

Smart Forest Tools

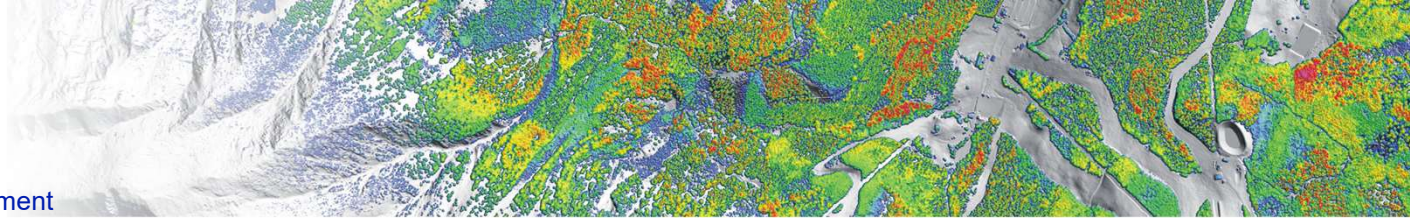
a country-wide
RS-based
forest management
support system

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umwelt  data
FOREST MANAGEMENT TOOLS & SERVICES

REMOTE SENSING BASED FOREST INVENTORY
CARBON MONITORING WITH LIDAR ACCURACY



Styria (federal country of Austria)

- 1,6 Mio hectares in total
- 0,8 Mio hectares forest area
- 50% small structured forest property
- Forest owners are supported by the „Chamber of Agriculture“
- Smart Forest Tools for 5 federal countries: Styria, Upper Austria, Salzburg, Carinthia and Vorarlberg



