Theme: Radiata Management

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Results of the Survey on the Proposed Upgrade of the PSP System

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EXECUTIVE SUMMARY

Permanent Sample Plot data have been stored and managed on computer systems at Scion since the early 1960s. In the late1980s the system was converted to a relational database running under VAX/VMS (PSP version 3), and a simplified version (MicroPSP) was developed for the DOS environment. In the closing years of the 1990s the system was completely rewritten to operate under a Windows 95+/NT environment. Although many new fields and new tables were added to extend the range of data stored about PSPs, the underlying design of the PSP database was not altered greatly in PSP version 4[1,2]. A new version of the PSP system is now required to incorporate new plot and tree variables as found in the wood quality and environmental databases.

Objective one under the Radiata Management theme calls for the development of mathematical models that predict stem growth, crown architecture and wood properties of forest stands, collection of the data to develop these models, and an improved PSP system that will allow the storage of these data.

In October 2008, a survey was undertaken for system requirements for the upgrade to the Scion PSP database system. In the first phase of this survey, Scion staff members were asked to list any requirements (enhancements or additions) they would consider a useful improvement to the current PSP system (version 4). The list of requirements was collated and a discussion session was held to identify what tasks were possible, probable or not feasible.

The second phase of the survey was extended to industry clients who currently have use of the PSP database system as a stand alone version, or use the services of the PSP database administrators on a regular basis.

The outcome of the survey showed that the end users' requirements were mostly similar for both Scion staff and industry. Amongst the requests was the need to have the ability to link to associated datasets, databases and documentation, and the need for additional user defined fields for the use of wood quality properties, carbon calculations and health assessment variables, to name just a few.

An upgrade to the PSP system has been long overdue, and reaction from the survey shows that both Scion staff and Industry users are keen for a 'new look' PSP system that will provide them with a more powerful tool for forest and silvicultural management and forest valuation. This upgrade is a requirement under the Intensive Forest Systems contract.

It should be noted that there is a need to be careful when defining the boundaries for the project i.e., cost/benefit/priority/relevance. This will be documented in a follow-up report by Scion staff.

Christian Pilaar, software development specialist for ATLAS, has been given the task of documenting the actual system design and architecture based on the cost/benefit report. Any upgrade to the system must maintain the security and data integrity that is an integral part of the current system.
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INTRODUCTION

Objective 1 of the IFS research programme encompasses growth and quality of forest stands. One of the tasks within this objective is the New Zealand National Permanent Sample Plot (PSP) Database system (Task 1.6). In the objective plan for 2008-09 there is an annual task to carry out routine PSP measurements along with updates and maintenance of the PSP database.

The main task of Task 1.6 is to complete the system design and development for a new version of the NZ National PSP database system, to incorporate a new data model that will cater for new plot and tree variables. This task is scheduled for completion by July 2011.

This report details the scope and scale of the proposed PSP system improvements (milestone 1.6.5) and people's aspirations for an upgraded PSP system. The next phase is to detail the priorities and costings of the project, which will be the subject of a future report.

METHODS

An internal survey of all PSP system users within Scion was undertaken in October 2008. Fourteen Scion PSP users were asked to complete a form listing their requirements and comments on features they would consider being important either as enhancements or additions to the current PSP database system. Other Scion staff (non-PSP users) were also asked for any contributions they would consider useful in the scoping of a PSP upgrade.

The survey asked users the following:
1. What do you want from the new PSP system (either enhancements or additions to the current system)?
2. User Case – outline a typical scenario in which you see yourself using the new system.

Following this, in January 2009 a letter was sent to Industry clients who have experience with the current PSP database and measurement data, within their companies.

Of the 11 people contacted, the following seven people replied.

Fred Schipper, Timberlands Ltd **
Brian Garnett, PanPac Forest Products Ltd **
Mark Forward, Nelson Forests **
Ian Jenkin, Hancock Forest Management (NZ) Ltd
Ross Jackson ex-Timberlands West Coast (response requested by PF Olsen Ltd) **
Peter Oliver, City Forests Ltd **
Jeff Schnell, PF Olsen Ltd

Companies that did not respond were

Ernslaw One Ltd
School of Forestry Canterbury **
Forest Products Commission, WA, Australia
Southwood Export **
State Forests NSW, Australia

These people either use the PSP system as stand alone software (**) or use the services of the Scion PSP database administrators.

