Questions for second opinion WSP:

1. Introduction

Amsterdam has been working on the implementation of a new signaling and control system since 2012. The first part of the project has been deployed in 2018 on the new North South Line. In February of this year we started the deployment on the rest of the network. This network is a fully integrated network. This means there are no separate tracks for separate lines. Therefore it was not possible to introduce the system line by line. In order to avoid a big bang Amsterdam came up with a strategy that we call 'staged commissioning'. During a set period of time the new system and the legacy system are alternately being used. On the 28th of February this year we started to use the system on weekend days and we have been gradually extending the number of days per week on which we use the new system in a consecutive manner. This strategy gave us the opportunity to balance the evaluation of the performance under operational conditions and the (expected) hinderance for passengers.

As expected we met several problems during the staged commissioning. Before the summer the system got overloaded on 5 occasions. In July a new software update for the ATS was implemented. This seems to effectively have brought down the processor load. A number of technical issues remained but seemed to be manageable by operational work around. However on the 24th and 25th of September we had to reset the system again causing a global hold of the system. On the 25th we even had to switch back to the legacy system during the day. This obviously caused a disruption of service for several hours and decreasing confidence in the project.

2. Current situation

As noted before, a number of technical issues remain. The most important known technical issues are:

1) Train-label issues. In the ATS system, train-labels are sometimes split or shown incorrectly. This occurs in particular between station Overamstel and station RAI. These issues lead to a considerable amount of manual actions for the traffic controllers. Alstom is currently trying to solve these issues by the use of patches. Until these issues are solved, Alstom has proposed to implement a technical work-around.
2) Memory leak. During the staged commissioning there have been occasional events that caused CPU and/or RAM memory overloads. Alstom's analysis has shown that different events all led to a memory leak, which in turn causes the overloads. Alstom is working on a solution for the memory leaks.

In addition to the most pressing issues, a plethora of lesser technical issues remain (i.e. vehicle issues, display-information issues, driving-times issues, etc.). Together with GVB, the S&C Program is prioritising in which order Alstom should solve these technical issues.

3. Conditions for re-starting the staged commissioning

In an ideal situation we would prefer to first solve all the remaining technical issues, and subsequently start implementing the system in revenue service. However, we believe that some issues can only be identified by experiencing them during prolonged use of the CBTC system. In the Amsterdam context that means these issues can only be encountered during revenue service. Therefore, we want to re-start the staged commissioning and the use of the CBTC system in revenue service as soon as possible.

We discern 4 re-start conditions that have to be met before we can re-start the staged commissioning. These conditions are necessary to limit the risk of future global holds and possibly having to switch back to the legacy system. Additionally, implementing the re-start conditions should enhance the capability of the Amsterdam operation to quickly solve malfunctions in the system if they occur. The re-start conditions are:

Technical conditions

1) The memory leak issue has to be solved. Alstom is developing a technical solution to solve the issue. The solution will need to be tested and brought live before we feel confident enough in the system that we can re-start the staged commissioning.
2) The operational work-around for the train-label issues has to be implemented. We feel that the system is not workable for the traffic controllers if the train-label issues remain.

Operational conditions

3) The traffic controllers are presently being supported by an Alstom support team on site. This support team has to be strengthened with more in depth knowledge of the system. This has to be arranged before restart of the commissioning of the system.
4) A protocol/checklist has to be prepared for diagnosing and resetting different parts of the system. This protocol /checklist should support discission making in case problems occur during commissioning. This should shorten the down time of the system and by doing so limit the hinderance for passengers.

4. <u>Review questions</u>

Against this background we would like you to answer the following questions:

Quick-scan (within 2 weeks, based on interviews):

A1. Which additional preconditions, beside the 4 identified, should we consider for restarting the commissioning of the CBTC system?

For more thorough analysis:

B1. Do you see any reason to believe a successful implementation of the system on the Amsterdam network is not possible? If so, are there alternatives to the CBTC system available that have more potential success?
B2. What's your opinion about the current implementation strategy and in particular the Staged Commissioning approach?
B3. Are there any recommendations that you propose for adjusting or improving the current implementation strategy?