
CrownPro 1.0

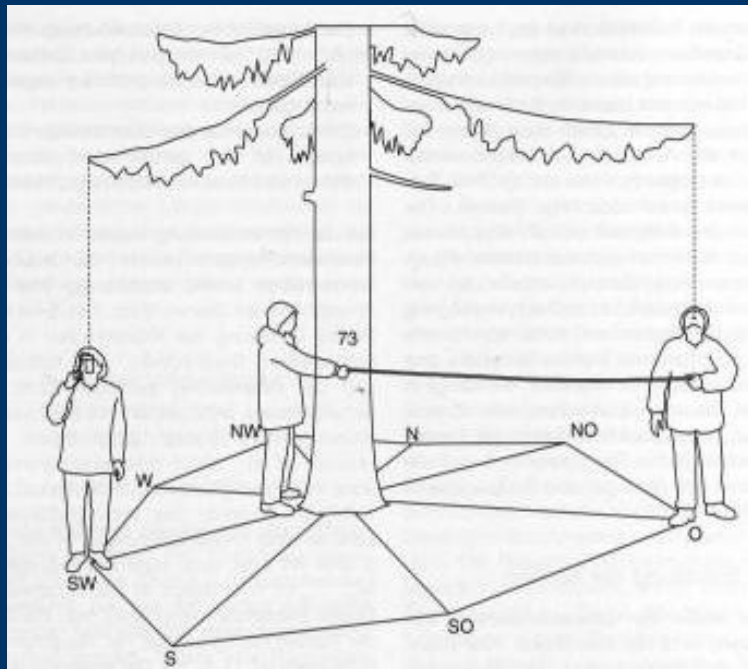
Program for the calculation of
crown projection areas

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Background

- Crown projection – What is it?
 - 2D representation of horizontal crown extent
 - Created by perpendicularly 'projecting' outermost points of a crown to the ground



Background

- Crown projection – What is it?
 - 2D representation of horizontal crown extent
- Crown projection – Purpose?
 - Analyze / visualize horizontal spatial dimension and interaction of forest tree crowns
 - Calculation of “Deckungsgrad” = ratio of crown covered area to total area of sample plot
 - Calculation of crown surface area
 - Interception of precipitation / evaporation
 - Absorption of sun radiation
 - Photosynthesis / respiration
- Program “Kronenprojektion”

Original program: Kronenprojektion

Kronenüberdeckung: Dateneingabe

Probefläche | Eingabe der Baumdaten | Darstellungsoptionen | Datenausgabe | Druckausgabe

Kein Name

Baumnummer	<input type="text" value="0"/>				
Baumart	<input type="text"/>		<input type="button" value="Erster"/>	HW_Min	
Entfernung Stamm:	<input type="text" value="0,00"/>	m	<input type="button" value="Zurück"/>	<input type="text"/>	Größte Ausdehnung der vermessenen Fläche in N-S und O-W-Richtung
Azimut Stamm:	<input type="text" value="0,00"/>	Grad	<input type="button" value="Vor"/>	HW_Max	
BHD	<input type="text" value="0,00"/>	cm	<input type="button" value="Letzter"/>	<input type="text"/>	N-S-Richtung
			<input type="button" value="Neu"/>	RW_Min	<input type="text" value="10"/> m
Entfernung Kronenpunkt 1:	<input type="text" value="0,00"/>	m	<input type="button" value="OK"/>	RW_Max	O-W-Richtung
Azimut Kronenpunkt 1:	<input type="text" value="0,00"/>	Grad		<input type="text"/>	<input type="text" value="10"/> m
Entfernung Kronenpunkt 2:	<input type="text" value="0,00"/>	m			
Azimut Kronenpunkt 2:	<input type="text" value="0,00"/>	Grad			
Entfernung Kronenpunkt 3:	<input type="text" value="0,00"/>	m			
Azimut Kronenpunkt 3:	<input type="text" value="0,00"/>	Grad			
Entfernung Kronenpunkt 4:	<input type="text" value="0,00"/>	m			
Azimut Kronenpunkt 4:	<input type="text" value="0,00"/>	Grad			
Entfernung Kronenpunkt 5:	<input type="text" value="0,00"/>	m			
Azimut Kronenpunkt 5:	<input type="text" value="0,00"/>	Grad			
Schicht	<input type="text"/>				
Anzahl der Bäume:	<input type="text"/>				

