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Compsis at a Crossroads

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2004 had not been a good year for Compsis. Founded in 1989 in the Brazilian industrial city of São José dos Campos, Compsis had grown steadily and successfully. In its largest service line, systems integration for electronic toll collection (ETC), the company had gained the dominant share of the Brazilian market and had even managed projects in Australia and India. Compsis had developed strong relationships with the Brazilian government and toll road operators, as well as an international reputation among industry competitors for quality and technological expertise. By 2003, the company's founders could take pride in reaching a height of 165 employees and US$4.2 million (R$11.1 million) in revenue.

In 2004, however, it appeared that Compsis's success might be in jeopardy. Revenue fell to US$3.3 million, primarily due to the Brazilian government's prolonged delay in awarding new toll road construction rights to concessionaires (road operators). Despite considerable efforts by the business development team, Compsis had been unable to win new ETC projects outside Brazil, not only in Latin America but in Europe and India as well. True, Compsis was making progress in turning its ETC software – SICAT – into a simpler, more flexible product, but the senior managers knew that even after the new version was completed in April 2005 it would not be easy to convince existing customers to upgrade.

Therefore Compsis stood at a crossroads. CEO Ailton de Assis Queiroga and his fellow Compsis leaders anticipated that 2005 would be a better year: the Brazilian government was expected to award more concessions, the new SICAT version would be completed, and Compsis would be ready to test new products ranging from traffic management systems to magnetically guided buses. On the other hand, Compsis could ill afford to depend solely on the vagaries of the Brazilian market for its long-term financial future. The company could continue to pursue expansion elsewhere in Latin America

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and other developing ETC markets, recognizing however that the highly price-sensitive buyers might not be willing to pay for Compsis's technologically sophisticated services. Or Compsis could turn to a mature market, a country where experienced toll system buyers demanded and paid for cutting-edge technology from industry leaders. Among all such countries, one stood out for its sheer size: the United States.

The Electronic Toll Industry

Transportation tolls date from at least the fifth century B.C., when the Greeks told stories of Charon, the ferryman who charged a toll to convey the dead across the river Acheron. The earliest recorded U.S. toll road was the Lancaster Turnpike, built in the 1790s to link the Pennsylvanian cities of Philadelphia and Lancaster. As automobiles became popular in the 1920s, tolls were often instituted to obtain government revenue and to manage high traffic volumes by creating limited-access highways. By 2004 drivers were paying tolls on the majority of expressways and major inter-city roads in the U.S., China, Singapore, and Western and Central Europe. These governments used tolls to pay for the road maintenance, supplement their coffers, or reduce congestion by discouraging traffic.[1]

A modern toll plaza often featured multiple lane types, broadly classified into three categories: manual, semi-automatic, and fully automatic. A manual toll collection booth accepted either coins or cash. A semi-automatic toll lane allowed cash collection, credit cards, coupons, and drive-through using RFID transponders. A fully automatic, unmanned toll booth only permitted vehicles that were RFID-equipped. Linking the various lanes was a complex and integrated system of wires, detection devices, and software, both to monitor drivers and employees and to audit the receipts.

These receipts were collected by the toll road operator, the company or agency that usually paid for the detection and auditing technology. In some countries, including Brazil, most operators were private concessionaires, companies who won a contract from the government to manage (and frequently build) a toll road. In return for paying annual fees or revenue percentages and for maintaining certain price and service standards, the concessionaire operated the road for its own profit. In other countries, such as the United States, the operator and the government were one and the same; perceiving the road as a public good, the government managed the road either through a transportation department or ministry or through a quasi-independent toll agency.

Serving these public and private operators was a multi-billion-dollar international toll industry. In ETC alone, companies based in the U.S., France, Spain, and elsewhere competed for contracts throughout the world with local suppliers of tags (RFID transponders), hardware, integration and software, maintenance, and back-office (customer support) services. Some firms offered one area of service, others a suite; some positioned themselves based on price, others on quality, technical know-how, or local knowledge. It was not uncommon for a major international player to manage a contract

[1] http://www.answers.com/topic/toll-road, reviewed February 28, 2005.

in a new country, then lose its foothold to international or local competitors who won more of the available projects. Depending on the number of operators in the market, there might not be enough roads and contracts to go around.

