

# TOWARDS E-LAND ADMINISTRATION - ELECTRONIC PLANS OF SUBDIVISIONS IN VICTORIA

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## ABSTRACT

The Internet and web technologies are now thoroughly integrated into the business of the cadastre, with initiatives like VOTS, LASSI, SMES, LANDATA and SPEAR completed or well underway in Victoria. These technologies provide great opportunities for better service delivery, more customer satisfaction and reductions in operating costs through integrated electronic land administration.

With this systematic introduction of the Internet and web technologies into the business of the cadastre, electronic lodgement of plans of subdivisions (ePlan) are about to introduce a new era to the surveying industry by providing an infrastructure for the digital lodgement, exchange, alteration, examination and approval of plans of subdivisions and their associated documents and data in this State.

A number of components are needed to be established and a number of current systems are needed to be re-engineered through the ePlan project implementation. This article introduces the Victorian ePlan initiative and outlines the technical component of the system. The ePlan initiative will bring significant benefits to the surveying profession, land development industry, local councils, State Government agencies and instrumentalities and other key stakeholders involved in the land development process by optimising the current practices of submitting plans of subdivision in Victoria, both paper-based and PDF-based plans, by making them fully electronic.

Finally, the article discusses that the electronic plan of subdivision is not an end by itself; rather it is a means that facilitates achieving a number of goals remarkably authoritative cadastral database, standardised data exchange between user and databases and electronic land development process.

## INTRODUCTION

The Internet and web technologies are now thoroughly integrated into the business of the land administration with initiatives like Victorian Online Titling System, Land And Spatial Survey Information, Survey Mark Enquiry Service, LANDATA and the Land Exchange program (Electronic Conveyancing and Streamlined Planning through Electronic Applications and Referrals (SPEAR)) completed or well underway in Victoria.

Many of these activities in Land Victoria serve a broad range of people and businesses. These technologies provide great opportunities for increased customer satisfaction, reduction in operating costs and increased efficiencies in work flows of the overall land administration process. In this context, electronic lodgement of plans of subdivisions, known as the ePlan initiative in Victoria, aims to provide

an infrastructure for the digital lodgement, exchange, alteration, examination and approval of plans of subdivisions and their associated documents and data in this State.

In 2003 the ePlan working group was formed by the Intergovernmental Committee on Surveying and Mapping (ICSM) to develop a national digital cadastral data transfer standard. The ePlan working group has now developed a model to produce a generic subdivision data format based on LandXML, an internationally accepted standard for cadastral plan data, which includes jurisdictionally specific elements. The ePlan model accommodates all of the survey geometry and administrative and titling data required to process a plan of subdivision from its initial preparation by the surveyor through to its lodgement with council for certification and subsequent registration by Land Victoria and entry in the Digital Cadastral Database (DCDB).

In 2007 the working group began the project implementation phase, aiming at trialling and adapting the data transfer standard to enable surveyors to complete on line cadastral and survey information searches of the relevant jurisdictional databases; receive standard survey data downloads and create a cadastral survey (data) plan. At a later, and more mature stage in the project, it is envisaged that surveyor's digital files will ultimately be visualised, validated and approved by the relevant jurisdictional authorities as a spatially and legally valid instrument for subdivision plan registration and land title registration.

Through the optimisation of the facility currently provided by the SPEAR, pdf-based, subdivision plan delivery system, the ePlan initiative is seen as bringing significant benefits to the surveying profession, the land development industry and State Government agencies. The anticipated improvements will align with those that might be expected in other systems where there is a transition from paper-based products (in this case, plans of subdivision and related documents) to those which are fully digital.

Whilst a significant amount of work had previously been performed in other jurisdictions in the development of standards for the ePlan model (notably Queensland and New Zealand) it was not until April 2008, that a steering committee was formed in Land Victoria to investigate the ePlan initiative and the potential benefits that could flow to Victoria from its implementation in this State. The steering committee includes the Executive Director of Land Victoria, the Surveyor-General of Victoria, the Director of Land Registry Services and the manager of Land Victoria's Project and Policy Division. Land Victoria has also recruited an ePlan coordinator with specialist skills in LandXML. Since then, a range of aspects of the ePlan concept have been explored. These aspects include the vision, scope, identification of stakeholders and the technical components of the project. This article introduces those concepts being researched in Victoria in regard to the ePlan initiative and outlines the scope of the investigation.

