Siemens Advanta Consulting

DIGITALIZATION AT SIEMENS RAIL

Siemens Advanta Consulting – Practice Case

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1 Question

Interviewer:

Today I'd like to discuss a fascinating question with you: Does the "Digital Revolution" of services in the local transport sector hold opportunities for Siemens?

The business events presented here are based on real project examples and have been adapted for training purposes

Source: Siemens Advanta Consulting

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2 Qualitative Part I: Pros and cons of digitalization (1/3)

“ As I understand it, the topic has to do with the "Digital Revolution" in the local transport sector. Now I'd like to clarify the general parameters and understand what you mean by the *local transport sector*.

“ Siemens designs and produces transport systems for both long-distance and local trains. It also has a business area which is responsible for providing rail operators with service and maintenance for their trains (so-called "external maintainers"). The unit also makes available resources and support systems so that so-called "self maintainers" can service their own trains.

“ That means that Siemens produces local transport trains and offers resources and services for this business sector. Digitalization will certainly have an impact on all three elements. But you spoke specifically about service. Am I right to assume that the business potential for Siemens regarding the digital service offering for "external maintainers" and "self maintainers" is what should be examined?

“ Yes, that's right.

Candidate Interviewer

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2 Qualitative Part I: Pros and cons of digitalization (2/3)

"I'm sure there are multiple digital approaches for increasing train availability or reducing costs. I'm thinking for example about data analysis and "predictive maintenance" for trains, driverless trains, automated communication between switches and trains and the communication between track signaling installations.

"If we look at it from the client perspective, what are the pros and cons when a rail operator uses products and services to support "predictive maintenance"?

"There are indeed many pros and cons for clients when it comes to the topic of "predictive maintenance", e.g.,

- \+ Improved client satisfaction through increased punctuality
- \+ Better monitoring of the train condition and thus fewer train cancellations/defects in running operation
- \+ Fewer contractual penalties arising from malfunctions
- \+ Cost savings through preventative replacement of critical parts, which otherwise would cause consequential damages
- \- Increased risk of cyber attacks
- \- Increasing complexity of systems and possibly an increase in error susceptibility

These points are the pros and cons Siemens would be faced with.

Candidate Interviewer

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2 Qualitative Part I: Pros and cons of "predictive maintenance" (3/3)

"And what opportunities and risks do you see for Siemens?

"The following aspects immediately come to mind:

- \+ Data analysis conducted by Siemens could lead to strengthened customer-specific products and services
- \+ Lower storage costs because replacement parts could be produced "Just In Time", meaning for defined, specific times
- \+ Additional revenues generated from preventative maintenance contracts
- \+ Increased client loyalty through closer collaboration
- \- Increased competition from other railway suppliers is imaginable in the area of "predictive maintenance"
- \- Contractual penalties when "predictive maintenance" malfunctions

To derive the real potential for Siemens, we should now do a cost-benefit consideration.

"Very good.

Candidate Interviewer

Source: Siemens Advanta Consulting

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3 Qualitative Part II: Sales potential (1/2)

"In order to evaluate a possible market entry strategy for services in the framework of "predictive maintenance", we should carefully consider the different dimensions. Before I even start to think about an entry strategy, I need to first consider whether entering the market makes any sense at all. To do this I'd take a look at the following:

- Market analysis: Clients, competitors, technologies and R&D requirements …
- Supply and demand consideration: Product advantages, cost structure and pricing strategy policy, marketing, etc.
- Competences: Which competences do we need to be able to successfully position these services on the market?

In addition, one would need to calculate how much sales Siemens could generate and what costs would be incurred.

"Super! Go for it!

"**I'd first like to calculate sales.**

In order to calculate sales, we need to know how many service offerings we can sell and multiply this number with the price per service.

The interesting question here is how many service offerings can Siemens sell at the respective prices.

Candidate Interviewer

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3 Qualitative Part II: Sales potential (2/2)

“ Absolutely. What would you do now so that you can answer this question?

“ I would need to know the current market size, the market development and our share of the market. Can you tell me how large the market is?

“ I would like to be able to do that. But if we take the view that the market does not yet exist, how could Siemens estimate whether there is a potential market for the "predictive maintenance" of local transport trains?

“ All things considered, customers buy Siemens services when there is a financial advantage for them in doing so. In the case of trains we can assume that "predictive maintenance" goes hand-in-hand with an increase in train availability and a reduction in repair costs. That's why I'd like to find out whether the purchase of a train system with "predictive maintenance" service is less expensive for a Siemens customer than is currently the case.

Candidate Interviewer

Source: Siemens Advanta Consulting

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4 Quantitative Part I: Cost calculation (1/3)

“ Okay.

“ [Assesses the yearly cost blocks with "predictive maintenance"]

- Acquisition costs (higher because of "predictive maintenance" technology)
- Yearly repair costs (lower because of "predictive maintenance" technology), however additional monitoring costs
- Yearly contractual penalties (lower)

...

