



## The CORENET project in Singapore

### Singapore government harnesses IFCs for planning applications

The CORENET project – in full, the Construction and Real Estate Network – was launched in 1995 by the Ministry of National Development with the Building and Construction Authority as the lead implementing agency.

The aim of CORENET is to allow the parties to building projects, including the planning authorities, to exchange information swiftly and seamlessly. The new systems will save time and costs at the same time as improving quality. The CORENET project has three strands: e-Submission, e-PlanCheck and e-Info.

#### The project: (1) CORENET e-Submission

The e-Submission System has been up and running as an electronic service since early 2002. Involving the 16 regulatory authorities across eight government ministries regulating the construction and real estate industry, it facilitates collaboration among the various regulatory authorities. By allowing industry professionals to submit the progress of planning applications over the internet, e-submission serves as a single government counter, available non-stop on a 24x7 basis. Industry professionals today do not need to make hardcopy prints of building plans or physical trips to the authorities. Transparency is also improved as all stakeholders can monitor the status and progress of the planning applications online. As part of the project, government processes have been streamlined to improve efficiency and customer experience.

#### Technology used

Developed for the Singapore government by novaCITYNETS Pte Ltd, the e-Submission System runs on PAVO™, a robust suite of the J2EE application which enables submission logic handling and rules validation, and provides built-in business intelligence and secure transmissibility.

#### The project: (2) CORENET e-PlanCheck

The e-PlanCheck initiative is the most ambitious part of CORENET. The process allows designs for new buildings to be digitally checked against building codes, using automated procedures, rather than manual paper-



The glittering city skyline of Singapore's Central Business District. The city has a busy construction programme (Image courtesy of the Singapore Tourism Board)

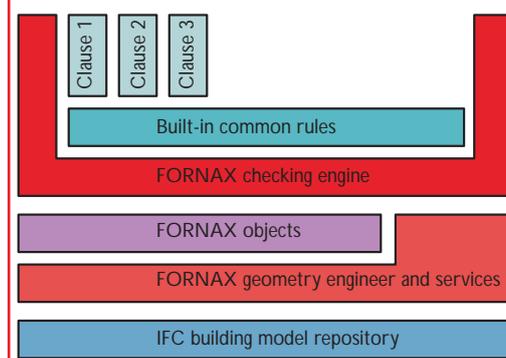
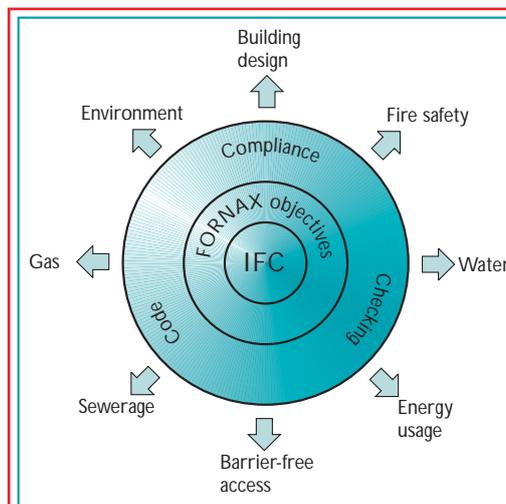
based processes. Involving eight regulatory authorities from five government ministries, the project will be rolled out in phases, starting with architectural works and building services.

#### Technology used

e-PlanCheck is implemented on top of FORNAX™ – a software which extends the IFC models and builds additional intelligence to enable the implementation of checking functions. As the name suggests, checking functions are the core functionality of the e-PlanCheck system.

At the base of the FORNAX™ software are: (a) database technology from EPM Technology A/S; (b) an ACIS library from Spatial Corp; (c) Open Cascade technology from Open Cascade; and, most importantly, (d) Industry Foundation Classes (IFC) Release 2x2 from BuildingSMART IAI International.

With IFC 2x2 as a base, a layer of FORNAX™ objects were built. These FORNAX™ objects are enhancements to the IFC 2x2 model. These objects provide richer information which is required for the implementation of checking functions in the system. In order for the system to perform checks successfully, qualified persons submitting plans need to use CAD software which has been certified as capable of producing the IFC 2x2 model data expected by the system. This data is complemented by client-side functions which capture the additional information required by the checking functions. UK consultancy firm AEC3 provided model development assistance to the Singapore government.



