2 Iowa Safety Efforts:

Analyst Tool

&

Location Aggregation Project

Iowa Department of Transportation

Highway Division, Engineering Bureau,
  Office of Traffic and Safety
Phone: (515) 239-1557 Fax: (515) 239-1891

Michael D. Pawlovich
   Michael.Pawlovich@dot.state.ia.us
   (515) 239-1428

http://www.dot.state.ia.us/crashanalysis/

Development of New Strategies
for
Locating
Safety Improvement Candidate Locations
(Top 200+ List)

Iowa State University (ISU)/
Center for Transportation Research and Education (CTRE)
(Dr. Shauna Hallmark)

in collaboration with

Iowa Dept. of Trans. – Office of Traffic and Safety
(Michael Pawlovich)

July 2003-June 2004

Background

- SICL: one list with all feature types included (intersection-related, link, node)

- SICL method change
  - Old Index Method: Frequency (1/3), Rate (1/3), Severity (1/3) on 5 years
    - Severity: Fatal ($1,000,000), Major ($150,000), Minor ($10,000), Possible/Unknown ($2,500)
  - New Index Method: Frequency (1/5), Rate (1/5), **Severity (3/5)** on 5 years
    - Severity: **Fatal (200)**, **Major (100)**, Minor (10), Possible/Unknown (1)
- Change indicates willingness to do so
- Future: Bayes-based

- Crashes
  - pre-2000: quasi-coordinate link-node system [TRB, 1974] w/ all statistical information
  - 2000+: x,y-coordinates w/ all data

- Problem: SICL method **RELIES** on link-node system

- Must find new (replacement) location aggregation strategy(-ies)

- Major constraints: still want only **1** list and want generation by locals an option

Current Data

- Crash database w/ x,y-coordinates (2000+ and pre-2000 converted)

- Roadway database (GIMS)
  - segment-based
  - volumes, geometrics, other features

- Intersection location data
  - newly developed → points only
  - attribute data scarce but development underway

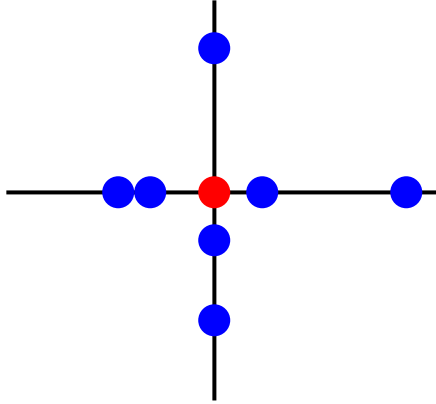- **All spatial → Geographic Information System (GIS)**

Identified Location Aggregation Options

- Intersection
  - intersection-only
  - intersection-related
  - within X distance
- Link/segment
- Corridor
  - urban
  - rural
- Sliding scale
  - standard
  - expanding/contracting
- Interchange
  - interchange ramps and junctions-only
  - interchange-related
  - within X distance
- Proximity
  - concentric (intersections)
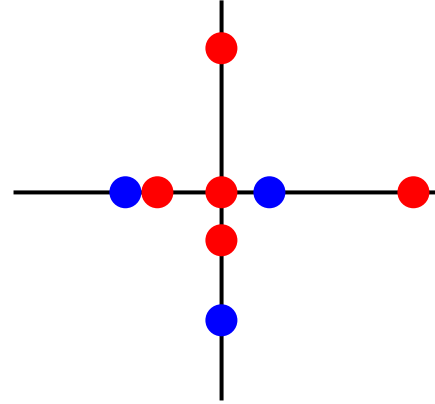 - linear (segments)
- Special case: rail, bridge, etc.

