The Development and Application of a Maturity Model to Understand Volunteer Driver Program Practices

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1   Introduction

Organized volunteer driver programs are emerging as solutions to fill the transportation service gap for those unable to meet their personal transportation needs independently with the private automobile and where taxi, transit or active transportation are unrealistic or unavailable options. Volunteer driver programs (VDP) are typically able to serve areas of low population density at a lower overall cost than paratransit services by using volunteer labour and vehicles (Beverly Foundation, 2008). They replicate the on-demand travel and social aspects associated with relying on friends and family for transportation, which is attractive to those who do not have access to a personal network. VDPs can be stand-alone programs, extensions of non-profit or charitable activities, or in some instances in the United States, are integrated as part of rural transit (Schlachman, 2009).

There is limited understanding of these programs from a transportation engineering and planning perspective, which includes the relationship to travel behaviour, feasibility, and potential for expanded operations in underserved areas. It is unclear exactly how many Canadians rely on such programs and the degree of their reliance, though Hanson (2018) reported data from the 2012 Canadian General Social Survey that approximately 230,000 Canadians received help with transportation from professional sources, including from volunteers.   Canadians that do rely on such programs can be expected to have a vested interest in ensuring the continued success of operations, while others looking to transition from driver to passenger may desire an option that allows them to maintain equivalent levels of independence. Numerous resources exist to guide new and existing VDPs; however, the resources are "best practice" based, with focuses on developing business plans, completing legal requirements, and tailoring their service practices. There is little, if any, scientifically-based guidance for supporting VDP operations that could assign degrees to best practices, and associate practices with groups of varying attributes, such as ridership or budget.

This paper summarizes recent efforts to quantify the types and levels of best practices employed by successful VDPs in New Brunswick through the development and application of a Maturity Model that quantified how groups define, manage, measure, and control key processes. These were explored in terms of organizational attributes (e.g. budget, number of users) of seven VDPs participating in the research. Quantifying the effects of organisational factors will provide existing VDP the tools to self-evaluate and provide a resource for future VDP to consult.

2   Background

Volunteer Driver Programs (VDP) are typically not-for-profit groups or charities that have an organizational structure and processes that they employ in order to meet organizational goals. It can be expected that there is a relationship between the size of the organization and the sophistication of its processes; the more users, the greater the budget, the greater the need for accounting tools, for example.

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The approach to understanding the relationship between organizational processes and the sophistication of these processes has been explored in engineering through the use of Organizational Maturity Models.

2.1 Introduction to Maturity Models

Maturity is often measured by attributing a "process" a level somewhere in a range of maturity, the lowest being chaotic or ad-hoc while the highest is often defined as a mature process with improved quality and continued optimization. The Organisational Maturity Model first became prominent in the software manufacturing industry (Finnemore et al. 2000) shortly after the development of the Critical Success Factor method (CSF) in the late 1980s. The concept of the CSF method was redeveloped into the Capability Maturity Model (CMM) (Aho, 2009) created to evaluate an organization's "ability to perform" through maturity. This method of "objective" modeling has been applied to many areas beyond technology and engineering, notably risk management and business process optimization (Hamel, 2009). The assessment of the maturity of a process at the organisational level entails determining the extent to which the process is defined, managed, measured, and controlled (Drofman and Thayer, 1997). Maturity in this case can be viewed as a combination of actions, attitudes, and knowledge (Anderson and Jessen, 2003) which is commonly assessed through observations of the practices performed within an organisation.

2.2 Application of Organizational Maturity Models to Volunteer Organizations

Organizational maturity models in civil engineering have included applications to the construction management sector, including Standardised Process Improvement for Construction Enterprises (SPICE) (Sarshar et al, 1999) and Fuzzy Industry Maturity Grid (FIGM) (Tay and Low, 1994). SPICE, for example, assesses maturity at five levels, and the process is considered "mature" when all of the process enablers are fully satisfied, though is limited in assessing organisations of simple complexity (Willis and Rankin, 2011). FIGM relies on professional opinion to create an analytical hierarchical process, followed by a process to determine whether organizational characteristics are "mature" or "immature", though Willis and Rankin presented further criticisms for this model that stem from the binary nature of qualitative measurement and the lack tangible measurement to assure validity in the process and results of the model.

The Construction Industry Macro Maturity Model (CIM3) views the construction industry as being comprised of key practice areas (KPA) made up of "key practices" and has been applied to volunteer construction organizations (Perreira, 2017). A "key practice" is an approach in which the construction industry seeks to achieve a specific objective. The approach may be described as an activity, set of activities, regulations, and/or infrastructure that are relied upon to achieve various objectives. Each key practice is assessed to determine the industry's capability with respect to that key practice which is attributed a level of maturity. Maturity in this model is defined as having three tiers: immature, transitionally mature, or mature, for key processes which form the lowest hierarchical tier of the model. An average maturity of key practices determines the maturity of their KPA, the second level of the hierarchy. The third and top tier of the hierarchy is the overall maturity of an organisation or industry which is calculated from the average maturities of KPAs. Averages that are calculated in this model can be weighted to better reflect complex organisations or industries that are well understood.

