Adding To Your VE Toolkit:
Enhancing Value With Road Safety Analysis Within Value Engineering Studies

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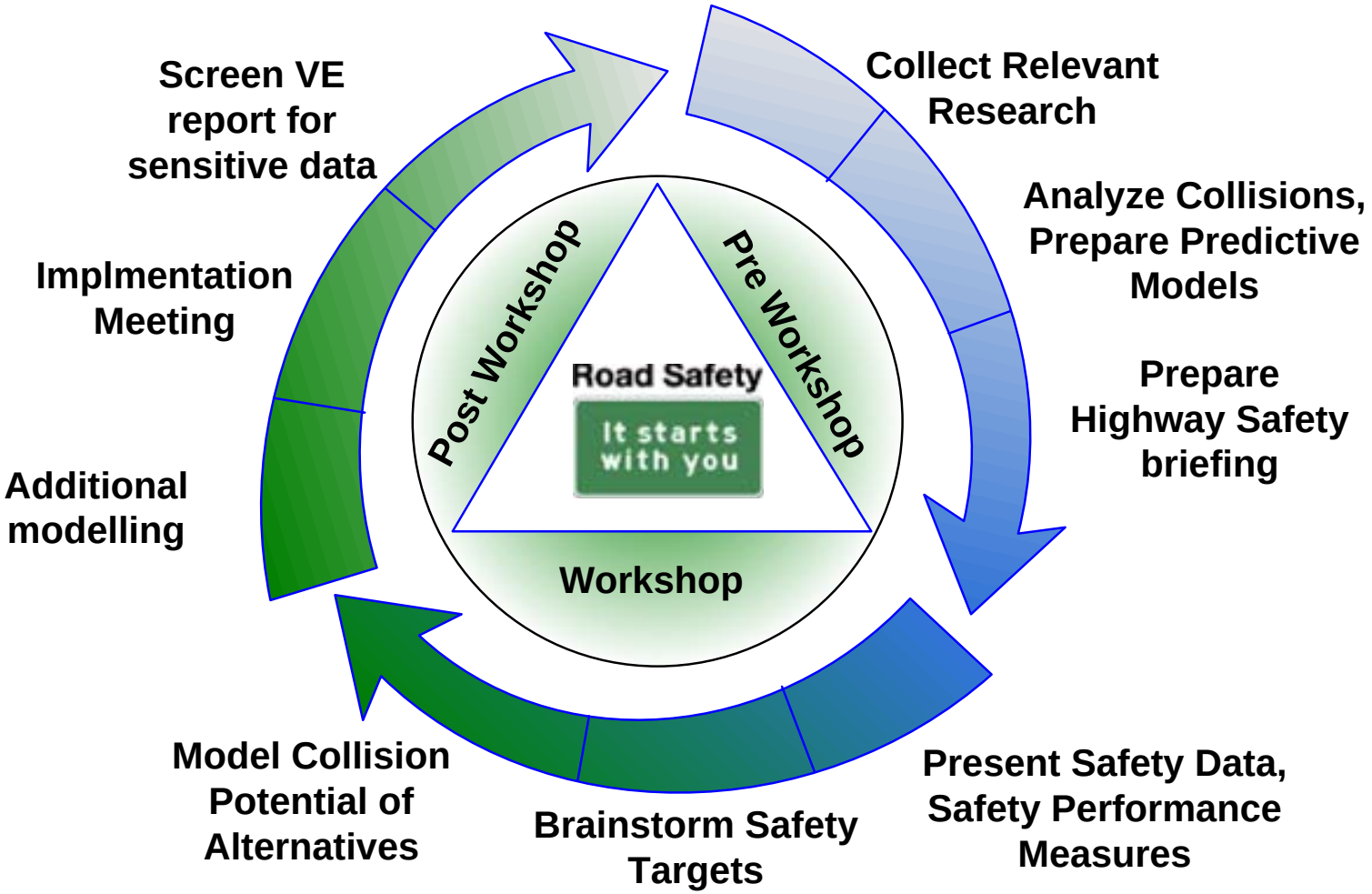
Topic Overview