Intersection

Intersection-only

Intersection-related

Within X Distance

X radius

Link/segment

OR

intersection-related

OR

X radius

X radius

Others…
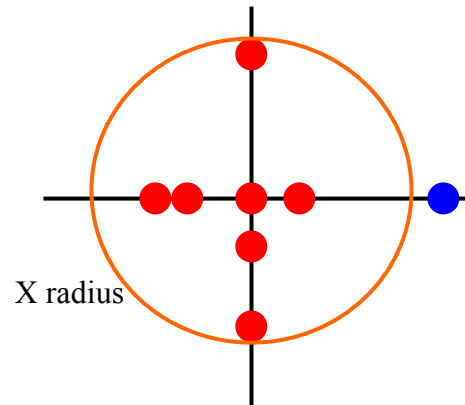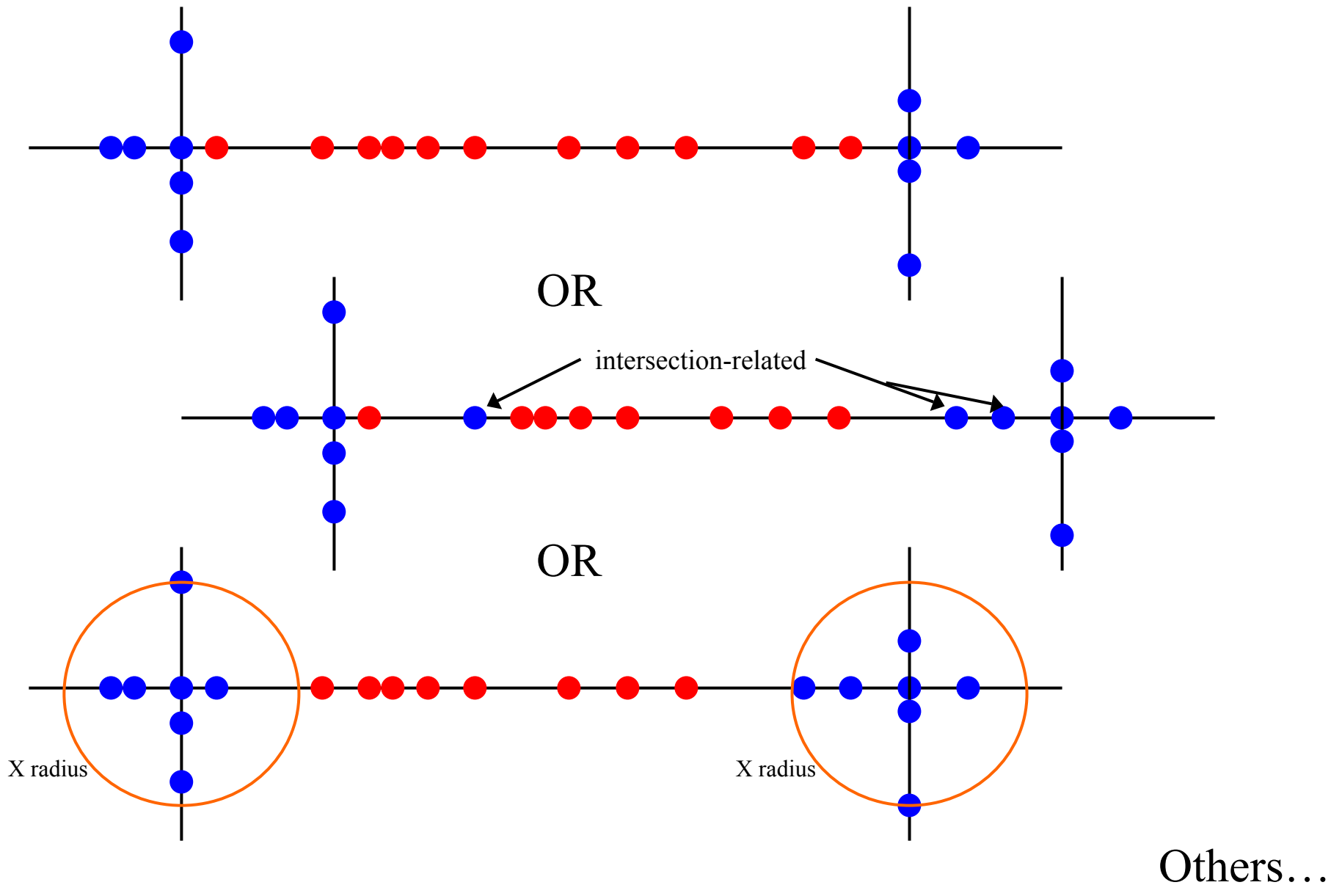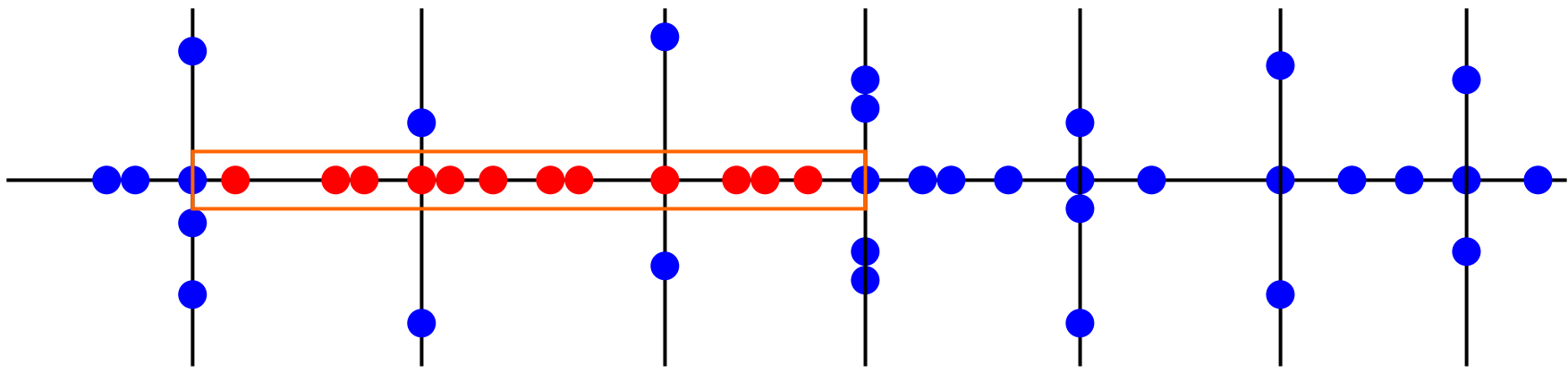
Corridor − 1a