Schrittweite (m): Maßstab:

m²

Summe der Kronenfläche auf der Probefläche m²

Summe der Kronenflächen: m²

Raster Baumnummern Achsen Ecken

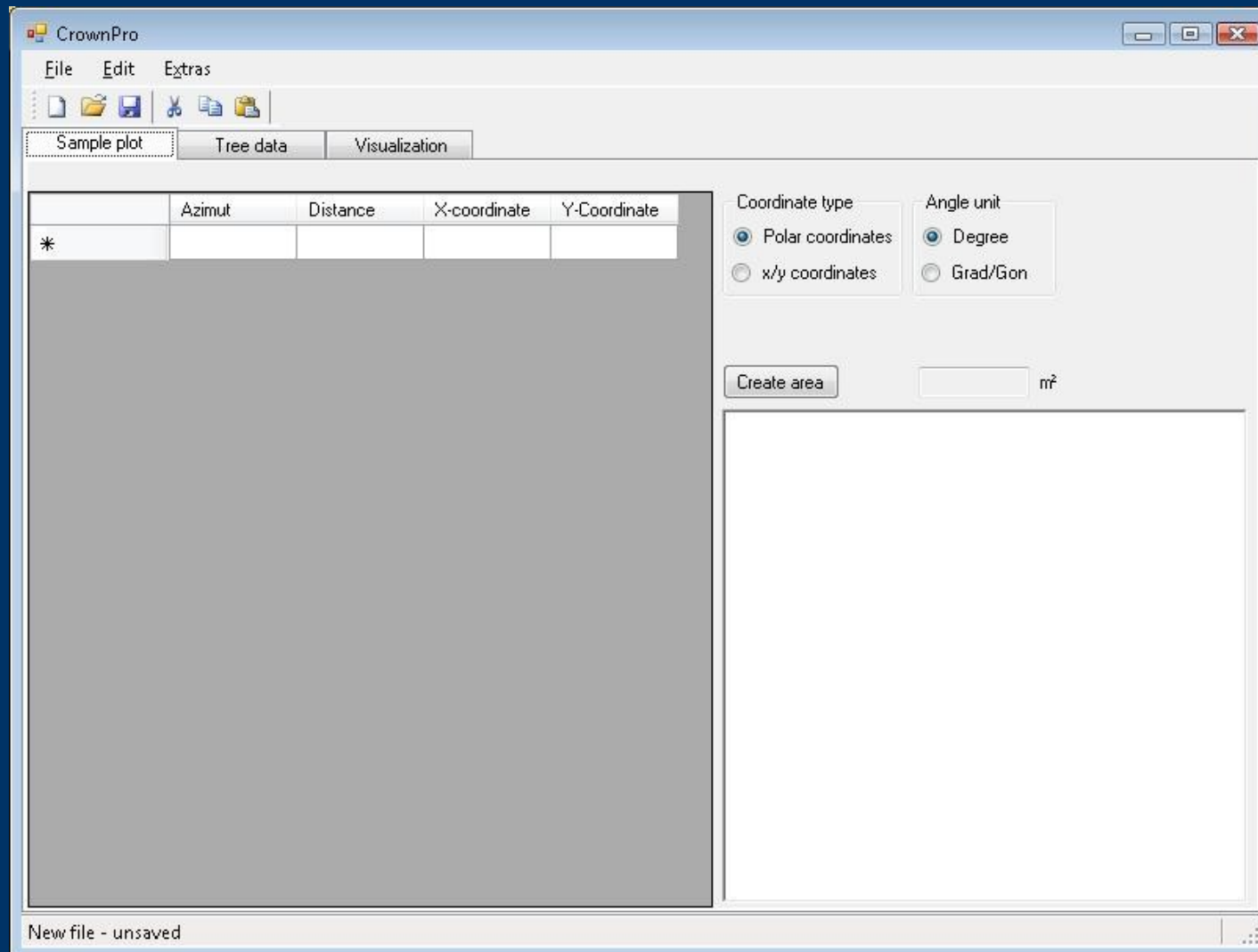
Goal of the project

- Write a program with same basic capabilities which additionally allows:
 - Creation of more than 5 crown points per tree to allow a better approximation of crown shape
 - Crown points having the center of the stem as point of origin
 - Multi-language GUI (German / English)
- More:
 - Use modern programming language and programming approach (object oriented!)
 - Improve stability / usability / interface design
 - Windows - 'Look & Feel'

