FPDat Showcase Project – Excellence and Innovation in Operational Block Planning Workshop

John Bastone and Dean Caron
February 21, 2017
Presentation Team - Dean

- John Bastone:
  - Domtar Forestlands Strategic Planning Lead.
  - Over 35 years in the industry.

- Dean Caron:
  - 29 years in the industry.
Outline

- What is the FPDat, FPCom and FPTrak (Dean)
- FPDat Showcase Project Partners and Contributions (Dean)
- Project Budget/Costs (John)
- Project Objectives (John)
- Project Status (John)
- Potential Benefits (John)
- Examples of Data Collected (John)
- Preliminary Learnings (Dean)
- Where This May Lead Us (John)
What is FPDat?

- Rugged PC with data acquisition module and 10 inch monitor to collect equipment data:
  - Motion sensor (machine hours).
  - Input channels (machine activities).
  - High end GPS receiver (GPS track logs).
  - J1939 ECM data (fuel, RPM, etc.).
- Various communications options.
- Collect information from operators (id, stop codes, activities performed, some basic production data).
- Navigation system with specialized forestry features:
  - Customizable maps using ESRI shape files and geo-referenced images.
  - Adjustable halo with estimated precision.
  - Boundary alarms.
- Integrated KPI display.
- Note: also versions for graders (FPDat Grader) and haul trucks (FPDat Transport).
FPCom – Moving data between the field and the office

- Using mainly satellite modem to transfer data to FPTrak.
- Under development: Wifi to allow machine to machine communication and use of smartphones for downloads/uploads.
FPTrak – Data Hosting & Reporting

- Web portal and data hosting service.
- Tabular, graphical & map reports.
- Drill-down capabilities.
- Centralized platform, very easy to share information (web).
- No software to install and maintain.
FPDat in Canada

- ~ 800 units in Canada.
- Very little uptake in Ontario to date.
- Northwestern Ontario was among the first geographies in the country to be impacted during the downturn and the last to recover.
- This technology is needed to help with competitiveness.
- We are confident this project will lead to further installations and use (success breeds success).

"FPDat: Atlantic Canada's Homegrown Success Story"

Forestry operations can be complex. J.J. Burton, a harvester based out of Truro, Nova Scotia knows this first hand. He has a demanding job, working long hours running an expensive machine with the expectation of working efficiently and productively while avoiding countless environmentally sensitive areas such as wetlands, hawk's nests shallow soils etc. Three years ago J.J.'s job got a lot easier when he switched over from using aerial maps to navigate the complex landscape to relying on a cutting edge device – an FPDat system – installed right in his harvester that takes a lot of the guess work away.

Martin Castonguay (Research Leader at FPInnovations – the company that created FPDat) explains, “FPDat is essentially a forestry data logger and on-board computer. It can be installed on any type of machinery and comes fully equipped with a GPS navigation system and a touch screen that allows operators to interact and also feed information into the system about their production or downtime. It senses when a machine is working or not and uploads this information along with GPS tracklogs to FPTrak, a central data hosting and web application platform for all the installed systems across Canada. The main benefit of a centralized platform like FPTrak is that everyone involved in the operations has the ability to see the same information from only one source.

For operators like J.J., it has revolutionized the way they work. J.J. tells me, “It’s great, I think it’s a huge benefit. I like having the GPS there... I can move the map around, I can judge where I want to go – it’s a great asset for the harvesters... the boss will put the map in for us and you can drive right to your block with the GPS on the road.”

With forest operations involving so many moving parts, Martin Castonguay and Deon Hamlyn saw the need for technology to streamline the entire system. When Deon, a gregarious forester from Newfoundland who worked twenty nine years at Corner Brook Pulp and Paper Ltd., decided that he wanted to take forestry operations high tech, he troubleshoot his way there along with Martin and his Precision forestry team at...
FPDat Showcase Project - Partners

- Lakehead University
- KBM Resources Group
- St Onge Logging
- Raleigh Falls Timber
- CRIBE: Centre for Research & Innovation in the Bio-Economy
- Domtar
Partner Contributions

- Project management and monitoring.
  - John Bastone
- Cash for FPDat units.
- Applicant for CRIBE funding.
- Recipient of benefits of project.
Partner Contributions

- Installation of FPDat Units.
- Installation of initial maps and shapefiles on FPDat Units.
- Technical support.
Partner Contributions

- Provide a student (Steve Tepylo) for undergrad thesis on project.
- Provide a thesis advisor (Kevin Shorthouse).
Partner Contributions

- Provide equipment for the FPDat units to be installed.
  - One feller buncher at each operation.
  - One grapple skidder at each operation.
- Use FPDat system.
- Recipient of benefits.

