Background

Road authorities are being challenged to accelerate and enhance road safety programs, in conjunction with aggressive national and state goals and increasing calls to move "towards a zero death" vision. Meanwhile, the difficult economic climate has placed unprecedented burdens on public agencies to continue to "do more with less." As federal legislators are moving towards reauthorization of the Federal highway program, there is a growing consensus that the new law will place increased emphasis on accountability and transparency through implementation of performance metrics. The law is also expected to require renewed emphasis on rural road safety where a majority of road crash deaths occur.

Overview of usRAP

In 2004, the AAA Foundation for Traffic Safety (AAAFTS) initiated a pilot project to explore the technical and political feasibility of adapting the European Road Assessment Program (EuroRAP) to the United States. usRAP provides a method to benchmark the safety performance of specific road segments in comparison with similar roads, and is intended to complement other state highway safety management programs.

The primary objectives of usRAP are to:

- Reduce death and serious injuries on U.S. roads through a program of systematic assessment of risk to identify major safety shortcomings and address with practical road improvement measures.

- Ensure that assessment of risk lies at the heart of strategic decisions on route improvements, crash protection, and standards of safety management.

- Forge partnerships among those responsible for a safe road system.

- Supplement and complement ongoing state highway safety planning.

usRAP Protocols

Working in partnership with highway agencies, auto clubs, and other stakeholders, usRAP uses four protocols to enhance highway safety management. usRAP utilizes both historical crash data and safety-relevant roadway inventory data to produce color coded risk maps and star-rating maps, respectively. The four usRAP protocols are:

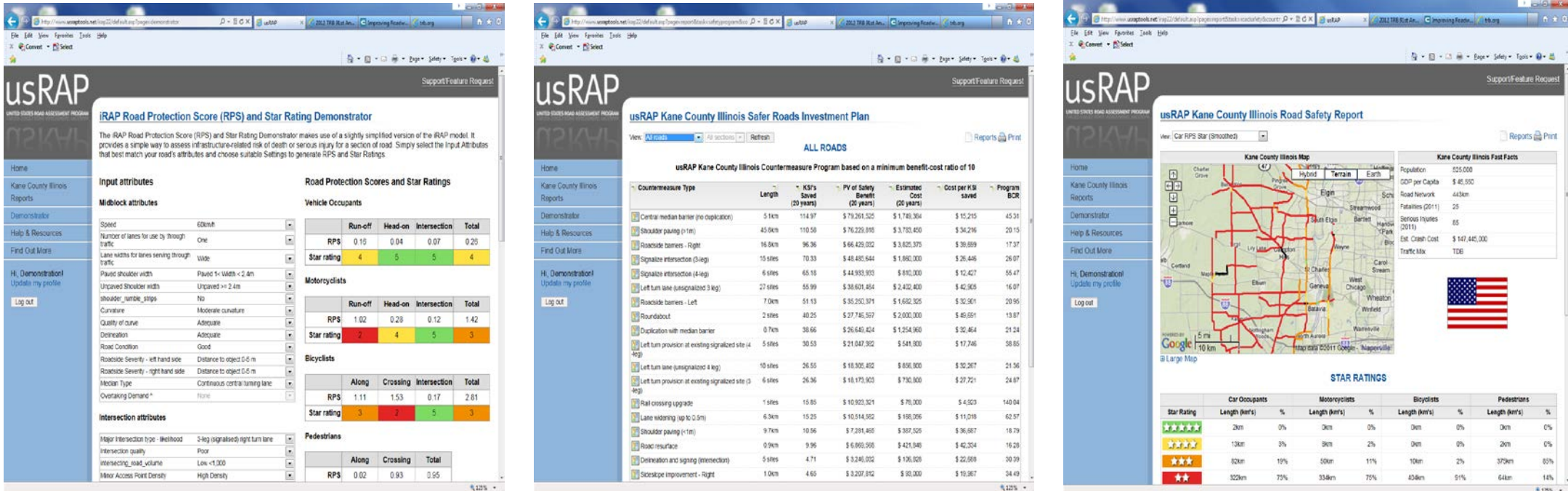| usRAP Protocols		
1 **Risk mapping**	To document the risk of death and serious injury crashes and show where risk is high and low	
2 **Performance tracking**	To monitor changes in the safety performance of the road system over time and relate those changes to ongoing safety improvement programs	
3 **Star ratings**	Based on inspection of roads to examine how well they protect users from involvement in crashes and from deaths and serious injuries when crashes occur	
4 **Safer roads investment plans**	From the same inspection data on which star ratings are based, to develop programs of cost-effective countermeasures to improve safety for specific highway networks	