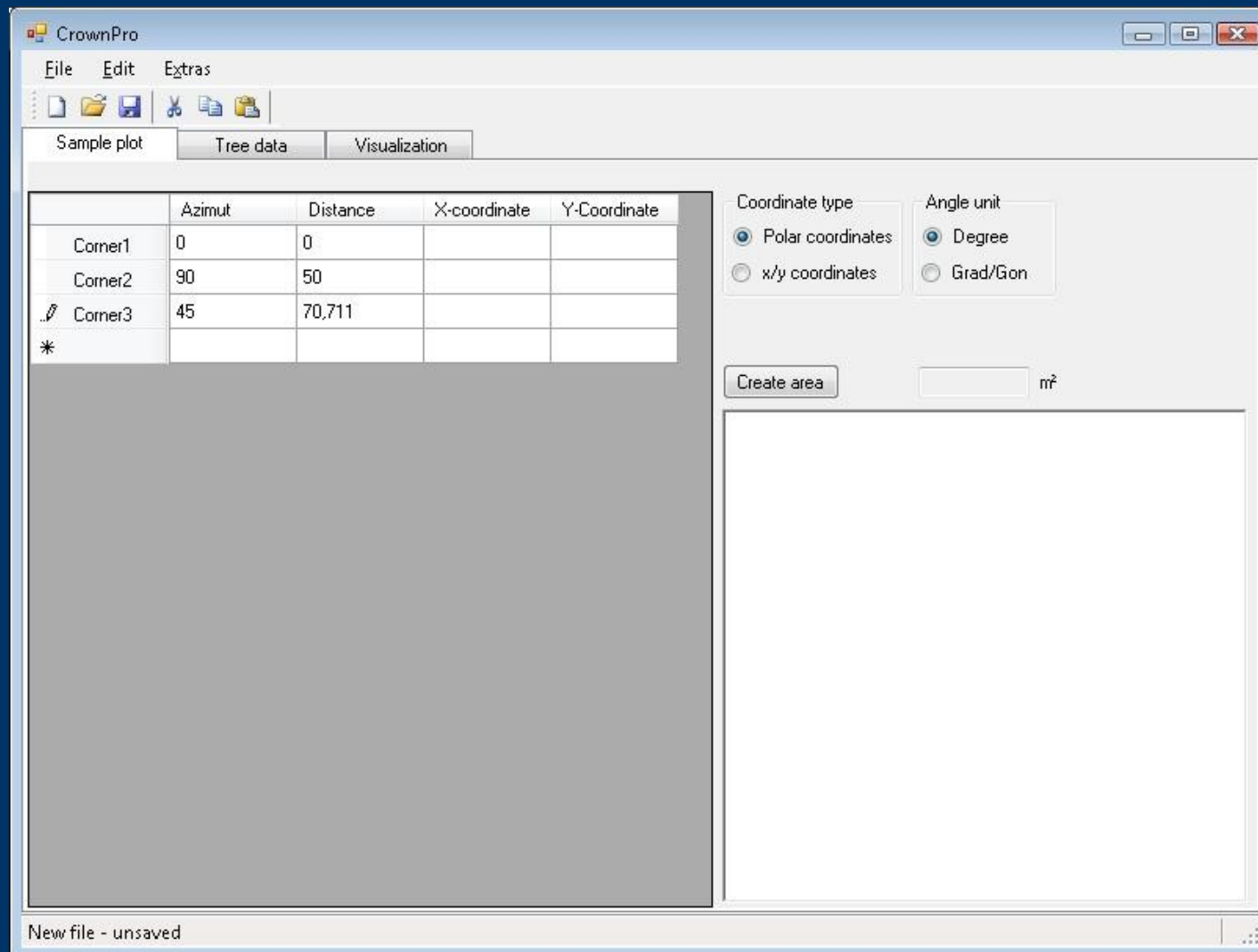
Methodology

- Programming language:
 - Visual Basic .NET 2005
- Development:
 - Visual Basic 2005 Express, Visual Studio 2005 Professional

