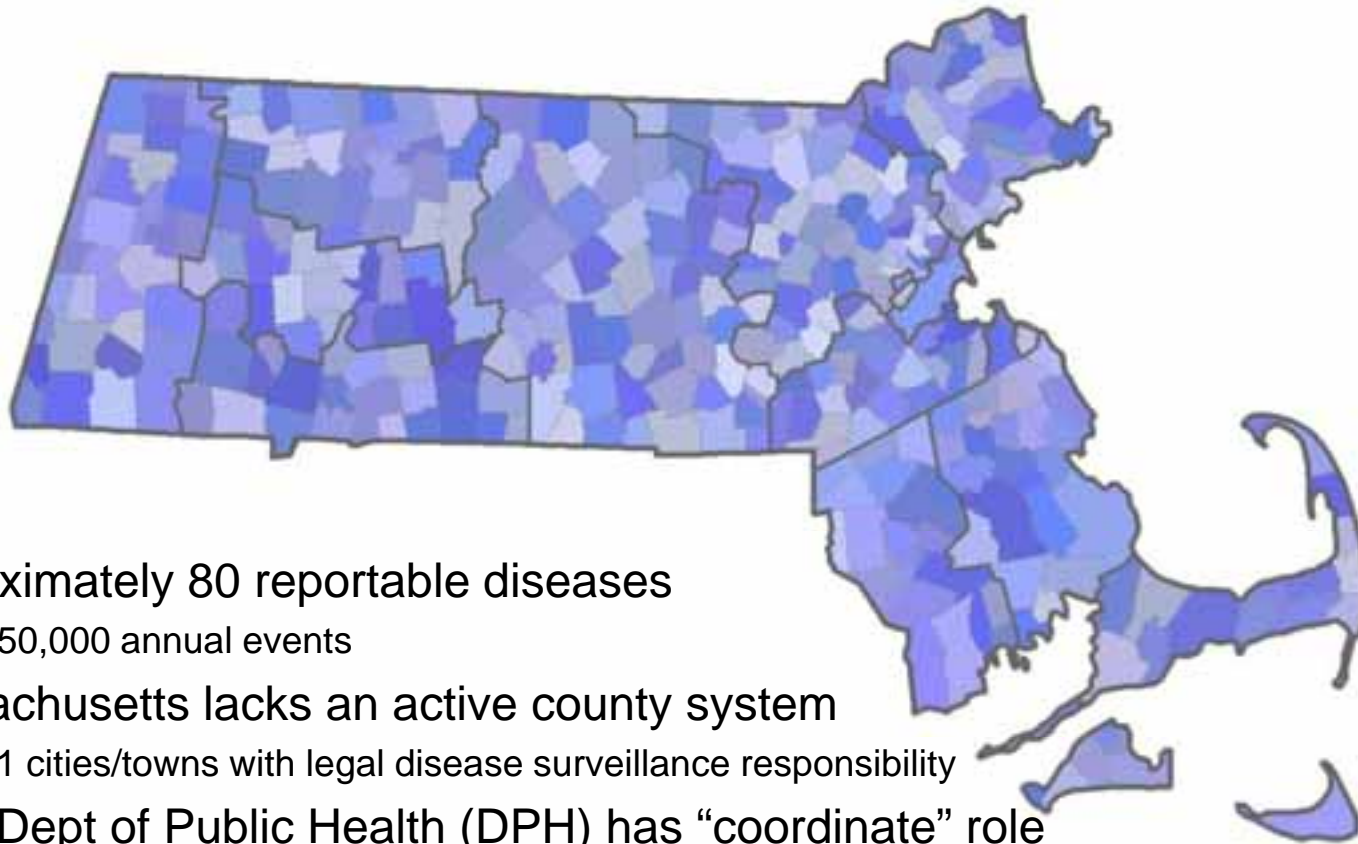
Denver, CO

# Presentation Outline

- Introduction & Background
- Goals & Objectives
- Dataset Preparation
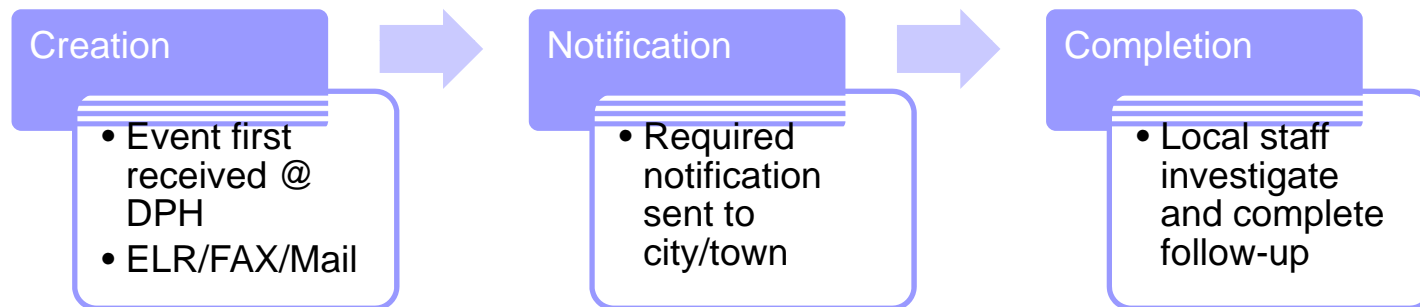- Summary & Discussion
- Questions

