transfinder

The Desirability Factor in a Routing Algorithm

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Each and every day Pupil Transportation Departments in school districts across the country better understand the importance and value of the "desirability" factor in transporting students. Where and when students are picked up and dropped off from school or activities affects not only their charges, but also a host of others, including their drivers, parents, teachers, coaches, and the entire community.

Making the student experience ***desirable*** for all constituents and from a number of factors – safety, of course, being at the top of the list – is essential. Otherwise phone calls from parents and complaints from district administrators could flood their desks on an ongoing basis. They cannot afford to "hold their breath" while implementing a new transportation management system. They need to know it will work.

All routing software solutions need to keep this in mind. While software is always intended to make the user's life easier, more efficient, and cost effective, routing software holds a special place among software solutions, as the welfare of students is at stake and at the heart of all the features built into the software.

As a result, real world conditions, including the landscape of the district, natural or man-made hazards in driving paths, and the demographic profiles of their student body, affect how bus routes and stops are determined. Moreover, changes continually occur that involve road repairs, construction, and new housing developments that affect pupil transportation logistics.

For these reasons, routing software should not be fully computerized. Rather it needs to be "enabling"

to allow transportation directors to incorporate their local knowledge of real-world conditions and their experience with the community into what will become their own customized transportation management system.

Once safe and realistic stops for the district are selected, the power of a computerized software system can then be unleashed, automatically optimizing the routes between stops for time or for distance. Even as the routes are optimized, transportation directors are still in control. They can select which factor – time or distance – is more important to the safety, efficiency, and cost effectiveness of their department's operation.

OPTIMIZATION: EXPECTED OUTCOME

All software is mathematical in nature as it is built upon computer science coding methodologies. Routing software also includes GIS (Geographic Information System) methodologies as geography plays a major role in defining reasonable routes and stops. In addition, the goal of all routing software solutions is optimization.

The more optimized the routes are, the more efficient the operation, and the more value received from an investment in a routing software solution.

But it must be kept in mind that optimization – if it is to work properly – is an expected ***outcome*** of intelligent planning and implementation, not a starting point. Transportation directors need to consider the unique characteristics of their district's landscape, where schools are located, where students live, their demographics, and where bus drivers should travel to ensure the safe transport of their charges each and every day.

For example, if optimization is the starting point, and routes and stops are built solely by using a mathematical algorithm, there is no room for incorporating real-world conditions into the solution until after the fact. Once the stops and routes are hard-wired, so to speak, it becomes extremely time-consuming and much more difficult to make adjustments for actual conditions, bus travel times, or realistic student rider-ship levels.

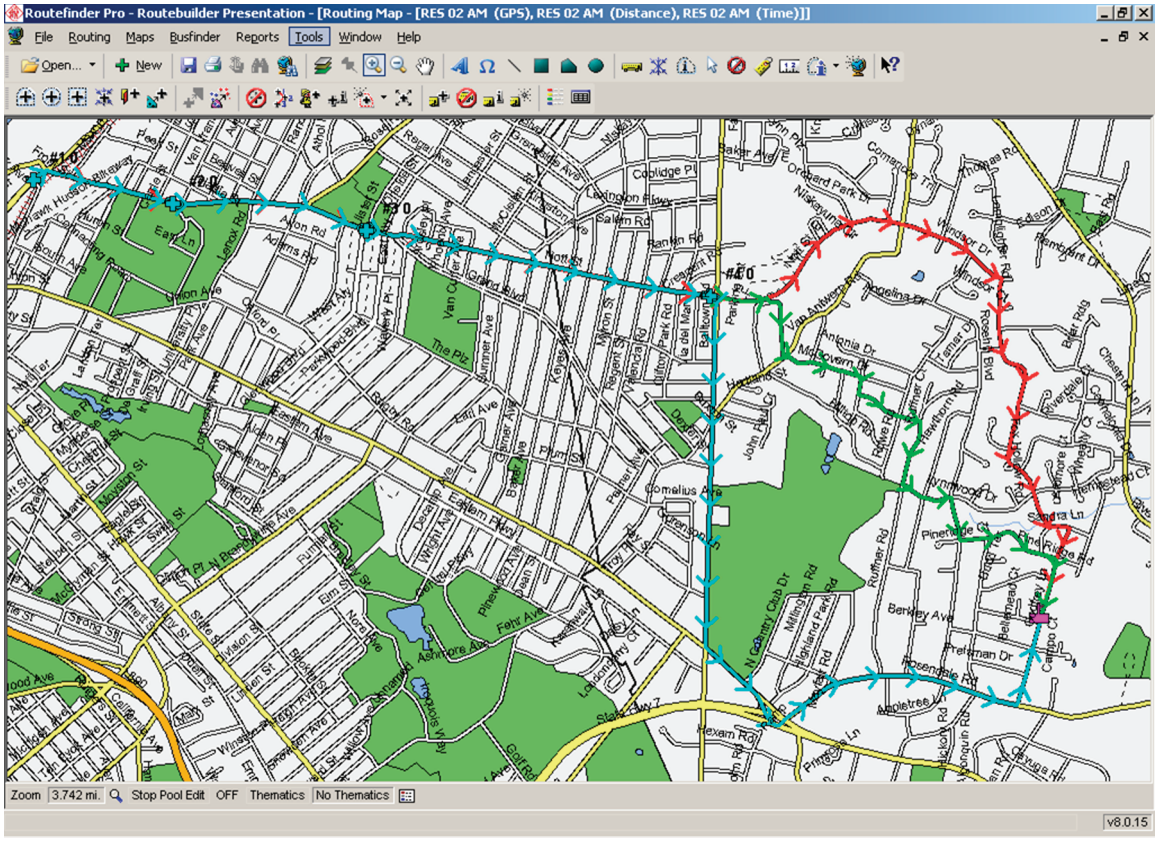
The reality is that only seasoned transportation directors can determine the safest bus stops based on their knowledge of the school district. An important function in transportation management software is the ability to employ a mathematical algorithm to create optimized routes based on the stops determined by transportation directors.

