

# SmartTrans Case Study

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## ABSTRACT

Raj and team are disheartened at the change in approach of the project, with the product close to system testing. They feel that the hard work they put in to the project for the past 10 months is futile. The team had to scrap the existing implementation done on an embedded platform using a Real-time Operating System (RTOS). Instead, they had to start porting the code from another project done on PC platform using Linux to embedded platform using RTOS.

The sudden change communicated by Japan team during the recent weekly meeting came as a surprise to Raj and team. Adding to the confusion, the Japan team could not explain the rationale behind this decision. The only information they could share was that this was a “management decision”. Raj was worried about keeping the team morale and enthusiasm high during such a critical phase.

Was it lack of fruitful communication? Was it lack of concrete requirements? Was it the difference of culture (work and regional)? This case study presents the situation and the involved stakeholders to understand the answers to these questions.

## 1. Stakeholders<sup>1</sup>

### 1.1. Kanemitsu Transportation Systems Corporation (KTSC), Japan

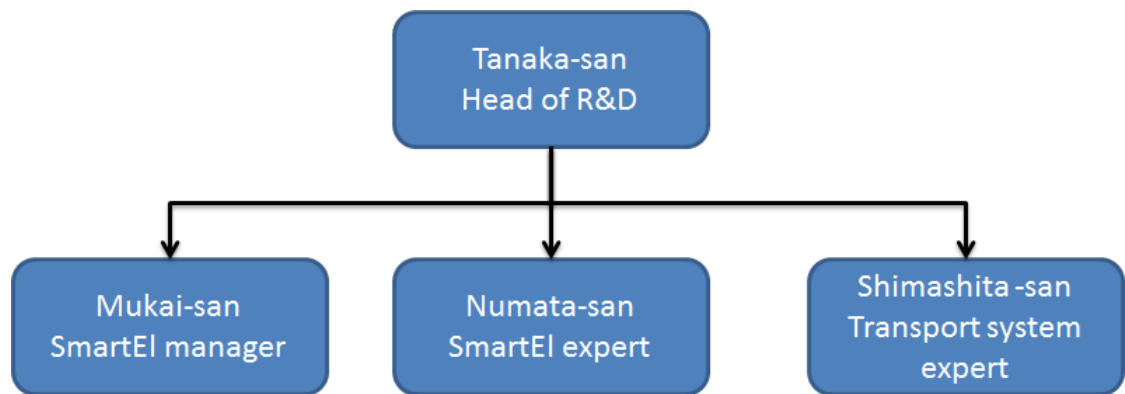
Kanemitsu Transportation and Building Systems Corporation, a business unit of Kanemitsu Corporation, is a Japan based leading manufacturer of transportation systems. They have a sizeable market share in South-east Asia and Japan. They have started new business ventures in India and Middle East Asia to capture the fast growing market. They hope of making a foray into the Europe and US markets in the near future.

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<sup>1</sup>Refer to Appendix A for further information regarding the stakeholder responsibilities and dependencies

The captive development team at Japan was very small and depended on outsourcing the development work to other subsidiaries of Kanemitsu within Japan. Their primary vendor was Kanemitsu Digital Engineering (KDE), Japan. They had long history of collaborating on various successful projects in the past.

The decision to develop a next generation control system for transportation system - branded as SmartTrans was taken by KTSC management to cater to growing market needs. As a first step, KTSC decided to develop a PC based implementation, named SmartTrans Step-1. The end-to-end responsibility of this project was assigned to KDE.



**Tanaka-san:** the head of R&D division for transportation systems. He is an experienced person with long experience in outsourcing. He is the person responsible for coming up with new products for the transportation division.

**Mukai-san:** The manager responsible for SmartTrans. Has expertise in SmartTrans signaling.

**Numata-san:** The creator of the SmartTrans control algorithm.

**Shimashita-san:** The transportation expert responsible for transport management operations.

## 1.2. Kanemitsu Digital Engineering (KDE), Japan

Kanemitsu Digital Engineering is a business unit of Kanemitsu Corporation, which specializes in software solutions for embedded systems and digital lifestyle products. Besides KTSC, they also work with other business units of Kanemitsu Corp.