[Assesses the yearly cost blocks without "predictive maintenance"]

- Acquisition costs (lower)
- Yearly repair costs (high as there is no "predictive maintenance")
- Yearly contractual penalties (owing to malfunctions and delays)

...

It appears that train systems with "predictive maintenance" capabilities are more expensive to procure, but have lower maintenance costs. We need to calculate if it is advantageous or not. But we can already assume that trains with "predictive maintenance" will prove to be cheaper when total figures are considered, once break-even points have been reached.

Candidate Interviewer

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4 Quantitative Part I: Cost calculation (2/3)

“ Let's make this more specific. Let's assume that the Siemens Rail unit is working at the moment on an offer for the metropolitan area of Lisbon in Portugal. How long would the city of Lisbon need to replace all existing local transport trains with the newest generation of trains that are "predictive maintenance" capable?

“ To answer this question, I first have to make a number of assumptions to estimate the number of trains in Lisbon. I will also calculate the exchange frequency of local transport trains.

- The average distance between the stops is 5 kilometers
- The metropolitan area of Lisbon has a size of ca. 50 x 60 km ➞ 11 * 13 = 143 stops
- A train covers 3 stations ➞ ca. 48 trains are in operation
- There's also around 5% replacement trains (= ~2 replacement trains) ➞ 50 trains in total
- The lifetime of a local transport train is roughly 30 years on average

Assuming that the age structure of the 50 trains in Lisbon is distributed equally, that gives on average ~1.6 trains that have to be replaced each year. This means that all trains would be completely replaced with the new generation in 30 years.

Candidate Interviewer

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4 Quantitative Part I: Cost calculation (3/3)

“ That sounds good – we would have the opportunity to offer our digital services over many decades. But can you imagine some reasons why Lisbon might not want to replace its trains?

“ I'm guessing that the licensing of a new train type requires substantial time investment as well as costs for the rail operator. In addition there are procurement costs so that the rail operator could find itself in a financial tight spot. But I think that Siemens could provide active support here to counter these concerns, e.g., through a "self-financing model". Comparable offers are already established for example in the energy sector. A new train with "predictive maintenance" would finance itself through the saved service costs accrued over the years.

Candidate Interviewer

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5 Quantitative Part II: Price calculation (1/2)

"Yes, that is a good idea. But we're concerned at the moment with another topic: A price must be given in the offer for the "predictive maintenance" system. What possibilities do we have to determine the price?

"Besides competitive-oriented pricing, I see two possibilities. Let me sketch these out.

Top-down Calculation based on client savings	**Bottom-up** Calculation based on own costs and margins

To me it seems advisable to focus first on the top-down analysis. I say this because I assume that rail operators in Portugal, similar to those in Germany, must reimburse passengers with the cost of the ticket cost when trains are delayed. But to be able to calculate the potential savings of the rail operators when using "predictive maintenance" I must compare both options – meaning once with and once without "predictive maintenance". Is there any information available here regarding this?

"We know that a ticket costs 1.80 EUR on average. A train can transport 200 people and has a 70% capacity load on average. A train makes 20 trips each day. The rail operator has 50 trains and by using "predictive maintenance" can save 0.5 lost days per train each year.

"1.80 EUR / person * 140 people * 20 trips / day * 0.5 lost days * 50 trains = 126,000 EUR annually

Candidate Interviewer

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5 Quantitative Part II: Price calculation (2/2)

"OK. Go on.

"Now we've worked out the savings; the price should be based on this. The client must keep a target margin, so that maximal 75% of the price may be asked.
126,000 EUR * 75% = 94,500 EUR

"Is that suitable in your view?

"Well the client faces other costs as well when a train is delayed or doesn't operate. So he can realize further savings by using "predictive maintenance". These costs are not yet calculated into the pricing model. I'm thinking here about:

- Costs for hauling away the train
- Organizational expenses (delaying other trains)
- Making available a replacement train

…

"Ok, let's set an annual price of 120,000 EUR for "predictive maintenance" for 50 trains. What problems and difficulties in your view could arise in the framework of using "predictive maintenance" in general and "big data" specifically?

Candidate Interviewer

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6 Outlook

"Here you're posing a number of questions, e.g.,
- What data must or should be collected?
- Who does the data belong to? Where would be it saved?
- May data analysis findings from one customers be used with other customers?
- Is data privacy guaranteed?
- How large is the expected data volume for each time unit?

"Fantastic! Can you please summarize the case and state your recommendation?

"The task was to evaluate the opportunities in the digitalization of the local train sector. We focused on the service area.
My conclusion is that digitalization, especially in the form of "predictive maintenance", would have a positive influence on the examined market, for travelers, rail operators and the manufacturers of train systems. That is why I would recommend Siemens to promote digitalization in the local train sector or even to bring it to maturity, provided that they do so in a cost competitive fashion.
Potential stumbling blocks, such as financing bottlenecks, could be countered using innovative contract design. In general, it seems advisable for Siemens to position itself as a partner of rail operators and not simply as a technical solution provider.

"Many thanks for your excellent case solution!

Candidate Interviewer

Source: Siemens Advanta Consulting

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