The construction of digital twinning platform in the Yongjiang River Basin from the perspective of resilient cities

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Objectives

The proposal of "Urban resilience" has become the forefront of the concept of urban safety development in recent years. Flood control and typhoon prevention in river basins require coordinated basin planning and water city governance, and close integration of key defense targets with urban infrastructure. Therefore, it is necessary to meet the needs of water disaster prevention in the Yongjiang River basin and urban waterlogging control in Ningbo city, combine the theory of "Urban resilience", take the "forecast, early warning, rehearsal, and plan" four pre system of flood control and disaster reduction as the guide, use the powerful rendering ability of the digital twin engine, and take hydrological and hydrodynamic models, spatial computing technology, and other important basic support to realize the construction of the platform for flood control and disaster reduction.

Methods

The key methods mainly include three aspects. The first is the construction method of the integrated digital twin data base integrating the basin and city, the second is the urban waterlogging calculation method based on parallel computing and big data spatio-temporal analysis, and the third is the construction method of the "four pre" system for flood control and disaster reduction coupling river basins, cities and water conservancy projects.

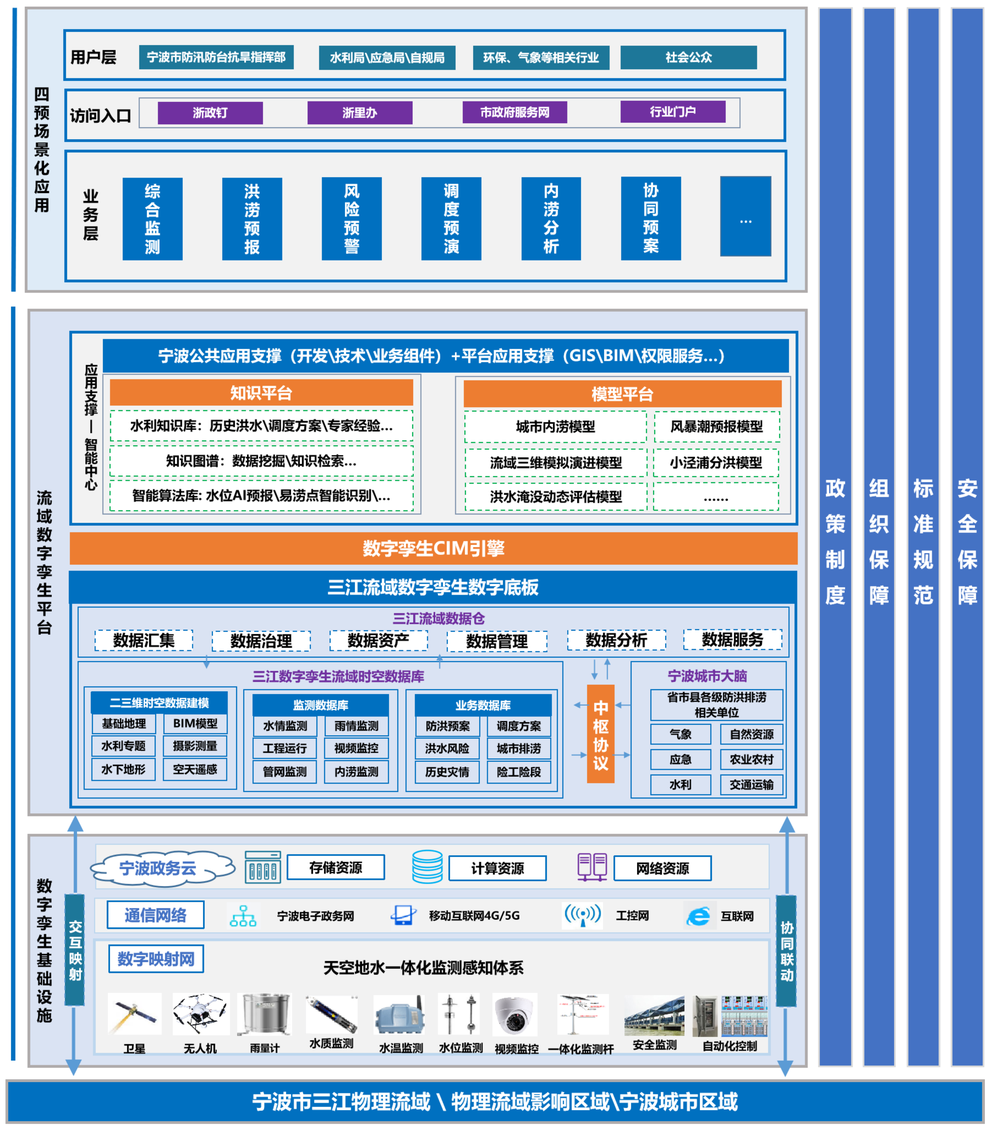

Figure 1 General Framework

Results

The platform has built a full element digital twin basin spatio-temporal database. With digital twin, big data, artificial intelligence, cloud computing and other key technologies, it has built a hydrological and hydrodynamic model and urban waterlogging model, and designed business function modules such as comprehensive monitoring, flood forecasting, risk early warning, dynamic rehearsal, and collaborative preplan.This platform provides important support for watershed and urban water security.

Figure 2 Integrated monitoring

Figure 3 Waterlogging analysis

Conclusions

The practical application shows that the platform improves the accuracy of forecasting, realizes the rapid judgment of waterlogging risk, and supports the intelligent decision-making of flood control project scheduling.The platform has successfully withstood the super-standard flood brought by Super Typhoon Muifa in the Yongjiang River basin, and has enlightenment significance for the optimization of the future flood control engineering system, and has certain reference significance for the flood control and disaster reduction and Urban waterlogging control in other basins.