Result: CrownPro 1.0



Definition of sample area



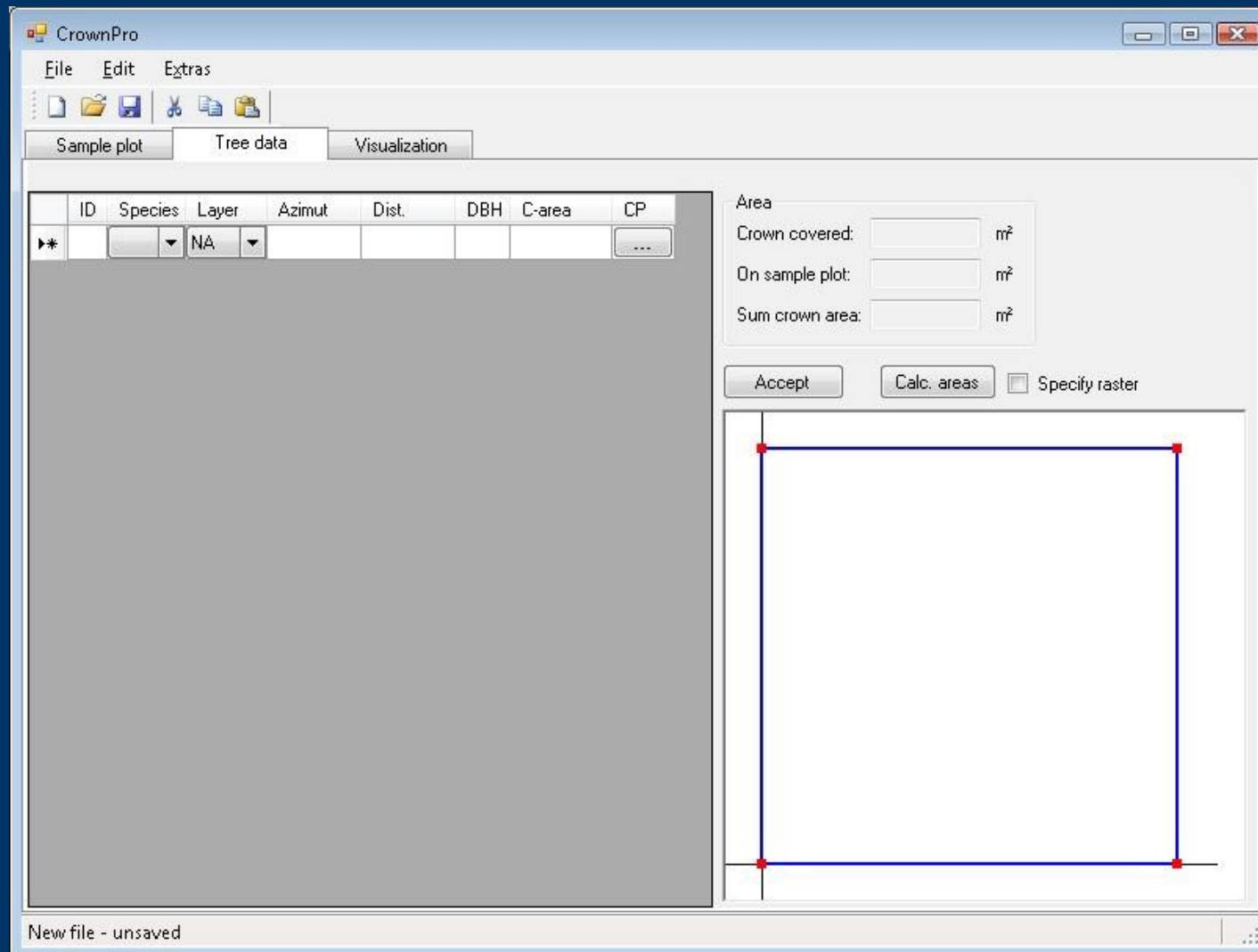
Definition of sample area

The screenshot displays the CrownPro software interface. The main window is titled "CrownPro" and has a menu bar with "File", "Edit", and "Extras". Below the menu bar is a toolbar with icons for file operations. The interface is divided into several sections:

