



SUMMER SCHOOL SIV 2012 - ROAD SAFETY MANAGEMENT

Theoretical principles and practical application in the framework of the European Directive 2008/96/CE

Catania 24-28 September 2012



# Case Histories and Practical Examples

Jake Kononov, P.E. Ph.D.

DiExSys, LLC

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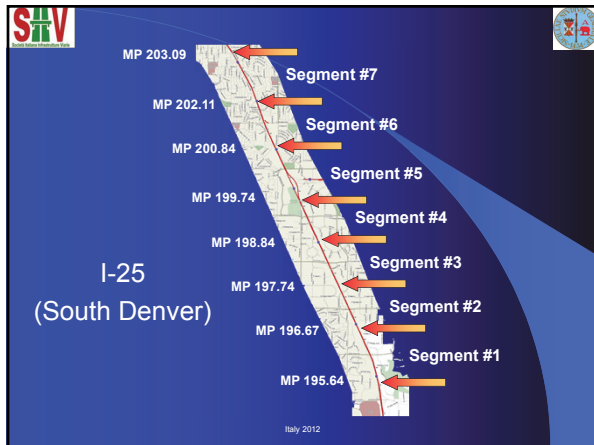
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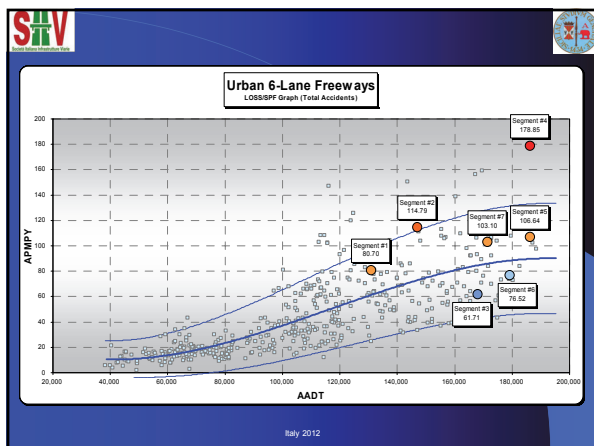
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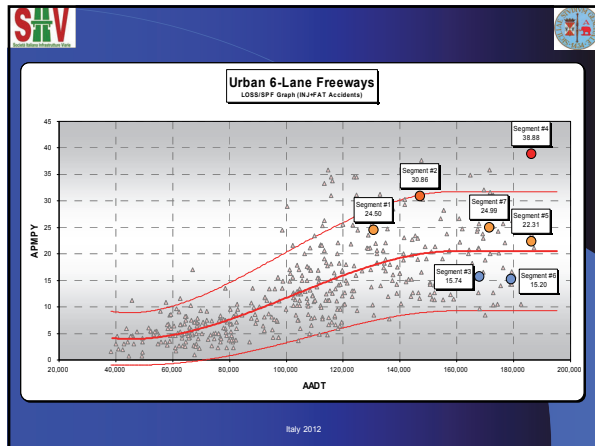
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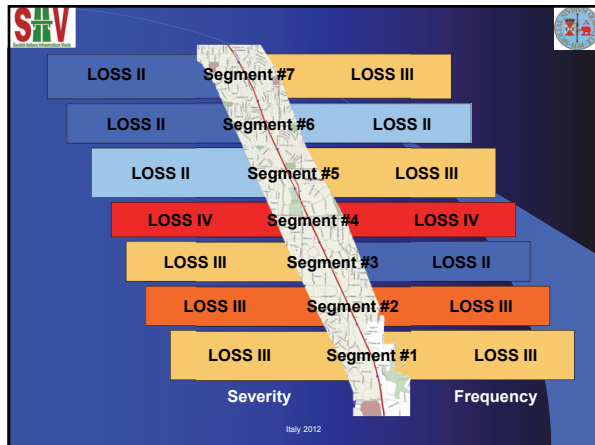
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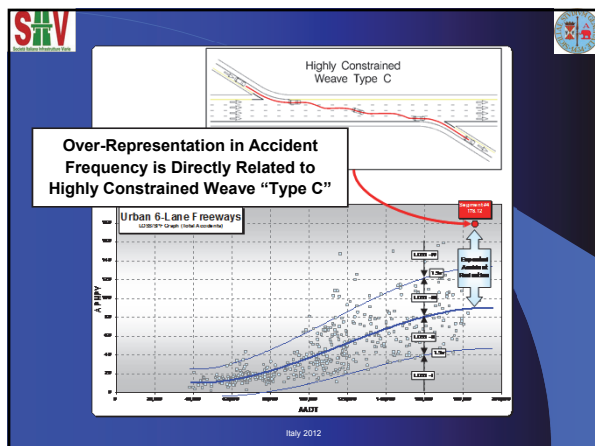
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# System Level Planning and Program Development (Pattern Recognition Based)