## 1.3. Kanemitsu India Pvt. Ltd. (KIPL), India

Kanemitsu India Pvt. Ltd. is an Indian subsidiary of the Kanemitsu Corporation specializing in providing software solutions to different business units of Kanemitsu Corporation. Based in Bangalore; it was chosen to collaborate with KTSC for

developing products for the global market. The team at KIPL consisted of one specialist in Transportation Systems and other members experienced in embedded systems however no knowledge of the transportation systems.

**Raj:** Project lead for transportation projects at KIPL. He has 11 years' experience in embedded systems and 2 years of experience with transportation control systems. He had previously worked for Japanese companies for 7 years.

**Koga-san:** MD of KIPL.

## 2. Background

In July 2013 at KTSC, Tanaka-san assembled his team to share the vision to create a global solution for next generation control system for transportation system - that is economical and easy to maintain. The project was branded as SmartTrans.

His idea was to develop a solution based on in-house developed control boards to reduce the cost and meet performance expectations. However to meet immediate market demand, he decided to start with a PC based control system — named as Step-1. He met with the SmartTrans team to share his vision and roadmap for SmartTrans project.

### 2.1. Conversation 1

**Venue:** Discussion room at KTSC

**Tanaka-san:** Hello Team. I have called this meeting to discuss the roadmap and approach for realizing the SmartTrans project. I would like to break the project into two phases. The first phase, called Step-1, will see the implementation done on PC platform. The second phase, called Step-2, will be implemented on the embedded platform.

**Mukai-san:** Why two phases? Won't it be time and resource consuming?

**Tanaka-san:** We are currently not sure about the feasibility of using the embedded platform for SmartTrans project. This needs to be validated. This is a time consuming work. To cater to the immediate orders of SmartTrans we will start with the PC platform based implementation. This will be carried out by KDE. In parallel we have to start the process of validating the feasibility of using the embedded platform.

**Mukai-san:** Are we going for new implementation on embedded platform?

**Tanaka-san:** No, we will port the code from Step-1 onto the embedded platform once Step-1 is completed. This will save the effort on testing and validation. This will also maintain the compatibility with Step-1 once Step-2 is ready.

### 3. Journey Begins<sup>2</sup>

#### 3.1. Building a Proof of Concept

The SmartTrans Step-2 team from KIPL visited Japan, from Nov-13 to Dec-13, for knowledge transfer of the current transportation systems and the action plan for Step-2. During this visit, the team was provided with a detailed training on the SmartTrans algorithm by Tanaka-san and Numata-san.

Tanaka-san felt the involvement of KIPL is growing and strong communication support is required to ensure good collaboration. He decided to involve Yamamoto-san. Yamamoto-san has good English language skills and capable of communication with Indian teams — as he was stationed in India for few months and also, point of contact for the India sales team.

Tanaka-san and Yamamoto-san informed KIPL about performance expectations.

For Step-2, the KIPL team was expected to implement the algorithm for embedded platform and not to port the existing implementation from Step-1.

##### 3.1.1. Conversation 2

**Venue:** Discussion room at KTSC

**Tanaka-san:** Hello team. I hope you have had a good understanding of the transportation system and the SmartTrans system during your training here.

**Raj:** Yes Tanaka-san. After the training, we definitely have better understanding of the system. The SmartTrans algorithm session with Numata-san was very helpful. It will help us in porting the code from the Step 1 project.

**Tanaka-san:** Not "port" neh...we would like KIPL to implement the algorithm from scratch and not port the existing code from Step-1.

**Raj:** Oh, thanks for the clarification Tanaka-san. Otherwise, we would have simply ported the code. Thanks that we cleared the misunderstanding.