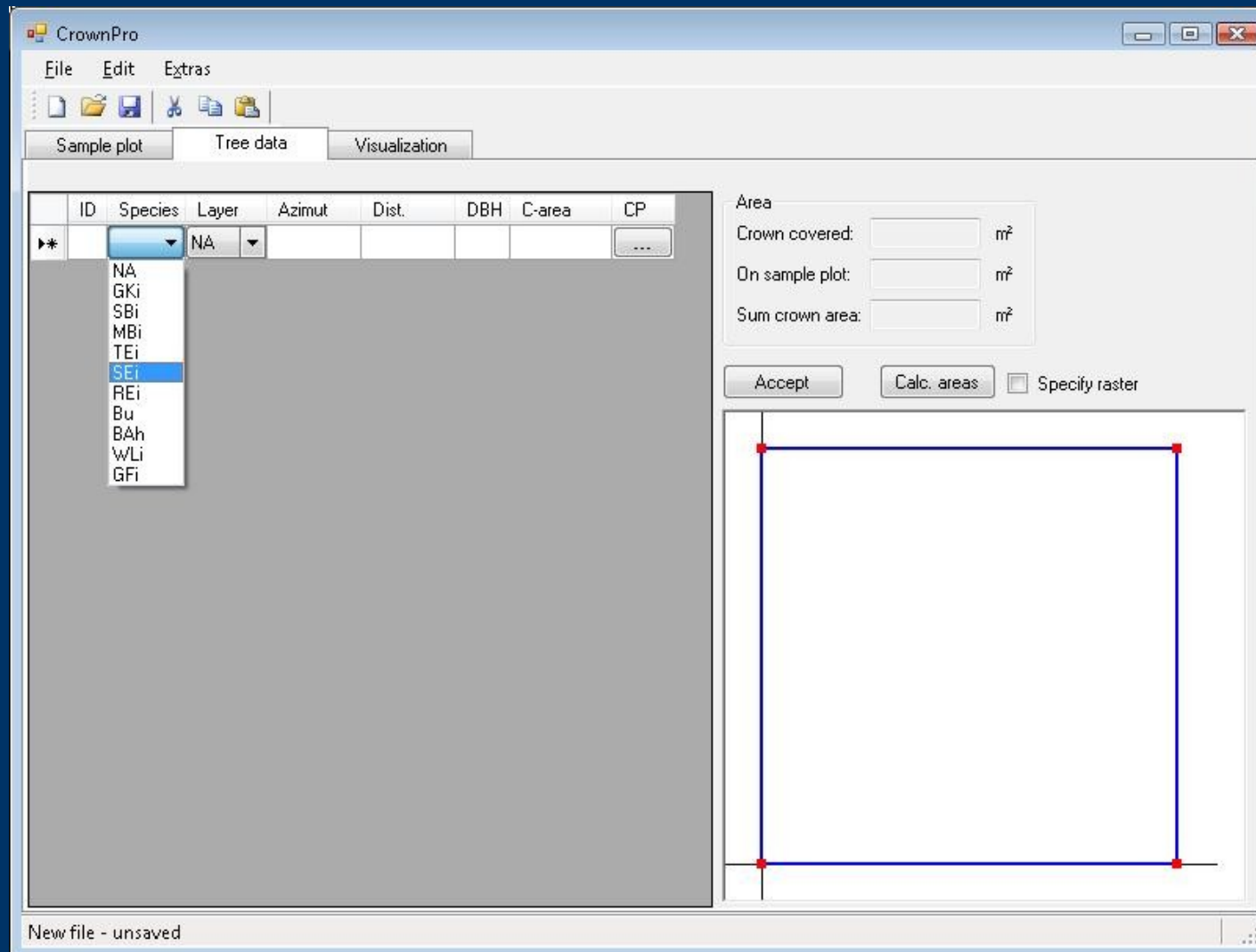
- Sample plot:** A table with columns "Azimut", "Distance", "X-coordinate", and "Y-Coordinate".
- Coordinate type:** Radio buttons for "Polar coordinates" (selected) and "x/y coordinates".
- Angle unit:** Radio buttons for "Degree" (selected) and "Grad/Gon".
- Create area:** A button and a text field showing "2.500,00 m²".
- Visualization:** A large gray area for the sample plot and a smaller white area showing a square defined by four red dots at the corners.

	Azimut	Distance	X-coordinate	Y-Coordinate
Corner1	0	0	0	0
Corner2	90	50	50	0
Corner3	45	70.711	50	50
Corner4	0	50	0	50
▶*				

Definition of trees



Definition of trees



Definition of trees

The screenshot displays the CrownPro software interface. The main window is titled "CrownPro" and features a menu bar with "File", "Edit", and "Extras". Below the menu bar is a toolbar with icons for file operations. The interface is divided into three tabs: "Sample plot", "Tree data", and "Visualization". The "Tree data" tab is active, showing a table with the following data:

ID	Species	Layer	Azimet	Dist.	DBH	C-area	CP
▶ 1	REi	U	45	50	100		...
*	NA	NA					...