St Onge Logging

Raleigh Falls Timber
Partner Contributions

- Provincial government funding partner ($22,000.00).
- Dr. Scott Wiebe of CRIBE has a forestry background and will be a thesis advisor for the Lakehead University Student doing the thesis.
Partner Contributions

- Wrote project proposal.
- Provide hardware and support systems.
- Technical support/coaching.
- Oversee project and provide advice.
- Provide networks.
- Ensure project success by putting the right people together.
Project Location

- Trout Lake Forest
- Wabigooon Lake Forest
- Lac Seul Forest
FPDat Unit / FPTrak Costs - John

- Each FPDat ~$5,250.00 with satellite modem.
- Installation cost ~ $2,000.00 per unit.
- Monthly satellite communication fee ~ $50.00 per month per unit.
- FPTrak fee ~ $25 per month per FPDat.
Potential Benefits

- A means to track fuel use.
- A means to track production (including bush inventory).
- A means to track machine location and movement. Will add value in terms of safety, compliance and logistical planning.
- A means to produce up to date harvest depletion maps and skidding production maps. This helps plan the scheduling of blocks and equipment moves.
- Use of various imagery types with GPS (traditional pre-work maps, aerial photography, 3D photography).
- Proximity alarms when approaching boundary lines, areas of concern, or other values.
Other Benefits

- Forest fibre utilization is expected to be improved via track log sharing (machine travel paths can be shared between the buncher and skidder – meaning fallen wood would not be lost in snow or for other reasons).
- The FPDat system will allow for the collection of factual data that will provide accurate contractor rate model development.
- This technology is cool! Should help in the attraction and retention of operators and forestry professionals (younger people especially).
Project Status

- Commenced in early summer of 2016.
- Expected to conclude in spring of 2017.
Project Objectives

2. Better monitor fuel consumption.
4. Identify mechanism for operators to track hardwood harvested by feller buncher for future retrieval by grapple skidders.
5. Utilize geo-referenced pre-work maps in the unit to give buncher and skidder operators better block information.
Project – Current State

- Demonstration of reports and maps from FPTrak.
Machine Daily Report

You can customize the reports however you wish.
## Buncher Weekly Summary

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<th>C</th>
<th>D - Total time</th>
<th>E - Engine on</th>
<th>F - Total work time</th>
<th>G - Channel</th>
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Machine Activity Report
Time Distribution – Feller Bunchers

Figure 2. Time distribution for feller-bunchers per week since April 2016
Table 1 summarizes for the 2 bunchers, the average hours per week for various types of times and shows relevant percentages.

Table 1. Times per average week since end of May for feller-bunchers.

<table>
<thead>
<tr>
<th>Machine name</th>
<th>Weeks n</th>
<th>Channel1 hrs</th>
<th>NoUseGrab hrs</th>
<th>Idle hrs</th>
<th>NoUseGrab (%)</th>
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<td>18.1</td>
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</table>
So What Does This Mean?