1 - Risk Maps

Risk mapping has been extensively developed in pilot studies with highway agencies. usRAP uses four types of risk maps to document the safety performance of roads. These four types of maps are based on the following safety measures:

1. Crash density (fatal and serious injury crashes per mile)
2. Crash rate (fatal and serious injury crashes per 100 million vehicle-miles of travel)
3. Crash rate ratio (fatal and injury crash rate compared to average crash rates for similar roads)
4. Potential crash savings (number of fatal and serious injury crashes saved per three years if crash rate were reduced to the average crash rate for similar roads)

Based on analysis of historical crash data of deaths and serious injuries, these color-coded risk maps can be used to:

- Benchmark the relative risk of road segments and track safety performance over time.
- Allocate scarce resources based on real world risk.
- Support public education and enforcement programs.

United States Road Assessment Program: Pilots, Partnerships and Progress

Reg Souleyrette, University of Kentucky

Zach Hans, Iowa State University

Peter Kissinger, AAA Foundation for Traffic Safety

Doug Harwood, MRI Global

Improving Roadway Safety Programs Through University–Agency Partnerships
A Conference
November 2–3, 2011
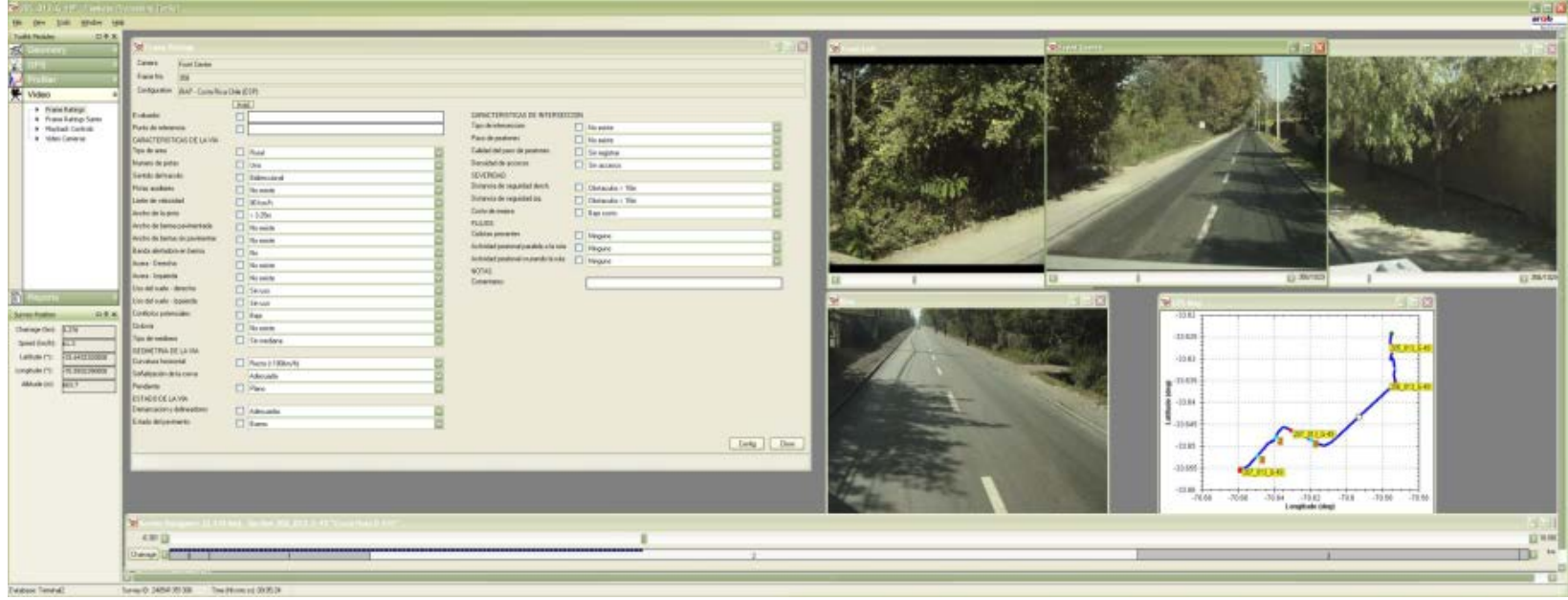The Keck Center of the National Academies
Washington, D.C.