Jake Kononov, P.E. Ph.D.  
Bryan K. Allery, P.E.

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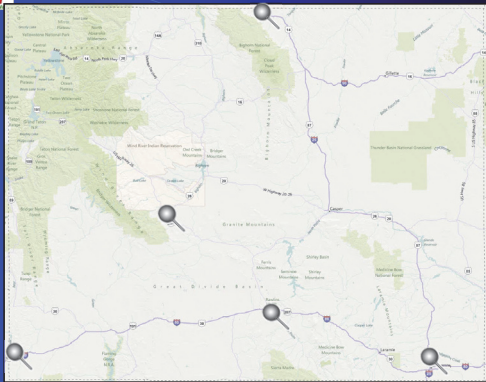
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19/162019

Job # 20101015002335

Location File: TEST\_00000\_002009\_BATCH\_FILE\_SUMMARY Cutoff: 5 Acc's @ 90%

| Location | SH0012A MP: 37.00 to 38.00 :: From: 01/01/1999 to 12/31/2008                                                                                      | PDO | KI | FAT |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|-----|
| Patterns | Severity: PROPERTY DAMAGE ONLY (PDO) [21]<br>Road Condition: Icy Road [6]<br>Contributing Factor: DRIVER 1 - NO APPARENT CONTRIBUTING FACTOR [14] | 21  | 3  | 0   |
| Location | SH0012A MP: 37.75 to 38.75 :: From: 01/01/1999 to 12/31/2008                                                                                      | 12  | 6  | 0   |
| Patterns | Crash Type: OVERTURNING [8]<br>Weather: NO ADVERSE WEATHER [3]                                                                                    |     |    |     |
| Location | SH0012A MP: 38.00 to 39.00 :: From: 01/01/1999 to 12/31/2008                                                                                      | 22  | 8  | 0   |
| Patterns | Location: UNKNOWN ROAD LOCATED [12]<br>Crash Type: OVERTURNING [12]                                                                               |     |    |     |
| Location | SH0012A MP: 38.25 to 39.25 :: From: 01/01/1999 to 12/31/2008                                                                                      | 19  | 6  | 0   |
| Patterns | Crash Type: OVERTURNING [11]                                                                                                                      |     |    |     |
| Location | SH0012A MP: 38.50 to 39.50 :: From: 01/01/1999 to 12/31/2008                                                                                      | 20  | 10 | 0   |
| Patterns | Crash Type: OVERTURNING [12]                                                                                                                      |     |    |     |
| Location | SH0012A MP: 38.75 to 39.75 :: From: 01/01/1999 to 12/31/2008                                                                                      | 21  | 8  | 1   |
| Patterns |                                                                                                                                                   |     |    |     |

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# Level of Service of Safety (LOSS) and Pattern Recognition Analysis

## Example #3 State Highway 470 Median Barrier Analysis

*Jake Kononov, P.E. Ph.D.*  
*Bryan K. Allery, P.E.*

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Identify unprotected median on Denver urban freeways with median width between 30 and 50 feet

According to the AASHTO roadside design guide if median width is equal to or more than 30 feet, median barrier would not required

Latest research shows median barrier in 30-50 feet medians may be cost-effective even if not warranted by AASHTO roadside design guide

We will identify these locations first and then conduct B/C analysis for median barrier installation

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Step I  
Define Study Limits