# Infectious Disease Surveillance Background



- Approximately 80 reportable diseases
  - ~150,000 annual events
- Massachusetts lacks an active county system
  - 351 cities/towns with legal disease surveillance responsibility
- State Dept of Public Health (DPH) has "coordinate" role
  - Oversight & advisory with some direct follow-up responsibility
- Rolled out MA Virtual Epidemiology Network "MAVEN"
  - Online Disease Surveillance & Case Mgmt System in 2007 to help coordinate & manage activities & communications
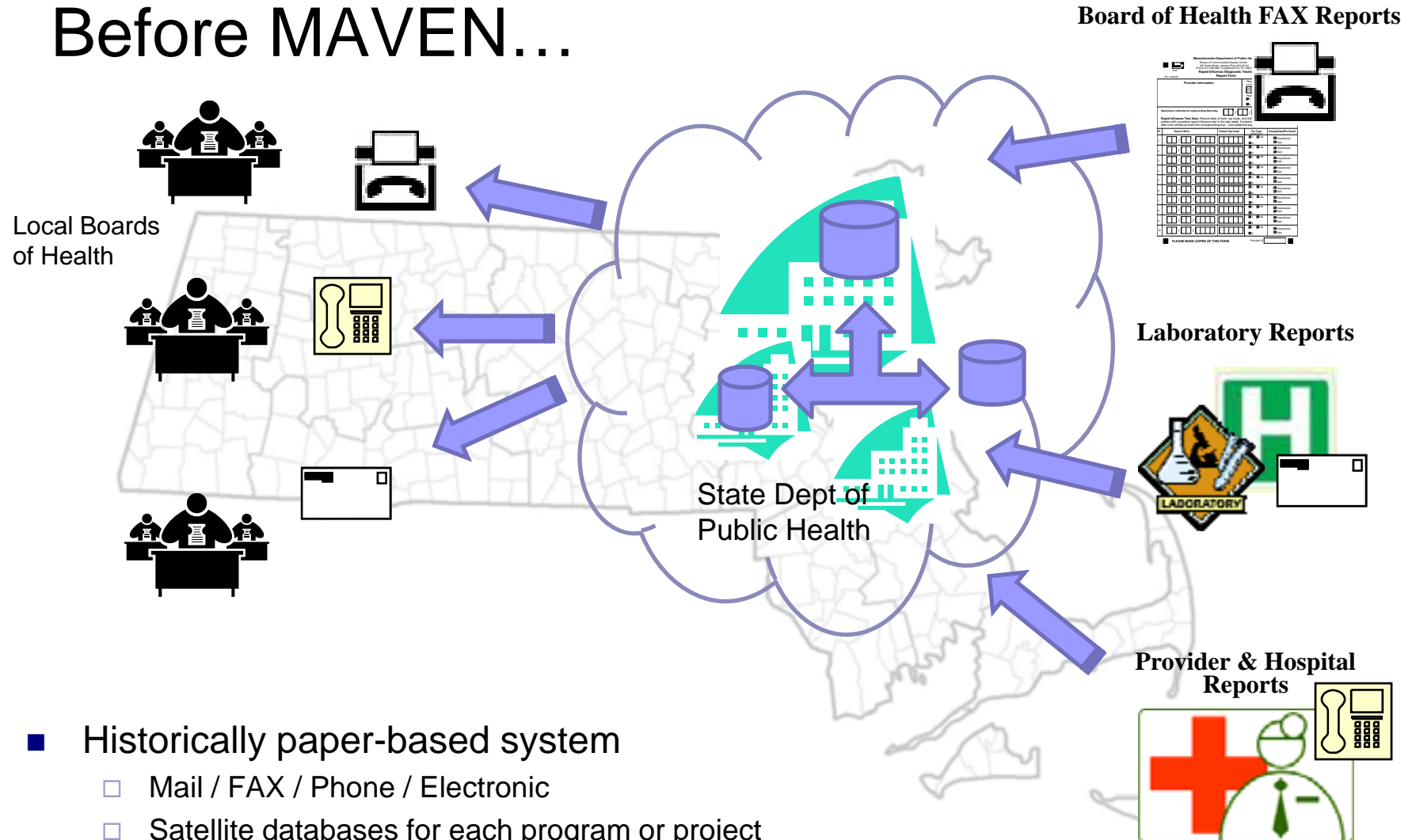
# Disease event "life-cycle"
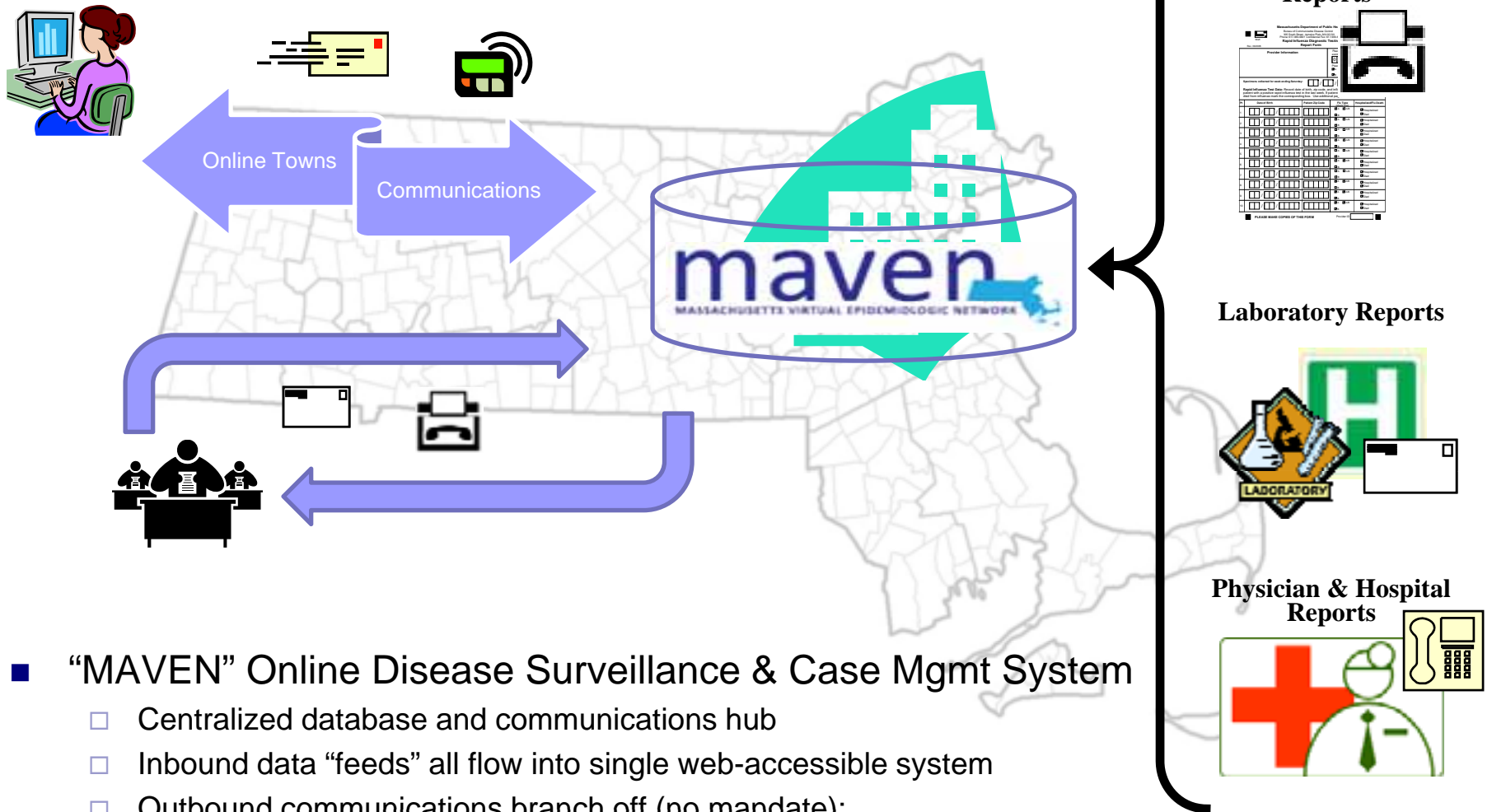
(simplified communication "loop")