3 - Star Rating Maps

Based on an inspection of design attributes linked to both the likelihood of a crash and being seriously injured if the crash occurs, these maps can be used to:
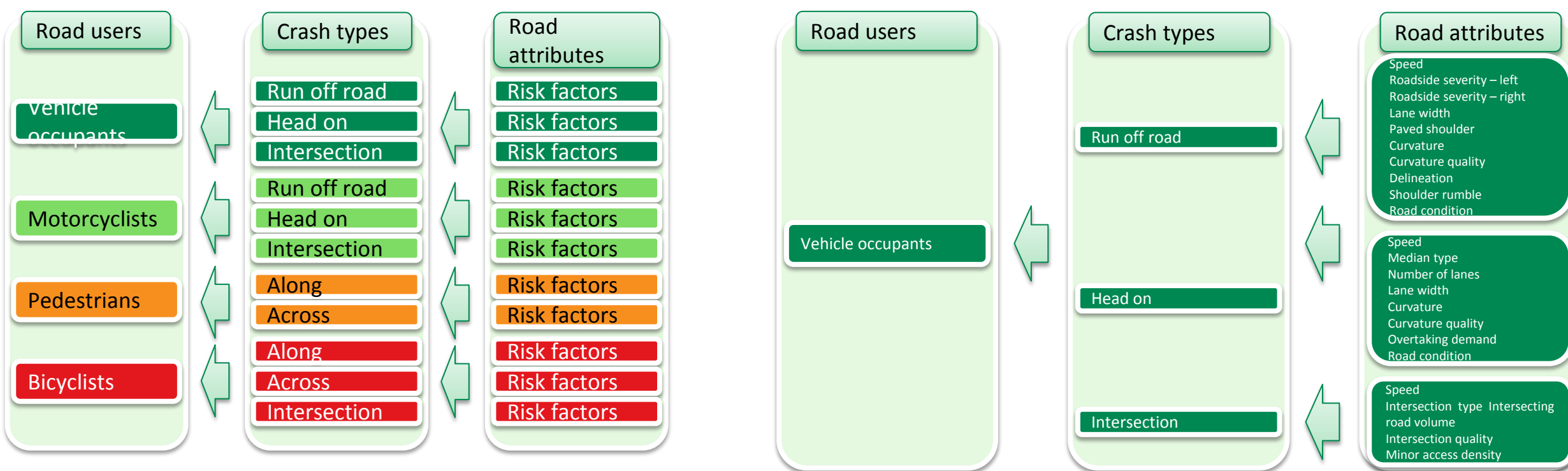
- Identify high risk roads, even where good crash data is inadequate.
- Provide specific guidance to local road authorities on cost-effective road safety upgrades.
- Support a "safest route app" for motorists.

Typical Inspection Vehicle

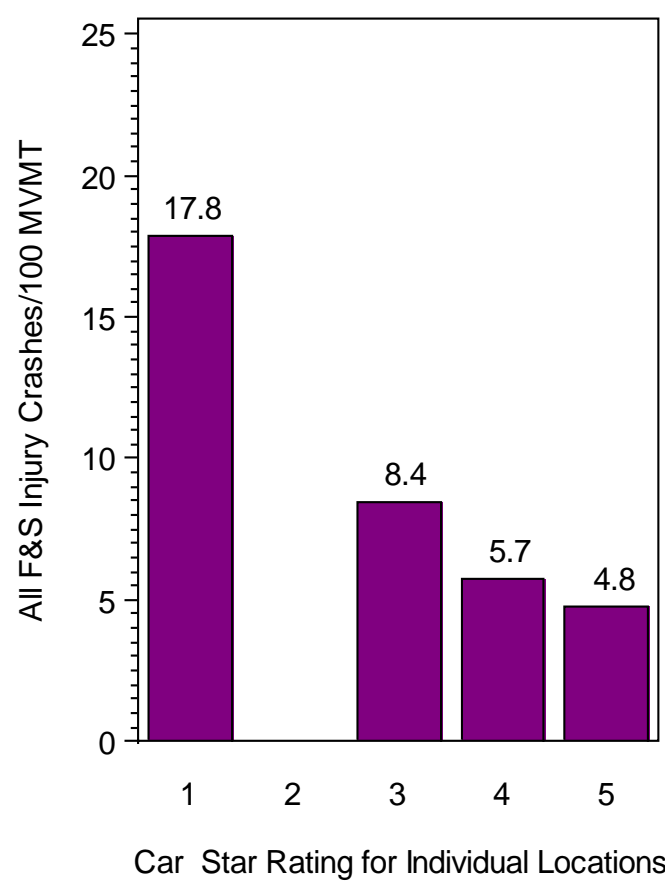**Coding Safety-Related Road Attributes**