(exclusive)

OR
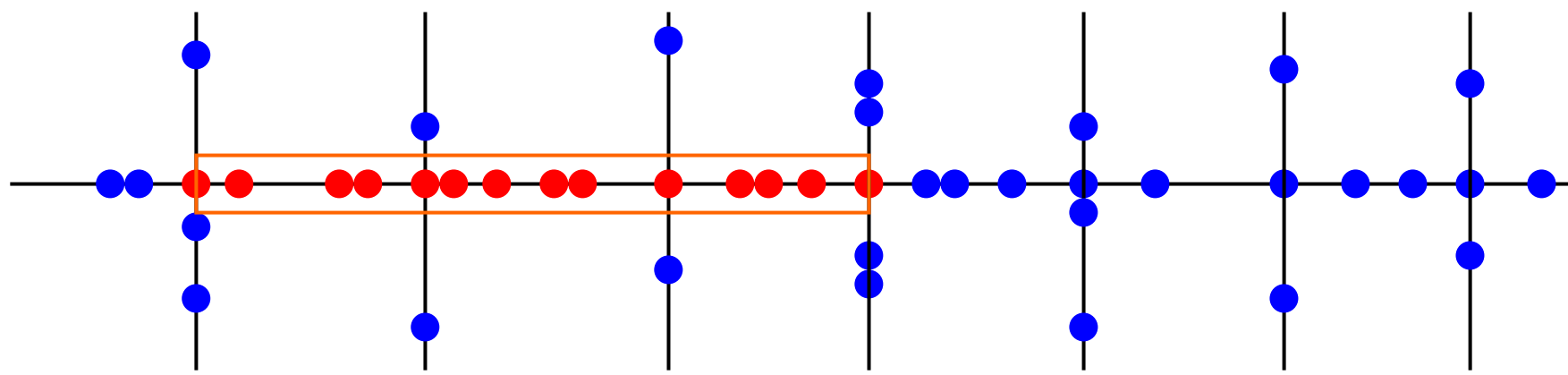
(inclusive)
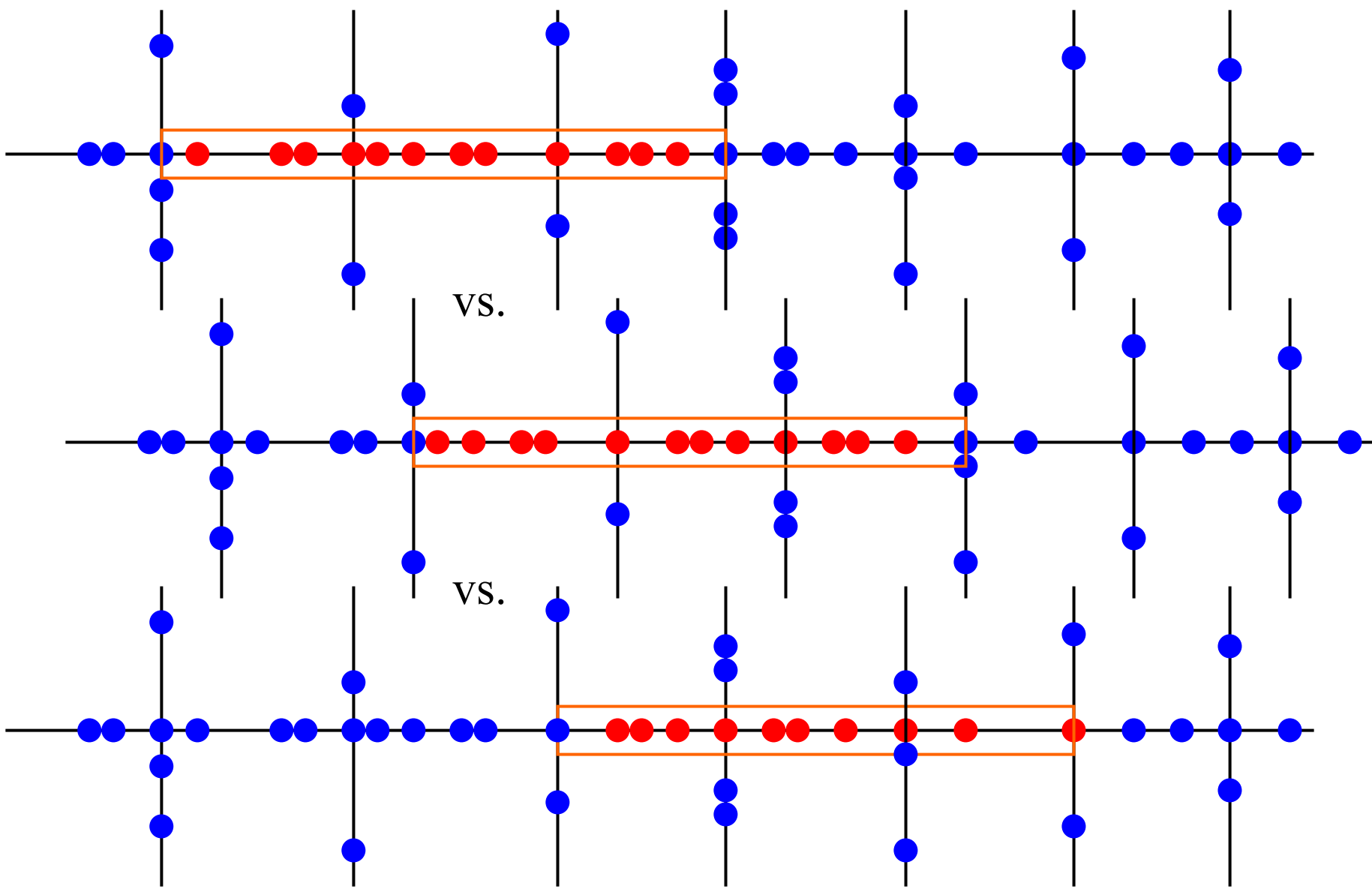
OR