**Tanaka-san:** Also, the system should be having basic communication interface with which we can check the functionality of the algorithm and measure the performance.

**Raj:** Yes Tanaka-san, we will add the same and update the requirements specification accordingly. The initial part of Step-2 was to be a Proof of Concept<sup>3</sup> (POC)

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<sup>2</sup>Refer to Appendix B for timelines of the case study

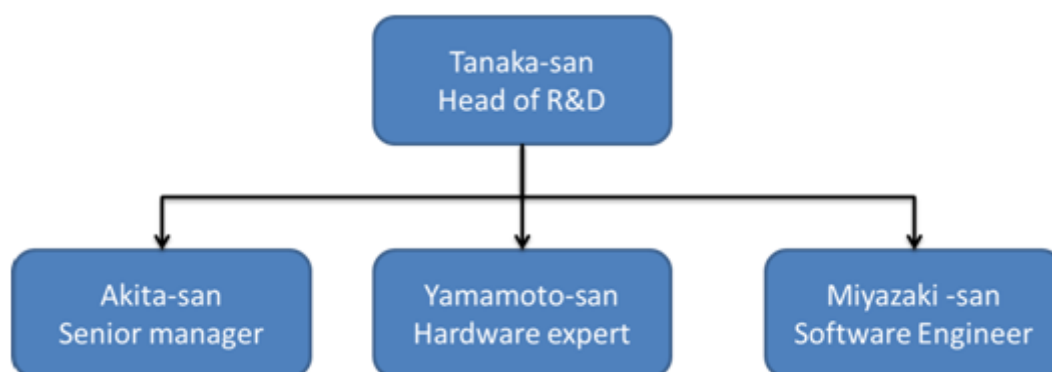
<sup>3</sup>A small project proving or disproving the idea

that will familiarize the KIPL team with KTSC manufactured boards for controlling the transportation systems. The POC would also help KTSC to assess whether the implementation can be done using the KTSC boards and the RTOS. The basic requirements for developing the POC were shared with KIPL team over various discussions at KTSC with Tanaka-san and Yamamoto-san. The KIPL team documented and shared the requirements with KTSC for confirmation and approval. Tanaka-san promptly approved the spec while the KIPL team was still at KTSC.

From January to March of 2014, the KIPL team put their heads together to study the control board architecture to find the best design approach for implementing the POC. By the end of March 2014, the POC was implemented as per the basic requirements provided by Tanaka-san. The tested POC was delivered to KTSC for review. KIPL conducted minimal testing, as they did not have the simulator setup. During this phase, KIPL demonstrated the POC confirming to the test results and performance expectation over a video call. From KTSC, the meeting was attended by Yamasaki-san (Head of software development Group at KTSC), Tanaka-san, Yamamoto-san, Akita-san, and Mukai-san. Yamasaki-san was satisfied with the POC performance and there were no major comments or remarks made by KTSC.

### 3.2. Change in management at KTSC

In April 2014, there was a change in the organizational structure at KTSC. The new team members had limited knowledge of Step-1 and even lesser information about Step-2. They did not receive the appropriate handover information and technical knowledge from the previous members due to unavoidable circumstances.



**Akita-san:** Akita-san is assigned as the new manager for SmartTrans project. He was handling a division that dealt with transportation components. He was new to SmartTrans concept. He had some prior interaction with KIPL team. Additionally, this was his first experience dealing with Indian company for outsourced project.

**Yamamoto-san:** Yamamoto-san was a hardware expert dealing with procuring all the devices for SmartTrans controller.

**Miyazaki-san:** Miyazaki-san is the software engineer and his responsibilities include understanding the current implementation and help in solving issues arising in SmartTrans project.

Akita-san was selected to lead the SmartTrans Step-1 and Step-2 project, with Yamamoto-san and Miyazaki-san to support him. Tanaka-san briefed Akita-san about his vision and the roadmap.