Then they can employ "what if" scenarios that capitalize on their knowledge of their own district to create the best, safest, and most efficient transportation management system.

INTELLIGENT PLANNING

Dan Roberts of Round Rock ISD in Texas, a pioneer in developing routing and logistics software solutions, who also conducts on-site management reviews of pupil transportation systems as well as teaches a number of classes to certify school transportation personnel, once believed a computerized system could automate everything. But he has since changed his mind. "Many years ago I had a philosophical change and now take an entirely new approach to computerized transportation systems.

As a result, I urge other school districts and everyone on the transportation team at Round Rock to physically examine every site for proposed



Three routes to the same school are shown on this map. The blue route is optimized for fastest time, yet the bus travels across a main arterial. The green route is optimized for shortest distance, yet the bus travels through several small neighborhoods. The red route is the one planned by the transportation department, as best suited to the geographic landscape and demographics of the district.

bus stops, because a computerized system cannot detect risk factors, such as heavy traffic volumes, line of sight obstructions, or other unacceptable risk factors, such as abandoned buildings nearby."

Roberts asserts that the primary role of a transportation system in a school district is to ensure the safety of students, and to do so, no transportation department can rely solely on a software solution. Roberts added, "Once due diligence is completed and each bus stop meets safety requirements, then the system is extremely useful in creating efficient, safe bus routes and determining other things, such as walk zones, redistricting, as well as providing an online interactive public information and communications capability."

In commenting on the need and criteria for routing software in school districts, Roberts concluded, "All school districts need a software solution to establish routes and redistricting plans and these need to be automated, especially in districts the size of Round Rock and in very large districts.

At the same time, the software solution needs to be simple enough so that any person can come in with a minimum amount of training and be immediately productive. It needs to process a district's needs

quickly and get that information out rapidly to the public and be functional for a large group of people. However, the solution does not have to contain 'bells and whistles' that are non-essential and only serve to drive up the price."

PATHS OF LEAST RESISTANCE

Once transportation directors analyze "what if" scenarios, they can determine the "paths of least resistance." The outcome is an optimized transportation management operation with bus driving paths that incorporate the ***desirability factor*** in meeting the expectations of the school district's constituencies. Each trip, including stops, becomes smooth-going for the district's drivers – each avoids hazards, line of sight obstacles, and busy intersections – each leads to on-time pick up and drop off points for students. And each trip ensures the safety of the district's precious cargo – the students in its care every day.

Antonio Civitella is President and CEO of Transfinder Corporation. Mr. Civitella began his career as an intern with James Forth & Associates, a management-consulting firm. He became involved with the successful launch of the company's flagship product, Routefinder Pro, and upon graduation from Siena College, became an employee of Forth & Associates. In 2000, as Vice President and COO of Forth & Associates, Civitella purchased the company and became Chairman and CEO. The company's name was changed to Transfinder to reflect the focus on the products and services offered to school districts. After more than 20 years providing school districts with the latest in transportation and communication management systems and working with more than 1,000 clients across the country, Civitella is recognized as an authority in the field.