Corridor – 1b

(exclusive 2)
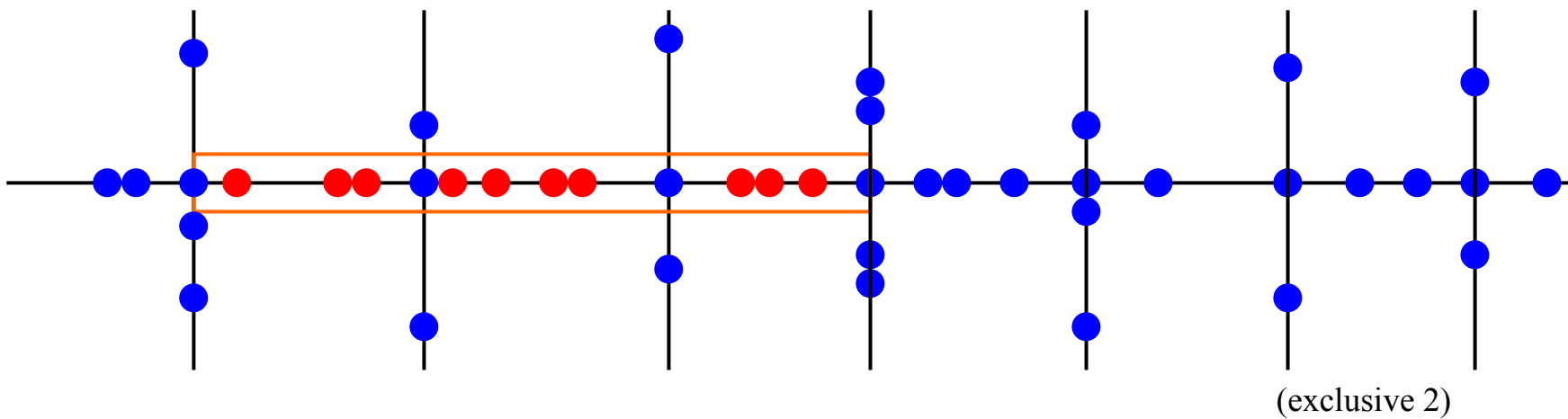
OR

• exclude intersection-related
• exclude within X distance of intersection

These make less sense unless ONLY non-intersection corridor upgrades were under consideration…
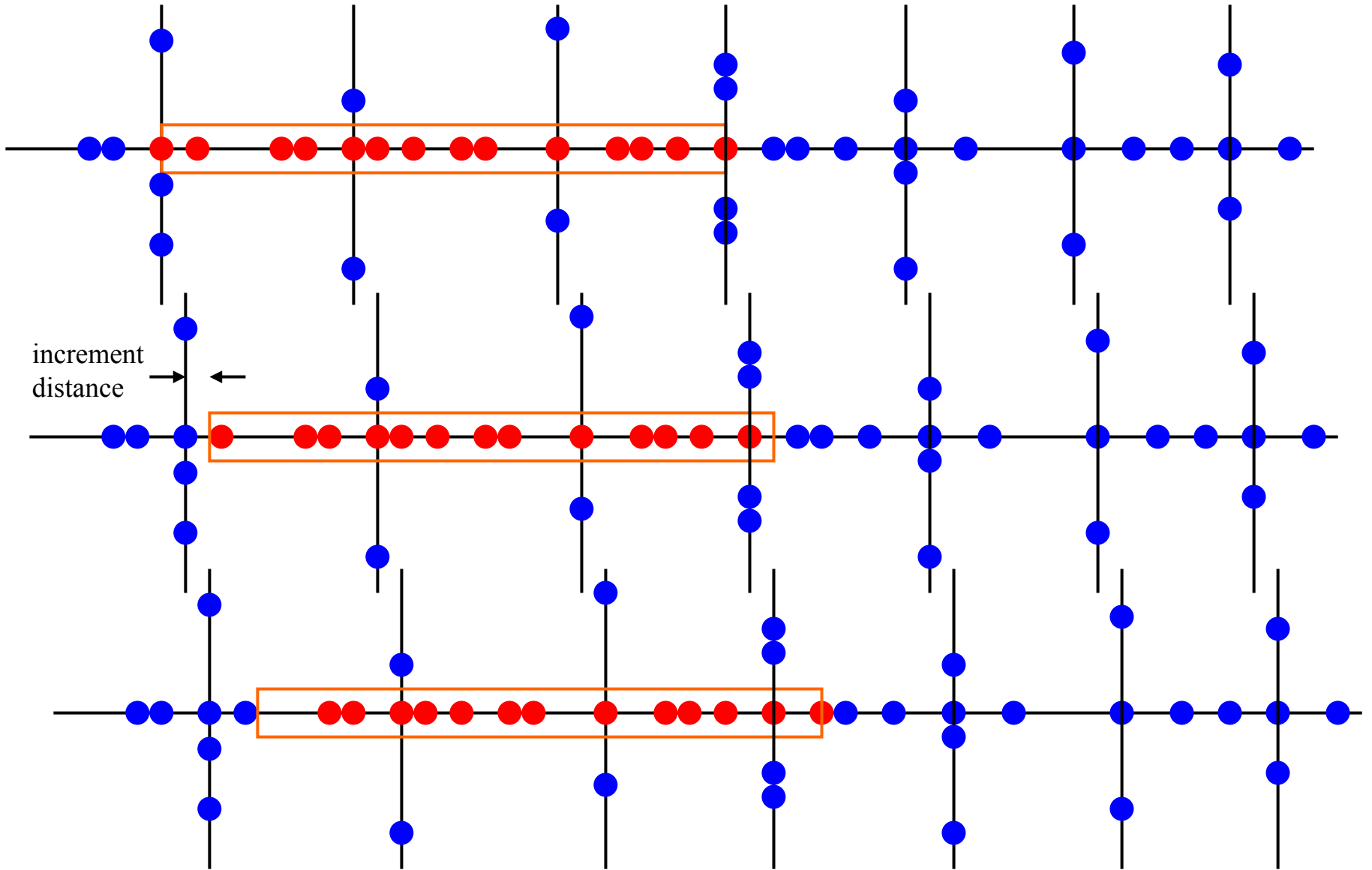
Corridor - 2

VS.

VS.

Corridor - 3

- Other considerations:
    - number of blocks for consideration – set number vs. expand/contract?

    - use blocks at all? – perhaps sliding scale is better…

    - consider side road crashes within X distance?

    - rounding corners – corridor definition database needed? (Iowa's LRS and updated GIMS!)