Road Protection Scores

Example Roads for Each Star Rating: Car Occupants

Star Rating/Crash Relationships

All F&S Injury Crashes/100 MVMT for All 2U Roadways
Star Rating Based on Individual Locations

17.8, 8.4, 5.7, 4.8

Car Star Rating for Individual Locations

2 – Performance Tracking

Michigan Field Review

Crash Severity
- Fatal
- Major Injury

Vehicles
- 2 or More Vehicles
- Single Vehicle

Crash Type
11 = Overturn
21 = Angle Straight
31 = Head On

Example of field review data for a site selected from usRAP risk maps

4 - Safer roads investment Plans

- Safer roads investment plans were first developed based on star ratings by iRAP
- Applied in many low and middle-income countries
- Enables development of safety improvement plans based on road attributes without the need for detailed site-specific crash data

Potential applications:

- agencies without crash data
- agencies with poorly located crashes, not suitable for site-specific assessment
- any agency with good road inventory data and/or with video coverage of its road system

Safest Route App

Utilizing the usRAP star-rating protocol, the AAA Foundation for Traffic Safety and NAVTEQ are collaborating to provide motorists with the ability to plan their trips by selecting the "safest route" from point A to point B.

Progress

To date, usRAP has been piloted in eight states and three counties. The program is sponsored by the AAAFTS and Midwest Transportation Consortium (a USDOT UTC). Participating agencies have provided in-kind support of staff time and data. Current efforts are investigating the utility of the Road Protection Score (RPS) protocol, a tool that generates star ratings based on road design features. This protocol can be used in counties that don't have good crash data to help guide safety investment decisions.

usRAP, together with international partners, has developed software that can use the roadway characteristics data on which RPS scores and star ratings are based, to develop safer roads investment plans. These plans are based on benefit-cost analysis of alternative countermeasures for specific sites across an entire highway network.

- Phase I
- Phase II
- Phase III

★ RPS Validation – Washington, Iowa
★ Public Awareness Campaigns – Utah, Michigan

usRAP Benefits

Both highway agencies and road users will benefit from the information provided by usRAP. Agencies responsible for road safety can use the usRAP maps to see how well their road system is performing and to direct resources rationally toward systematic improvement of their road system. usRAP maps can also help individual road users to understand the risks involved in traveling on roads of different types and the safety performance of the specific roads that they travel. Risk-aware motorists may select lower risk routes, such as freeways, and will be more likely to adapt their driving behavior to reduce their risk of crash.

usRAP results can assist highway agencies in meeting Federal requirements including:

- Development of reports identifying 5% of sites with the most severe safety needs
- Documenting the eligibility for roads for improvement under the high-risk rural roads program

Partners

usRAP partners and members of the technical advisory panel include:

- AAA clubs
- American Highway Users Alliance
- Federal Highway Administration
- American Association of State Highway and Transportation Officials
- National Association of County Engineers
- Institute of Transportation Engineers
- American Traffic Safety Services Association
- Participating state and local highway agencies

usRAP operates in partnership with the European Road Assessment Program (EuroRAP) and the Australian Road Assessment Program (AusRAP) with coordination through the International Road Assessment Program (iRAP)

Kentucky

- Over 78,000 miles of public road
- 27,500 miles of state maintained highway

Summary Risk Mapping Data

KENTUCKY STATE PRIMARY AND SECONDARY HIGHWAY SYSTEM ROADS 2002-2006

Road Type	Sections	Road Miles	Average Length (mi)	Average AADT (veh/day)	Annual VMT (Billion)	Fatal & Serious Injury Crashes			
						Total Frequency	Annual Frequency	Annual Density	Annual Rate (HMVM)
Interstate/Freeway	129	1,082	8.4	22,065	8.7	1,532	2.07	0.25	3.06
Multilane Divided	255	592	2.3	11,480	2.5	911	8.71	0.31	7.35
Multilane Undivided	92	45	0.5	13,842	0.2	126	0.27	0.56	11.09
Two-lane Undivided	2,635	9,066	3.4	3,120	10.3	7,895	0.60	0.17	15.29
Total	3,111	10,784	3.5	5,524	21.7	10,264	0.66	0.19	9.44

www.usRAP.us