Given the CIM3 approach has already seen application to volunteer organizations in construction management, with well-defined approaches for scientific analysis, it appears logical to extend this approach to volunteer organizations in transportation. This requires the identification of organizational best practices and levels of maturity for those practices.

Goudreau & Hanson

2.3   Best Practices in VDP literature

There are several widely available sources for VDP information. One of the earliest is the case-study based "Succeeding with Volunteer Transportation" written by Dennis Studebaker in 1990. In 2004, the Beverly Foundation, with the help of AAA Foundation for Traffic Safety catalogued and studied over 400 volunteer driver programs, documenting this work into a series of reports and fact sheets. The document did not attempt to present overarching best practices that could be adopted by groups, rather it catalogued service attributes and served as a toolkit to aid in the development of future groups. Though larger in scope than Studebaker's 1990 tool-kit, it continued to be case-study based. Later work by the Beverly Foundation catalogued VDP practices which culminated in the report: Volunteer Driver Recruitment: an idea book for action by Kerschner (2006) with contributions from 140 volunteer groups from 38 states. The Beverly Foundation further expanded this with another report in 2008 that addressed many of the same topics covered by Studebaker in the 1990s but sourced its conclusions from a larger sample of VDPs across multiple states and developed some common definitions. Many of the organizational alternatives that were provided for each component were not given the term "best practice" or formally recommended, rather they were situationally determined based on the needs of the reader's program.

Soon after the series of reports from the Beverly Foundation were published, the Rockingham Planning Commission in New Hampshire released its own guide document for volunteer driver programs (called "brokerages") which identified "best practices" and recommendations (Schlachman, 2009). The significant literature review drew from numerous groups involved in community transportation including: Beverly Foundation, CTAA, TRB, Easter Seals' Project Action, and FTA's United We Ride initiative. Schlachman listed best practices (or Key Practices "KPs") which she believed had consensus as significant contributors to success and included 42 best practices within the following five categories:

- Volunteer Roles, Recruitment, and Retention
- Service Delivery
- Funding and Compensation
- Marketing
- Leadership and Sustainability

"Risk Management" as an explicitly defined best practice was absent from this literature, though elements such as appropriate insurance have been part of earlier case-study guides. Risk Management as a defined best practice did find its way into a VDP document prepared by Washington State (2013).

3   Methodology

The following sections describe the methodology to choose and apply a maturity model to VDP.

3.1   Choosing a VDP Maturity Model

The most applicable organizational Maturity Model to this VDP research was the Construction Industry Macro Maturity Model (CIM3) by Willis and Rankin (2009). Willis and Rankin developed a three-tiered approach in CIM3 to limit complexity by restricting the number of maturity increments when evaluating industries on a macro scale. This approach is directly applicable to this research where the goal was not necessarily to evaluate the performance of a specific group, rather to gain a better understanding of the maturity of the practice among groups, in the absence of any indexing information. This limitation on complexity includes the added benefit of simplifying the data collection process, reducing response burden on the volunteer programs. One limitation of applying CIM3 levels directly to VDPs is that there is not a provision for a "not practiced" level; it can be expected that processes in construction management are sufficiently defined that only relevant processes are evaluated, while for VDP it is possible that a best

practice is "not practiced" at all. Organizational maturity of a process for VDPs is presented as four levels Table 1.

Table 1: Assessed Levels of Maturity (Adapted from Willis and Rankin, 2009)

Not Practiced (0)	A key practice is not used
Immature (1)	Use of a key practice is ad-hoc.
Transitional Mature (2)	Use of a key practice is standard.
Mature (3)	Use of a key practice is proactively managed.

## 3.2 Developing KPA of VDP Maturity

Schlachman's (2009) KPs and KPAs formed the basis for the KPAs used in this research but were adapted to account for a Risk Management KPA. The final KPA and their definitions are summarized in Table 2:

Table 2 KPA Summaries

Volunteer Driver Recruitment and Retention	The ongoing effort to recruit and retain a volunteer driver group.
Service Delivery (Quality Assurance)	The ability for organisations to provide a high-quality service which leverages advantages in its service area.
Cost Effectiveness and Funding	The mechanisms emplaced to ensure fiscally sound operations for service, reimbursement, and the pursuit of funding sources.
Leadership and Management	The awareness of managers of how the program is operating and how reliable can key positions be effectively performed.
Risk Management	The measures which are employed by the organisation to limit and reduce risk.