Compsis: Company History

Compsis was founded in 1989 by engineers from the Brazilian aircraft firm Embraer, also based in São José dos Campos (see **Exhibit 1** for the founders' biographies). Initially the founders planned to develop and integrate aircraft embedded systems for the Brazilian Air Force, but when these efforts proved fruitless Compsis shifted to new applications for its technologies. In 1991 Compsis found its launching customer, General Motors Brazil, and from then on devoted its systems integration expertise primarily to the broad field of automotive products. (See **Exhibit 2** for revenue by business division.)

In 1996 Compsis decided to expand its technology strategy into a new area: intelligent transportation systems (ITS). Rather than manufacture transponders or run customer service centers, Compsis stuck to its core skills: integrating complex hardware and software systems. As system integrators, Compsis sought contracts for a range of Brazilian ITS projects, including:

- *Advanced Traffic Management (ATMS).* These systems would enable efficient operational management of highways or public transport corridors in cities. Numerous subsystems connected to an Operational Control Center would monitor and control traffic conditions.
- *Vehicle Monitoring System (SMV).* Using GPS positioning integrated with a data center, SMV would enable officials to efficiently manage and deploy the public fleets: buses, garbage transport, police vehicles, fire engines, and ambulances.
- *Magnetic Guidance System (SGM).* To increase the efficiency and safety of mass transport, SGM would use a computer-controlled system to automatically guide a city bus on exclusive lanes or corridors.
- *Electronic Toll Audit (SICAT).* The product would provide integrated real-time management of all the processes of automation, accounting, and auditing of revenues at highway toll plazas.

Of these four concepts, SICAT proved the most attractive to buyers. By the close of 2004, Compsis was deriving the majority of its revenue from SICAT implementation and maintenance. SICAT was entering its sixth major revision and had consolidated the market's greatest needs. Compsis did expect ATMS solutions to play an increasing role in its ITS strategy, and it looked forward to rolling out its first SMV and SGM solutions in São Paulo in 2005. Nonetheless, SICAT remained the company's flagship and cornerstone.

SICAT

Compsis designed its own SICAT software in-house and sub-contracted the hardware manufacturing to local suppliers, who provided vehicle sensors, high resolution cameras, toll gates, signaling

elements, RFID sensors, etc. Compsis would install both the hardware and software, then integrate the two at the level of the booth, plaza, and multi-plaza auditing system (see **Exhibit 3**).

In 1996 Compsis developed the first version of the toll collection system – SICAT 4 – specifically for the Brazilian toll collection market. Over the next six years Compsis's C++ developers responded to customers' requests and expectations by gradually improving on SICAT 4 and developing four levels of functionality.

- *Level 1: Lane Level.* As a vehicle drove into a toll collection lane, the SICAT system read the tag or sensed the axles, sent the information to the individual toll collector, printed the receipt, and did some basic security (e.g., whether the car had a tag at all). It could even detect any suspended axles, although no client had yet taken advantage of the feature.[2] The current system offered exceptionally high accuracy (99.4%) in detecting the vehicle's category based on number of axles. Compsis considered the Level 1 application a commodity product, not significantly better than competitors' software.
- *Level 2: Plaza Supervision.* SICAT separated the collection processing from the Automatic Vehicle Classification (AVC) algorithm, putting the algorithm on a central computer where it was easy to audit. The supervisor could give permission or instructions to collectors in the booths to obtain information, recognize hardware breakdowns, correct mistakes in reading the vehicle type, and see a graphic depicting traffic flow through the plaza ("Fluxo Horario"). With the exception of the hardware fault messaging feature, Level 2 too did not distinguish SICAT from the competition.
- *Level 3: Auditing.* Level 3, on the other hand, Compsis considered a major breakthrough, the first real accounting system for ETC. Level 3 could audit the amounts declared by the toll collector at the end of the shift – the cash-up – by comparing data from Levels 1 and 2. In a human-operated or manual lane, Level 3 could determine whether an operator was over- or under-counting, either by error, hurry, or deliberate violation; in an automatic lane, Level 3 would spot violator drivers (for example, those who used a small-car transponder in an eighteen-wheeler truck). As late as 2004 Compsis found that few competitors offered these accounting and auditing services, for one or many plazas.
- *Level 4: Overall Financial Supervision*. As Level 3 tracked the moneybag, Level 4 provided the auditing tracks. By rolling up information from multiple plazas that had different systems (including non-Compsis systems), Level 4 gave the finance and accounting departments direct access to all the revenues being generated at different toll lanes at one or more toll plazas. This deep management of operations was not possible on most competitors' systems.

