



Tianjin Smart City Creates Economic Prosperity and Better Lives

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The Tianjin Economic-Technological Development Area (TEDA), established in 1984, is located in the eastern coastal region of Tianjin, at the center of the Bohai Economic Rim. TEDA is one of the earliest coastal economic and technology development areas in China.

Over its 34-year history, TEDA has focused exclusively on investment promotion and the development of enterprise services. In terms of today's industrial footprint, the area now hosts more than 37,000 international corporations, including more than 200 members of the *Fortune Global 500*, such as Motorola and Samsung. Each of these companies is an active contributor to the economic health of the TEDA region.

One example of the type of innovation emerging from Tianjin region is Motorola's concept for total customer satisfaction: Simple customer satisfaction occurs when basic expectations are met. Total satisfaction is achieved when customer expectations are exceeded. However clear the premise, absent the availability of Big Data or Artificial Intelligence (AI) at the time, it was impossible for the program to succeed.

One Center: AI Performs Deep Analysis, 'City Brain' Generates Value

Today, Tianjin's Binhai New Area Smart City solution provides an accurate macro and micro understanding of the needs of its industrial and residential constituents. The Smart City solution uses cloud computing, Big Data, and AI to offer services that were not possible before. The '1 + 4' solution, with an AI platform at the core, was designed by TEDA and implemented with Huawei's support for processing, communication, and in-depth mining with the goal to maximally integrate information about people and things via the 'City Brain' Intelligent Operations Center (IOC). In this way, TEDA provides enterprises and residents with full-lifecycle, point-to-point smart services through the 'Serving Enterprises' and the 'Caring for Residents' platforms. TEDA's platform integration enables the

As China's first comprehensive district of reform and innovation, Tianjin Binhai New Area has taken the lead with in-depth integration of Artificial Intelligence and Smart City technologies to become a new benchmark for Smart City solutions.

analysis and prediction of the needs of each enterprise and the ability to communicate with residents and households for the delivery of services targeted to meet their specific needs.

The '1 + 4' solution refers to one center, the IOC, and four AI platforms. The IOC is the central point for recommendations and fulfillment. Data sourced from government, industry, and individual citizens through the Internet and the Internet of Things (IoT) is aggregated for processing by the TEDA AI.

The analysis performed by the IOC delivers the following three benefits. First, a real-time dashboard visualizes the moment-to-moment status of the local area for city managers. Second, decision-making tools analyze and offer optimization solutions to high- and low-level decision makers. For example, heat maps illustrate residential activity to help officials precisely site new commercial or industrial construction. Third, the IOC hosts a suite of technical monitoring, warning, and event-linkage responses based on scientific protocols, which are especially important for complex accidents or emergencies. One such example is when the public security agencies are able to easily manage a festival or other type of celebratory activity based on input from the heat map. In the past the agencies may have been nervous or uncertain about crowd control for a daytime marathon or evening light show. With the video surveillance and cloud computing technologies available today, the agencies are far better equipped to relay dynamically changing information about all sites to the IOC.

The IOC command and control screen displays the operating status of six distinct domains in real time: A TEDA overview, economic flow, safety, transportation, public utilities, and macro quality-of-life (happiness) indices that are extracted

from the data. By presenting the information visually the IOC operators are able to gain a comprehensive understanding of TEDA's overall operating status.

Four AI Platforms Support the 'City Brain'

The TEDA solution currently involves four AI platforms that interact closely with the IOC to provide smart services: Resident Voices, Resident Care, Sensing the City, and Enterprise Services.

- **Resident Voices:** Voice recognition and semantic parsing technologies enable city managers to understand the voice of each resident to gain insight into their needs. Resident voices are captured through a hotline, online messages, and in-person visits. The information and data are then analyzed in text and audio data formats. The platform provides voice navigation for residents to improve their service experience. The smart monitoring of sensitive details enhances the quality of management by government agencies. Key information is communicated to leaders at all levels for further action.