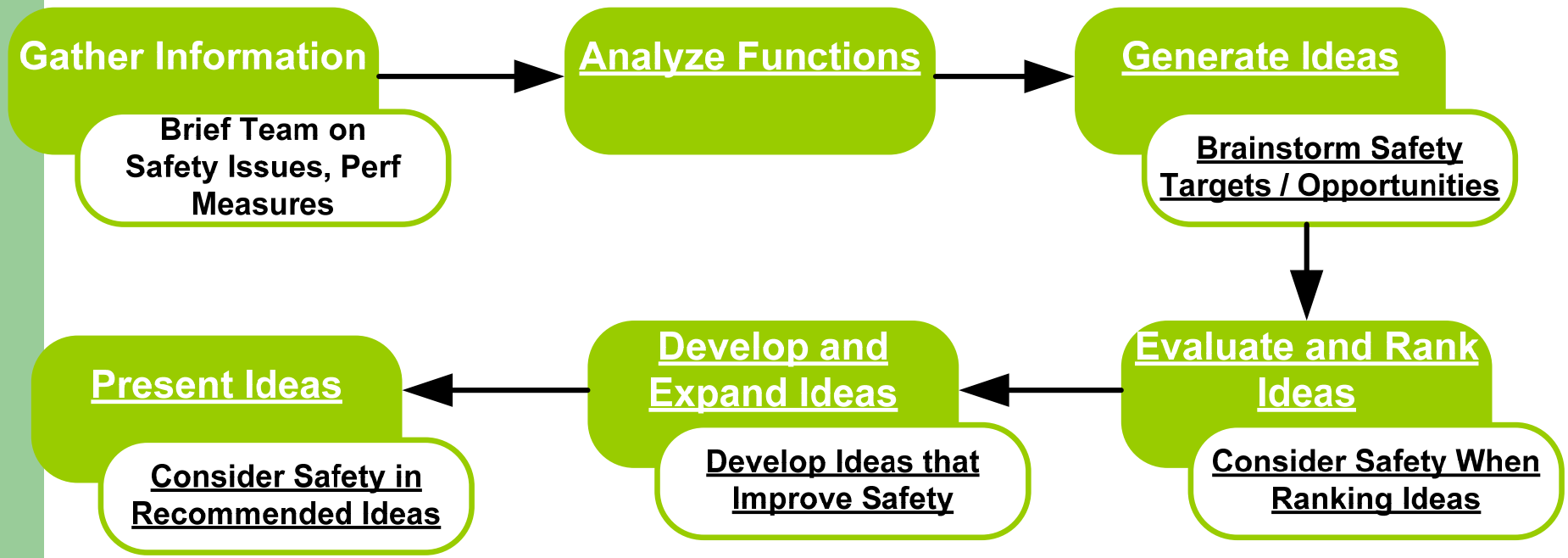
- *How to integrate Road Safety Analyis and the Value Methodology?*
- *Understanding of Risk-Based Road Safety Analysis Methodology*
- *Sample RSA on a real project*
- *MTO's role in the integration of these two tools.*

RSA in a workshop environment



Source: Steve Holmes

Integrating RSA into the Value Methodology



Source: Steve Holmes

Risk-Based RSA Approach

- Risk management approach
- Identification of risk feature
- Assessment of potential “impact”:
  - 0 to 1 scale reflecting collision severity
- Assessment of “likelihood” of occurrence
  - 0 to 1 scale reflecting likelihood

- Development of a quantitative index:

Risk Index = Impact x Likelihood

Source

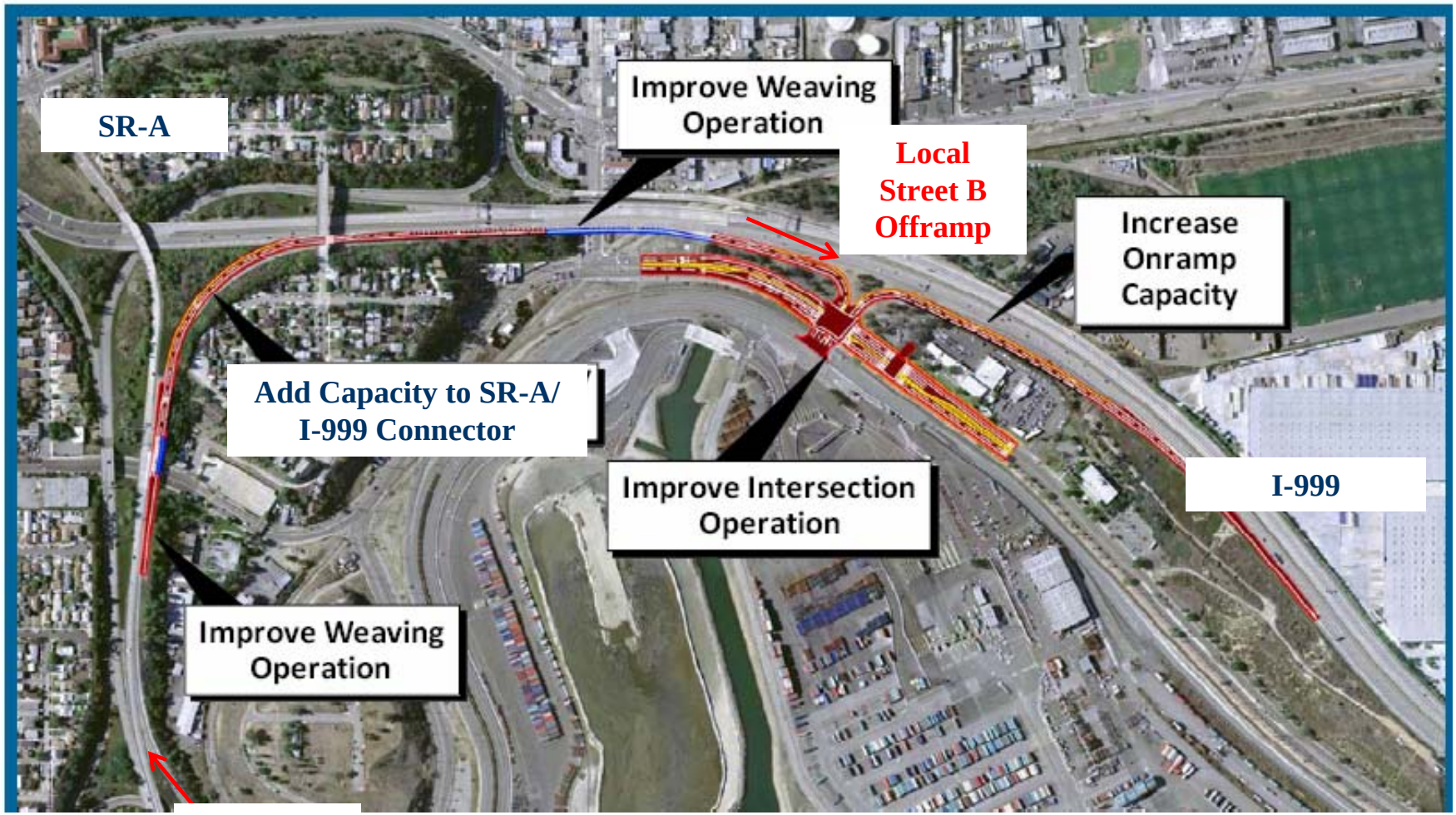
delphi MRC

SCAV CSVA

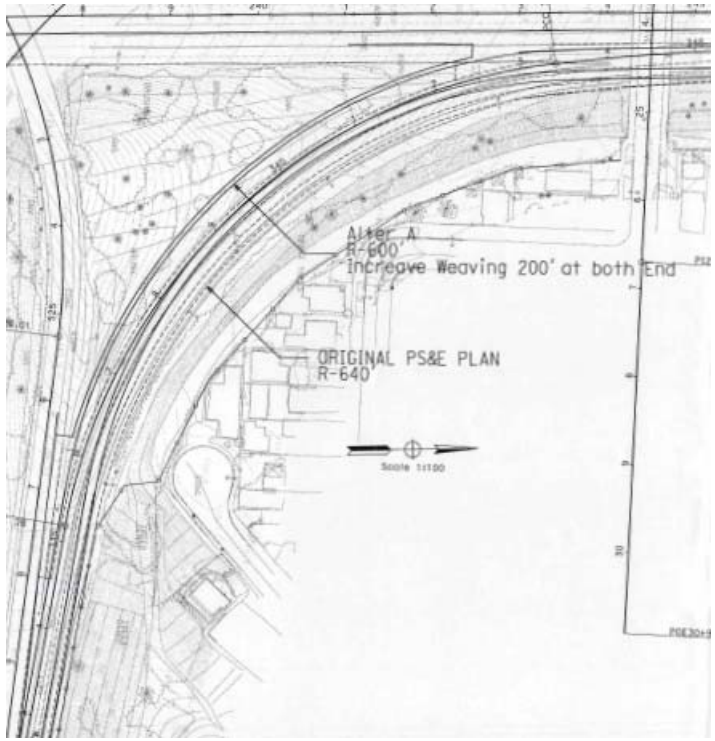
Some comments on Risk Index

- Subjective, based on expert judgement
  - Supported by accepted quantitative & performance-based safety analysis techniques
- Relative differences are key
  - Lower values are “more safe”
  - Higher values are “less safe”

Sample Project Analysis



Value Solutions to Address SR-1/ I-999 Weaving Condition



-Alt 5.1 "Move the Southbound SR 1/Northbound I 999 Connector Nose Downstream and the Connector/Northbound I 999 Nose Upstream" to gain 200 ft on each weave movement.

-This alternative was rejected based on the fact that this ramp radius would require the design speed be reduced from 43 mph to 35 mph.

-This reduction was due to the

Value Solutions to Address SR-1/ I-999 Weaving Condition

Alt 5.2 "Move only the Southbound SR 1 /Northbound I 99 Connector Nose Downstream" - increased the weaving distance by 300 ft. This alternative was rejected because it creates new mandatory design exceptions for deceleration length (DL). The DL in the Value Alt was 290 ft versus the standard for DL preceding curves is 420. The weaving distance would have increased from 430 ft to 730 ft.

Collision vectors used in this analysis

- Weaving
- Deceleration distance
- Ramp geometry
- Speed differential
- Driver expectation

Sample Project Risk Indeces

	Baseline	Alternative 5.1	Alternative 5.2
Risk element	Risk Severity Rating	Risk Severity Rating	Risk Severity Rating