In the fall of 2001, Compsis began to upgrade SICAT 4. For a large toll road project in New Delhi, Compsis used early Java tolls to develop SICAT India, which introduced business intelligence tools

[2] In an effort to evade a toll based on the number of axles per vehicle, some truck drivers temporarily suspended an axle or two, drove through the tollbooth and paid a lower toll, then dropped the axles down again at the other side.

to ease the operator's tasks. SICAT India would be succeeded by SICAT XP, which was scheduled for release in April 2005 and which promised to incorporate all the lessons learned from developing toll collection systems. To be sold both as a stand-alone product and as an upgrade for current SICAT 4 customers, SICAT XP would be Web-based, layered on an inexpensive SQL or MySQL database, and most importantly flexible enough to be sold in modules. Compsis envisioned selling each customer a full SICAT XP package, installing the software with a minimum of front-end interface customization, and then switching on or off whichever functions and levels the buyer had chosen to license or forgo. For the first time Compsis could sell SICAT not as a project that required building and customization, but as a product that would approach the convenience of plug-and-play.

The Expansion of the Compsis ETC Business

Compsis developed its first version of SICAT in 1996 to capture the growing Brazilian market for ETC systems integration. Eight years later, Compsis had done precisely that: 39% of Brazilian toll concessionaires had contracted with Compsis for installation and software (see **Exhibit 4**). Moreover, since 2002 Compsis had aggressively pursued and won contracts for ongoing updates and maintenance (U&M), contracts that had become a profitable and rapidly growing segment of the firm's business. Compsis also expected to gain additional market share after the launch of SICAT XP, as it intended to persuade toll operators nearing their system license renewal date to switch to the more powerful, flexible, user-friendly SICAT XP product.

Yet Compsis refused to rely solely on its Brazilian SICAT business. Ailton and the other founders strongly believed that any technology-based company in Brazil would be vulnerable if it were to depend solely on a single product line. A European competitor might be able to succeed with just one product, since the European market was much more stable, but Compsis had to allow for significant variation in demand (see **Exhibit 5**). Therefore for the last four years Compsis had invested significantly in new product lines, largely using SICAT profits. The strategy was to broaden both the product and geographical ranges of Compsis: even as it developed new offerings for the Brazilian market (particularly ATMS), Compsis strove to expand into new markets throughout the world. In each new country Compsis would lead with its most mature product, SICAT; then, once its brand was established, Compsis could introduce its other products as well.

Indeed, Compsis had adopted this SICAT-first approach in both its projects outside Brazil thus far. In 1999 Compsis collaborated with Philips, an American technology firm, to implement SICAT 4 systems for a toll plaza in Australia. This partnership worked extremely well. Philips handled the hardware, Compsis the software, and Philips had both the local commercial contacts and the technical sophistication to win the business and quickly learn to install the SICAT system. True, Compsis had had to send an employee to Australia for several months to train the operator to use the software, and subsequently Philips was purchased by Tyco and lost interest in the toll business, but Compsis could point to Australia as a successful model of international expansion.

In India, however, the technological advances of the project were overshadowed by the financial losses. After Compsis was called into the project by Intertoll, a respected South African construction consulting firm, Compsis had sought to reduce its costs by searching for a local contractor to install and test the hardware and SICAT system. Unfortunately, the Indian contractor Compsis selected proved unable to do the job competently, necessitating four complete re-installations. Moreover, unlike the Australian customers who could afford high-cost systems, the Indian toll highway authorities were so sensitive to price that they would probably have been satisfied with a system far less sophisticated than the one they received (SICAT India). Lacking the experience of working in a developing economy so different from their own, Compsis ultimately completed the project having written a new iteration of software, but also having overrun the engineering segment of the budget by 100 percent. Instead of the comfortable margin Compsis customarily achieved on its other ETC implementations, the India project was a wash – no losses, but no profits either.