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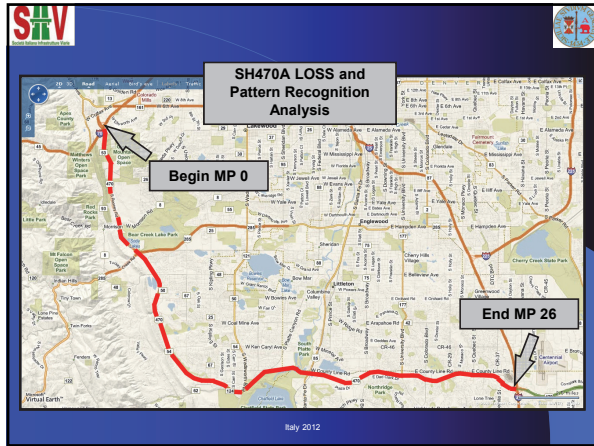
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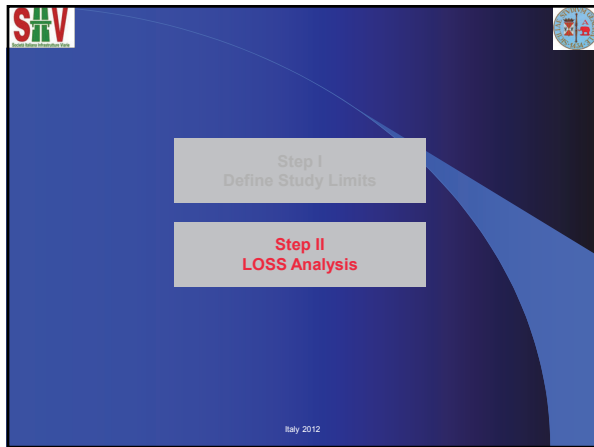
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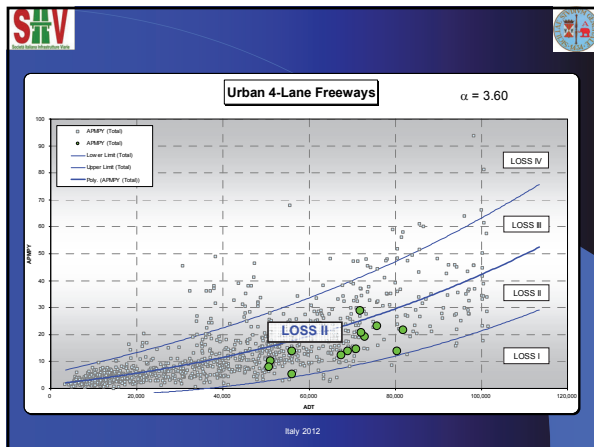
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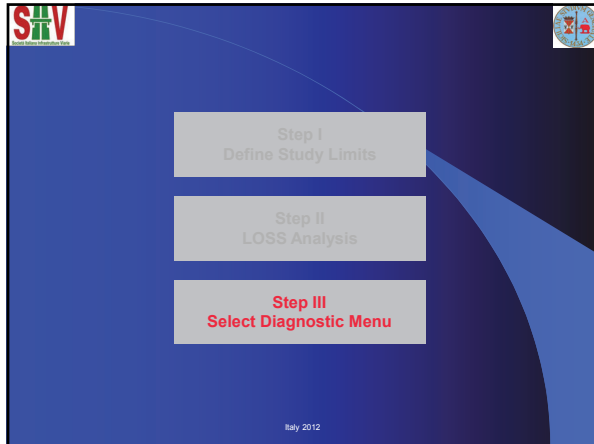
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| Diagnostic Normative Percentages (Urban 4-Lane Freeways > 50K ADT) |                                  |                                      |
|--------------------------------------------------------------------|----------------------------------|--------------------------------------|
| 68.19% PDO                                                         | 0.05% Bicycle                    | 22.17% Total Fixed Objects           |
| 31.24% INJ                                                         | 0.01% Motorized Bicycle          | 2.24% Total Other Objects            |
| 0.58% FAT                                                          | 0.03% Domestic Animal            | 63.67% Daylight                      |
| N/A Persons Injured                                                | 1.79% Wild Animal                | 4.83% Dawn or Dusk                   |
| N/A Persons Killed                                                 | 1.21% Light or Utility Pole      | 13.36% Dark-Lighted                  |
| 30.19% Single Vehicle Accidents                                    | 0.03% Traffic Signal Pole        | 12.55% Dark-Unlighted                |
| 54.65% Two Vehicle Accidents                                       | 1.10% Sign                       | 5.78% Unknown Lighting               |
| 15.02% Three or more Vehicle Accident                              | 0.83% Bridge Rail                | 76.34% No Adverse Weather            |
| 0.14% Unknown Number of Vehicles                                   | 5.43% Guard Rail                 | 5.25% Rain                           |
| 68.76% On Road                                                     | 7.88% Median Barrier             | 11.72% Snow or Sleet or Hail         |
| 14.50% Off Road Left                                               | 0.22% Bridge Abutment            | 0.30% Fog                            |
| 14.35% Off Road Right                                              | 0.84% Column or Pier             | 0.01% Dust                           |
| 0.02% Off Road at Tee                                              | 0.12% Culvert or Headwall        | 0.54% Wind                           |
| 0.56% Off Road in Median                                           | 1.01% Embankment                 | 5.85% Unknown Weather                |
| 1.81% Unknown Road Location                                        | 0.42% Curb                       | 71.48% Dry Road                      |
| 5.76% Overtaking                                                   | 1.59% Delineator Post            | 8.83% Wet Road                       |
| 2.44% Other Non Collision                                          | 1.13% Fence                      | 0.08% Muddy Road                     |
| 0.01% School Age Pedestrians                                       | 0.14% Tree                       | 3.05% Snowy Road                     |
| 0.26% All Other Pedestrians                                        | 0.02% Large Boulder              | 7.88% Icy Road                       |
| 1.07% Broadside                                                    | 0.02% Rocks in Roadway           | 1.29% Slushy Road                    |
| 0.69% Head On                                                      | 0.11% Barricade                  | 0.12% Foreign Material Road          |
| 45.53% Rear End                                                    | 0.15% Wall or Building           | 0.09% With Road Treatment            |
| 13.15% Sideswipe (Same Direction)                                  | 0.32% Crash Cushion              | 0.17% Dry with Icy Road Treatment    |
| 0.25% Sideswipe (Opposite Direction)                               | 0.02% Mailbox                    | 0.05% Wet with Icy Road Treatment    |
| 1.09% Approach Turn                                                | 0.22% Other Fixed Object         | 0.08% Snowy with Icy Road Treatment  |
| 0.25% Overtaking Turn                                              | 2.12% Involving Other Object     | 0.20% Icy with Icy Road Treatment    |
| 1.59% Parked Motor Vehicle                                         | 0.10% Road Maintenance Equipment | 0.06% Slushy with Icy Road Treatment |
| 0.00% Railway Vehicle                                              | 1.57% Unknown Accident Type      | 6.60% Unknown Road Condition         |