Weaving	0.50	0.40	0.30
Deceleration distance	0.50	0.60	0.70
Ramp geometry	0.50	0.60	0.50
Speed differential	0.50	0.70	0.60
Driver expectation	0.50	0.60	0.60
Risk element	Risk Likelihood Rating	Risk Likelihood Rating	Risk Likelihood Rating
Weaving	0.50	0.50	0.50
Deceleration distance	0.50	0.60	0.60
Ramp geometry	0.50	0.50	0.50
Speed differential	0.50	0.60	0.50
Driver expectation	0.50	0.50	0.50
Risk element	Risk Index Calculated	Risk Index Calculated	Risk Index Calculated
Weaving	0.25	0.20	0.15
Deceleration distance	0.25	0.36	0.42
Ramp geometry	0.25	0.30	0.25
Speed differential	0.25	0.42	0.30
Driver expectation	0.25	0.30	0.30
Average Risk Index	**0.25**	**0.32**	**0.28**

Sample Project Findings

- Alternatives 51. & 5.2 slightly higher risk
- Average risk indices very close

- Justifies further analysis
  - Vehicle conflict analysis (SSAM)
  - Speed differential analysis (micro-simulation)
  - Weaving analysis (HCM or other method)

Conclusions

- Explicitly looking opportunities to improve value by tangibly improving safety Risk Based Road Safety Analysis quantifies the safety impacts of the proposed design and the VE alternatives.
- Models are used to assess the changes to safety resulting from VE recommendations.
- Where possible, the collision costs of the proposed design and VE alternatives are calculated.

- Ontario is the leader in using explicit Highway Safety evaluation techniques in VE studies.

Contact Information

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