RESULTS

Initially the list of requirements from Scion staff was collated and a discussion document was produced. This identified the Task as either
- Field and office data capture
- Database additions
- Database enhancements
- Other

The required features for each task were detailed. This document was discussed on 26 November 2008 with an internal Scion group consisting of Christian Pilaar, Carolyn Andersen, Jenny Grace, Judy Hayes, Chris Goulding, Bob Shula and Graham West.

Issues such as priority, benefit and relevance to the system were looked at for each required feature. Christian Pilaar was asked to comment on each feature option, particularly with respect to whether the task was possible or not. Some features require further clarification.

Appendix 1 shows summary notes of the possible features to be included in the upgrade with any relevant comments from Christian regarding points to note. These task/features are to be developed further in a detailed workplan showing priorities and costings.

Seven Industry representatives responded to the external survey, and their responses, some including priority, are documented in Appendix 2.

PSP administration and development staff at Scion reviewed both Appendix 1 and 2, and from these collated a list of current system components and a list of the new requirements. These lists have been broadly prioritised in Appendix 3.

CONCLUSIONS

The results of both surveys showed that the end users' requirements were mostly similar for both Scion staff and Industry.

Top priority for Scion staff though is the revision of a Data Capture program, from the current DOS based version (PSPDC) to a version suited for the current windows environment. Also high on the priority list for both users was a new function to allow links to other datasets, databases and documentation with easy retrieval of the summary data and documentation reports.

Scion staff saw the need for additional user-defined fields and/or tables that will allow more flexibility for inputting data associated with wood quality variables, soil, health and carbon modelling.

It should be noted that there is a need to be careful when defining the boundaries for the project, i.e., cost/benefit/priority/relevance. This will be documented in a follow-up report by Scion staff.

Christian Pilaar, software development specialist for ATLAS, has been given the task of documenting the actual system design and architecture based on the cost/benefit report. Any upgrade to the system must maintain the security and data integrity that is an integral part of the current system.

REFERENCES

1. Pilaar,C H; 1998. A Guide to using PSP Version 4 Sidney Output No. 21012.
2. Dunlop,J D; 1995. Permanent Sample Plot System User Manual, FRI Bulletin No.187 110p (1995).

APPENDICIES

Appendix 1. PSP: Upgrade and Enhancement notes for discussion

Task	Feature Required	Comments by Christian Pilaar
Field and Office Data Capture	Total revision of Data Capture program to work in the current Windows environment	Yes
	Generate output structure document for data capture input and output files.	New structure: probably XML
	The new data capture software should cater for more stand history and site information.	Ok
	Extra crop no.'s /species required in PSPDC program – can have several species on PSP system but not in PSPDC – this needs to be in line with any changes to the way mixed species plots are stored on the database.	Propose: Multiple Crops and/or Species/Age by stem
	Current trait code system a mystery to some. *User defined fields and desc codes could use drop down boxes (in PSPDC and database) to select from, giving code and definition.*	Review trait recording
Database Additions	Support scheduling by recording the frequency and dates of plot remeasurements	Ok
	Ability to have documentation (e.g., Maps or site access details - name, ph etc) attached to single or multiple plots	Possible
	More user-defined fields at tree and measurement level – addition of health variables. *(user defined/new table?)*	Will design for this
	System is not currently suited to mixed species/multiple-aged forests. (i.e., indigenous forest, continuous cover forestry – *uneven-aged crops no plant date at all).* Allow the handling of multiple species and crop types in the same plot and the same measurement. *(conversion program and data capture program)*	Propose: Multiple Crops and/or Species/Age by stem
	Links to associated datasets through metadata links, e.g., BIX Ability to link PSP database which is primarily a "tree strata database" with other emerging, often experimental, databases to allow combined queries.	Potentially
	Document the vast amount of historic wood quality information which is in real danger of being overlooked. Load/link historic datasets (all WQI studies). Stiffness and strength, stability and appearance are wood properties of primary concern to customers, and so, growers. Creation of growth AND quality PSP system should be paramount concern.	Negotiable - where relevant
	Simple GIS interface – to find plot/trials by pointing on map, to set search queries for regions by drawing on map. To generate map documents for plots (e.g., jpg), and to present plot data, e.g., growth rates, by the creation of thematic maps.	Yes
	Ability to have access to selected plots to directly input data. A security system that allows an individual access to certain plots to add data might be useful. This would need to be linked to a notification scheme that would indicate to Carolyn that plots had been accessed, by whom, and for what purpose.	Possibly (suggest restrict to Non-core data)