## **WHAT IS AN ELECTRONIC PLAN OF SUBDIVISION?**

An ePlan is principally a digital data file of surveying and administrative information related to a subdivision survey. It can contain all information in a cadastral survey and subdivision plan including surveying measurements; land parcel description and identifiers; dimensions of the parcel and interests in land such as easements; administrative information on the subdivision; annotations; plan approval status, the surveyors' details and so on. In fact, ePlan files will be a digital substitute for paper and PDF plans with the added advantage that information in ePlan files can be digitally extracted, populated into related database (such as the DCDB and VOTS registration databases) and reused for the creation of a new subdivision plans. The automatic digital data extraction from digital plans will contribute significantly to improving the spatial accuracy of the cadastral database. Furthermore, having structured plans of subdivisions in a digital format will allow for the automatic validation of those plans in terms of surveying errors; mathematical closure of parcels; and content and compliance with the requirements of the Registrar. It is envisaged that the validation can be facilitated by web service technology and be permanently available to surveyors as a self checking service. The registration process will also be assisted by computer aided examination of the digital plan. This facility will improve the efficiency of the plan registration process and thereby further shorten the registration time for plans of subdivision from that which is currently experienced.

In general terms, the ePlan system will be an infrastructure for the digital lodgement, exchange and examination of plans of subdivision as well as a means of contributing to the improvement of the digital cadastral database.

## EPLAN VISION

### Principles

There are three principles on which ePlan is built (see Figure 1). Firstly, it will enable surveyors to download digital cadastral and survey information to support the population of relevant data fields in the surveying and plan preparation of new subdivisions. Secondly, it provides the possibility for cadastral and survey data reuse by which land information databases can be updated and maintained more efficiently through the use of the digital files. Finally, it creates efficiency in plan preparation, submission, examination and registration through computer aided processes with less reliance on paper (digital process).

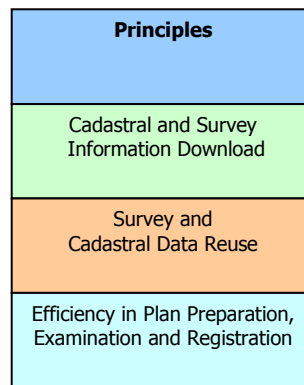


Figure 1: principles of the ePlan project

### Means

Having defined the principles of the vision, a number of corresponding means are also needed to support the principles (see Figure 2).

Initially, digital cadastral and survey information must meet specific levels of survey accuracy if it is going to replace the paper plans. A survey accurate digital cadastral database is therefore a critical supporting means for the first principle. Although one might argue that the introduction of electronic plans of subdivisions can progressively result in a survey accurate digital cadastral database that is still being investigated.

In addition, the principle of efficient survey and cadastral information reuse is not achievable unless a supporting standard data format is employed. Such a format will allow users to manipulate and transfer their data irrespective of the application used to create and maintain it. The national ePlan working group has ratified LandXML, an international data transfer standard for land development applications, as the data transfer protocol for survey and cadastral information in Australia. Implementation of ePlan takes advantage of LandXML's flexibility and openness, providing users with the tools to quickly and easily generate numerous representations of digital data with a style sheet type approach. This ability will allow visualisation of items such as plan drawings, administrative data, abstracts of surveyor's field notes, title diagrams, permanent mark sketch plans and so on.

Finally, the resultant efficiency in plan preparation, submission, certification, examination and registration will support a streamlined process for land subdivision. While in Victoria the delivery mechanism that is SPEAR reduces the current reliance on paper and the effort involved in sending and tracking applications through the subdivision process, an ePlan enabled SPEAR will further allow plans

of subdivision to be created, lodged, certified, examined and registered in a totally digital environment as outlined in the third part of the vision above.

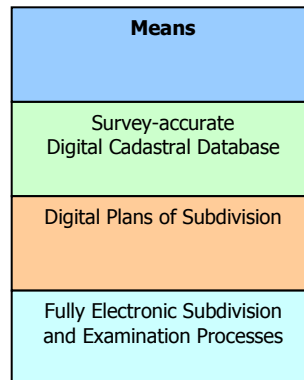


Figure 2: critical means required for the ePlan system

### **Outcomes**

Each of the principles, together with their corresponding means, form a foundation of an outcome in the ePlan vision. Authoritative digital cadastral information, standardised data exchange between databases and users as well as electronic land development process are identifiable products of the ePlan system.