The CIM3 structure defines three hierarchical levels for maturity models, the results of adapted for VDPs can be seen in Figure 3. The bottom level is the maturity of individual Key Practices (e.g "How organizations promote volunteer recruitment"), the second is the maturity of a Key Practice Area (e.g. Volunteer Driver Recruitment and Retention), while the third and top level is the overall maturity of a program. The key practices are individually measured from observations or from survey responses based on the four tiers in Table 2, with scores aggregated to determine the maturity of the higher tiers.

Figure 1 Applied VDP Maturity Model Hierarchy

Goudreau & Hanson
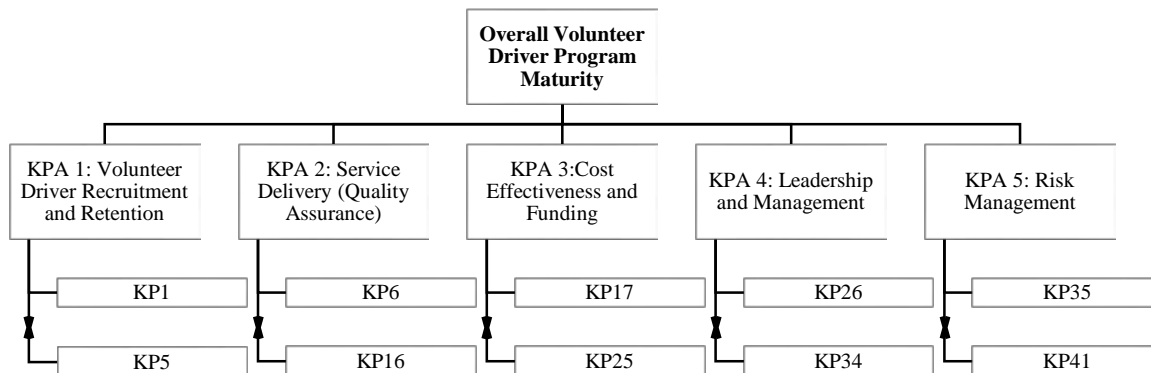
3.3 Developing Key Practices for KPAs

The key practices used in maturity models are typically identified as fundamental processes for the completion of goals. The goals are organised into relevant KPAs made up of multiple key practices as described above, though this does not exist in the literature for VDPs. This maturity model used the best practices outlined in the literature as a basis for determining key practices which contribute to KPAs.

3.4 Relative weights of KPAs and Key Practices

Given the scarcity of literature in this area relating to VDPs, it is unclear whether any one practice or practice area is more "key" than another. Methods the FIGM model evaluate relative importance based on scoring from a variety of professionals, but accuracy is subject to the industry being well understood and limited in complex interactions (Tay and Low, 1994). This understanding does not yet exist for VDP; therefore, KPA and key practices were be given equivalent weights within their own categories, the same method as the SPICE model.

3.5 Target Population, Survey Participation and Data Collection

The target population for data collection was from VDPs that primarily service a clientele outside of urban New Brunswick. Eligible VDPs where those where "volunteer driving" was the primary activity of the organization; this excluded organizations where volunteer driving was a component or extension of their overall activities. Respondents were solicited from organizations that participate (or invited to participate) in an informal association of provincial volunteer driving organizations. The project was reviewed and approved by the UNB Research Ethics Board (REB #2017-156).

A questionnaire and introductory letter were circulated to participating VDPs where respondents were asked to associate a Maturity level to 41 practices within five KPAs. Questionnaires also solicited VDP attribute information such as budget, number of users, number of volunteers, number of users over the age of 65 years, and age of the program. A draft questionnaire was circulated for feedback on length, wording, and clarity and used to finalize the questionnaire.

4 Results

Seven VDPs operating in rural New Brunswick responded to the questionnaire. Initial observations in the data suggest that there were three natural divisions among VDP according to number of riders (Small, Medium, Large number). There was a strong positive linear correlation between number of riders and group budget (R^2=0.82), suggesting that even though groups were independently organized and can operate in different geographic areas, the rate of budget increase per increase in number of riders appears to be fairly constant.

The VDP profiles of responding groups are aggregated in Table 3 according to number of riders, with a minimum of two responding groups per category, with data aggregated to prevent the association of data to an individual respondent. Values that could not be presented as an average of at least two numbers were suppressed.

Table 3 Aggregated VDP organizational attributes grouped by number of riders

	Small VDP (50 or fewer riders) Avg.	Medium VDP (50 – 100 Riders) Avg.	Large VDP (100 – 300 Riders) Avg.
Avg. Budget ($1K)	*	$55	$141
Avg. Age (years)	1	4.8	6.2
Avg. # of Paid Staff	0.5	1.5	1.7
Avg. % Riders Age 65+	65%	49%	*
Total Riders in sampled VDP			760
Total Paid Staff in sampled VDP			9
Total Volunteers in sampled VDP			129
			suppressed due to insufficient or incomplete responses

4.1   Maturity of Key Practice Areas

The average overall maturity score was lowest for the small VDPs, which was expected as fewer riders and volunteers, and smaller budgets, likely limit their need of sophisticated processes. Interestingly, the groups with the highest maturity scores were Medium-sized VDP, shown in Table 4.

