



 Harvesting the
 benefits of
 integration

Integrated Data Collection System for Census of Population

INDUSTRY

- Government

CHALLENGES

- Avoiding data discrepancy
- Streamlining processes
- Eradicating manual and time-consuming paperwork

OFFERING

- Integrated data collection system

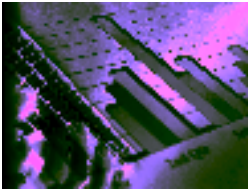
BENEFITS

- Ease of management
- Reduction of manpower
- Accurate statistics released in 2 months
- Streamline of processes

Singapore's Census of Population 2000 ■ The Singapore Department of Statistics (DOS) is the national statistical authority responsible for official statistics on the Singapore economy and its population. Its mission is to develop and manage a national statistical information system of quality and integrity to support Singapore's social and economic development planning.

When DOS was planning the Census of Population 2000, they were looking for better solutions and a breakthrough in data collection strategy. They were determined to further improve the management, processing and dissemination of Census data. They also wanted to better manage operational workflow and resources deployed during operations as well as closely monitor the progress of the entire Census.

Recognising the benefits they could derive by employing advanced Information Technology (IT), DOS selected NCS Pte. Ltd. to develop a fully integrated system that could centrally manage and streamline the processes for this island-wide project. NCS was thus entrusted with the task of developing and implementing ten application systems to establish the IT infrastructure required, and operating the Internet and telephone data collection modes for the Census of Population 2000.



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tabulation operations with good IT support from NCS enabled DOS to release information within two months of Census day from the previous Census 1990's nine months.

The Total Solution ■ NCS set up an e-infrastructure spanning strategic locations island-wide as well as developed and implemented ten application systems to run on this infrastructure. It also provided the facilities for the collection of data over the Internet and through the telephone. For this, an Internet application system was deployed with access to a restricted database for selected respondents to file and update their information electronically. Strong log-in authentication and 128-bit encryption method were used to ensure the secure transmission of data over the Internet. A Call Centre was set up to handle the collection of Census data and queries from the public over the telephone. A predictive dialer managed the outgoing calls to the selected respondents and automatically connected them to the interviewers, while an interactive voice response system handled incoming calls. A separate system also captured relevant data on foreign workers collected from companies.

The infrastructure deployed included a distributed database for the Internet, Call Centre and field enumeration data collection modes. Incomplete data collected via the first two modes of data collection were then sent to an Enterprise server for the printing of forms for door-to-door interviews. Fieldwork operations at the regional centres were managed via the fieldwork system.

A document management system using Optical Mark Recognition and Optical Character Recognition technology was implemented to facilitate the capture of data collected from face-to-face interviews. Completed data from the Internet, Call Centre, and the electronic document management system were synchronised at the enterprise server for computer-assisted coding and verification.

To improve public awareness, a Census website for the dissemination of Census related information was created. The web infrastructure was also designed to allow for scalability and availability. Other application systems were implemented for the processing of letters and reminders to the selected respondents, management of resources deployed for the Census and generation of management reports. Other than securing all leased lines and implementing strict authentication and encryption of data, measures were also implemented at various levels to prevent unauthorised changes to the system, and to detect and capture attempted cyber attacks for immediate follow-up investigation. These measures ensured that no breach of security was encountered during the Census operations. High availability was provided for and load-balancing features incorporated to handle the high traffic.

Benefits For All ■ The smooth and tightly integrated data collection, processing and tabulation operations with good IT support from NCS enabled DOS to release information within two months of Census day from the previous Census 1990's nine months. Manpower was significantly reduced and operational processes were streamlined. Only 600 staff was needed to conduct the Census 2000, compared with 6000 that would have been needed for the traditional approach. In all, DOS enjoyed cost savings of S\$48 million.

The use of the Internet and Call Centre technologies not only minimised the manpower needed to conduct the interviews face-to-face, the on-line data validation ensured more accurate data collection. The predictive dialer facilitated census officers in contacting the selected households. The use of the Internet also enabled selected households to submit the required information at their own convenience.

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Contact NCS today!

As a leading regional information technology (IT) and communications engineering services provider, NCS aims to work closely with you to create business value through the innovative use of IT. With proven experience and expertise in consulting, development, integration and managed services, we bring end-to-end support for your organisation's entire technology life-cycle.