**Creation**
- Event first received @ DPH
- ELR/FAX/Mail

→

**Notification**
- Required notification sent to city/town

→

**Completion**
- Local staff investigate and complete follow-up

☐ Distilling & quantifying this cycle lets us describe "how we're doing"

# Before MAVEN…

**Board of Health FAX Reports**

**Local Boards of Health**

**State Dept of Public Health**

**Laboratory Reports**

**Provider & Hospital Reports**

- Historically paper-based system
  - Mail / FAX / Phone / Electronic
  - Satellite databases for each program or project
  - Lacking centralized & standardized communications & workflow

# After MAVEN…

**Board of Health FAX Reports**



Online Towns

Communications

**Laboratory Reports**

**Physician & Hospital Reports**

- **"MAVEN" Online Disease Surveillance & Case Mgmt System**
  - Centralized database and communications hub
  - Inbound data "feeds" all flow into single web-accessible system
  - Outbound communications branch off (no mandate):
    - Online towns get email/pages and log into system
    - Offline towns get faxes and paper-mail

# Rolling out MAVEN (2007-2009)



**Maven Status**

Offline  Trained  Read Only  Epi/Imm  Epi/Imm/TB
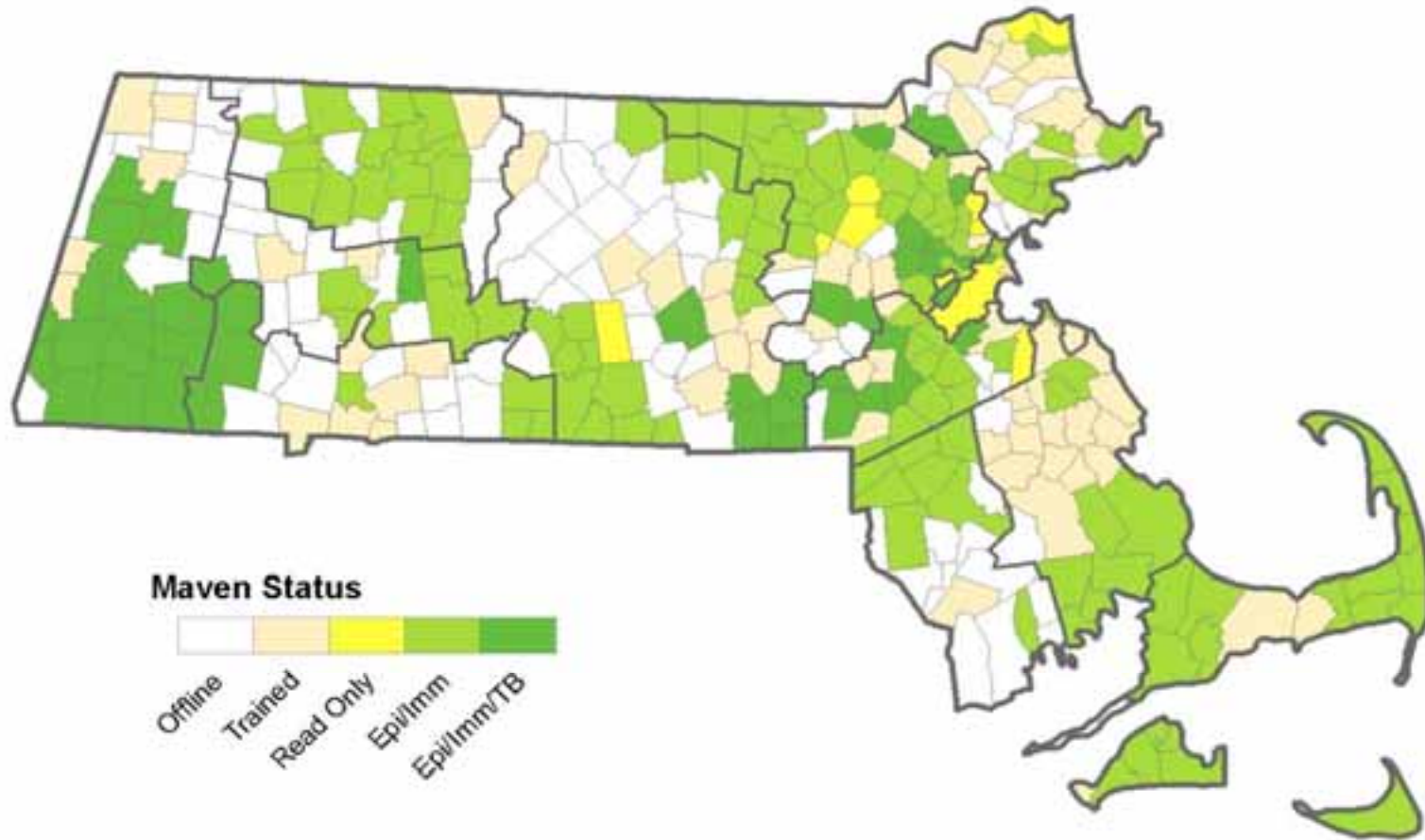
# Project Goals & Objectives