Survey accurate digital cadastral and survey information is the foundation of an authoritative digital cadastral database for a land administration system. While the benefits of applying such a database to land titling, valuation and planning are regarded as significant, the focus of this article are the gains that can be made in the subdivision of 'land'. Within this land subdivision process, ePlan will eliminate the role currently played by paper plans and facilitate the exchange of cadastral and survey information through the uploading and downloading of digital with minimal manual intervention.

Using a standard data format, interpretation and presentation of the contents of a digital survey file will be effective and efficient. Reusable cadastral and survey data or digital files will result in more efficient data exchange and sharing between the users as well as between users and databases. The process of updating land information databases, the most notable of which is the digital cadastral database, will be automatic and straightforward. Using this framework, the incidence human and non-human errors currently encountered in re-establishing a survey and/or parcel boundaries will be reduced.

Importantly, an electronic process of the land subdivision will be a 'driver' towards the implementation of a complete electronic land development process where efficiencies survey and plan preparation as part of the registration process are expected to attract digital and web-based methodology in other land development process such as buildings and major infrastructure development and construction.

Figure 3 summarises the relation among the principles, outcomes and the means in the ePlan vision.

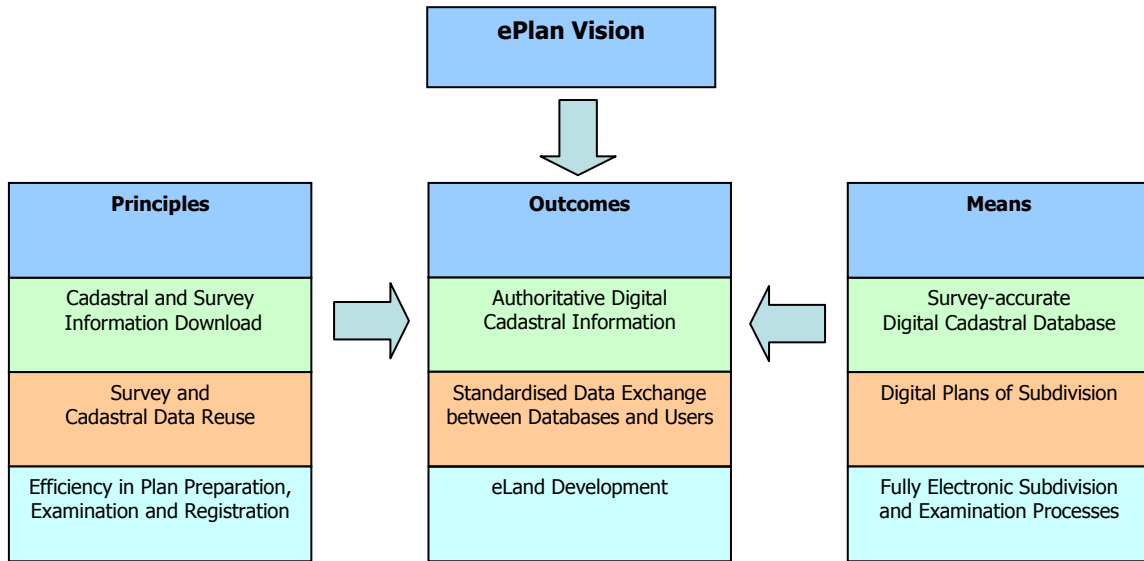


Figure 3: the outcomes of the ePlan described in a vision

## EPLAN STAKEHOLDERS

The process of land subdivision in Victoria involves a number of players that can directly or indirectly influence the ePlan system development. The stakeholders that are likely to be affected by the activities and outcomes of the implementation of the ePlan project components are identified below in **Error! Reference source not found.** In this table, the stakeholders of the project are classified into three groups.

The core internal stakeholders of the project will take the responsibilities of investigation, communication, design, development and maintenance of the ePlan system.

The primary stakeholders of the project are seen as the surveying industry, local councils and statutory authorities which will employ the system for their land subdivision related businesses. The CAD development industry has been identified as another important stakeholder which will be called upon to adopt the ePlan data transfer standard in the enhancement of their current packages. It is possible the involvement of the CAD vendors might extend beyond this to include communication with the other components of the ePlan system which will be introduced in the following sections.