	Wood property information (density, acoustics etc…): stand or plot level info, if not sampled directly, possibly a predicted or modelled value e.g., like Site Index.	Possible
	We need to survey more site information for improved modelling, for example, soil quality, wood quality and forest health, in order to track national changes over time – Higher number of flexible attribute fields (new tables?) for special purposes : *Tables for Carbon (by tree), LENZ data, WQ variables(stiffness, density, resin bleeding), Soil(event,C/N ratio), Health assessments. (e.g., Dothi summary and WQ included in summary table)*	Probably
	Additional user-defined fields and linking to other database - the ability to record other site variables or at least link to data sets such as soils data, biodiversity, etc. Site-related data (LENZ database) – soils, land use history, weeds, foliage analysis, forest health. This would then make the system highly usable for things like national indicator monitoring activities.	Where relevant
	Carbon to be calculated per plot. Fields required for carbon are to be explicitly incorporated.	Yes
	Redefine reports and summaries, particularly for indigenous species.	Yes
	Ownership/permission – Field describing accessibility of data/any restrictions on use. *This is a Big job, will need a set of rules.*	Clarify
Database Enhancements	Tracking ability of changes in attributes (transaction log) – data administrators need better access to this log file.	Yes
	Improve import data interfaces to allow various forms of data-input. *(Enhancements to current Conversion program)*	Possible; API might do it
	Implementation of pruned height summaries and volume predictions at young ages to be revised/improved. (Carry out validation exercise)	Modelling or PSP behaviour
	Spatial referencing of plots. (1949 NZ Map Grid will soon be replaced by NZ TransMercator 2000 grid references). New variable – old data can be converted.	Yes
	MTH – Issues identified when retrieving MTH for a stand – the system will fail when calculating the dbh/ht curve and only give mean ht, not MTH.	Needs further discussion
	Wider and more flexible range of outputs (more a question of easier interfaces) and query builder with possibility to link to statistical packages.	Probably; Clarify requirements
	Coding system for naming structure. Can we make this more uniform or structure it so fields represent actual codes?…..Acknowledged that every trial/site is different and standardisation difficult but current code system a mystery to some. *(User defined fields and desc codes could use drop down boxes to select from, giving code and definition)*	Discuss
Other	Visualisation tool. Showing the structure and maybe even the dynamic of the stand in a 3D view (like some of the growth simulators do – Silva) for client interactions very useful	Possible; options/requirements to be explored further
	Initially we could provide a link to analyses already carried out by Veritec and/or it would be beneficial to set up a FFR sampling strategy that undertakes sampling every 10 years (for an individual site) for properties of interest	Needs further discuss

Appendix 2. Scion Permanent Sample Plot database system Upgrade

Responses from Industry

Fred Schipper – Timberlands Ltd

I can't really think of any new features but would like to emphasise the things Timberlands doesn't want to lose. Our main reasons for using the PSP database are security and cleanliness (due to the error checking services) of data, and its accessibility.

At the moment, I have our data at my fingertips, because we have a copy of the PSP database with our data on our SQL database, and I can query the data with standard query language, because the table structure is transparent. I trust that any enhancements will not detract from this ability.

Brian Garnett – PanPac Forest Products

The PSP system hasn't had a decent revamp for many years so this is well over due.

PSP is the source of data for growth modelling but doesn't provide any direct outputs that could assist with validation of existing models.
It may be possible to keep PSP reasonably simple but have add ons you can export to with specific analytical capability- not SAS.
Being able to export to Excel would help

My feeling is that the PSP data collection system should be aligned with Cruiser and/or RTGen so that you can record detailed info on form, branching, cluster frequency, wood properties plus have capability of recording forest health, canopy closure, under story, nutrient status via foliage, soil sampling, rainfall, temperature.

The list goes on.

Mark Forward - Nelson Forests

Function	Priority
Download data direct to excel - basic and crucial requirement.	Very high
Ability to link to documents (pdf reports, photos, excel sheets, etc.)	Very high
Ability to contain narrative on trial (eg. Objectives, Milestones, assessment summaries, etc). See NFL trial summary sheets.	Very high
Ability to schedule/ plan assessments (like Geomaster). E.g. - June 2010 – check pegs/ weeds - June 2012 – measure heights/ stocking - July 2018 – full measure - Etc.	Very high
A spatial link to GIS.	High
Custom report functionality.	High
Ability to do plot tree maps (from plot centre and bearing, distance measurements).	High
Calculate 300Index for PSP's (and hence Site Productivity Class).	High
Ability to add 'predicted' growth data - plot actual growth vs predicted growth over time for a particular PSP (see graphs).	High
Ability to link to other Atlas modules (e.g. Geomaster).	Medium

Ian Jenkin – Hancock Forest Management Ltd

The main request from our users was to be able to extract the data in an easy to use (eg .csv) format for analysis and validation purposes.