Latin American Markets for Compsis

As Ailton and his fellow Compsis leaders considered possible markets for expansion, they knew that Brazil would continue to be fertile ground for their services. As **Exhibits 5 and 6** indicate, research conducted and purchased by Compsis showed that whenever the Brazilian government began awarding toll highway concessions again, the concessionaires – all of them well-known to Compsis and its business development team – would generate systems integration projects that could keep Compsis extremely busy. Typically Compsis would be alerted to an upcoming project and possibly consulted on its design, then submit a technical proposal to prove that it could meet the minimum performance standard. Once the small number of qualified vendors received notice that their technical proposals had been approved, Compsis would submit its cost proposal and prepare for a lengthy negotiation to find the right price. Although no contract was ever a sure thing, Compsis could count on its past performance, strong relationships with key decision-makers in the operator firms, and reasonable balance of price and quality to help it win a reasonable segment of the available business, both for new projects and for the follow-up U&M.

Outside Brazil, the Latin American market was projected to be small but growing rapidly. The six countries Compsis considered targeting all had relatively little experience with toll roads, so they would probably want simple, inexpensive solutions that would be easy for the systems integrator to implement. Compsis executives had visited Bolivia, Peru, and other key countries and had returned advising that Compsis identify a local commercial partner, someone who knew the right people, could maneuver around the complex and corrupt procurement systems, and would obtain information about upcoming projects before they were openly announced. Similar partnerships were also being considered, although in different political and commercial climates, in such countries as Great Britain, India, and Pakistan.

The United States ETC Market

Meanwhile Compsis was also turning its eyes north to the United States, an ETC market larger than all of Spanish-speaking Latin America put together (see **Exhibit 6**). The ETC industry in the United States was mature, growing steadily, and dominated by several well-established providers. (See **Table 1** below.) Potential vendors seeking to enter the ETC market found themselves competing for the favor of experienced buyers, not merely on price but on credibility, competence, and proven expertise.

The ETC customer base in the US was comprised mostly of transit agencies and transit authorities. Transit agencies, such as Departments of Transportation (DOT), were line agencies of the federal or state government, such as USDOT (Federal) and TxDOT (Texas). Transit authorities, such as the Massachusetts Turnpike Authority, were quasi-governmental bodies that worked alongside transit agencies but had independent boards of directors and the authority to issue bonds. As of 2004, a total of 64 toll agencies were distributed among 26 states, of which the largest toll road builders were Florida, New York, Texas, and Illinois. **(**See **Exhibit 7**.) Though there were a few private companies who operated toll roads and bought ETC products and services, the majority of the ETC projects in the US were handled by public organizations that also constructed and operated the roads.

Table 1 Major Competitors in Electronic Toll Collection

ETC Contracts*	Significant Players	Comments
Tags	MarkIV, TransCore	These two firms shared 92% of the market.
Hardware	TransCore, MarkIV, Raytheon, SIRIT	Raytheon was particularly big in Canada, SIRIT in California.
Integration and Software	TransCore, ACS State and Local Solutions, VES Systems, CASETA Technologies, ETC Inc., Iteris	TransCore and ACS each earned over $100 million in revenue on ETC. The others were far smaller: $10 million or less.
Maintenance	ACS State and Local Solutions, Transcore	
Back-office (Customer Service Center)	ACS State and Local Solutions, Transcore	ACS was perceived as dominant in this area.

* Each ETC project customarily required all of these contracts, although some might be combined.

The ETC Sales Process in the United States

Throughout the 1980s and early 1990s, public agencies had tremendous difficulty procuring ETC products and services, as government officials had neither sufficient knowledge of the product and service offerings nor previous experience procuring them. Several trade organizations therefore emerged in order to promote procurement of ITS technologies by creating a network of vendors and providing them the necessary exposure to potential customers. For ETC specifically, the International Bridge, Tunnel and Toll Association (IBTTA) served as the primary trade organization. The IBTTA included among its members virtually every toll authority and the most significant vendors, and organized the industry's most prominent conferences, seminars, advocacy initiatives, and list of current open Requests for Proposals (RFPs).

Membership in a trade organization might help a firm ensure that it heard about a project, but the firm then still needed to win the bid in an open process that evaluated multiple criteria. Although a firm might encounter a number of methods of awarding ETC projects – sealed bid, a 2-step sealed bid, competitive negotiation (RFP/RFQ), sole source, or unsolicited proposal – since the majority of customers in the U.S. were public agencies, the majority of projects were procured through public RFPs.

