



Re: RFI #:039/2024 - Solutions in the field of Digital Twin applications

For NTA – Metropolitan Mass Transit System Ltd (hereinafter: "NTA")

Clarification Notice no. 3

1. Following the publication of the RFI documents under consideration, attached hereto are NTA's answers to Participants' clarification questions, as well as amendments and clarifications to the RFI documents, as specified in **Appendix A**.
2. It is hereby clarified that the phrasing of the questions below may not necessarily be identical to the phrasing used by those who addressed NTA, and not all questions are necessarily answered. Additionally, it is clarified that certain questions may have been asked by more than one Participant, and therefore the response shall refer to the phrasing used by one of the Participants.
3. All clarifications, changes, and amendments specified in this Clarification Notice shall be considered part of the RFI documents, and shall prevail over any previous statement in the RFI documents and/or in earlier notices made by NTA. Each Participant submitting a response to the RFI shall be deemed to have agreed to the changes mentioned in this Clarification Notice and its appendices, whether attached to the response or not.
4. Unless stated otherwise, all terms and conditions specified in this Clarification Notice shall be interpreted as stated in the RFI documents.
5. Any verbal or written interpretation, by anyone on behalf of NTA or its Tender Committee, in any forum or manner whatsoever, shall not bind NTA. The only changes to the provisions of the RFI documents, as well as all interpretations and clarifications thereof, are those provided in this Clarification Notice and in further clarification notices that NTA may publish, at its sole discretion.
6. All Participants are required to have this notice signed by their authorized signatories and attach it to their response.
7. The provisions of this Clarification Letter do not modify or detract from the provisions of the RFI documents unless expressly stated otherwise.

With Regards,

NTA – Metropolitan Mass Transit System Ltd.



Appendix A

No.	Reference to the RFI documents	Question / Request	Answer
1	General	Has NTA defined the purpose of the digital twin? What is the narrative behind NTA's request?	NTA wishes to investigate DT solutions for the Design & Build stage and the O&M phase that can be suitable and applicable for its projects. The purpose is to learn more about DT solutions used worldwide by different providers, the maturity status of the providers' solutions, the main requirements to be considered by NTA, the main suggestions/expectations of different providers, and how different solutions can be applied to NTA's transportation projects. NTA wishes to use the digital twin to help: • Test the designs both internally and with key stakeholders in order to make sure it works properly • To support construction and information flows • To support commissioning • To support operations, management and maintenance of NTA's systems • To help NTA ensure integration across the whole light rail and metro network • To help support the integration of the system and stations into the different municipalities/neighborhoods with which we will work .
2	General	What applications will be connected to your digital twin? For example: a)Transportation applications b)Real estate applications c)Operational applications d)Artificial intelligence applications e)Security applications Are there additional applications, and what are they?	NTA expects that operation and maintenance systems will be connected to the maintenance phase – MMIS – maintenance management information system and SCADA – Supervisory Control And Data system .In future stages, artificial intelligence applications and other applications may also be connected, but a determination in that regard has not yet been made.



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			a) All aspects associated with planning, design, construction, and operation of 3 new metro lines and 3 LRT lines (one open and two in construction), including all facilities used to support operation. b) Stations, depots, utility coordination including underground utilities (power, water, IT, gas, drainage) and integration into existing neighborhoods. c) Red, green and purple light rail systems and long term management of new metro lines d) NTA would like to understand how AI could support a digital twin system across all phases of the development from design decisions to construction management, commissioning and operations e) NTA expects the digital twin will be used to support development of all security assets and management of the different systems. City integration of metro with other systems, support of local masterplans around stations especially interchanges, design of complex interchange stations.
3	General	Who will be NTA's user? Which department is responsible for the project?	The preliminary examination is currently made by the Information Systems and Innovation Division. . However, in the future NTA expects that other parties which will be in charge of operation and maintenance will use it (among them external parties who will be responsible for the maintenance of the lines). Lead for digital at NTA and program and project managers for each line, plus DB contractors and operators in due course.
4	General	Has the digital twin's cloud platform been configured (AWS, Azure, etc.?)	No. It still needs to be defined.
5	Summary of Adopting Digital Twin Solution in Big Infrastructure Projects	In addition to the Infrastructure Assets and Rolling Stock, does NTA desire a Digital Twin for buildings? In S. 12(3) the list includes Stations but notable exclusions are Depots/Yards, Control Centers, etc.	Yes, NTA expects all building assets to be included in the I



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6	Specifications for Requested Solutions	Is there a timeline for when NTA would like to have this technology deployed for the existing network and the new lines that are under construction?	NTA aims to plan POC after the RFI. Currently, NTA is gathering information from worldwide suppliers on DT technologies implemented in other projects and how their solutions can suit our project. NTA may investigate in details the most interesting solutions received, and after the RFI, NTA may promote a POC assessment to test DT on the operating LRT Red Line, or any other process subject to NTA's sole discretion.
7	Specifications for Requested Solutions	Is there a weighting or scoring method that can be shared with Participants for how NTA will weight and consider overall compliance to its requirements?	Not at this point. This RFI is a preliminary process solely for receiving information.
8	Specifications for Required Solutions	Can the DT be on multiple platforms for each project lifecycle stage (Design, Construction, O&M)?	Preferably one platform.
9	Specifications for Required Solutions	Can the DT be on different platforms for stations and linear elements?	Preferably Same platform. Currently, NTA manages its information on the same platforms. We need the DT solution to be able to use this information to the maximum extent possible.
10	Specifications for Required Solutions	What information exactly should be compatible with GIS and Aconex? Or is it just the possibility for future integrations?	Just the possibility for future integrations
11	Specifications for Required Solutions	Integrating with MMIS: Does the MMIS have an open API?	MMIS does not have an open API. It is a closed system, and therefore the solution cannot be cloud-based.
12	Summary of Adopting Digital Twin Solutions in Big Infrastructures Projects	A. Which GIS platforms are relevant? Is there a preference for a certain platform? Are GIS platforms installed and if so which ones? B. What is the level of interface/coupling with the GIS platforms? Data transfer interfaces? Information sharing interfaces? others? C. Which ACC / cloud platform is required? What is in the plant? What is the level of interface/coupling with the ACC platforms? Data transfer interfaces? Information sharing interfaces? others?	A. NTA has its BIM models for its assets in ACC and also GIS data in the ESRI platform. B. This is live information that is constantly updated as different projects and assets are being developed by NTA. C. The DT solution should be able to use this information with as minimum need to migrate information and processing to the DT platform.