- Bigger picture:
  - Build a framework for on-going system monitoring and evaluation.
  - Provide decision-makers with actionable information for system development and improvement

- Smaller picture:
  - Evaluate disease event life-cycle & communication channels
    - First: quantify & describe the percentage & timeliness of event notification and completion
    - Explore any possible association between MAVEN participation & these performance measures

# Dataset Preparation

- Data Extract
  - Disease events created 2007-2009.
  - Variables:
    - City/Town
    - Creation <date>
    - Notification <y/n, date>
    - Completion <y/n, date>
  - Only selected* diseases

- Analysis Dataset
  - Aggregated by Month and/or City-Town
    - Total Events <N>
    - Notification <%>
    - Completion <%>
    - Avg. Time-to-Notification <wks>
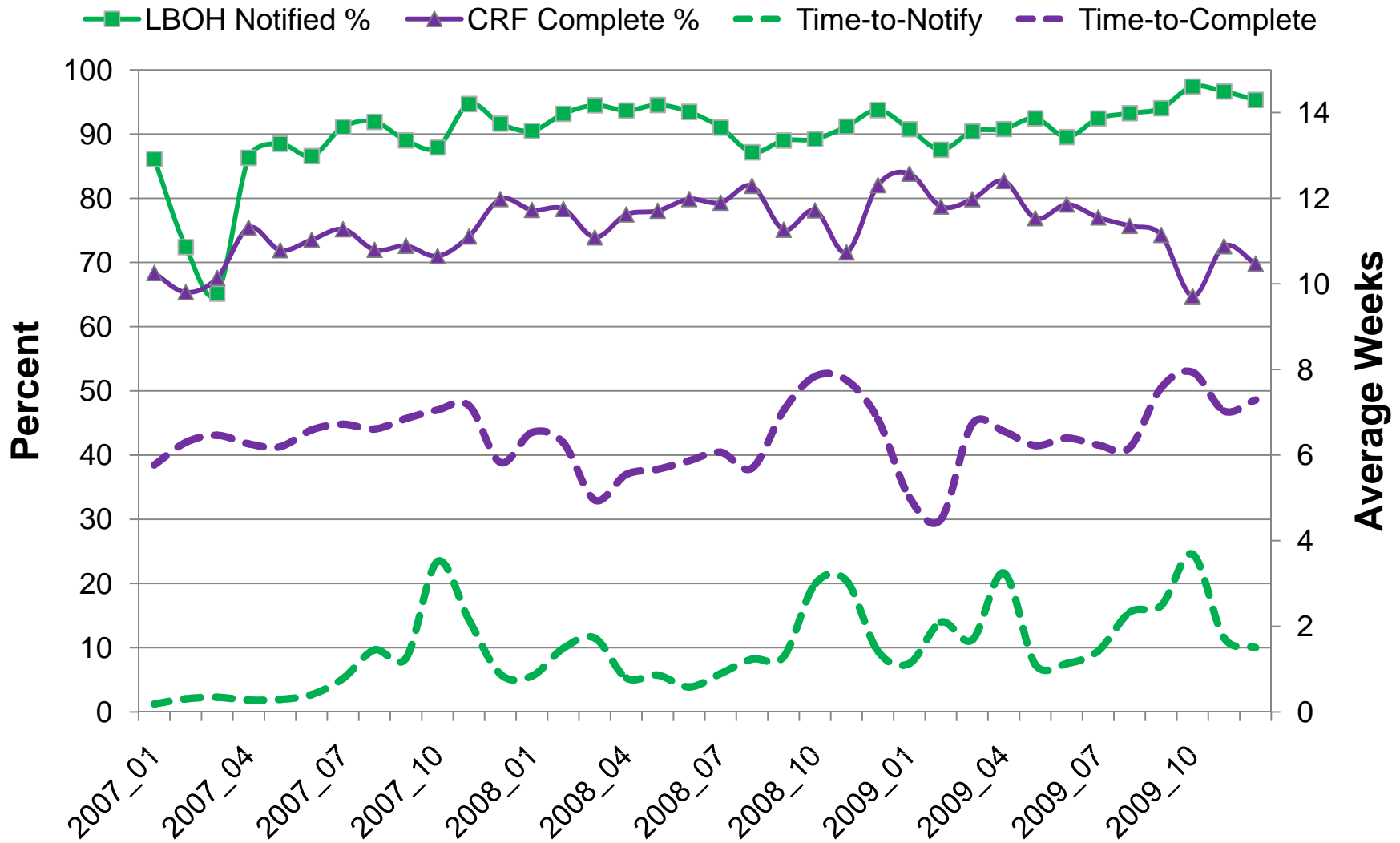    - Avg. Time-to-Completion <wks>