The RFP was a competitive, well-regulated bidding process with clear guidelines and procedures, designed to ensure fair competition among vendors. Typically the entire RFP process involved a few months, from the day the RFP was published in a trade journal or online source to the day a vendor was awarded a specific project. Once an RFP was announced to the public, vendors would respond to the announcement and obtain a copy, typically including the background on the agency and the project, project description, scope of required services, proposal requirements, submission requirements, and selection process. It also specified the evaluation criteria, such as:

- The quality of the employees who would work on the project.
- The ability of the vendor to maintain high-quality human resources for the duration of the project.
- The past performance on similar tasks.
- A demonstration that the task was well-understood and the needs could be met (the technical proposal).
- The cost of the solution.

Typically the issuing agency predefined the evaluation criteria and assigned a weight to factor into the decision-making process. For example, experience in providing similar services might be weighted 25%, approach to deliver quality technical resources 40%, management approach 10%, maintenance approach 10%, and cost 15%.

Within a few days after the RFP was issued, a pre-proposal, in-person conference, open to all respondents, would be held to address the questions of the vendors. All of the questions and answers

would be published to make all relevant information public. The deadline for vendors to submit multiple printed copies of their proposals fell four to eight weeks after the pre-proposal conference. The agency would then evaluate the proposals according to the announced scoring system. It was not uncommon for the vendor(s) that seemed most qualified to be given an oral interview before the project was finally awarded. Throughout the process the agency would devote great care to demonstrating the objectivity and defensibility of its decision, recognizing not only its public duty but also the risk that an unsuccessful bidder might file a public protest.

Entering the U.S. Market

In light of the size and complexity of the market, the Compsis directors knew that it would be no trivial matter to find and obtain ETC projects in the United States. Despite its strong quality reputation among industry competitors, as a market entrant Compsis would be virtually unknown among the transportation agency and authority buyers in the U.S. Sales resources too could pose an issue; at the close of 2004, the Compsis sales team consisted of five people, all with engineering backgrounds. The head of the sales group managed three salespeople as well as a person covering commercial applications, who was in charge of linking the engineering and sales teams in commercialization efforts. The sales office sat in the same building in São José dos Campos that housed the developers, the finance officers, and all of Compsis management, and did not add significant office costs compared to the rest of the organization.

In contrast to the work with Philips and Intertoll, in Brazil Compsis had not formed commercial partnerships, although it did have strong relationships as a supplier to highway construction and maintenance companies. Additionally, the company had strong ties to such leading Brazilian engineering universities as the Instituto Tecnologico de Aeronautica (ITA) and the Universidade do Vale do Paraiba (UNIVAP). To enter the U.S., however, Compsis was considering a broad range of approaches, including opening its own sales office in the U.S., partnering with a U.S. firm, pursuing a preferred vendor status with a construction company, or selling through a value-added reseller (VAR).

Sales Office. Compsis had no physical presence in the U.S. market, and indeed most of the executives had not visited the U.S. more than once. In order to open a U.S. office, Compsis would need to invest in hiring both sales staff and engineers, leasing office space, and maintaining the office itself. Through 2004, the company had not had any offices outside its headquarters in São José dos Campos.

Partnerships. Compsis could look for a partnership with different types of participants in the transportation industry, ranging from pure-play toll collection providers to vertically integrated transportation infrastructure companies.

- *Dominant ETC players.* Some of the companies that competed in ETC and ITS specialized solely in systems integration or software development, while others competed in all areas,

including toll collection, advanced traffic management, and GPS technology. Several competing companies even operated in segments of the same system, such as the E-ZPass toll collection program. The single largest player, Transcore, had an established name in all major important markets, and all of Compsis's products overlapped with Transcore products. Another key player, Affiliated Computer Services (ACS), was a large provider of business process and information technology outsourcing solutions, offering customer service centers related to the E-ZPass electronic toll collection system. (See Table 1 above.)