This finding may indicate that some key practices measured in the survey are transitional in nature, that is, that groups might identify practices as "key" at different group stages. In this case, as groups move from "Small" to "Medium", they may need to increase the sophistication of certain processes in Volunteer Recruitment & Retention, Service Delivery, and Risk Management, but in going from "Medium" to "Large", they may not need to retain the same sophistication of certain processes to remain effective. Further research is needed. The level of maturity for "Cost Effectiveness & Funding" and "Leadership & Management" do increase with group size, which is more consistent with expectations (i.e. the greater the budget and organization size, the greater need for more sophisticated processes in those areas).

Table 4 Overall and KPA Maturity Scores

Average and Maximum Maturity Scores out of 3	Small Avg.	Medium Avg.	Large Avg.	All VDP Avg.	Max.
Overall Maturity	1.2	2.0	1.8	1.7	2.1
Volunteer R&R	1.0	2.1	1.7	1.6	2.4
Service Delivery (QA)	1.2	2.0	1.7	1.6	2.1
Cost Effect. & Funding	0.8	1.6	1.6	1.4	1.9
Leadership & Management	1.4	2.2	2.3	2.0	2.8
Risk Management	1.4	2.1	1.7	1.7	2.3

4.2   Maturity of Key Practices

Individual key practices which make up KPA were investigated to determine where VDP prioritize thorough management and where more ad-hoc approaches are implemented. Table 5 presents the highest and lowest average maturity scores for each KPA as a way to identify the most (and least) relevant practices to successful VDP in New Brunswick.

Goudreau & Hanson

Table 5 Highest and Lowest Average Maturity Scores

Key Practice Area	Avg. Key Practice Maturity Score		Key Practice	Maturity Frequency (n = 7)			
				3	2	1	0
Volunteer Recruit. & Retention	Highest	1.9	How organizations promote volunteer recruitment	1	5	0	1
	Lowest	1.3	How the geographic distribution of drivers and riders is considered when targeting areas for volunteer driver recruitment	0	3	3	1
Service Delivery (Quality Assurance)	Highest	2.6	How organization determines reimbursement rates	5	1	1	0
	Lowest	0.9	How organizations choose which volunteers to contact when scheduling drives	1	0	3	3
Cost Effectiveness and Funding	Highest	2.6	Pursue multiple funding sources for the organisation	6	0	0	1
	Lowest	0.1	Encourage volunteers and riders to schedule their own drives through mutual agreement	0	0	1	6
Leadership and Management	Highest	2.9	Record organisation travel statistics	6	1	0	0
	Lowest	1.3	Maintain available replacements for key positions	2	0	3	2
Risk Management	Highest	3.0	Perform criminal background checks on potential volunteers	7	0	0	0
	Lowest	0.9	Maintain available replacements for key positions	2	0	3	2

Two key practices stand out as being ubiquitous at a high level of maturity: "Record organization travel statistics" and "Perform Criminal Background checks". This suggests that a high level of maturity is necessary for these processes regardless of the size or age of the organization. Other highly mature processes were "techniques to determine reimbursement rates" and "pursue multiple funding sources for the organisation".

One practice which was cited in the literature as key to success was the application of the "volunteer friends" model. The concept is to promote positive relationships between volunteers and riders who have become "friends" so that they might schedule their own drives without the need of the dispatcher, theoretically reducing the organizational burden on the dispatcher. No successful VDPs in the sample consider this a "key practice".

5   Conclusion
The application of a "maturity model" approach led to a much clearer understanding of the relevance and maturity of processes employed by VDP operators in New Brunswick. This could be used for self-analysis by groups looking to measure their progress towards desired goals related to KPAs. These metrics may be used to help managers guide the evolution of their programs over time, as they respond to changes in their environment or growth of their user base. The data suggest that trends may be evident among VDPs grouped according to number of riders, and that there is likely a connection between levels of maturity for

Goudreau & Hanson

particular processes and certain group sizes, though not for all Key Practice Areas and Key Practices. It is possible that some Key Practices are transitional in nature, meaning that they are necessary in certain stages of group development, but may not be necessary at a high level of sophistication in the long term. Further research is needed. There was a strong positive linear correlation (R^2=0.82) between number of riders and overall budget, suggesting that even though groups were independently organized and can operate in different geographic areas, the rate of budget increase per increase in number of riders appears to be fairly constant.

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