*Many diseases are not reportable nor the responsibility of local boards of health

# Overall: Annual Trends

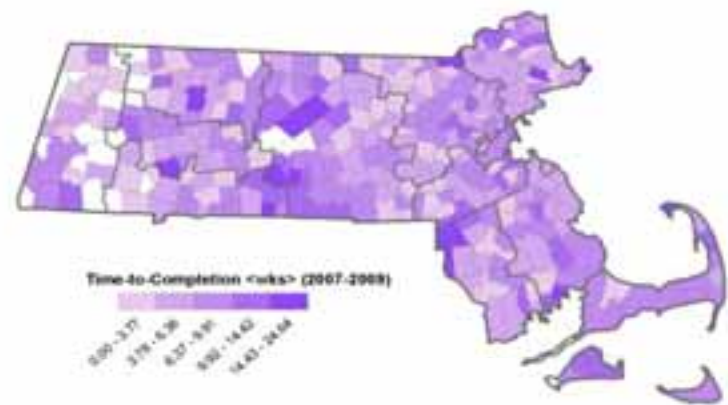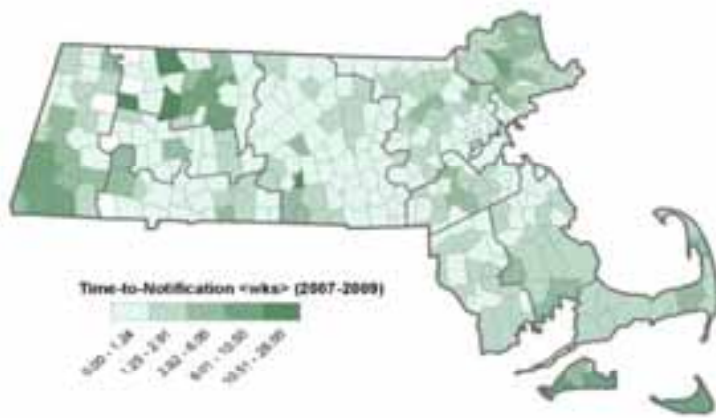|  | 2007 | 2008 | 2009 | % Change |
|---|---|---|---|---|
| **Total Events** | 7345 | 7393 | 7317 | **0.00%** |
| **Notification %** | 86.18% | 91.37% | 92.81% | **+ 7.69%** |
| **Completion %** | 72.01% | 77.90% | 75.66% | **+ 5.07%** |
| **Time-to-Notification (wks)** | 1.22 | 1.45 | 2.07 | **- 69.67%** |
| **Time-to-Completion (wks)** | 6.54 | 6.37 | 6.54 | **0.00%** |

# Overall: Notification & Completeness

# Overall Trends & Patterns
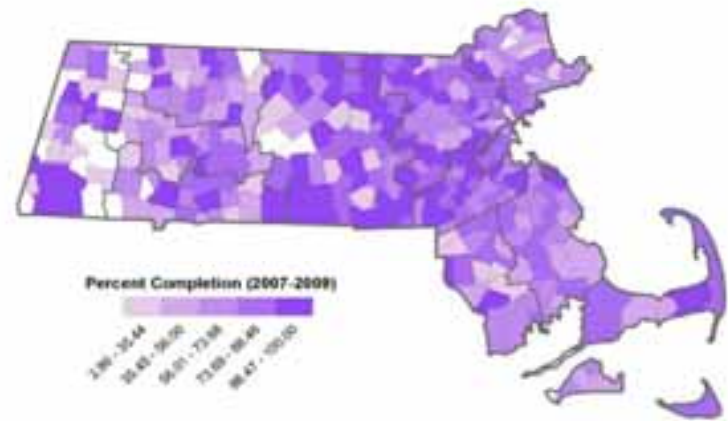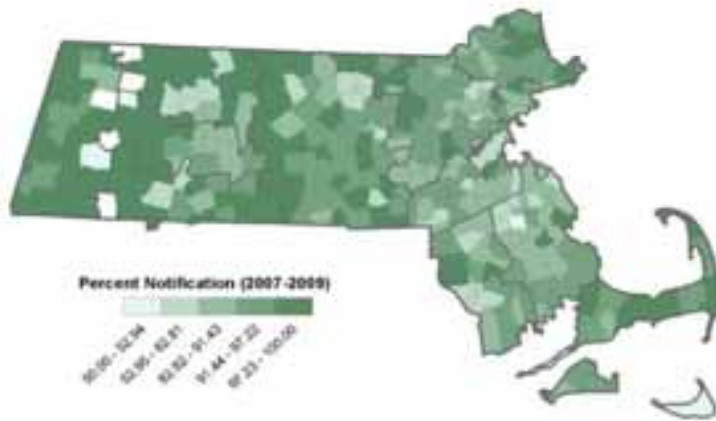
# Performance & Associations

- Collected local statistics for towns

  - MAVEN status (online/offline)