Tree Height

0

3m

6

9

12

15

18

21m

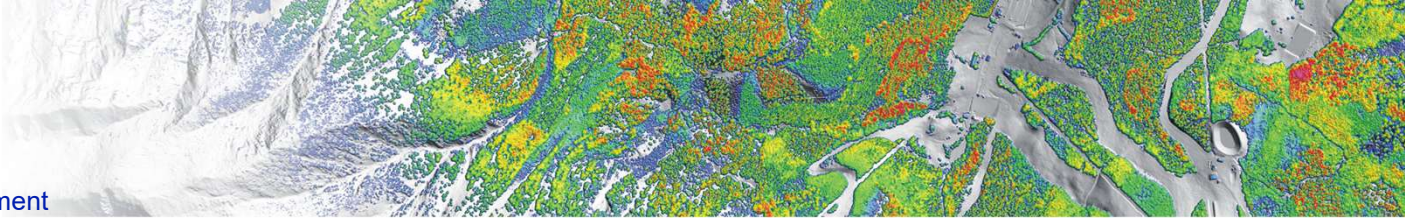
24

27

30

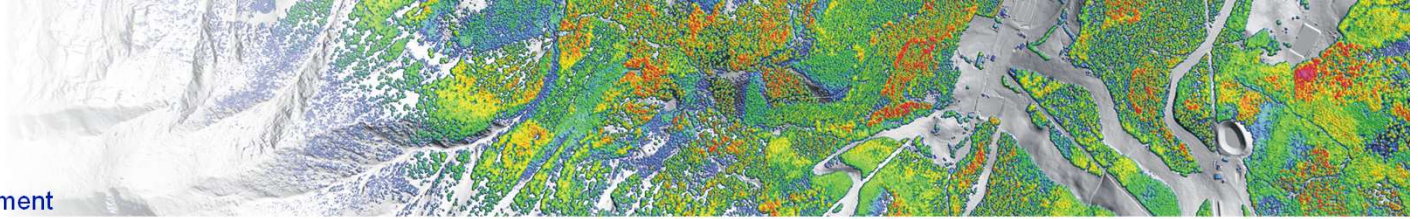
33

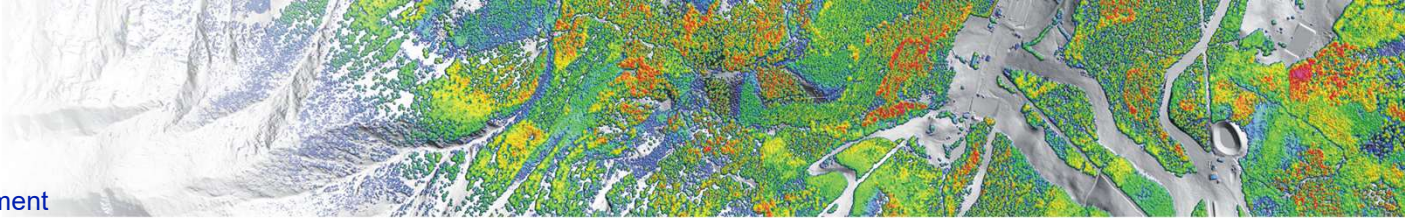
36m



Content SmartForestTools

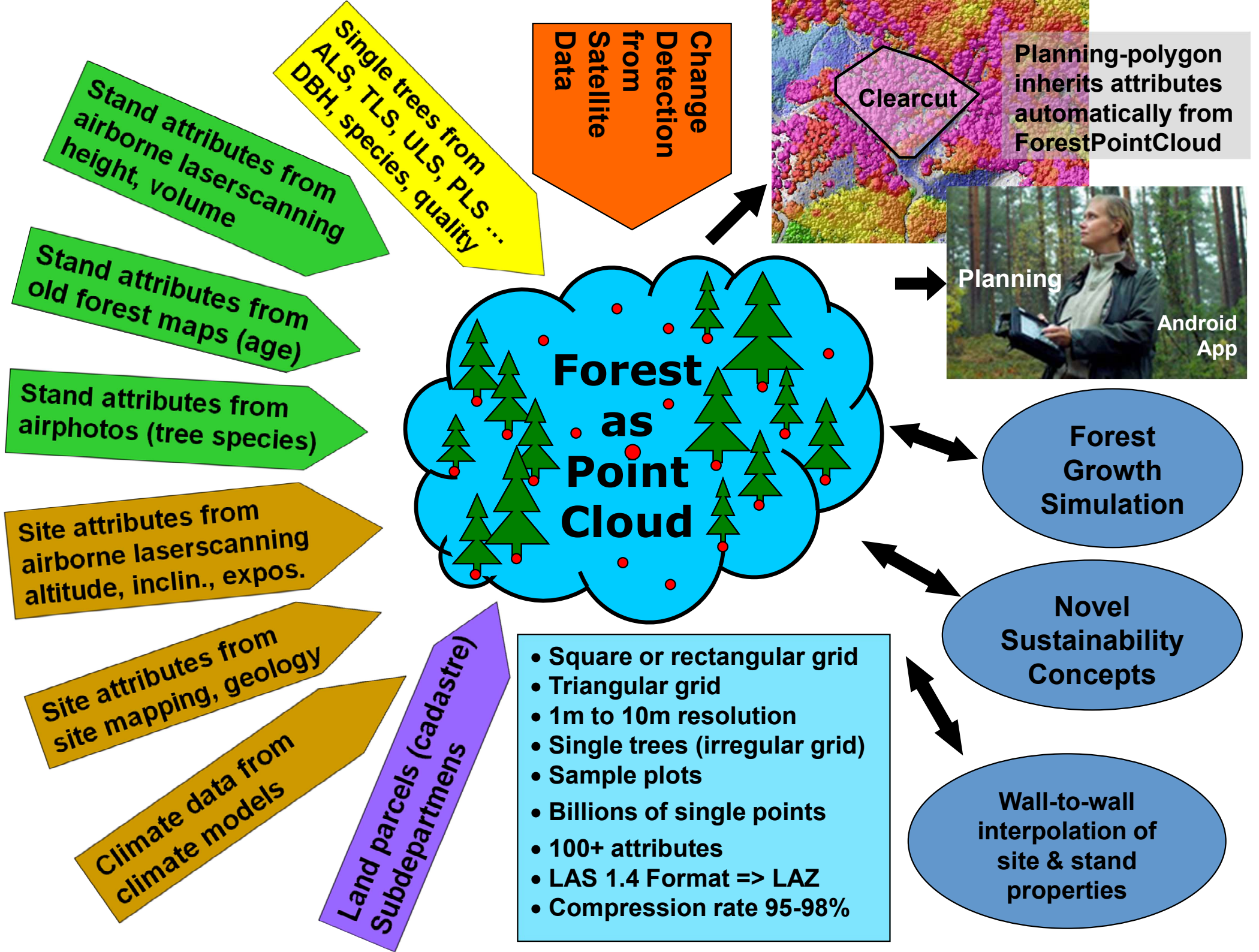
- Local storage on 512GB SD-card
- Orthoimages 0,2m RGB, CIR, mixed as ECW
- CHM coloured 1m as ECW, 2 variants
- DTM shaded relief 1m as ECW, 3 variants
- Topographic maps, OSM,
- Land parcels, contour lines (5m), roads, rivers
- Nature protection, geology,