- *Smaller toll industry players.* Numerous smaller ETC providers specialized in either product or geographic niches. International Road Dynamics (IRD), for example, was a small Canadian company that sold primarily in the United States. IRD had established relationships with DOTs for ITS products in selling weight motion systems, but had had limited success in entering the ETC industry with a strong collection systems offering.
- *Equipment manufacturers.* A different segment of the market manufactured the equipment used in toll collections systems and ITS, but stayed away from systems integrations. Mark IV, for example, as the largest toll transponder manufacturer in the U.S., had developed strong relationships with government buyers and all levels of toll suppliers in the industry.
- *Large technology firms.* Big players in the technology sectors – Cisco, Raytheon, Aecom, and others – were developing offerings in ITS and to a lesser extent in toll collection. Cisco had already teamed up with Transcore, resorting to partnerships to extend its product offerings and achieve efficiencies in the selling process.
- *Highway suppliers.* Many firms had established relationships with DOTs by providing equipment and systems unrelated to toll collection. A U.S. firm like Daktronics might have developed strong engineering expertise and ties to transportation authorities by selling its display systems (variable message signs) for highways and cities – not products for which Compsis had any intention of competing.
- *Large non-U.S. competitors.* Several European ETC leaders, close competitors to Compsis in Brazil and abroad, had no presence in the U.S. market. Although companies like GEA and CS Route (France) and SICE (Spain) had product overlap with Compsis and little or no experience in the U.S., they did have extensive experience competing for public RFPs outside their home market and possible interest in entering the United States.

Preferred Vendor for a Construction Firm. In some cases, it was not the DOT or toll authority that made purchasing decisions for ETC, but the construction company that had won the contract to build a toll road. Moreover, even when decisions were made directly by the public agency, the construction companies could influence the purchasing process. Rather than set up a partnership, such companies would treat Compsis as a preferred vendor, to be used at their convenience whenever an ETC project arose.

VAR (Value-added Reseller). If Compsis formed a commercial partnership with a VAR, it would obtain contacts and local business development expertise but no technical expertise or complementary services. In Pakistan, for example, in order to obtain vital personal contacts with government

officials, Compsis was exploring a relationship with a well-connected VAR who would receive a commission for all sales. In the U.S., former state Department of Transportation employees, highway construction company officers, or other government-connected individuals could potentially act as VARs for Compsis.

The Crossroads

As 2004 drew to a close, Ailton knew that Compsis had several months of operating cash in the bank. Perhaps the best option was to wait out the current drought, expecting that the Brazilian government's funding for toll concessions would rebound as predicted. On the other hand, once the government announced the reopening of concession grants, Compsis would have to wait for those contracts to be awarded, then delay while proposals were solicited by the concessionaires, then negotiate the prices and start the projects – assuming that Compsis won the bids at all.

It might be that Compsis had focused too intensely on electronic toll collection. Were Compsis to widen its product suite by focusing more on ATMS, SMV, or SGM, it could broaden its portfolio and spread the risk, albeit among much the same government and concessionaire buyers as for ETC. Compsis could even get away from its traditional higher-quality, higher-price strategy and aggressively pursue contracts for less expensive projects, such as setting up a series of emergency call boxes along a major highway.

But if Compsis really wanted to grow, then Brazil was ultimately a limited market. True, Compsis hadn't been perfectly successful in its earliest international projects, but the team had learned crucial lessons about project management, cultural differences, and the complexities of finding a local partner. Yet Compsis had a small sales team, relatively inexperienced with international, public RFP processes. Was Compsis ready to expand to the United States, where it could probably match the quality and beat the price of its competitors? If so, how should it enter? If not, should it go elsewhere instead – Latin America, Pakistan, Western Europe – or stay at home? Standing at this crossroads in the company's history, Ailton evaluated the options. Which road should Compsis choose?

Study Questions

1. Imagine that you're Ailton and you're applying to host a team in MIT Global Entrepreneurship Lab (G-Lab). What should be the team's project scope?

2. Now imagine you're on the G-Lab team. How will you set out to complete the project?
   - What will you do, in both October-December and January?
   - What will be the components of your project workplan?
   - What challenges do you anticipate and how will you prepare for them?
   - How will you organize your team?
   - What do you want to accomplish in your first conversation with your sponsor (Ailton)?

Case Write-up Questions

What do you recommend that Ailton do? Should Compsis expand? If so, where and how? If not, what should Compsis do instead?

Exhibit 1 Biographies of the Compsis Founders

Ailton de Assis Queiroga, electronic engineer, M.Sc., has been the CEO of Compsis since its foundation in 1989. He has wide experience in systems engineering and real-time software development. Some of Eng. Queiroga's main involvements have included: design of universal Programmable Logic Controllers - PLC (Philips, Holland, 1980-81); design of a MIL-STD-1553B remote terminal, AM-X Aircraft Avionic Integration and Validation Test Facility System (Aeritalia, Italy, 1982-85); conception and early design of the AM-X aircraft Operational Flight Program-OFP Maintenance and Test Support System, according to DOD-STD-2167A; and design of the EMB-120 Brasilia aircraft Mechanical and Pneumatic Systems testing facility (Embraer, 1985-1989).