    - *Total Full-Time-Equivalent Personnel (FTEs)*
    - *Time using Maven*
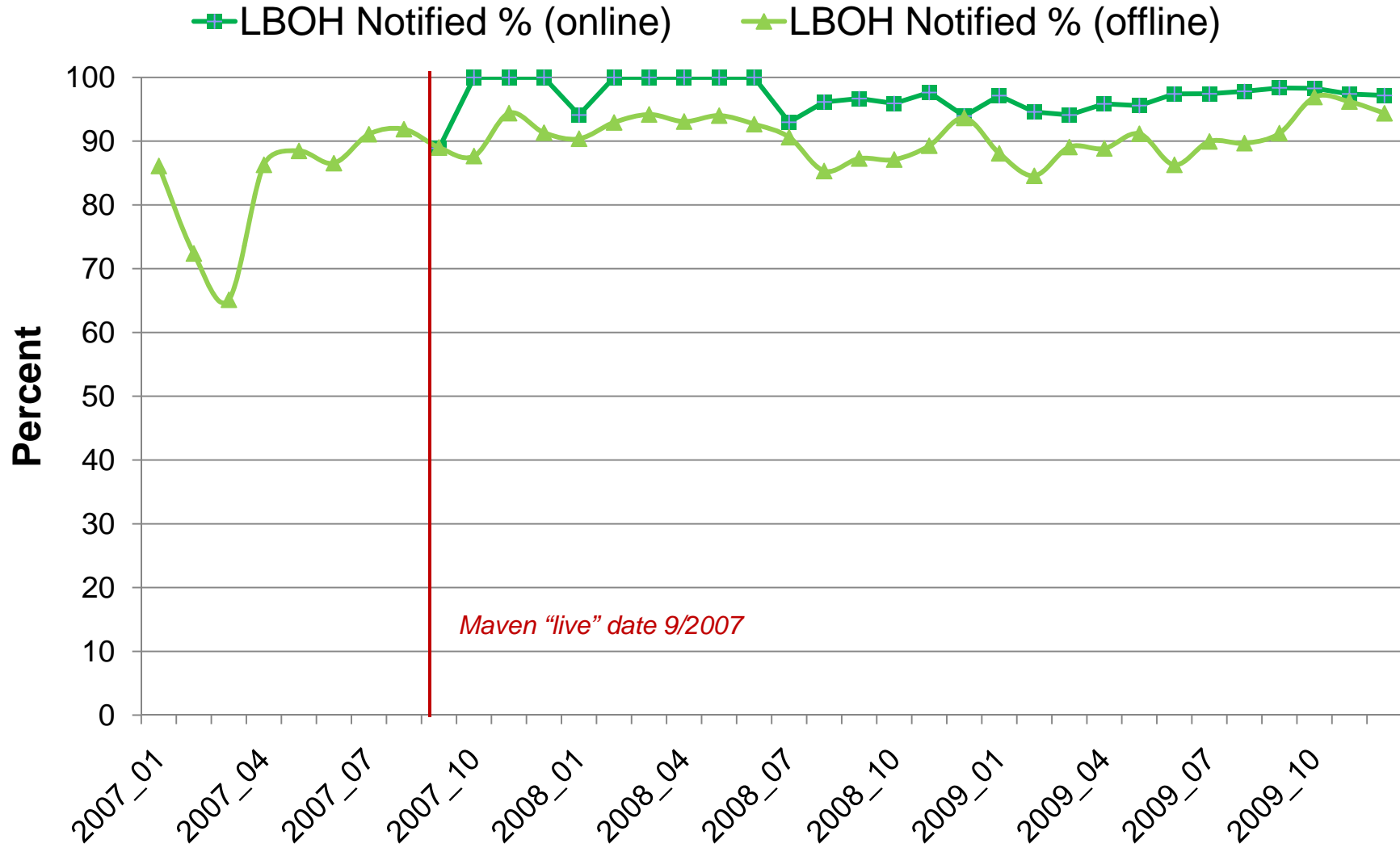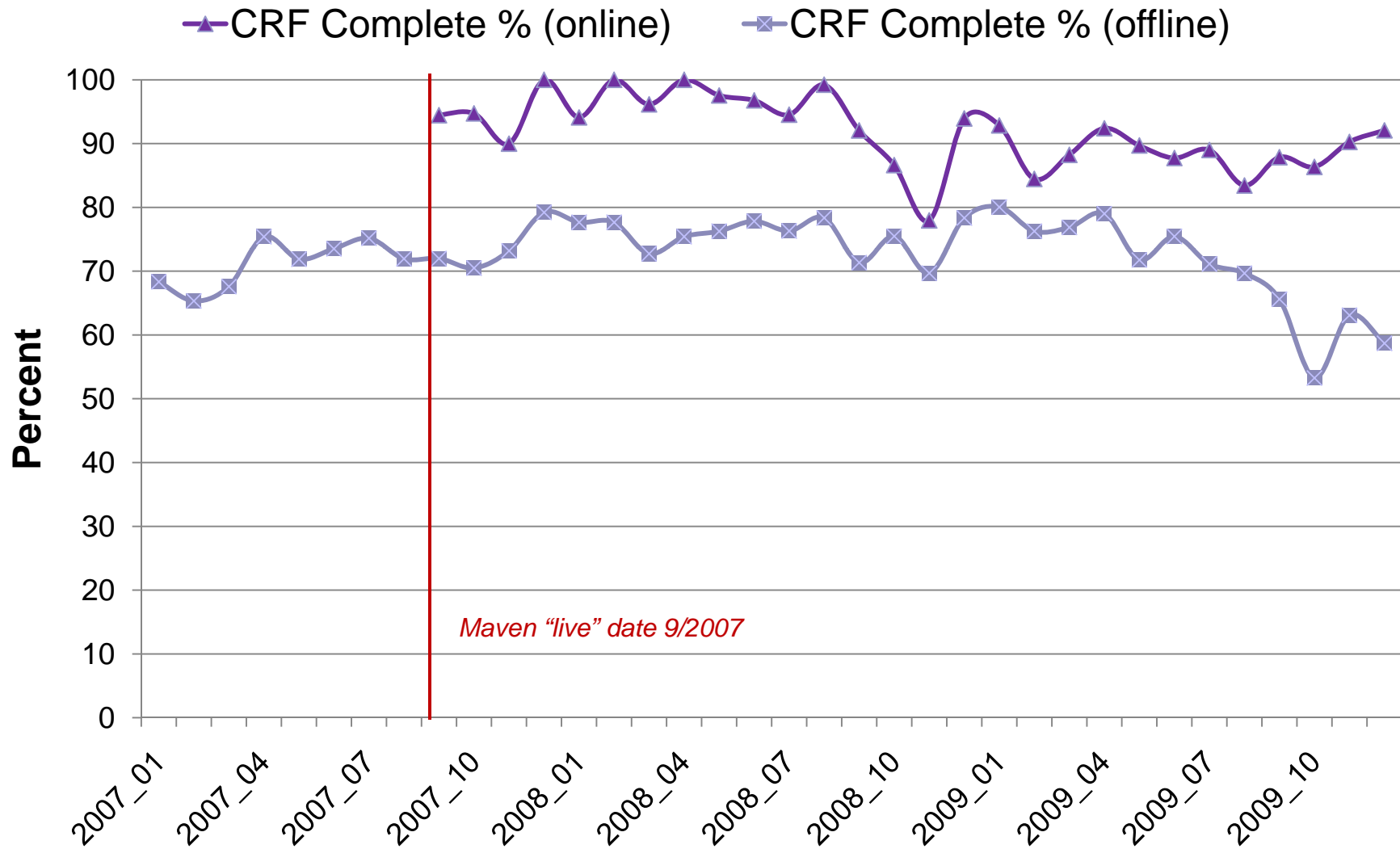    - *Board of Health (BOH) Type <VNA-shared or Municipal>*