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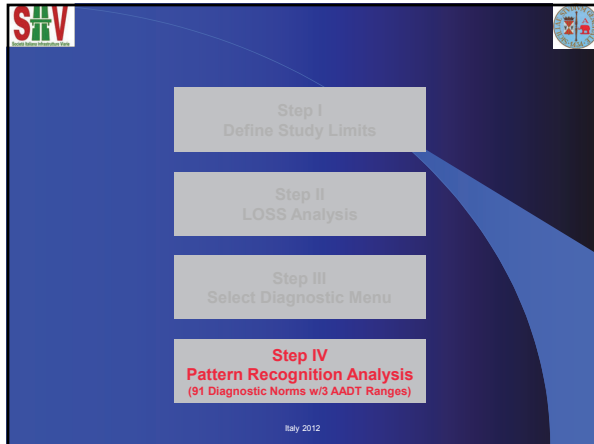
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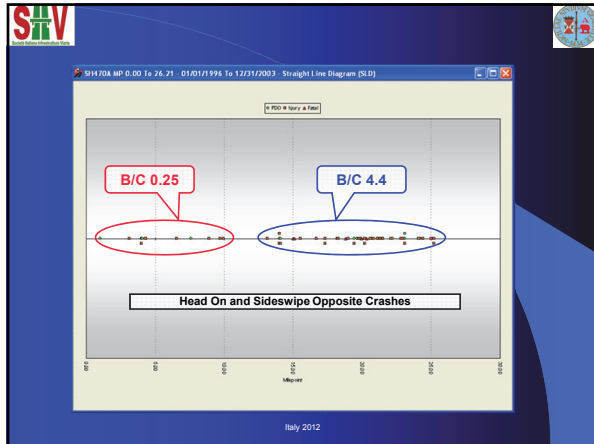
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# SPF Analysis in Concert with Direct Diagnostics Example #1 State Highway 88