- **Resident Care:** Deep learning and correlation analysis are used throughout the service lifecycle to generate personalized resources for residents. Beginning in utero, individual profiles are created for each person in the TEDA system, and additional information is added as residents progress through their lives. Pre-natal care and post-partum training is provided to expectant parents. Infant-nursing information is integrated with social support resources to manage the healthiest possible outcomes. As children begin school the smart education system will recognize each person's learning pattern and serve as a tutor. When the time comes for college entrance examinations, the system will recommend the most appropriate universities

to best enhance each person's personality and learning style. Post-graduation the system will help with individual career planning. In summary, the platform intelligently enables a comprehensive range of services throughout the life of each resident.

- **Sensing the City:** Image recognition and correlation analysis are used to explore the relationships between people, places, and things for the purpose of fostering a harmonious order for all. Sensors collect the data required for city management, including air and water quality, street lighting, available parking spaces, and other information. The video system collects information from transportation hubs, schools, community centers, hospitals, and other locations that, when combined with sensor data, is used to build a unified view for regional health and progress. The visualization platform is used to help city managers comprehensively understand the city's status. For example, residential community surveillance can intelligently analyze the risk level posed by unknown visitors to ensure community safety. Smart surveillance throughout the transportation network is used to monitor vehicles carrying dangerous chemicals or unlicensed vehicles to ensure road and railway safety. The sensor network is also used to monitor water tanks in households and high-rise buildings to alert for water quality changes to ensure the safety of the local water supply.

- **Enterprise Services:** Multi-dimensional correlation analysis helps to clarify the internal relationships of industries in the TEDA district for the purpose of accurately matching the availability of service resources throughout the enterprise lifecycle. A primary task for the TEDA administrators is the promotion of investments directed to local industry. The investment promotion phase relies on Big Data technologies to analyze the available information from government and Internet sources to better understand the market landscape in which the target enterprise is operating and evaluate its forward-looking risk. The Tianjin Binhai New Area district government pushes both targeted and general local investment information to regional enterprises in real time. Local governments follow their investments by providing targeted services during the construction and operation process. For example, if changes in the consumption data of water, electricity, gas, or heat of an enterprise are detected, this may indicate production or operational challenges that may require immediate intervention from a supervising agency.



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Additional Innovations: Residential Happiness Index

Evaluation standards complement the AI platforms to help ensure that residents enjoy a better life through access to high-quality services. The success of the 'AI + Smart City' solution is measured by a 'happiness index' that has been established to build a safe living environment for all local residents. First, data is collected through sensors or surveys. Then Big Data analytics are performed and the grid-based city management system is used to identify risks in all regions. One example of proactive discovery is TEDA's ability to track, capture, and analyze data on water consumption patterns for each household. Every service or utility is a candidate for this type of closed-loop management. Trends and projected outcomes are subject to further supervision by city managers who are charged with responsibility to assess and intervene with the relevant stakeholders, whether they are on the supply or consumption side of the equation. The TEDA data management tools allow public services to be provided in neighborhood convenience stores so that residents can apply for licenses, pay bills, and engage with other public services while they are close to their homes.

The goal of the TEDA 'AI + Smart City' construction is to continually improve and maintain a happy, comfortable living environment for all residents. Based on the information gathered from the distribution and collection of large numbers of questionnaires we learned the issues that bring inconvenience and unhappiness to urban residents. By using the TEDA AI platform we summarized the leading factors that bring happiness to our neighbors, including peace, beauty, convenience, harmony, social order, and vitality.

In the future, we hope to develop smarter platforms using AI technologies. Our goals include building more personalized Smart City applications to continually improve the happiness indices for the residents of Tianjin Binhai New Area. We expect that the next phase of our Smart City platform will better understand the needs of people and businesses to enable a prosperous and happy modern city, and a better way of life. ▲