# MAVEN Participation Status

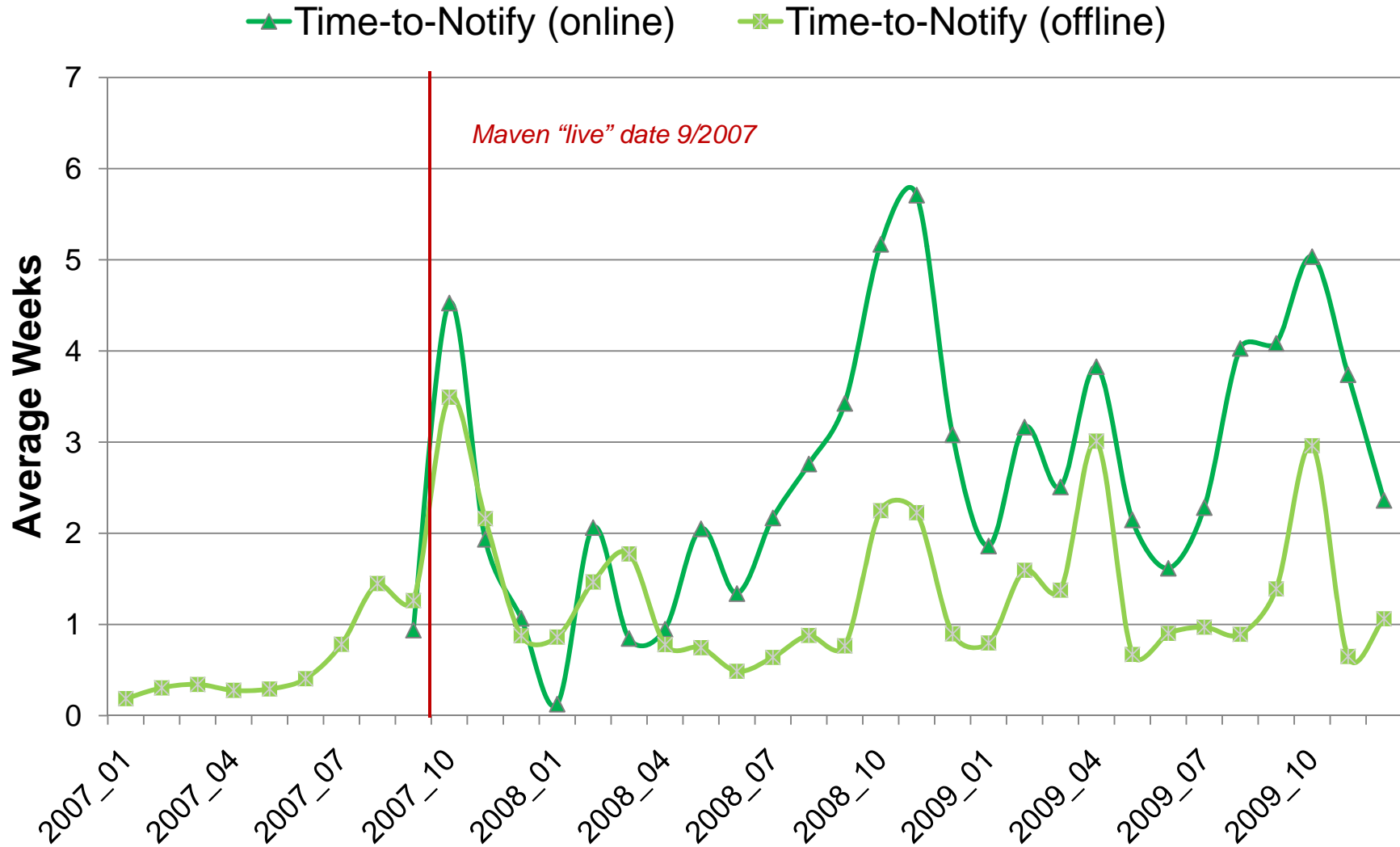| Towns | 2007 | 2008 | 2009 |
|---|---|---|---|
| Online Using Maven | 13 (4%) | 98 (28%) | 138 (39%) |
| Population Covered (cen2K) | 185,238 (3%) | 1,692,908 (26%) | 2,425,857 (37%) |
| Total FTEs (avg.) * | 0.59 | 0.59 | 0.59 |
| Weeks Using Maven (avg.) | 7.76 | 21.43 | 46.82 |

