

Addressing non-technical issues about CMF

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2011 TRB Annual Meeting

International Workshop on Transferability
of Crash Modification Factors (CMFs)

Framework

- Paradigms in road safety research
- Implications on knowledge
- External validity/Transferability
- Threats to external/internal validity and usage of CMFs
- How to increase the usage of evaluations beyond CMFs
 - System approach
 - Safety culture
 - Public action
- Exemple guardrails
- Recommandations

Paradigms in (road safety) research

- Paradigm=basic belief systems based on ontological, epistemological and methodological assumptions (Guba and Lincoln, 1994)

	Positivism	Postpositivism	Constructivism
Ontology	Naive realism « real »	Critical realism	Relativism « constructed »
Epistemology	Dualist/objectivist Findings true	Modified Probably true	Subjectivist created
Methodology	Experimental/manipulative Verification quantitative	Modified Quasi-experimental Falsification +qualitative	Hermeunetical/ dialectical

Implications on knowledge

	Positivism	Postpositivism	constructivism
Inquiry aim	explanation	Prediction control	understanding
Nature of knowledge	Verified hypothesis established as facts or laws	Falsified hypothesis established as probable facts or laws	Individual reconstructions + consensus
accumulation	Generalizations and cause-effect linkages		Informed reconstructions, experience
Goodness criteria	rigor		trustworthiness authenticity
values	excluded		included
voice	Desinterested scientists experts	Informer of decision makers	Passionate participant
training	technical	quantitative	qualitative
hegemony	In control	dominant	recognition

Criteria to judge the goodness or quality of an inquiry

Quantitative inquiry	Qualitative inquiry
Internal validity	credibility
External validity	transferability
reliability	dependability
objectivity	confirmability

External validity versus transferability

- **External validity**= ability to generalize findings across different settings
- Making generalizations involves trade-offs between external and internal validity. Limit the contexts to make generalizable statements
- **Transferability**= degree to which results can be transferred to others settings. If similarity of situation, assessed by the reader. The researcher has to provide the research context and the assumptions

Road safety research context on CMF

- Centered on outcomes: accidents and victims plus risk (exposure*frequency*severity)
- Quasi-experiments
- Researchers as evaluators of program/project/element
- Black-box approach in order to identify manipulative solutions (Cm factor or function)
- Road more as a technical object than a social object
- Meta-analysis in search of science-based « evidence », purely quantitative
- Informer for practitioners and decision makers

Threats to external validity

- No sampling model, but proximal similarity model (similarity principle)
- Over three components in dynamic (time dimension) interactions : road user/infrastructure/vehicle (see chapter 5 system approach by S. L.)
- Replication + meta-analysis = a solution against contextual variations (robustness principle)
- Country = the « synthetised context» discriminant factor (Elvik) ?

Threats to internal validity

- What you did in the intervention caused what you observed
- Must rely on Theory-based evaluation (explanation principle)
 - Accident models (sequential, epidemiological, systemic)
 - Theory of change (non linear engineering effect and behavioral effect, short and long-term effects))
 - Multi-level : network < sections < vehicles < road users (unit treatment)
- Depends on implementation process (organisational effect /degree and context of implementation)
 - Risk regulation regime as shaping actors' behavior

Threats to usage

- Best technology according to effectiveness does not mean used technology
- Diffusion process among a political, social and professional environment
- Role of translation by a road safety officer between researchers (pluridisciplinary) and transportation professionals : civil engineers, traffic engineers, transportation planners, urbanists, ...
- Articulation of safety into transportation programs

How to increase the usage of evaluations beyond CMFs

	Positivist CMF	Constructivist CMF
Ontology	road Engineering only	System approach
Methodology	Purely quantitative Quasi-experiment Analytic	Quantitative +Qualitative History Holistic
Models and theories	Black-box outcomes	Outcomes + implementation process
Evaluation findings	Manipulable solutions Instrumental and universal (generalizable probability)	Transferable explanations
Knowledge Transfer	Information to practitioners and decision makers	Safety culture Co-elaboration with practitioners and public
Policy	Cost-benefit	Integration Professionalisation

Exemple guardrails

- Physical barrier : Beam/concrete/wire/wood
(maintenance/performance according type of road and traffic)
- Norms from crash tests
- Median (isolate opposing traffic)
- Embankment (protect from obstacles, separate vulnerable road-users))
- Side-effects (motorcyclists in curve)
- Alternatives (remove obstacles)
- Context and standard
 - distance lane-obstacle
 - Speed/traffic

Recommendations

- Have multiple evaluations of the same kind of programs/projects/elements using different quantitative and qualitative techniques respecting the goodness criteria
- Specialization of evaluators in road safety able to co-construct a theory of change with the stakeholders and actors of the program
- Measure activities as outcomes at a multi-level
- Carry out critical reviews of evaluations
- Complete meta-analysis (quantitative evidence) by looking at evidence about the mechanisms and the contexts of change inside (inter)national committees
- Form translators between practitioners and researchers