- Rural issues similar

Sliding Scale - standard

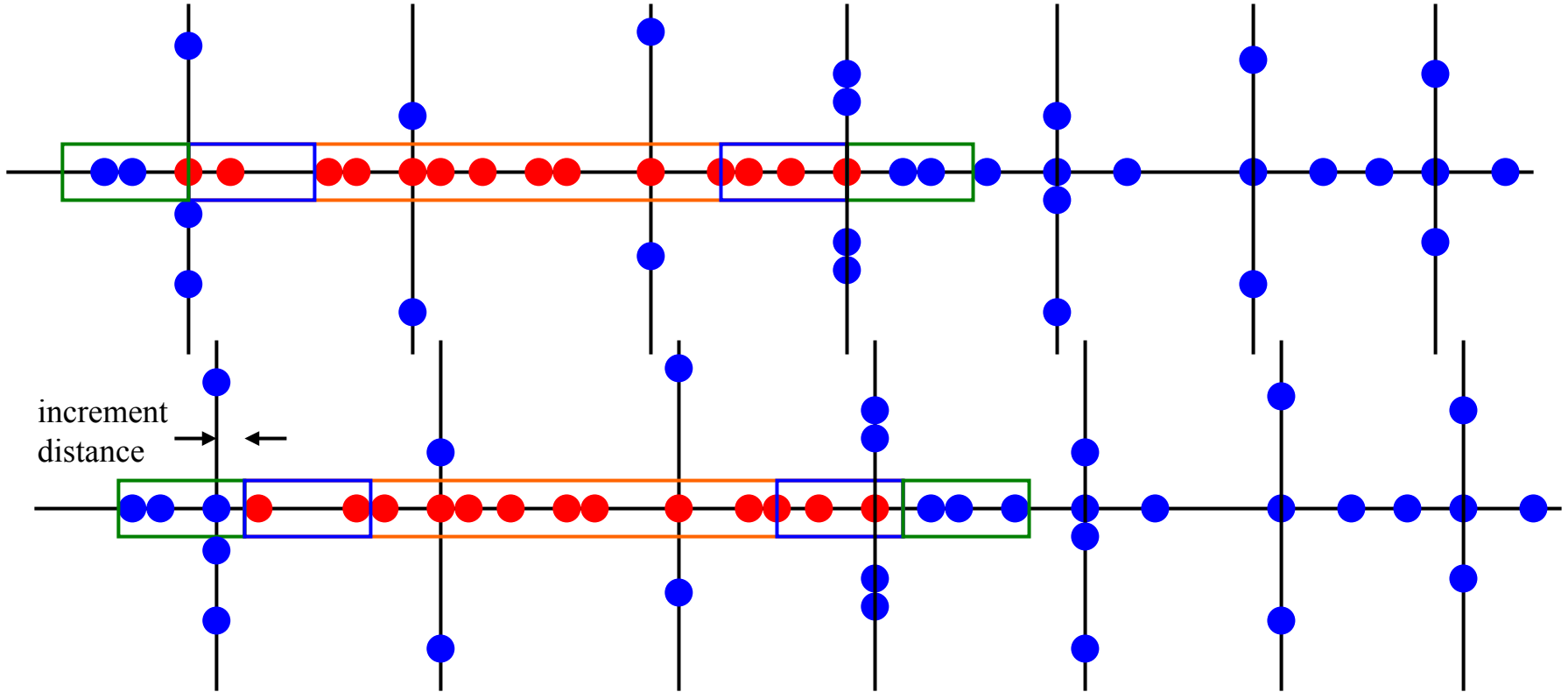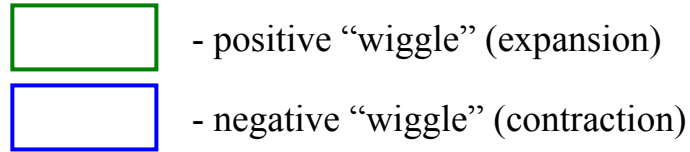**Note**: Each 🔴 or 🔵 could represent one or more crashes.

increment distance

etc. – along entirety of corridor/network

Sliding Scale – expanding/contracting

Note: Each 🔴 or 🔵 could represent one or more crashes.

Standard plus…"wiggle" factor

- positive "wiggle" (expansion)

- negative "wiggle" (contraction)

increment distance

etc. – along entirety of corridor/network

Sliding Scale

- Expansion/contraction additions:
  - expansion/contraction could occur simultaneously
  - expansion/contraction not set…based on crash spread → point is to find the region of most concern

- Other considerations (overall sliding scale):
  - set expansion/contraction?

  - how to treat intersections/junctions? – exclusive, inclusive, etc.

  - consider side road crashes within X distance?

  - rounding corners – corridor definition database needed? (Iowa's LRS and updated GIMS!)
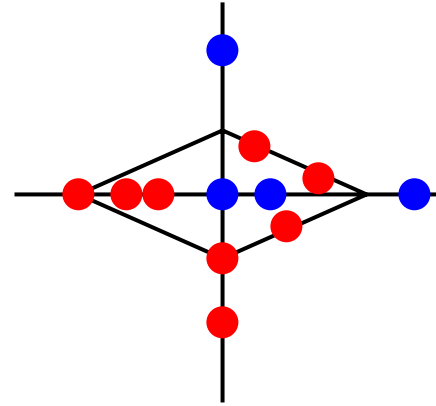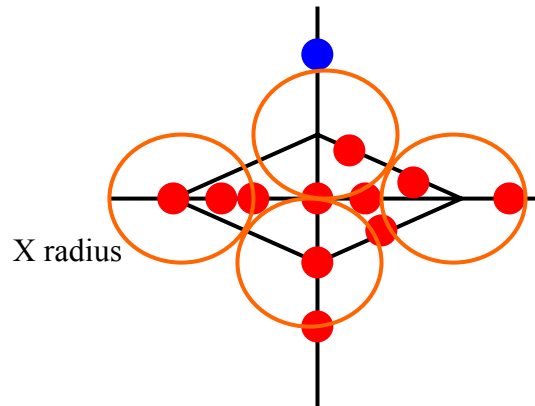
Interchange