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13	General	Will those who do not respond to the RFI be able to participate in future tenders for the supply of a DT technology ?	Yes. As specified in the RFI, Response to this request will not constitute a condition for participation in the tender, if any is subsequently issued, at NTA's sole discretion.
14	Questions and Clarification Requests	Is it possible to get a certain extension for Questions and Clarification requests?	The deadline was extended until March 1, 2024.
15	General	How should the responders transfer the information? • Attach to an email (I have large files)? • Send a link to the company website for independent download.	If the file does not exceed 20 MB, it can be sent by email; otherwise, via link.
16	General	After sending the RFI, what is the next step?	NTA will examine the solutions and decide on further actions, if any.
17	General	Are there any specific performance metrics or benchmarks that the Digital Twin solution should meet, such as scalability, real-time simulation capabilities, or data processing speed?	At this stage, NTA hasn't established specific performance metrics or benchmarks for the Digital Twin solution. However, we are interested in exploring solutions that offer: • Scalability: to accommodate potential future growth and expansion of the light rail system. • Real-time simulation capabilities: to enable proactive maintenance and optimize decision-making. • Data processing speed: to ensure efficient real-time and historical data stream handling.
18	General	• Could you clarify the expected scope of deliverables for the Digital Twin solution? Are there any specific use cases or functionalities that are considered high-priority or mission-critical for the project ? • Are there any specific KPIs or success criteria that will be used to evaluate the effectiveness and performance of the Digital Twin solution?	• NTA aims to integrate Digital Twin with its maintenance system to enhance fault/issue visualization and intervention planning. This will provide technicians with spatial awareness and contextual information to streamline repairs and improve decision-making. While NTA's initial focus is on this critical aspect, we are also exploring the broader potential of Digital Twin technology for predictive maintenance, improved communication, and data-driven decision-making to optimize maintenance strategies and ensure long-term system efficiency.



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			NTA is still in the early stages of exploration, but we believe Digital Twin integration holds significant promise for transforming our light rail system maintenance practices. .
19	Specifications for Requested Solutions	- Regarding compliance with ISO standards (e.g., ISO 19650 series, ISO/IEC 27001, ISO 16739-1), are there any specific certification requirements or accreditation processes that the Digital Twin solution must adhere to ? - Could you provide more details on how adherence to DIN SPEC 91391 (Common Data Environments for BIM projects) will be evaluated or verified ? - Are the SaaS solutions considered?	- ISO standards: At this stage, we are not imposing specific certification requirements, however, we are interested in understanding the solution's - general adherence to relevant ISO standards, particularly those related to data security and information management. - Yes, SaaS solutions are considered
20	General	- Is the organization open to Software as a Service (SaaS) solutions for the Digital Twin implementation, or is there a preference for on-premises deployment ? - Are there any specific considerations or requirements regarding cloud-based solutions, such as data security, compliance with regulatory standards, or data sovereignty concerns?	- NTA doesn't have a specific preference; we are open to suggestions. - NTA doesn't have a specific preference. - Each case shall be considered individually, if the system we interface with is not closed, for example.
21	General	How critical is it for the Digital Twin to facilitate collaboration and stakeholder engagement throughout the project lifecycle?	NTA expects to receive such information from the Participants.
22	Specifications for Requested Solutions	- Regarding compatibility with Aconex systems, could you specify the extent of integration required? Are there any specific modules or features within Aconex that the Digital Twin should seamlessly connect with ? - Are there specific GIS platforms or functionalities with which the Digital Twin should be compatible?	- It is Just a possibility for future integrations. We would be happy to hear from the participants about integration between EDMS/ACONEX and Digital Twin. - NTA is using GIS In ESRI technology.
23	Specifications for Requested Solutions	Maintenance and Operations : Could you elaborate on the expected integration between the Digital Twin and Maintenance	Beyond basic issue location visualisation, future MMIS integration aims to:



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		Management Information Systems (MMIS) during the operation and maintenance phase? What key functionalities or data exchanges are essential for this integration ? • Are there any specific requirements or standards for real-time monitoring and decision-making support during the operation and maintenance phase that the Digital Twin should fulfill?	• Enhance decision-making: Visualise historical data alongside real-time faults, overlay additional data layers, and potentially enable scenario simulations. • Explore predictive maintenance: Leverage data to predict potential failures and optimize maintenance strategies • Data exchange: • Functionalities: Streamlined workflows, enhanced decision-making, potential predictive maintenance. • Data: Equipment ID (CI code) , description, contractor in charge, maintenance history, etc . • Real-time requirements: Real-time monitoring and decision-making support are not essential for the POC but may be considered in future deployments depending on the evolving needs of our maintenance operations
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