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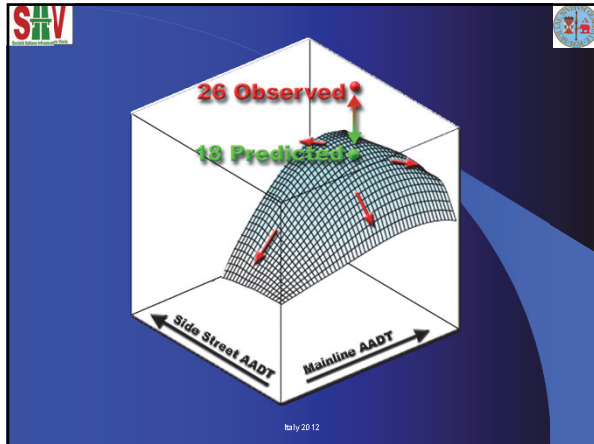
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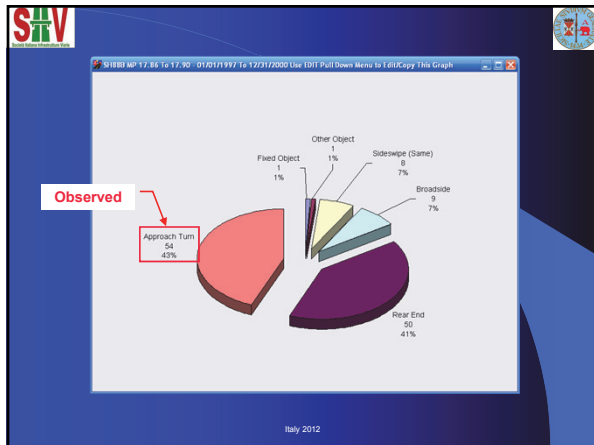
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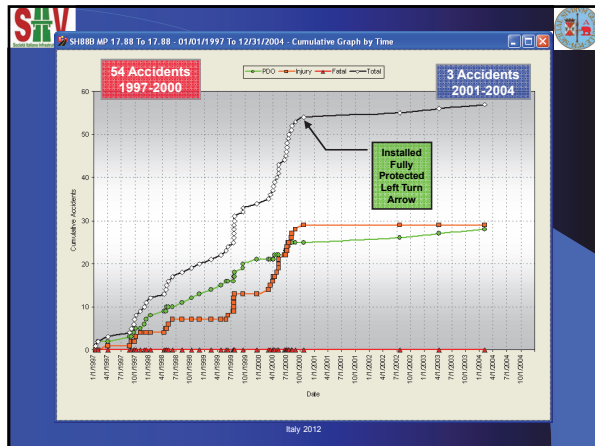
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SPF Analysis in Concert with  
Direct Diagnostics  
Example #2  
State Highway 40

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[illegible]