Stakeholder	Class
Surveyors and Professional Bodies	Primary
Local Councils	Primary
Referral Authorities	Primary
CAD Developers	Primary
SGV Office	Core Internal
Land Victoria Subdivision Branch	Core Internal
Spatial Information Infrastructure	Core Internal
SPEAR	Core Internal
Land developers and Property industry	Secondary
ICSM	Secondary

Table 2: Stakeholders of the ePlan project

Secondary stakeholders are identified as that group for whom it is necessary to be informed with the development of the system. For instance, land developers and the property industry are principally involved in the production, financing and marketing of all facets of property development but do not play a major role in the development of the ePlan concept. However, the impact of the concept will have significant ramifications for this group and therefore, this industry should be kept informed throughout the ePlan project development. As a subset of the model developed by the ICSM ePlan working group, the Victorian ePlan project will follow the ICSM ePlan standards and report its progress and achievements to the working group.

This initial listing of stakeholders may be expanded as other stakeholders are identified as the project continues. However, the current listing is useful in developing cooperation between the ePlan stakeholders and the project team and ultimately, assuring successful outcomes for the project.

## **SCOPE OF EPLAN INVESTIGATION IN VICTORIA**

To investigate the implementation of ePlan in Victoria, a number of steps have been planned. These include the adoption of the ICSM ePlan standard; consultation with the stakeholders; and the broader, multifaceted identification and development of the tools required to establish and maintain an ePlan-based subdivision process in Victoria.

### **ICSM ePlan Adoption**

The first phase of the investigation is the adoption of the ICSM ePlan data model as modified to accommodate the requirements of plans of subdivisions in Victoria, remembering that in its 'pure' form, ePlan is a national standard for digital survey and cadastral information. Land Victoria has undertaken a comparative analysis of the national ePlan and LandXML data models against the Victorian requirements for subdivision plans and completed a pilot project examining LandXML's capacity to accommodate Victoria's requirements. The result of the pilot study shows that ePlan can accommodate the majority of requirements of plans of subdivisions in Victoria and can be modified to satisfy all the requirements of plans of subdivisions in Victoria.

### **Consultation with the ePlan stakeholders**

Land Victoria has initiated discussions with several ePlan stakeholder groups but has paid particular attention to date to the surveying industry which is regarded as a major stakeholder of the system. The discussions have been designed to introduce the stakeholders to the ePlan concept and engage them in the development process. In the process of discussing some of the perceived costs and benefits of the project, and disclosing the complexity of the task, this engagement also has the advantage of enabling the project team to comprehend the needs and requirements of the relevant stakeholder.

The consultation with the surveying industry will continue through the running of regular workshops and seminars and by the publishing articles in the respective professional journals.

While similar discussions will progressively be held to engage other stakeholders of ePlan, an important link for the project is the consultation with the CAD software vendors whose contribution will allow the preparation of ePlan standard upgrades to individual surveying software packages and preliminary discussions have been held with this group of stakeholders. In order to gain the benefits of economies of scale and avoid unnecessary duplication in the development of software, the ICSM ePlan working group is working to ensure that the software development occurs on a collaborative national basis and not by stand-alone jurisdictional implementations.

### **Identification of the technical "tools"**

While some current systems will require re-engineering to facilitate the implementation of the ePlan project, a number of new technical components also need to be developed. In accordance with the existing subdivision process, the ePlan based subdivision system has been visualised as a 'virtual loop' in which cadastral data is generated, updated, upgraded and re-used. When fully developed, it is envisaged that surveyors will download the digital cadastral information (see Section 3 of Figure 4 below),

undertake the subdivision survey (see Section 1), submit the new subdivision for examination and registration (see Section 2) and at the end of the loop the digital cadastral database and other Land Victoria databases will be updated using new digital information from the subdivisions (see Section 3).