Interchange ramps and junctions-only

Interchange-related

Within X distance

X radius
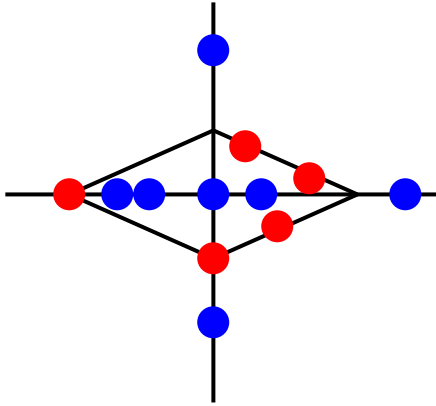
(within interchange confines + X distance from junctions)

Interchange

• Other considerations:
- • other interchange configurations
- • weaving sections
- • interchange-to-interchange interactions (close interchanges)
- • within X distance only on mainline?
- • different radii for mainline vs. crossroad?

Proximity - concentric

near/potential overlap

severe overlap

near/potential overlap

overlap
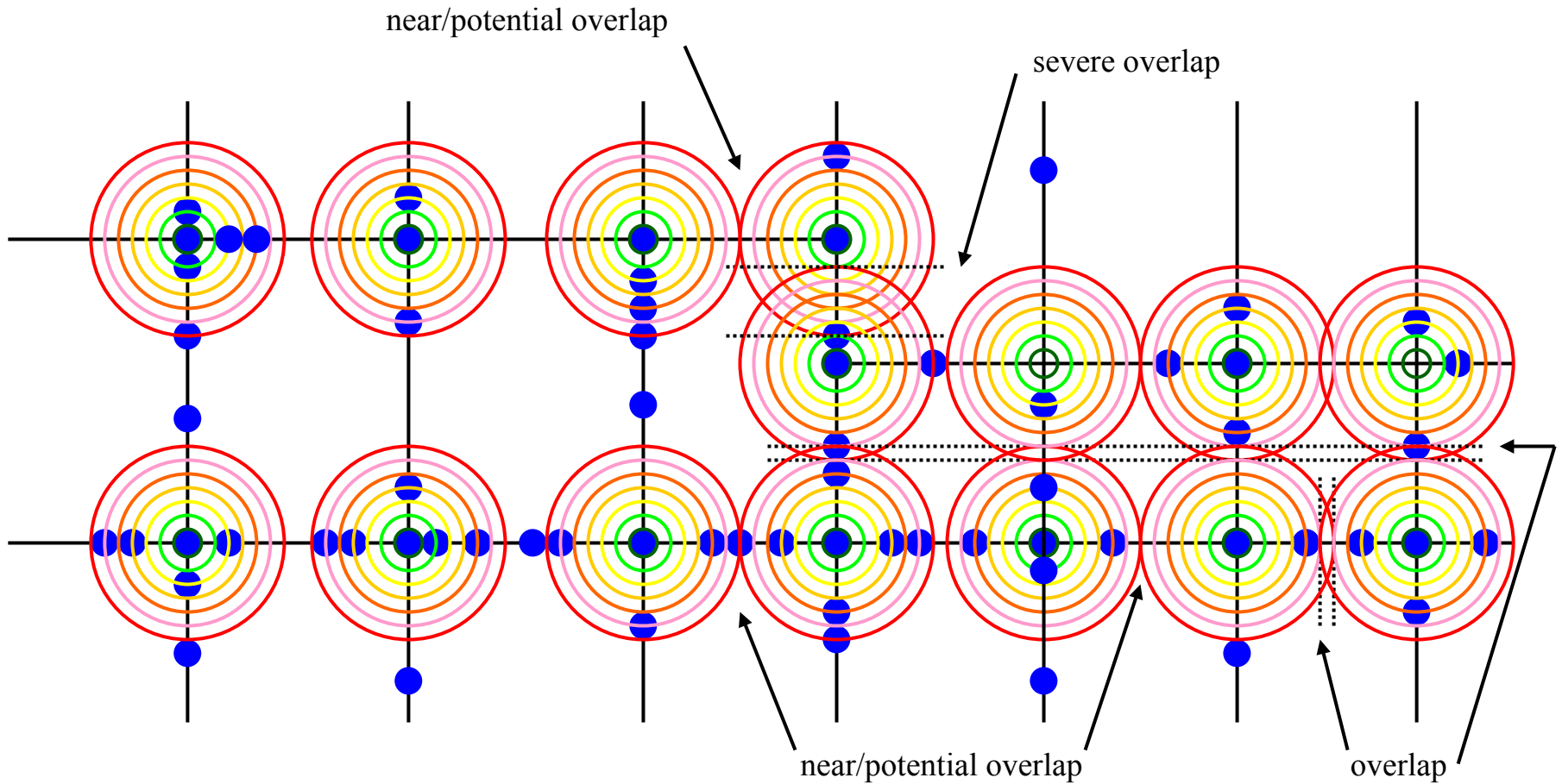
Linked to table, charts/graphs, better visuals for understanding + some statistical basis for constructing distributions – Bayes?