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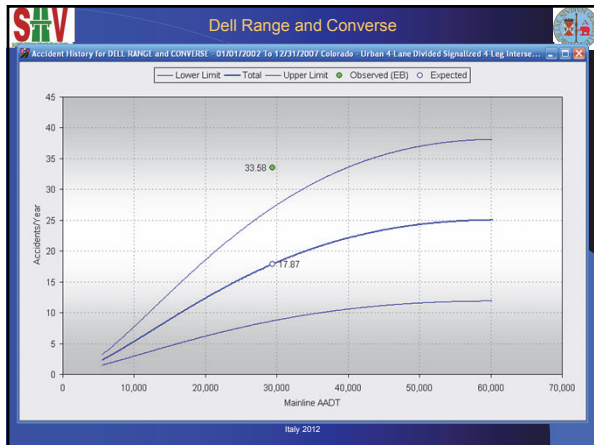
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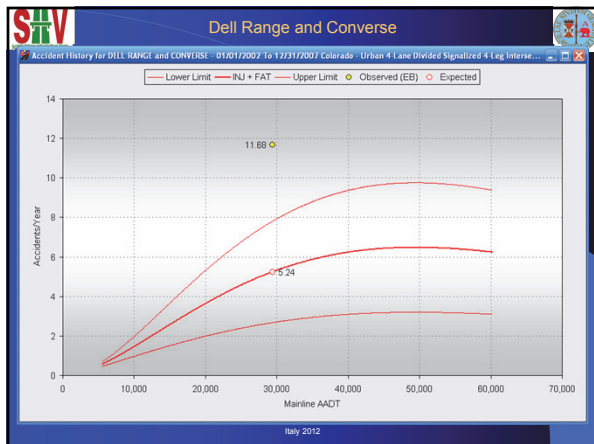
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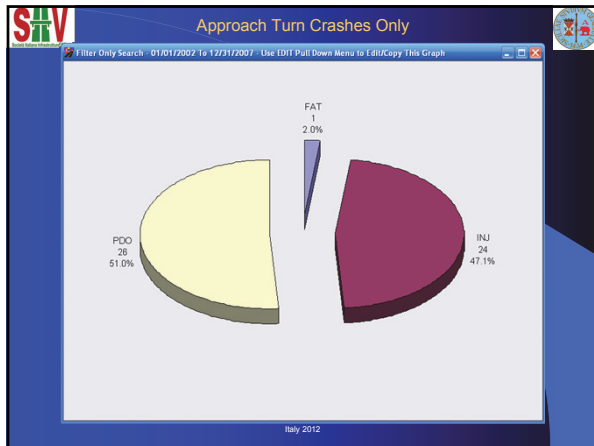
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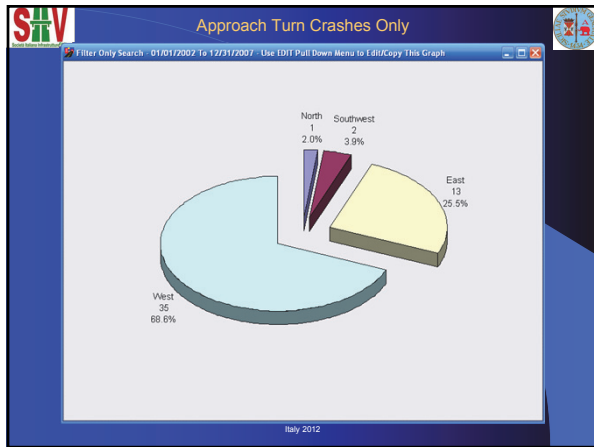
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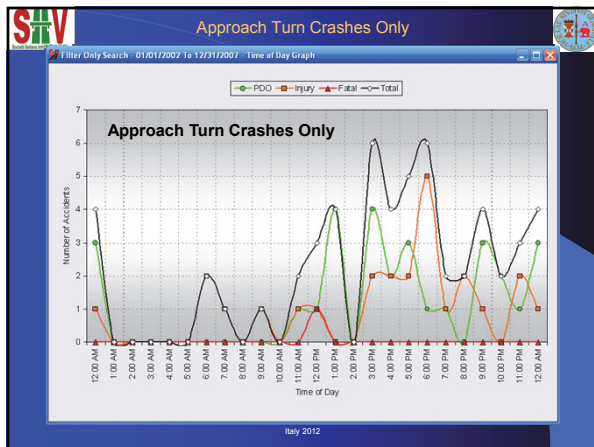
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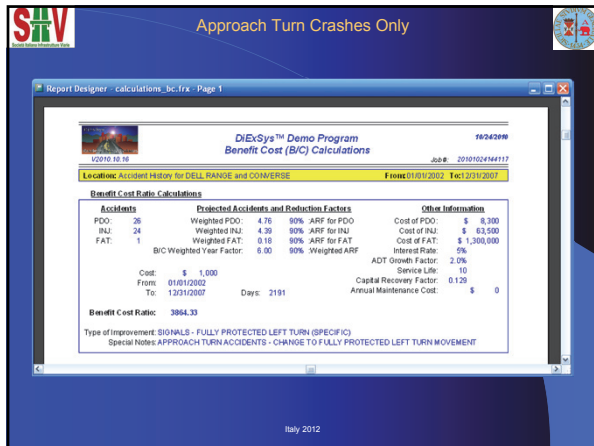
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