Timberlands West Coast – Ross Jackson (requested by P F Olsen – Chris Calder)

Ideally the PSP database should contain as much information as it is possible to extract from each plot because going into the future you don't know precisely what information will be useful and it is not easy to go back and get data from earlier years. There is however a catch with this in that you can make the database so big and cumbersome that it becomes difficult to use for the ordinary person.

It is important that the data stored can be readily accessed and exported to other programs for analysis. In the current system the standard reports are not easily exportable and SQL is not easy to use in its basic raw state. It may be fine as the background interrogator but it needs a much more user friendly front end.

Tables such as 300 Index, Volume, Taper, Ht/age etc need to be kept up to date whether that be at a central location or as something that the end user can easily do.

The easier it is to use the more it will be used and the more it is used the more proficient the end user will be in using it. This is particularly so for part time or occasional users.

In terms of data usage it is important that the raw data can be easily extracted and used, summarised/processed data may be fine for a lot of applications but if something new/different happens then the raw data can often be more useful because who can say now what somebody might want to look at in 15-20 years time.

Peter Oliver – City Forests Ltd

The database front end could benefit from providing more transparent access to the raw tree data for further analysis, and perhaps the provision for inclusion of future wood quality measures.

Jeff Schnell – P F Olsen Ltd

In my view, required features would include:

- Data security
- Expandable; allow for future data fields(user-defined)
- Easy and flexible data retrieval (eg. Customisable queries)

Desirable features:
- GIS interface
- Ability to store imagery, documents (Tree-D photos)

Appendix 3. PSP Redevelopment: Summary of existing and requested features

To support assessing the scale of the redevelopment process a summary has been prepared of key functions of the existing system, as well as requested new features:

Major components of existing system:

Priority	Component
High	PSPDC: Field data capture and checking tool
	Export PSP data to PSPDC
	Plot and measurement data loading and validation (from PSPDC)
	Batch updating
	Plot list management
	Configuration tool – eg error limits by species, lookup values etc
	Data editing interface for all entities
	Summary calculation (and storage) for full and partial measurements
	Error checking report
	Summary reporting (customised – incl aggregating groups of plots)
	Plot Index report
	Interactive querying (SQL)
Medium	Data conversion and importing from csv
	Site Index calculation
	Error plot editing (ie non-database editing interface)
	Summary reporting (standard – incl aggregating groups of plots)
	Adjusting thinning data – (dates, tree attributes etc)
	Transferring crown heights and pruned heights
	Quick look report – (brief description of plots listed)
	Forest/Species Table (updating of)
	PSP transfer format files
	Stem plot maps
	Graphing tool
	Basic Measurement report
Low	Full plot reporting
	Preprinted Field Forms

New requirements:

Priority	Component
High	Data capture tool to run on new hardware (Data transfer format likely to change from NDS to XML)
	Data capture tool to support wider range of data: stand history, multiple crops/mixed species/uneven aged plots, improved trait recording, incl user-defined attributes
	Full support for SQL Server
	New attributes: e.g., form, branching, health, carbon, wood quality and other wood properties
	300/500-Index calculation
	Flexible data export options
	User-friendly query tool
	Document Manager support/ Record narrative (comments?)
Medium	PSP Data model to support uneven-aged and mixed species plots (e.g., indigenous forest)
	Integration with other ATLAS tools (e.g., GeoMaster, and its GIS interface
	Support (update/edit/report) new user-defined fields on entities
	Carbon calculation and reporting
	GIS integration
	Drop down boxes for user defined fields (PSPDC or main program?)
	Audit trail – tracing all database updates
Low	New entities: under-storey, soils data, nutrient status, land-use history, foliage analysis, weeds, environmental properties (rainfall, temperature) (part of system or through linkages)
	Ability to schedule planned operations (incl remeasurements)
	Different paradigm likely for main interface and managing plot selections
	Conversion of existing spatial coordinates to NZTM
	Ownership/permission fields