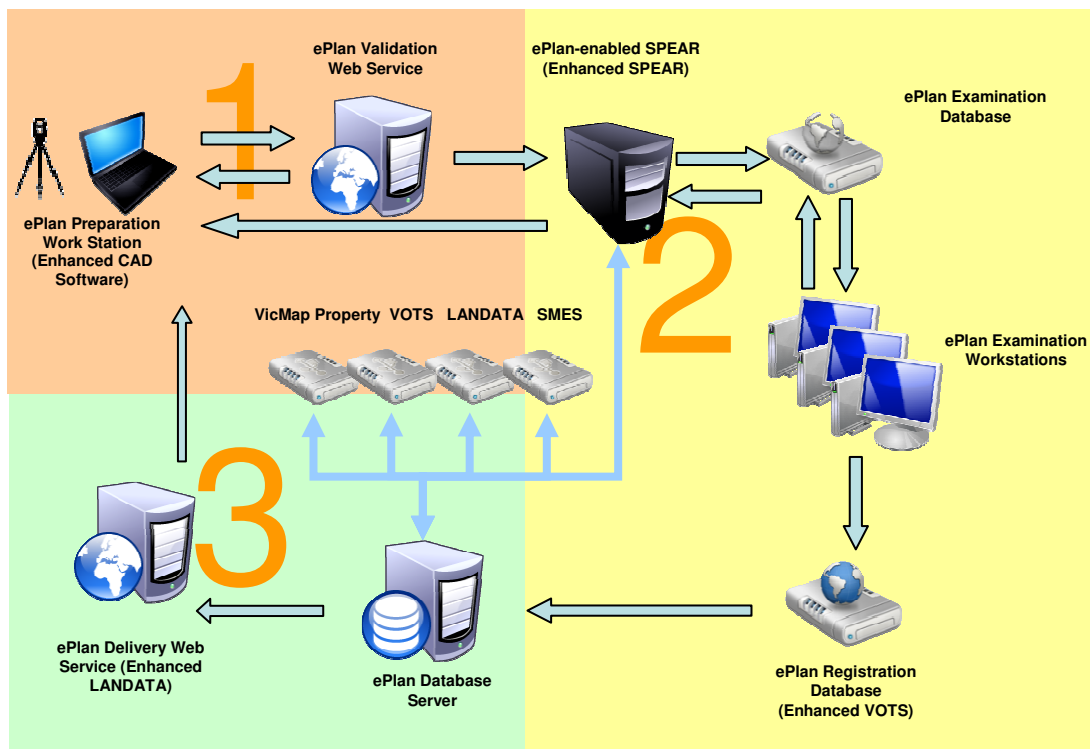


Figure 4: ePlan Loop in Victoria

The following tools as included in the diagram in Figure 4 have been identified as needing to be developed to allow the process described in the ePlan loop to function;

An ePlan file validation tool is required to enable surveyors at the time of the commencement of the plan preparation, before submission to council for certification and subsequent registration, to ensure that the data complies with the LandXML format and the requirements of the Registrar of Titles and/or the Surveyor-General..

An online ePlan visualisation tool needs to be developed and integrated into the existing SPEAR delivery system. This visualisation tool must be able to represent different ‘views’ of a plan of subdivision including the plan , abstract of field notes and permanent survey mark sketch plans as well as the related administrative information within a plan.

An ePlan examination tool that will replace or re-engineer the current manual examination process employed in Land Victoria will also be needed to automate much of the current manual labour-intensive examination process. It is envisaged that this tool will complement the previously discussed validation tool.

After examination, the plan of subdivision will be registered in the ePlan registration database before being integrated into the corresponding databases such as VicMap property, VOTS, SMES and LANDATA through an ePlan database server.

Investigation of mechanisms to deliver digital plan data to users is to be considered in a tool called ePlan delivery web service. Being web-based, this service will be available for surveyors to download digital plans of subdivisions and upload information for new surveys at any time.

## **CONCLUSION**

With the systematic introduction of the Internet and web technologies into the business of land administration in Victoria, electronic lodgement of plans of subdivision is about to introduce a new era to the surveying industry by providing an infrastructure for the digital lodgement, exchange, alteration, examination and approval of plans of subdivisions and their associated documents and data in this State.

It is stressed that the electronic plan of subdivision is not an end by itself but a means that facilitates achieving a number of goals including the provision and maintenance of an authoritative cadastral database; standardised data exchange between users; and the automated population and transmission of relevant data records to aid the land subdivision process.

## **BRIEF BIOGRAPHY OF PRESENTER**

Mohsen Kalantari started his role as the ePlan coordinator at Land Victoria in April 2008 after he finished his PhD from the University of Melbourne. He is currently a member of the ICSM ePlan working group. Mohsen has also the experience of coordinating similar initiatives notably the development of the Spatial Data Infrastructure of Yazd province in Iran. Mohsen also involved in a number of projects including the assessment of metadata entry tools and their fitness for ANZLIC requirements, development of a web based GIS for Iranian Roads Information and designing a National Spatial Data Transfer Standard for Iran. Mohsen has a bachelor degree in surveying engineering and master degree in GIS engineering.





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