### 3.2.1. Conversation 3

**Venue:** KTSC discussion room

**Tanaka-san:** Team, as you know Mukai-san had to leave the organization. Akita-san will take over the management of SmartTrans project.

**Akita-san:** Thanks for providing an opportunity to work on the project. Can you please let us know the roadmap of the project? I have received very brief information from Mukai-san regarding the project

**Tanaka-san:** Yes, the project is separated into two phases. Step-1, currently being developed by KDE is for the current orders. KIPL will implement the Step-2 project, which will be the final product. Both use the algorithm developed by Numata-san. Please coordinate with KIPL and KDE for the product releases. Step-1 is of higher priority as it caters to already existing orders.

**Akita-san:** I will co-ordinate with them.

Tanaka-san briefly explained the technical part of the SmartTrans system and concluded the meeting. No details on the method of implementation of his vision were shared. Conversation after the meeting with Tanaka-san:

**Yamamoto-san:** Akita-san, Tanaka-san did not mention, what should be the design approach for Step-2?

**Akita-san:** I think KIPL should continue with whatever approach they have now as they know more about the system than us. I think we should concentrate on Step-1 as that is of high priority.

By not sharing his vision, Tanaka-san, left the newly formed team to make their own decisions regarding the execution of this project.

Out of the three members, Miyazaki was familiar with the software development aspects of the project. , However, none of the three members had knowledge about the SmartTrans system.

As the development team at KIPL is at offshore location, in order to share information and create a good understanding of the situation — Akita-san suggested

a weekly video conference. Akita-san tried involving technical experts from KTSC and KDE; however their presence during the call was not regular. In addition to this, KIPL shared Weekly Status Reports (WSR) and Minutes of Meeting (MoM) with KTSC.

While KIPL was content with the reports, Akita-san felt that the reports were lacking details. However, as he was not familiar with the technology used in SmartTrans, and to avoid hurting anyone's feelings, he never shared his feelings with KIPL.

### **3.3. Miscellaneous tasks**

From April to June of 2014, while the team at KIPL was waiting for further action plans from KTSC, they were assigned miscellaneous activities for developing debug tools. These activities were unrelated to SmartTrans Step-2. During this time, KIPL voluntarily developed a PC based simulator to validate the correctness of the algorithm - as the actual simulator used by KTSC for validations was not available with the KIPL team.

Meanwhile, there many specification changes during Step-1 development causing delays in the original schedule. This situation created lot of pressure on Akita-san and other KTSC members. Consequently, they could not devote much time needed to interact and discuss the next action plans with KIPL. SmartTrans Step2

During May 2014, Tanaka-san and Akita-san visited KIPL for 2 days for discussing the Step-2 roadmap. Tanaka-san was on a business trip to all the South East Asian offices and spent only a day in the KIPL office confirming the roadmap. Akita-san handed over the design documents of SmartTrans Step-1 to KIPL. The goal was to derive at the requirement specification for SmartTrans Step-2. Apart from sharing the high-level design document for Step-1, there were no design discussions for Step-2.

During the visit, Koga-san met KTSC members. He insisted that any feedback, good or bad, should be shared with KIPL, as this will help to fix the issues and have good working relation.

The KIPL team studied the documents provided by KTSC and came up with the System Requirement Specifications (SRS). The SRS captured requirements at high level and mainly focused on the system operation. The SRS was shared with KTSC by July. Akita-san confirmed the specifications were correct and KIPL team can proceed with the detailed design of the system.

The KIPL team worked on the detailed design of the Step-2 between July and August 2014. This design was based on the POC developed earlier. The design document was submitted to KTSC for review. KIPL team discussed the POC code reuse

during the weekly meetings and verbally confirmed by Akita-san, there was no documentation done for the same.