Hélio Ikedo, electronic engineer, graduated from ITA (Instituto Tecnologico de Aeronautica). He did his post-graduate work on control systems for real-time systems, with large experience in projects and development of industrial and aerospace systems, and an emphasis on system engineering, special equipment, and software. Eng. Ikedo has worked with system and software development for on-board computing, MIL-STD 1553B bus controller network, equipment test and control and supervisory system based on mini and microcomputers. He has also participated in a joint program with MBB Aerospace Division München (Germany) and AMX Program with AERITALIA – Turin (Italy). Eng. Ikedo is one of the founding members of Compsis, developing the first Brazilian Toll Collection System.

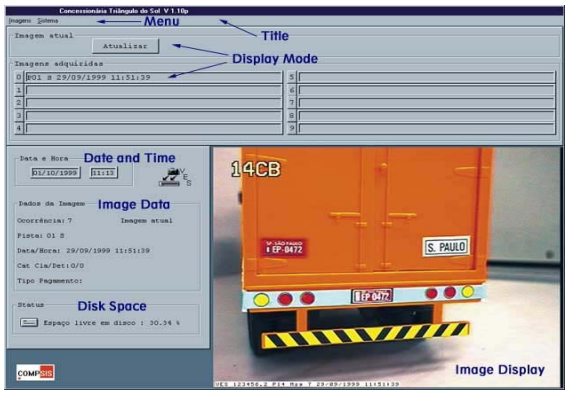
Exhibit 2 Revenues by Division, 2002-2004

	2002	**2003**	**2004**
Revenues (Total; US$ millions)	3.21	4.171	3.32
Division (%)			
SICAT	44.2	18.0	10.4
ATMS	0.0	6.0	0.0
SMV	0.1	2.0	0.0
SGM	0.0	26.0	0.3
Automotive	23.1	9.0	23.7
Aerospace	0.0	0.0	0.0
Updates & Maintenance (U&M)	32.6	38.0	65.7

Source: Compsis.

Exhibit 3 The Compsis ETC and ITS Product Lines

Toll Plaza near São Paulo, Brazil, operated by Compsis client Viao Este



The Compsis SICAT software

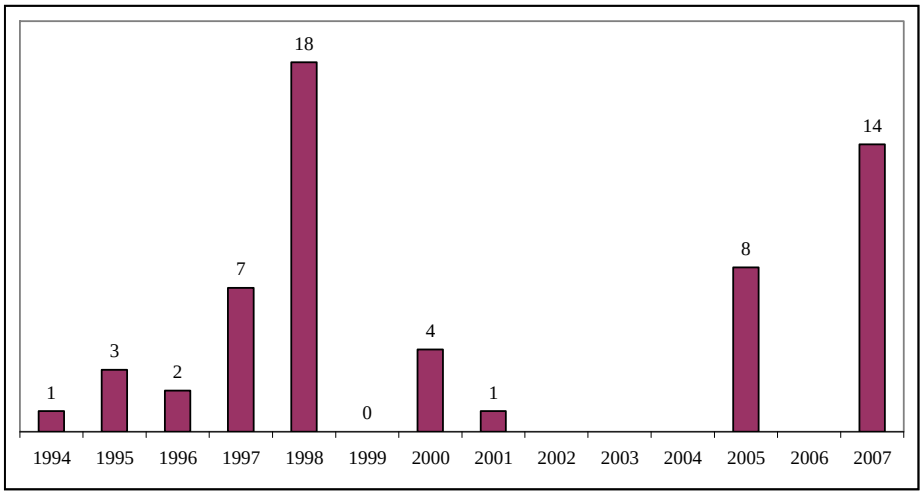
Control Center equipped with Compsis ATMS (Advanced Traffic Management)

Exhibit 4 Shares of ETC Integration Market in Brazil (2004)

	Concessions (36)	Lanes (1,698)
Compsis	39%	31%
CSRoute	17%	20%
GEA	6%	14%
TESC	14%	9%
Sainco	8%	8%
Servotron	8%	6%
Telectronica	3%	6%
Tecsidel	3%	4%
DM	3%	2%

Sources: Compsis, ABCR (2004).