Proximity - concentric
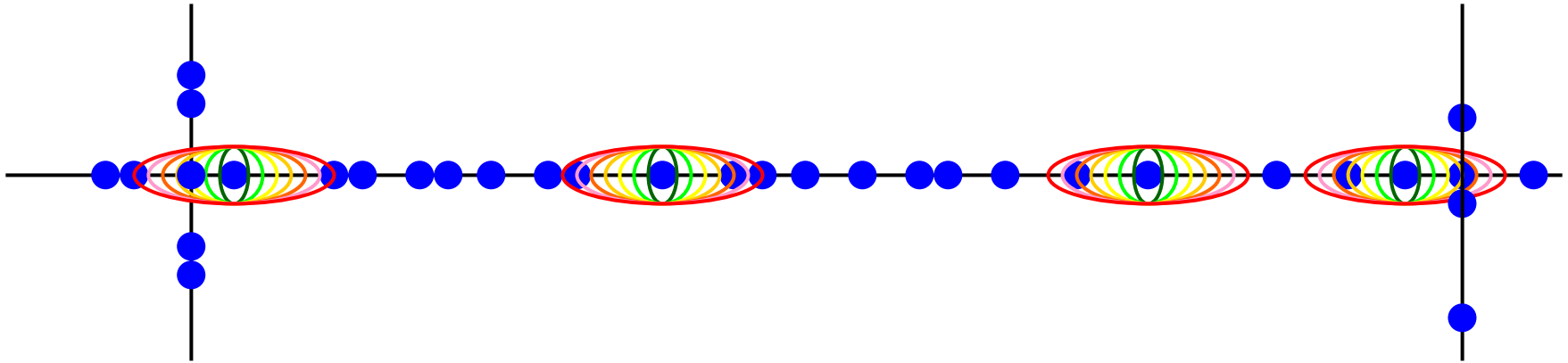
• Other considerations:
- • where to stop concentric circles?
- • concentric circle increment value
- • overlap – does it matter? → don't believe so, as point is to develop distributions for each intersection
- • statistical bases for comparison
- • presentation materials: tables, charts/graphs and maps best suited for conveying answer/message
- • concerns similar to intersection: intersection-only, intersection-related, etc.???
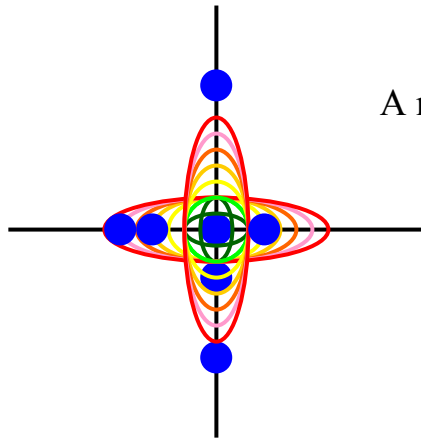
A more appropriate representation???

Proximity - linear

- Other considerations:
  - where to stop linear "ovals"?
  - linear "oval" increment value
  - overlap – does it matter? → don't believe so, as point is to develop distributions for each crash point
  - statistical bases for comparison
  - presentation materials: tables, charts/graphs and maps best suited for conveying answer/message
  - concerns similar to segments: exclusive, inclusive, etc.

- Can this expand to corridors? -- rounding corners and other issues

Overall statements

• Special cases (bridges, rails, etc.) have similar considerations – depending on analysis

• Crash attributes used extensively along with x,y-coordinate location
  • can expand further into specific issue analyses (e.g., older drivers)

• Not a substitute for statistical analyses for determining "most hazardous" locations, "sites with promise", "blackspots", etc.