Meanwhile, in Japan, KTSC and KDE were busy in meeting the schedule for the market release of SmartTrans Step-1 planned for August 2014. The project for installing the SmartTrans Step-1 was based in India - a first-of-its-kind installation for Kanemitsu Corp and KTSC. This meant the timelines were non-moveable. On the other hand, apart from the delays due specification changes, the Step-1 project faced many unexpected issues like failures of hardware, sub-standard performance - requiring long resolution time. There was a feeling that the Step-1 project may miss the deadlines. After lot of hard work and dedication, the SmartTrans Step-1 was released in September 2014 — delayed by a month. Even after the release, KTSC and KDE teams were occupied in fixing multiple issues to make Step-1 ready for installation at customer site.

As Step-1 was high priority for KTSC, they confirmed the design documents without a detailed review and any follow-up discussions. The confirmation from KTSC was delayed however to confirm to the schedule, the KIPL team did not insist for detailed review or discussions. The KIPL team, unaware of the internal review process of KTSC, simply accepted this approval and moved on with implementation.

From August to December of 2014, KIPL team worked towards the implementation as per the approved design of SmartTrans Step-2. At this point, KTSC requested KIPL to send one of their engineers for supporting KTSC team in installation and testing of SmartTrans Step-1 project in India. Despite of the fact that this may have impact on project, KIPL accepted this request to maintain good relations as well as to gain more knowledge about the actual system.

In December 2014, KIPL completed the implementation of SmartTrans Step-2. The source code and unit test reports were submitted to KTSC. This was just before the year end and New Year vacations in Japan.

### **3.4. New Realizations**

KIPL started to test the performance of the SmartTrans Step-2 during January 2015. The performance test reports were shared with KTSC; the reports indicated that the SmartTrans Step-2 has better response time as compared to SmartTrans Step-1 and met all the other performance criteria. This was taken as good news on KTSC side; Akita-san was excited to see such good results in such a short period of time.

As the SmartTrans Step-1 was installed in customer site, KTSC finally had the time for deeper review of SmartTrans Step-2. The KTSC team started looking into the working of the SmartTrans Step-2. During the weekly calls over next 2-3 weeks, the design and working of the system became clearer to the KTSC team, especially Akita-san.



#### 3.4.1. Conversation 4

**Venue:** KTSC

**Akita-san:** We have received the software from KIPL for SmartTrans Step-2. The performance is better than SmartTrans Step-1.

**Tanaka-san:** Good to hear this. So we are on track for release.

**Akita-san:** We might have to add some more testing as the KIPL developed software uses the algorithm implemented during the POC and other new software. They have also not been able to test it thoroughly as they do not have the full simulator setup.

**Tanaka-san:** Why did the KIPL team use the POC code as base? Weren't we clear that the code should be ported from the SmartTrans Step-1 code? The SmartTrans Step-1 software, which is tested, should be taken for implementing Step-2. The plan is to develop software that has compatibility with the existing SmartTrans Step-1 system, and further to replace the PC which are in operation with embedded boards, thereby increasing the maintainability.

**Akita-san:** But this was not conveyed to me or to the team at KIPL. This will have implications on the schedule and responsibilities.

**Tanaka-san:** This has always been the way KTSC has operated. This has been the vision from the start. This reduces the effort in validation and ensures a quality product. Now please plan to mitigate this issue and realize the product as soon as possible.

**Akita-san:** I understand. I will confirm with KIPL and also plan for the risks associated with it.

Now, Akita-san was to inform KIPL that the SmartTrans Step-2 software designed, implemented and submitted by KIPL in the last ten months was not in line with the vision of KTSC. KIPL was required to port the SmartTrans Step-1 code from PC based platform to embedded platform.