Exhibit 5 Highway Concessions Awarded in Brazil (1994-2007)



Source: Compsis, ABCR (2004). 1994-2004 actual; 2005-2007 projected.

Exhibit 6 Projected ETC Revenues in Latin America and the U.S., 2004-2008 in US$ Millions

	2004	2005	2006	2007	2008
Brazil					
New Projects	0	52	42	41	0
Upgrade & Maintenance	18	18	23	25	28
Total	18	70	65	66	28
Latin America (outside Brazil)					
New Projects	18	6	0	20	21
Upgrade & Maintenance	1	1	1	2	3
Total	19	7	1	22	24
United States					
New Projects and U&M	49	54	60	66	73

Notes: Latin American projects are projected to be divided as follows: Chile 31%, Bolivia 20%, Argentina 19%, Peru 16%, Ecuador 8%, Colombia 6%. Other Latin American countries are projected to have virtually no ETC expenditures.

Source: Compsis, ABCR, Entrevistas Itelogy, IBTTA, FHWA (2004).

Exhibit 7 Toll Road Projects in the United States, by State (2001-2004)

State	Toll Road Mileage (2003)	Total Toll Road Projects (US$ millions) 2001	2002	2003 (proj.)	2004 (proj.)
Alabama	6.0	-	-	-	-
Alaska	0.0	-	-	-	-
Arizona	0.0	-	-	-	-
Arkansas	0.0	-	-	-	-
California	95.8	126.5	92.7	224.3	69.0
Colorado	48.0	152.4	223.3	115.3	47.6
Connecticut	0.0	-	-	-	-
Delaware	49.3	193.4	51.2	54.7	20.0
District of Columbia	0.0	-	-	-	-
Florida	657.0	262.4	574.0	513.5	773.7
Georgia	6.2	-	-	-	-
Hawaii	0.0	-	-	-	-
Idaho	0.0	-	-	-	-
Illinois	282.1	153.3	104.6	257.0	358.0
Indiana	156.8	26.0	-	-	-
Iowa	0.0	-	-	-	-
Kansas	236.1	28.8	26.3	23.3	21.9
Kentucky	248.5	-	-	-	-
Louisiana	1.5	2.4	9.6	12.8	10.9
Maine	106.2	53.2	39.5	44.5	19.1
Maryland	0.0	53.1	129.6	167.8	-
Massachusetts	135.6	38.8	44.2	32.0	-
Michigan	0.0	39.2	37.0	35.1	-
Minnesota	0.0	-	-	-	-
Mississippi	0.0	-	-	-	-
Missouri	0.0	-	-	-	-
Montana	0.0	-	-	-	-
Nebraska	0.0	-	-	-	-
Nevada	6.4	-	-	-	-
New Hampshire	97.1	10.1	11.7	38.2	-
New Jersey	356.0	187.4	289.8	318.3	61.0
New Mexico	0.0	-	-	-	-
New York	574.6	574.1	627.2	587.0	699.7
North Carolina	0.0	-	-	-	-
North Dakota	0.0	-	-	-	-
Ohio	392.2	152.1	74.0	76.0	60.8
Oklahoma	596.7	44.7	45.3	43.5	48.8
Oregon	0.0	-	-	-	-
Pennsylvania	508.2	267.3	231.0	221.0	-
Puerto Rico	N/A	24.5	57.4	54.0	-
Rhode Island	0.0	6.5	3.0	3.5	-
South Carolina	23.5	-	-	-	-
South Dakota	0.0	-	-	-	-
Tennessee	0.0	-	-	-	-
Texas	145.6	198.4	556.6	1,095.8	686.3
Utah	1.0	-	-	-	-
Vermont	11.9	-	-	-	-
Virginia	65.1	6.2	3.7	14.6	11.4
Washington	0.0	-	-	-	-
West Virginia	86.8	-	-	-	-
Wisconsin	0.0	-	-	-	-
Wyoming	0.0	-	-	-	-
United States, total	4,894.2	2,601.0	3,231.5	3,932.3	2,888.1

Source: Survey by the International Bridge, Toll and Tunnel Association (2003). http://www.ibtta.org/website/article.asp?id=206