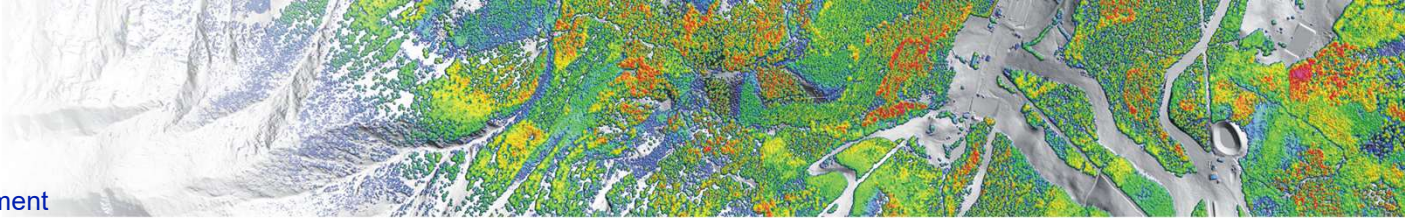




Specs

- off-line with cloud synchronization
- Windows, Android, iOS (coming soon)
- Full GNSS support (internal, external, advanced functions)
- proprietary C++ library (TopoLynx, HU)
- proprietary vector format (X-layer, compressed, indexed)
- ECW support including Android, iOS
- polygon building by „Spaghetti-Click“
- real-time aggregation of stored attributes





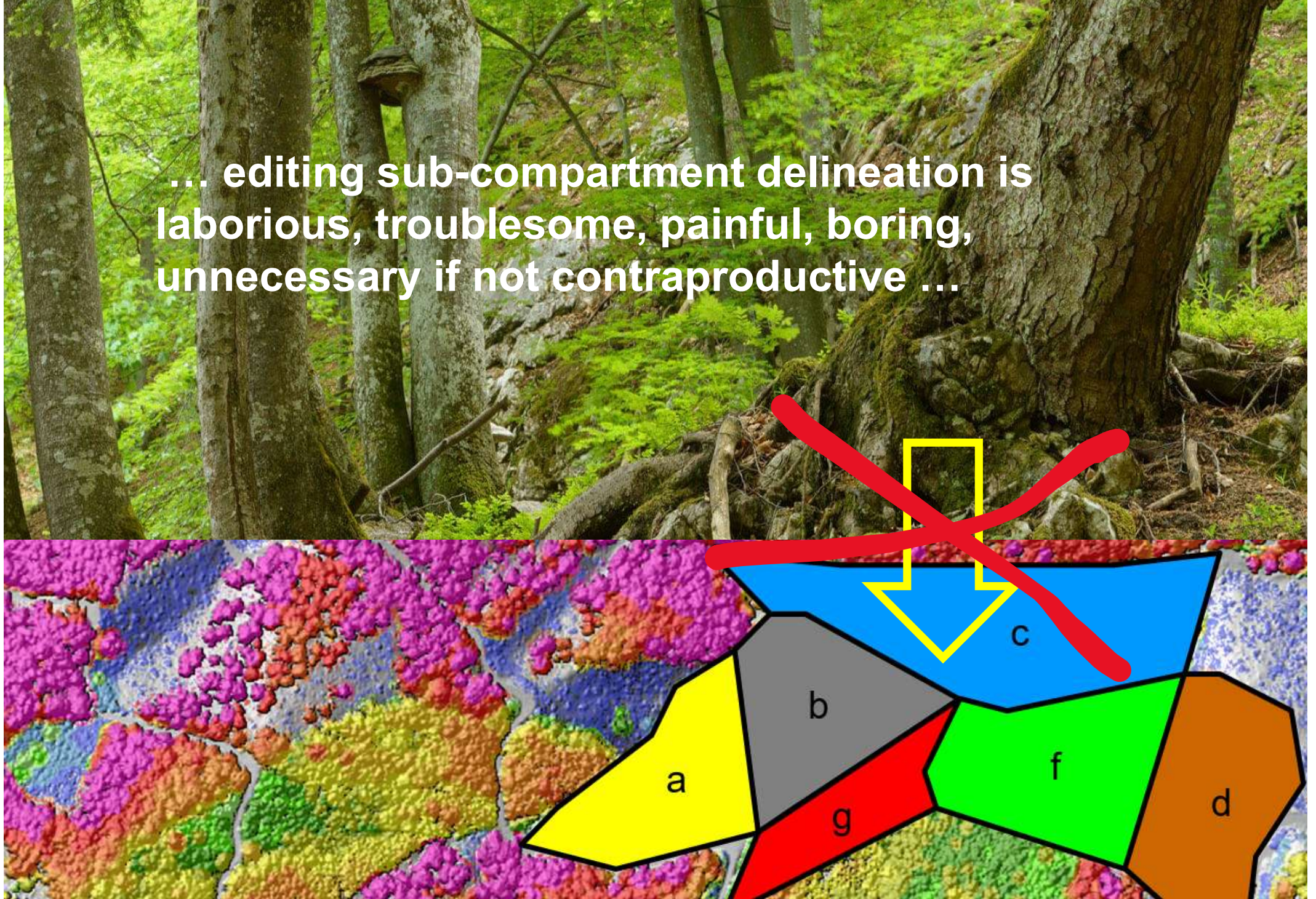
SilviLaser 2017
@ VirginiaTech:

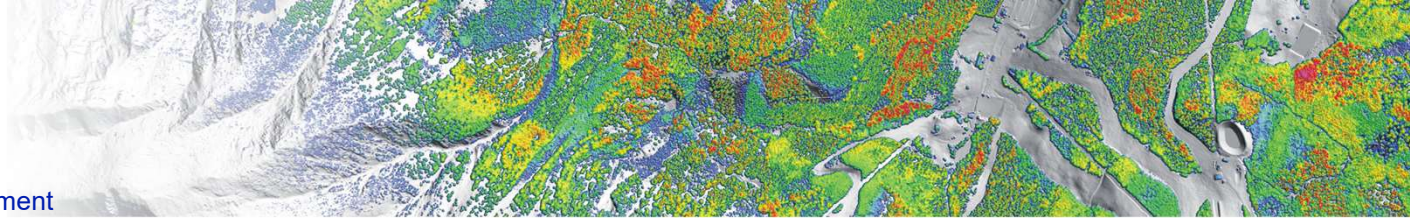


launching a novel approach of

Forest Representation

... editing sub-compartment delineation is laborious, troublesome, painful, boring, unnecessary if not contraproductive ...





2016, @ ForestSAT Santiago:

... Martin, could you please help me to create a new data format ??

- My friend, do not reinvent the wheel,
- just take LAS 1.4 format!
- Wisely use its 256 extra-bytes,
- normalize the forest- / tree-properties,
- use LAZ-Kompression,
... off you go !!





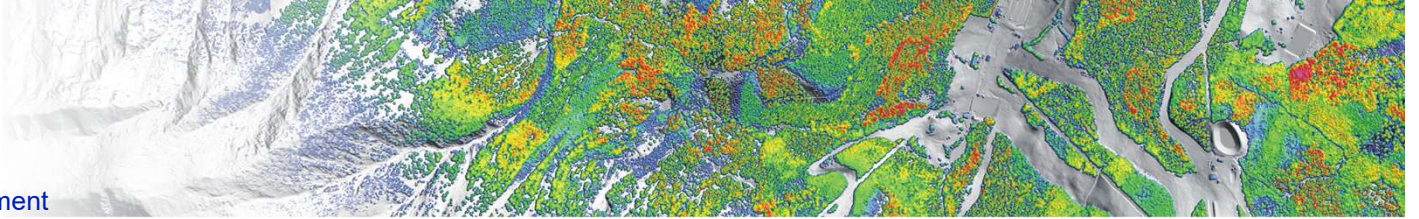
Management Planning:

... from smooth representation of the forest

... aggregation to discrete planning poly

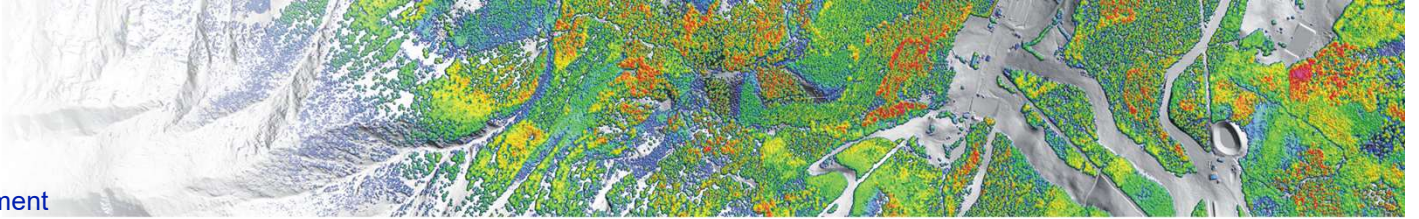


Clearcut 0.5 ha



Aggregation

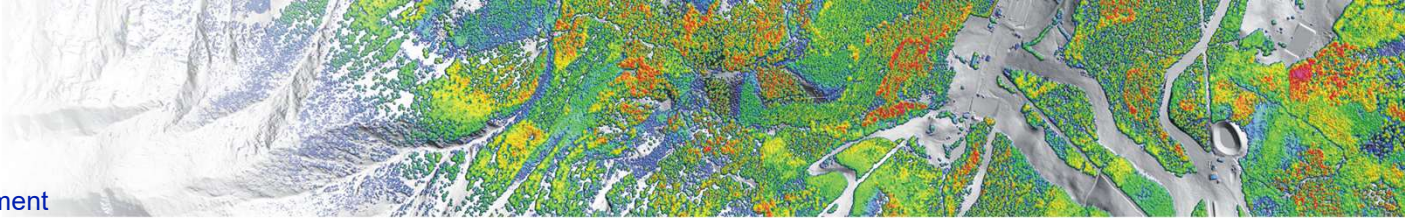
- Forest representation as regular grid (5m)
altitude, exposition, slope, geology, climate,
tree height, stock volume, stand density, ...
land parcel, nature protection, ...
- Trees + attributes as irregular point cloud
- Aggregation: sum, average, percentiles,
most frequent, list, list + percentage
- aggregation as formula in layer definition file



Project preparation & data processing

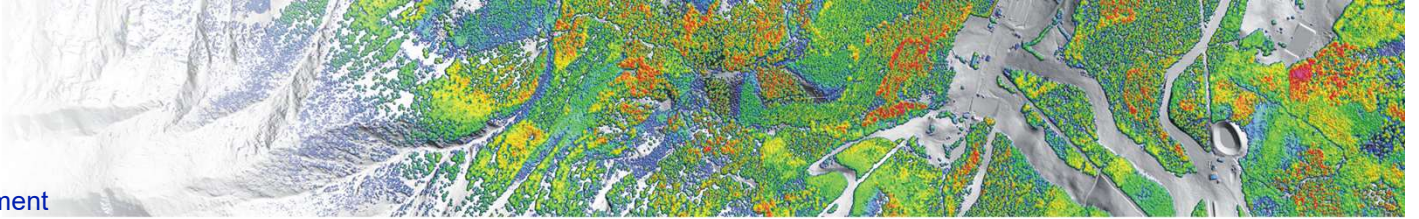
- Workshops with user groups for layer definition
- Commandline tools & scripts (Gdal, R, own)
- 1 month: 1 person + 2-3 VM (8 cores)
- most of the data freely available: DOP 20cm, DTM+DSM (ALS), div. vector layers from federal administration, cadastre without owners
- Stock volume calibration by 7000 own sample plots from other projects in the region