FORNAX platform (Courtesy: novaCITYNETS Pte Ltd, Singapore)

### The project: (3) CORENET e-Info

Available since 2002, the e-Info System provides a comprehensive central repository of building and construction-related information in Singapore, presented in a single format via a single portal on the internet. The integrated information channel provides a quick and easy source of reference, doing away with the need for industry professionals to maintain hard-copy reference materials. Email broadcasts are also available to alert them to new information and updates on the portal. Supported by 13 regulatory organisations across seven government ministries, e-Info offers information on codes, regulations, guidelines, standards, product catalogues, contractors' performance and Singapore standards.

### Technology used

By leveraging the XML (extensible mark-up language) technologies, e-Info stores and describes information in a machine-interpretable format that can be processed and understood easily by different IT applications. Apart from allowing seamless communication, the content can be used by different internet-based e-business applications. At the same time, the removal of machine dependency meant the life and value of information in e-Info can be better preserved and extended.

### One-stop shop

Public sector organisations participating in CORENET e-Submission:

- Building and Construction Authority
- Agri-food and Veterinary Authority
- Defense Science and Technology Agency
- Energy Markets Authority
- Fire Safety and Shelters Department
- Housing and Development Board
- Infocomm Development Authority
- JTC Corporation (formerly Jurong Town Corporation)
- Land Transport Authority
- Maritime and Port Authority
- National Environment Agency
- National Parks Board
- Public Utilities Board
- Singapore Land Authority
- Singapore Power
- Urban Redevelopment Authority

Public sector organisations participating in CORENET e-Info:

- Building and Construction Authority
- Attorney-General's Chambers
- Fire Safety and Shelters Department
- Housing and Development Board
- JTC Corporation (formerly Jurong Town Corporation)

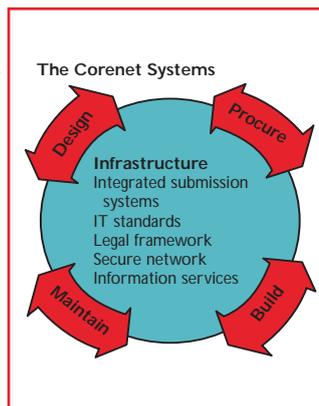
- SPRING Singapore (formerly Productivity and Standard Board)
- Land Transport Authority
- Ministry of Manpower
- National Parks Board
- National Environment Agency
- Public Utilities Board
- Singapore Power
- Urban Redevelopment Authority

Public sector organisations participating in CORENET e-PlanCheck:

- Building and Construction Authority
- Fire Safety and Shelters Department
- Housing and Development Board
- JTC Corporation (formerly Jurong Town Corporation)
- Land Transport Authority
- National Environment Agency
- Public Utilities Board
- Singapore Power

Industry organisations supporting the CORENET project:

- Singapore Institute of Architects
- Institution of Engineers, Singapore
- Association of Consulting Engineers, Singapore
- Real Estate Developers Association
- Singapore Contractors Association



Making a planning application online: the CORENET log-in page for e-submissions

### The wider impact

- In Singapore, almost 100% of planning applications are now performed on the e-Submission System. With a customer base of over 2,500 firms, it is used widely by architects, engineers, surveyors, plumbers, electricians and other professionals. In an industry survey, 89% of the respondents indicated they had experienced cost and time savings related to printing of plans, transportation/dispatch services and increased staff productivity.
- Adoption of the e-Information System is similarly widespread, with a user base of over 12,000 industry professionals, resulting in the gradual phasing out of printed copies of circulars and correspondence by the participating regulatory departments.
- Recently completed, e-PlanCheck will be gradually extended, first through a pilot and then through key industry players.
- Norway is implementing a similar electronic e-submission system, and the two countries have collaborated to allow Norway to benefit from Singapore's experience. Norway is also piloting a code-checking system.
- In New York City, a pilot project for automatic building code checking using the International Code Council codes is in progress.

For more information please contact: Thomas Lim Boon Han, CORENET programme manager, Building and Construction Authority, Singapore, or Jeffrey Wix, technical coordinator, UK, initially via the UK BuildingSMART office (Beryl Garcka: beryl.garcka@b-r-t.co.uk or 020 8660 1631; Christopher Groome: chris.groome@b-r-t.co.uk or 07973 638 742).

