

Leveraging Web and Database Technologies to Help Manage Bolivia's Forest Resources



Leverage IT for Bolivia

- Bolivia / IBIF
- Challenges
- Software Development Strategies
- Leveraging IT



Bolivia and IBIF

- Who is IBIF?
 - Instituto Boliviano de Investigación Forestal
aka, Bolivian Forestry Research Institute
- What do they do?
 - IBIF is passionate about their trees
 - Silvicultural management
 - Sustainable resource:
54.2% of land area is forest cover



IBIF's BOLFOR II Project Silvicultural Stats

- 10 forestry concessions
 - Forest types include subhumid, dry, and Amazonian rainforest
 - Concessions divided into blocks, each of which has 4 plots
- Plots have varying degrees of silvicultural intensity:
 - unlogged control plot
 - normal treatment (traditional logging methods)
 - improved treatment (marking and releasing future crop trees)
 - intensive treatment (more intensive logging and release treatments, and soil scarification in logged clearings to induce regeneration)
- Trees, trees, and more trees:
 - 200+ species of trees
 - 20,000+ individual trees monitored
 - 80,000+ measurements taken



IBIF's BOLFOR II Project Data Points

- Concessions
- Province – Municipality – Locality
 - Cutting Cycle
 - Design Type (predefined list for design and size)
 - Average Annual Rainfall
 - Average Temperature
 - Physiographical Position (e.g., In a Valley, On a Hillside, etc.)
 - Soil Texture (e.g., Clay, Clay Loam, Sandy Loam, etc.)
 - Drainage (Good, Regular, and Bad)



IBIF's BOLFOR II Project Data Points

- Plots and Sub Plots
- Block
 - Strip
 - Treatment (Control, Normal, Improved, Intensive)
 - Understory (Absent, Thin, Dense)



IBIF's BOLFOR II Project Data Points

Trees	Measurements
<ul style="list-style-type: none"> ■ Plot ■ Sub Plot ■ Tag ■ X, Y coordinates ■ hmed ■ Trail 	<ul style="list-style-type: none"> ■ Measurement date ■ Common name ■ Genus/Species/Family ■ Trunk quality ■ Height ■ DAP ■ AFC (future crop tree) ■ Crown position (exposure to sunlight) ■ Crown shape ■ Liana infestation (free, trunk, crown, growth affected) ■ Tree health (standing, leaning, fallen, etc.) ■ Trunk health (healthy, burnt, rotten, etc.)

Challenges

USA → VaTech → CMI → Me (Bill)

Bolivia → IBIF → Them (Stakeholders)

- Long distance runaround

Challenges

Avoiding Communication Breakdown

CMI	~5% Spanish-speaking
IBIF	+ ~95% English-speaking
Us and Them	100% Communication!

Software Development Strategies

Spectrum

← ad hoc/hacker ----- limited/linear ----- fluid/flexible →

Waterfall

CMM Level 1 Spiral Unified Process

Software Development Strategies Limited Procedures

Waterfall	Spiral
<ul style="list-style-type: none"> ■ tasks performed in series ■ slow and cumbersome 	<ul style="list-style-type: none"> ■ organizes the waterfall model ■ large overhead/docs

Software Development Strategies Unified Process

- Software development process framework
- Incremental and iterative
- Best-known refinement is Rational Unified Process (RUP) ® (IBM)
- Increased processes usually result in increased documentation
- Allows for variable level of structure/detail as required by the project

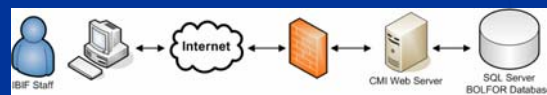
Leveraging IT What did we build?

- Web-enabled database application
 - All data in one central database
 - Accessible anywhere via Internet
 - Capable of supporting handheld devices
- Technologies used
 - Microsoft ASP.NET, MS IIS, MS SQL Server



Leveraging IT Architecture

- Standard Web architecture



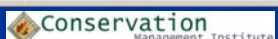
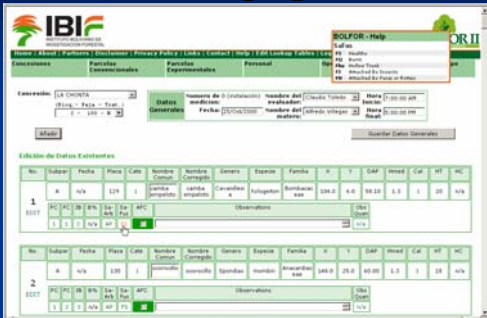
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IBIF's BOLFOR II Project Data Examples

La Chonta concession – plot list with tree counts

Concesiones	Parcelas Concesionadas	Parcelas Experimentales	Personal	Opciones de Usuario	Plantas de Campo	
Experimental Parcelas						
Presione EDIT para modificar información.						
	Nombre de la Concesión	Ubicación (AAA)	Bloque	Faja	Tratamiento	# Árboles
EDIT	LA CHONTA		1	368	Control	552
EDIT	LA CHONTA		1	400	Intensiva	320
EDIT	LA CHONTA		1	400	Normal	242
EDIT	LA CHONTA		1	400	Improvised	230
EDIT	LA CHONTA		1	400	Control	248
EDIT	LA CHONTA		2	0	Intensiva	89
EDIT	LA CHONTA		2	0	Normal	76
EDIT	LA CHONTA		2	0	Improvised	90
EDIT	LA CHONTA		2	0	Control	89
EDIT	LA CHONTA		2	50	Intensiva	87



Leveraging IT

	Total	Average of Sup (ha)	Average of Sup (ha)	Average of Sup (ha)	Average of Sup (ha)	Average of Sup (ha)
M	13,356,109.02	12,500,613.39	16,200,609.7	14,08,306.771		
E	13,440,207.56	14,095,049.2	13,665,033.3	13,730,337.99		
E	12,699,663.84	13,462,253.84	16,842,848	14,110,006		
E	12,309,602.14	21,708,199.6	16,273,068.13	16,914,806.64		
Grand Total	13,050,215.1	16,520,000.8	16,594,442.1	14,717,107.17		

Leverage IT for Bolivia Review

- Bolivia / IBIF
 - Silvicultural management
- Challenges
 - distance and language
- Software Development Strategies
 - Unified Process
- Leveraging IT
 - Use Web standards
 - Microsoft ASP.NET, MS IIS, MS SQL Server