# SG Legacy System Modernization Program T661

### What scientific or technological uncertainties did you attempt to overcome? (Maximum 350 words)

We were presented with a vast modernization project in Stargate Logistics. They sought an open consultancy on the modernization of their logistics and trucking operation.

We had to look at the business as a whole. What could technology do for the project, and what could modern data aggregation and analysis mean for them. There was an industry standard to achieve in the fusion between the Global Positioning System (GPS) and vehicle tracking. The uncertainty of the enterprise was integration with other systems such as Health and Safety, Dispatch Management, Accounting, and Maintenance.

Many vendors in the marketplace provide these services. The problem was that nobody had approached the logistics market as its own Enterprise Resource Planning (ERP) platform within an Internet of Things (IoT) functionality. We wanted to move everything onto the cloud. We wanted to harvest all their existing functionality and data schemes, and we wanted to bring in new devices to expand precision, capability, and analysis to the business with new tools and device-based data inputs. This entailed replicating everything on the existing logistics system in a new way in a cloud environment.

Many uncertainties existed about continuity of basic systems operation and data retention. Existing systems were calibrated to real-time data gathering. Many of the other systems operated in a real-time way, as is to be expected in transport and logistics.

Stargate was under constant pressure to remain competitive, deliver quality customer service, and find innovative ways to optimize operations. Modernization became necessary for survival. The challenges impacting the operations and profitability of the company included: increasing operational costs, manual business processes,  
outdated legacy systems,  
stricter regulations imposed by federal, provincial, state, and local authorities, environmental issues,  
driver shortage and retention, and — most important of all — the lack of a technology strategy and implementation.

We set about to achieve the following business objectives: fleet visibility and tracking, increase operational efficiency, decrease operating expenses,  
increase compliance and safety,  
modernize fleet management and maintenance.

Our strategy lay in planning an ERP system that modernized the logistics and transport capabilities for our client in such a way that we also created a process and tool set that could be resold in the same marketplace, a marketplace invariably going to IoT logistics systems. The uncertainties lay in planning and implementing the new system alongside the old system while maintaining the basic operational integrity of the existing system/process — it's a lot like the trick of getting the tablecloth out from under the porcelain tableware without breaking anything.

### What work did you perform in the tax year to overcome the scientific or technological uncertainties described in line 242?

We had to research options for compatibility and performance. We selected Microsoft Azure™ for cloud services. The client existed in a Microsoft environment upon commencement. Staying with Microsoft was a logical choice for them. The Azure API allowed all needed hooks to integrate existing functionality. We selected Samsara™ for GPS Tracking devices. It had an open API that allowed us to blend with Azure. We selected IngramMicro™ for supply chain efficiency and tracking. They also had an open API that allowed us the freedom to work with Azure and Samsara. The key was integrating various systems together to provide a single view for various teams: Health and Safety, Dispatch Management, Accounting, and Maintenance.

We used Azure as the glue to integrate all our applications and services. In the process, we created an Azure infrastructure that connects the various vendor services. We structured the infrastructure for maximum reuse, in effect creating a logistics framework for the cloud leveraged off RHEL. The cost savings achieved by adopting an IoT based logistics platform are enormous.

Samsara had to be integrated as well through their API for the GPS service. Concatenating Samsara and Azure began the framework for a cloud based IoT logistics service leveraged off existing devices and infrastructure. IngramMicro brought a final dimension in supply chain for a complete logistics ERP. The existing application and database client inventory was harvested for data supply and retention. The IoT add-ons like Samsara and IngramMicro form the infrastructure.

The goal was to create an ERP for the logistics industry that could be ported to other medium sized logistics companies. Utilizing the distributed framework of IoT, the application interface is browser based. Client libraries for existing applications form the basis of the logistics ERP framework. Azure Data Explorer API allowed us to add considerable logistics functionality to data analytics, leveraging existing databases in the company infrastructure while simultaneously creating new data gathering and storing capabilities in the cloud infrastructure. This included the two new data streams brought in through the API integrations with Samsara and IngramMicro.

With the new APIs wrapped in the Azure infrastructure, we were able to create a number of logistics specific plugins through the Azure infrastructure. With the added GPS and tracking systems in the IoT space, we were able to leverage the existing dispatch management to operate with much greater efficiency, factoring repair and maintenance reminders for the entire fleet based on analytics provided by the GPS system and simple kilometer triggered reminder, like oil changes. This trailed into a revamped fleet management system with the same criteria, new IoT data to leverage. Our system also corralled the existing human resources into the new IoT model, making work hours and available workers line up to industry regulations. The IngramMicro tracking system brought in better warehousing by keeping to the second data on product locations, whether they be in transit or in storage. Finance and management was brought to greater real-time precision with the added GPS and tracking. Repairs and maintenance, including parts and supplies, became part of the economy's supply chain, saving time and money and greatly increasing security.

Throughout every stage of the process, compatibility was the main concern. Could we bring legacy systems into the Azure API and create a fully functioning logistics ERP.

### What scientific or technological advancements did you achieve or attempt to achieve as a result of the work described in line 244? (Maximum 350 words)

We created an ERP system in IoT space. We concatenated APIs into an operative cloud based logistics and transport framework: Azure, Samsara, and IngramMicro, combining the best of available technologies for a comprehensive cloud based system that operates with the robustness of an ERP with a focus on transport and logistics, replete with all the micro-management within those general parameters: supply chain integrity and rerouting, material safety data sheet logging and geographic location of all regulated materials. We took the transport and logistics industry as a whole and trimmed every unnecessary expense away by streamlining the chain of custody, reducing or in many cases eliminating lost time, and maintain optimal fleet operability by data driven analysis guiding maintenance and parts replacements based on kilometers traveled and conditions traveled in, including weather.

The planning itself was a milestone seamless operation, a change of culture so expansive the management plan included the delivery of knowledge transfer to in-house IT staff, training for employees, managers, and stakeholders, including comprehensive documentation, tutorials, and training.

We integrated Dispatch Management, GPS Tracking and Account systems together, reducing the billing and invoicing time by sixty percent.  
We provided real time access to load tracking,  
reduced the on-boarding time by eighty percent, and reduced the number of systems in the company from twelve to four.

Most importantly, we created a project map within the transport and logistics space that can be sold as specialized and experienced cultural renovators for new technology in an ever evolving business, transport and logistics.