*annual data unavailable.
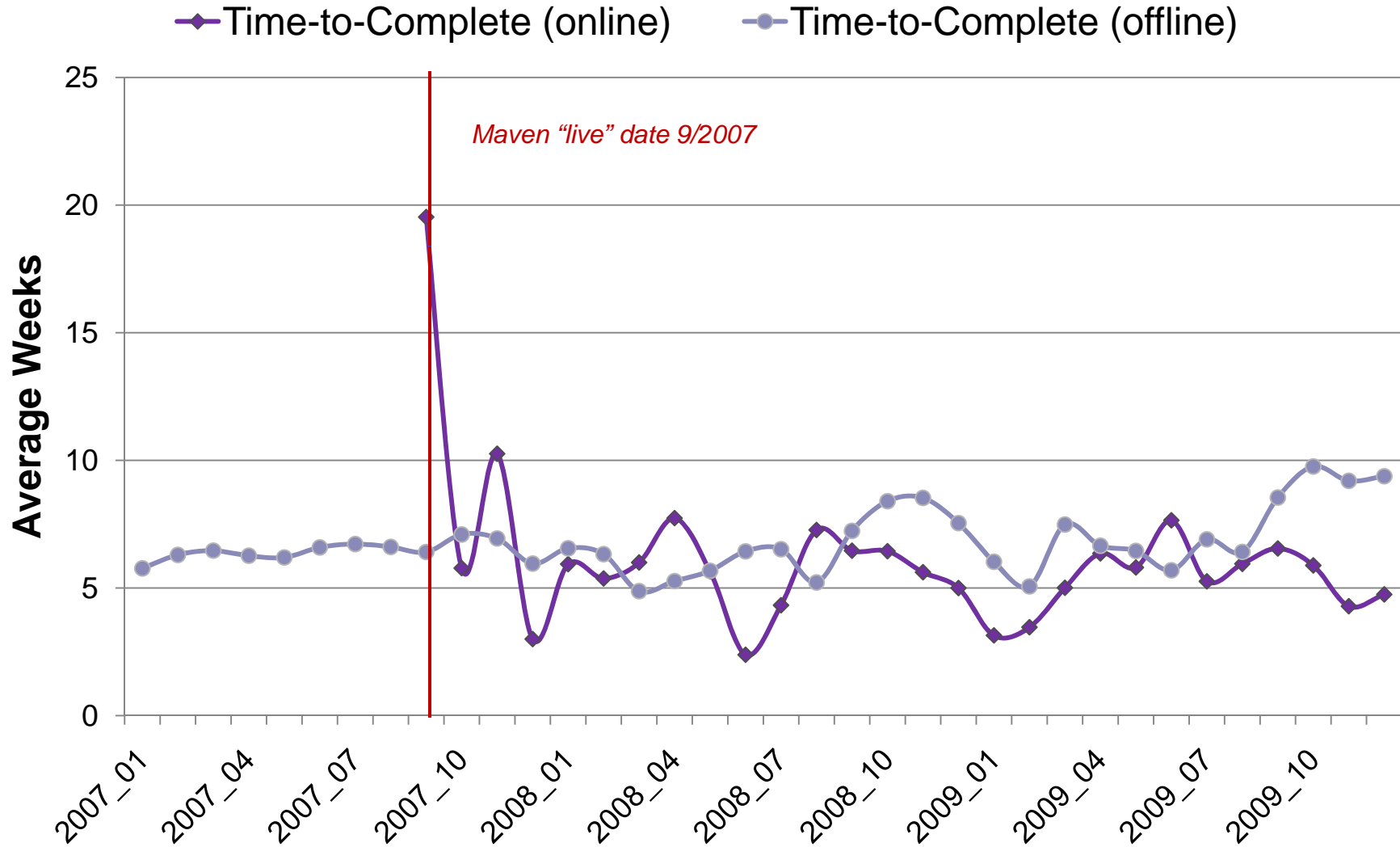
# 1. Notification %: Online vs Offline

# 2. Completion %: Online vs Offline

# 3. Time-to-Notify: Online vs Offline



Time-to-Notify (online)    Time-to-Notify (offline)

Maven "live" date 9/2007

# 4. Time-to-Complete: Online vs Offline

# Summary & Discussion

☐ **Smaller Picture** (Performance: online vs offline)
- Doesn't support "conclusions" yet
- Confounded by many unknowns
- Needs more investigation to understand why/how some towns do better than others

☐ **Bigger Picture** (Monitoring & Evaluation Framework)
- Capability to even begin to discuss these issues and analyses
- How can we help/model best practices

*So many additional areas to explore…*
- ☐ Are certain reportable disease records more complete and timely than others?
- ☐ Are shared/VNA contract groups more efficient than single, municipal towns?
- ☐ Are certain regions or demographics performing better than others?

# Next Steps: GIS Tools

- Using GIS for exploration & monitoring
  - Common platform
  - Space-time visualization
  - Find trends & Isolate outliers
  - Reporting (data export/etc)

# Visualization: Instant Atlas



Begun using interactive visualization tools to explore and present these data.

# Questions & Ideas?

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