- There appears to be somewhat excessive idle time and time when the machine is moving but not performing its desired function (harvesting trees).
  - There is likely good reason for this. A discussion with the contractor should take place and an analysis of work functions to find ways to reduce such. After analysis let’s assume it is determined we can reduce the non productive but active time (working time when not cutting trees) by 50%.
  - This would amount to an extra 9,000 m³ of wood being harvested at no extra cost.
  - $9,000 \text{ m}^3 \times $4.50/\text{m}^3 = $40,500 revenue (one buncher).
Mapping Example: Depletions - FPTrak
Depletion Mapping – With Buffer of Points
Depletion Mapping – with Imagery In Background
Mapping: FPTrak Data to Arcmap
Mapping Example – FPTrak onto Prework Map
Mapping Example – FPTrak onto Aerial Depletion Photo – Courtesy HME Enterprises (Steve Yeung)
Time and Motion Field Productivity Studies

- Data has been collected.
- Data analysis is taking place.
- Further collection/analysis will take place.
Preliminary Learnings - Dean

- Champions at all levels involved in the project is key:
  - Operator level
  - Supervisor level
  - Manager level
  - Contractor
  - Company Representative(s)
  - FPInnovations Industry Advisor
  - FPInnovations Forest Operations / Fibre Supply Team (tech support)
  - Regional FPDat supplier

- Lack of alignment at any level or multiple levels can lead to project delivery challenges and / or failure.

- Instead of working with two or more contractors on project, equip one contractor (all bunchers and skidders working in an area) on the trial.
Preliminary Learnings

- FPDat system when used properly has great potential to allow efficiencies for organizations to save money – however:
  - The use of the system requires committed people:
    - Need to have a basic understanding of GPS/GIS.
    - Need to upload maps to units.
    - Need to analyze data.
    - Need to communicate findings.
- If you want to save money by using the FPDat system – you need to be prepared to spend money (time/resources).
Preliminary Learnings

- Consistency in operator input is important to maximize on the benefits of the system.
  - Entering stop codes.
  - Entering shift start/end.
  - Points of interest (challenging terrain, hardwood bundles etc).
  - If we could to this over we would start without code entry and gradually move to operator input.
- Clear communication and training is recommended.
- Keeping it simple to start is key.
Preliminary Learnings

- FPDat can not take large amounts of data (digital maps and imagery) at a time.
- Putting in months worth of cut area maps for large contractors is not possible.
- Recommendation to allow for additional FPDat capacity in future editions (as an option at least).
- FPDat currently is not able to accept geo-referenced PDF maps. Recommendation to allow for use of PDF format in future editions.
Preliminary Learnings

- Excellent potential to capture real data that can assist in accurate rate development for logging contractors.
- Excellent potential to assess and action plan for factors impacting machine utilization.
- Excellent potential for depletion mapping in near real time.
- Excellent tool for due diligence and environmental performance.
- Excellent potential as tool to point out opportunities for improvement in operations and to recognize well dones.
- Good potential for on-going operational planning. Excellent potential with FPDat capacity upgrade (to allow for fast processing with hi-res imagery).
- If you are looking just for a navigation system there are less costly options. FPDat provides operational data (key strength/value) plus navigation.
Where we would like this to go in the future… John

- Cost effective, more powerful FPDat.
- Use of high resolution imagery of any common type – including 3D and PDF.
  - Field testing of prototypes (FPDat 2) in the next operating season.
    - Considering FPDat transport data logger with Windows tablet of users choice.
- Shared staff with industry and/or contractor partners on a project specific basis to assist in the successful deployment of the systems and capacity development.
3D Anaglyph Images…. Dean

- We plan to test 3D anaglyph images in the machines towards the end of the trial.
- The following images are 3D anaglyph images.
- Please put on the blue/red 3D glasses for the following slides.
- Best viewed straight on (not from an angle).
Domtar Block 2572 Area 1:2,000 Anaglyph
Sample 3D Anaglyph Image – Provided by Lakehead University
Domtar Block  2572 Area 1:2000
Anaglyph
Domtar Block 2572 Area 1:5,000 Anaglyph
Domtar Block 2572 Area 1:10,000 Anaglyph
Weyerhaeuser Block 12.218 Area
Witch Bay Rd Lake of The Woods
Weyerhaeuser Block 12.218 Area
Witch Bay Rd Lake of The Woods
Special Thanks!

- CRIBE
- KBM
- St. Onge Contracting
- Raleigh Falls Timber
- Lakehead University
- Sumac
- FPInnovations Forest Operations/Fibre Supply Team
- Domtar Dryden Forestlands Team
Thank You!
Dean Caron, dean.caron@fpinnovations.ca
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