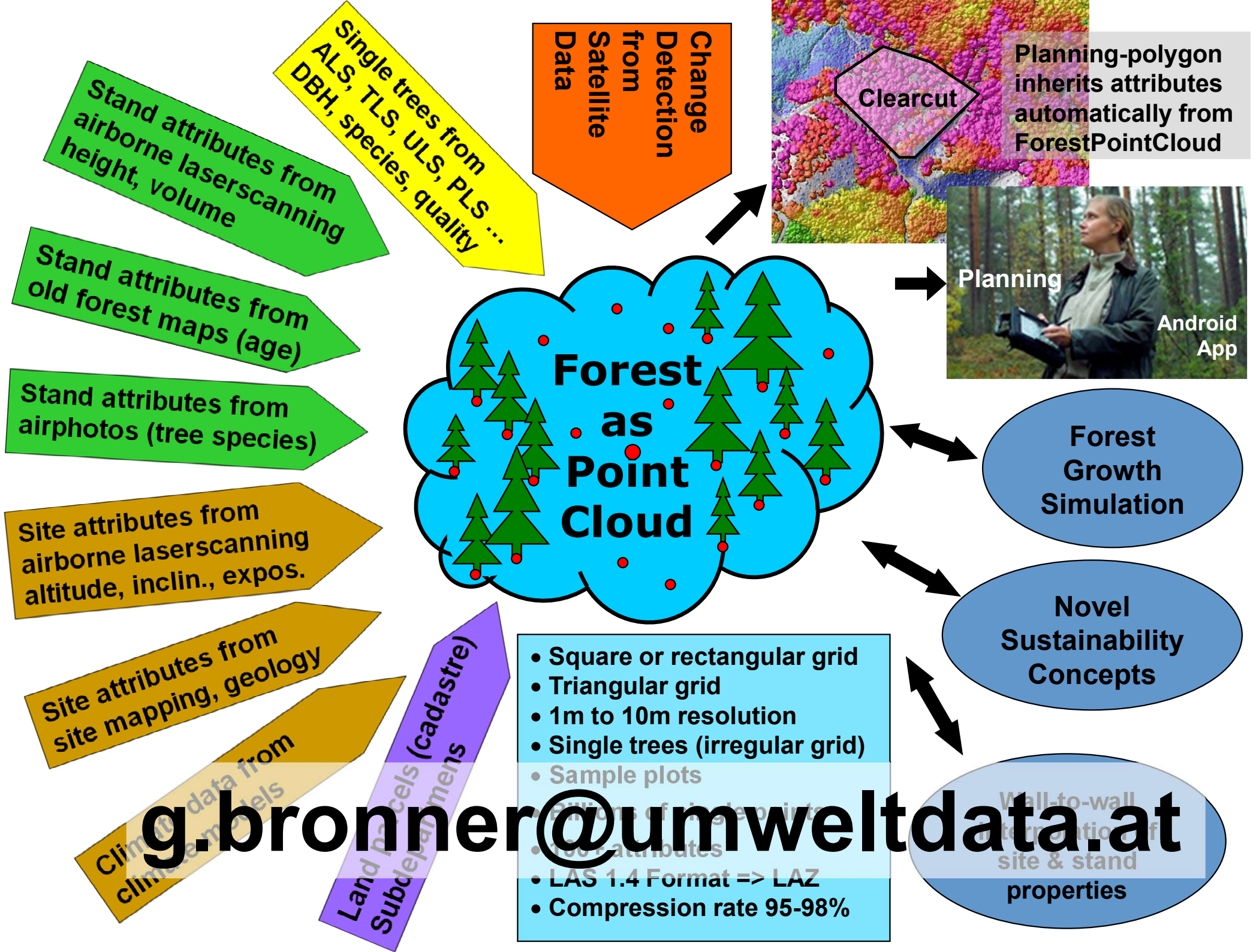
User feedback after one year (30 users)

- Fantastic! Terrific! OK, but ...
- great performance, smooth workflow
- Stock volume values fit perfectly
- too much layers ... some layers missing ...
- too much attributes ... some missing ...
- too much functionality ... functions missing
- too much restrictions in configuration ...
restrictions should be more severe ...



Outlook, next steps

- Clipping of small projects for land owners
- Growth prognosis from bi-temporal CHM
- bark-beetle risk layer every 2 weeks
- Climate-sensitive forest types implementation
- comprehensive reporting from collected data
- enhanced management plan tool
- support road construction & cable car



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