#### 3.4.2. Conversation 5

**Venue:** Tele-conference

**Raj:** Hello Akita-san. Good evening.

**Akita-san:** Hello Raj-san.

**Raj:** Akita-san shall we start with the status report

**Akita-san:** Yes please.

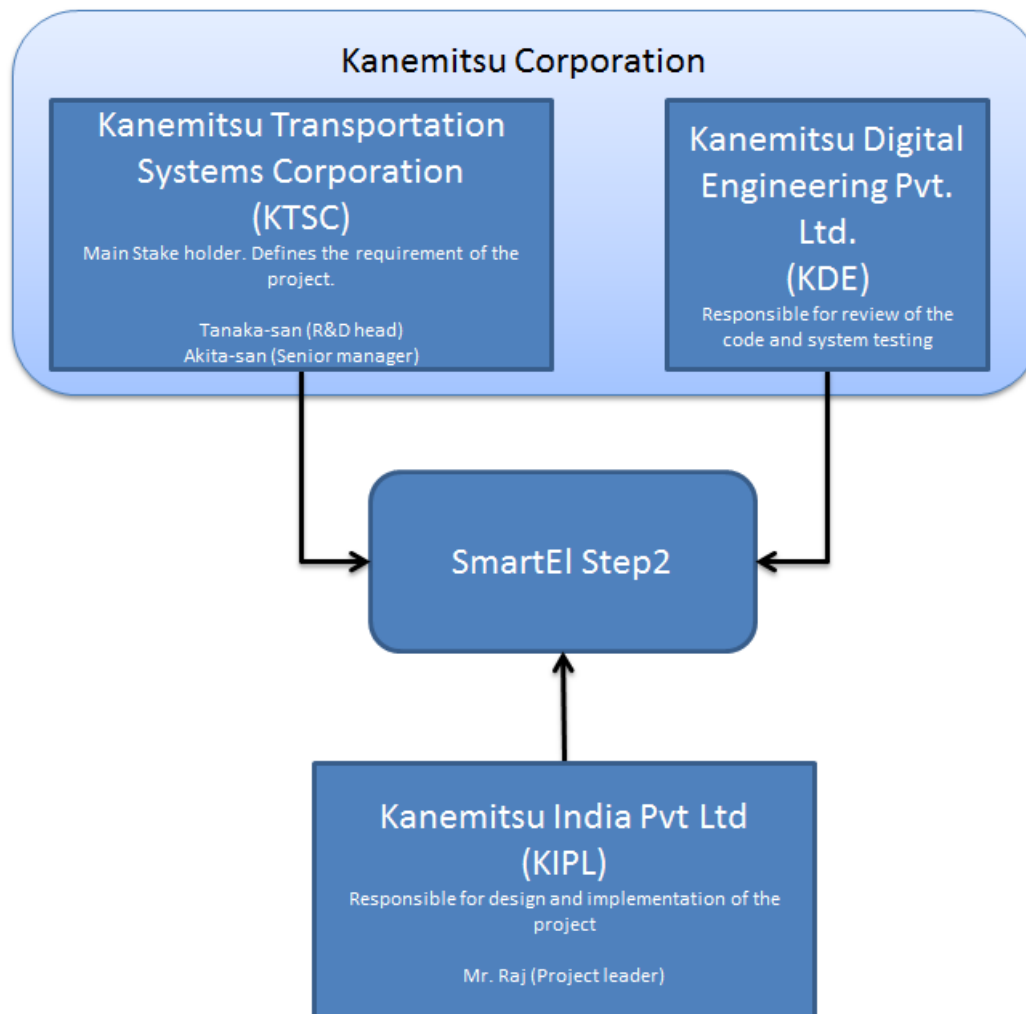
During the call Akita-san did not ask any questions. This was different from the usual calls, as Akita-san was always interested in getting confirmations. It sounded strange to Raj.

**Raj** (After completing the status report): Akita-san any comments on the current status of the project?

**Akita-san:** Yes Raj-san, it is rather unfortunate that there seems to be gap in the project approach between KTSC and KIPL. We regret to inform that KTSC intends to port the SmartTrans Step1 code onto the embedded platform, rather than completely new implementation as done currently. We deeply regret the situation but we need your support in completing the work according to our vision.

Raj was surprised to hear the update from KTSC.

## Appendix A: Stakeholders



Appendix B: Timeline