Below the table is a large grey rectangular area, likely for visualization. To the right of the table is a control panel for area calculations:

Area
Crown covered: m²
On sample plot: m²
Sum crown area: 0,00 m²

Buttons: Accept, Calc. areas, Specify raster

At the bottom right, there is a visualization window showing a blue square with red dots at its corners and a small red dot in the center, representing a tree's crown area.

New file - unsaved

Definition of crown points

The screenshot shows the CrownPro software interface. The main window has a menu bar (File, Edit, Extras) and a toolbar. Below the toolbar are three tabs: Sample plot, Tree data, and Visualization. The Tree data tab is active, displaying a table with the following data:

ID	Species	Layer	Azimut	Dist.	DBH	C-area	CP
▶ 1	REi	U	45	50	100		...
*	NA	NA					...

A dialog box titled "Crown points of tree 1" is open, showing a table with two columns: Azimut and Entfernung. The first row is highlighted with a blue background and contains a right-pointing arrow followed by an asterisk (▶*).

At the bottom of the dialog box are two buttons: Übernehmen and Abbrechen.

The main window also shows a visualization area on the right side, which is currently empty. The status bar at the bottom of the window reads "New file - unsaved".

Definition of crown points

The screenshot displays the CrownPro software interface. The main window has a menu bar (File, Edit, Extras) and a toolbar. Below the toolbar are three tabs: 'Sample plot', 'Tree data', and 'Visualization'. The 'Tree data' tab is active, showing a table with the following data:

	ID	Species	Layer	Azimet	Dist.	DBH	C-area	CP
▶	1	REi	U	45	50	100	110,52	6
*		NA	NA					...

A dialog box titled 'Crown points of tree 1' is open, showing a table of crown points:

	Azimet	Entfernung
Corner 1	0	6,5
Corner 2	35	5
Corner 3	100	7
Corner 4	187	6,95
Corner 5	260	7,5
✍ Corner 6	335	7,23
*		

At the bottom of the dialog box are two buttons: 'Übernehmen' and 'Abbrechen'. The background of the main window shows a visualization area with a blue line and red dots representing the crown points of a tree.

New file - unsaved

Definition of trees

The screenshot displays the CrownPro software interface. The main window is titled "CrownPro" and has a menu bar with "File", "Edit", and "Extras". Below the menu bar is a toolbar with icons for file operations. The interface is divided into three tabs: "Sample plot", "Tree data", and "Visualization". The "Tree data" tab is active, showing a table with the following data:

ID	Species	Layer	Azimut	Dist.	DBH	C-area	CP
▶ 1	REi	U	45	50	100	110,52	6
*	NA	NA					...

Below the table is a large gray area, likely for visualization. To the right of the table is a panel titled "Area" with three input fields: "Crown covered:" (empty), "On sample plot:" (empty), and "Sum crown area: 110,52" (filled). Below these fields are three buttons: "Accept", "Calc. areas", and "Specify raster" (with an unchecked checkbox). At the bottom right is a visualization window showing a blue square representing the sample plot and a green pentagon representing the tree crown. A red dot is located at the center of the crown. The status bar at the bottom left reads "New file - unsaved".

Calculate crown covered area

The screenshot shows the CrownPro software interface. The main window is titled "CrownPro" and has a menu bar with "File", "Edit", and "Extras". Below the menu bar are icons for file operations. The interface is divided into three tabs: "Sample plot", "Tree data", and "Visualization". The "Tree data" tab is active, displaying a table with the following data:

ID	Species	Layer	Azimut	Dist.	DBH	C-area	CP
1	Bu	U	45	50	70	77,26	3
2	Bu	U	45	45	65	97,28	3
3	Bu	U	70	39	60	181,02	8
4	Bu	U	10	45	67	59,59	3
5	Bu	U	15	40	66	43,29	3
6	Bu	U	12	25	65	77,26	3
7	Bu	U	28	35	70	101,83	8
8	Bu	U	28	50	68	117,32	4
9	Bu	U	45	20	64	218,00	4
10	BAh	L	10	35	40	30,18	3
11	BAh	L	22	42	40	43,50	4
12	BAh	L	18	49	40	24,50	4
13	BAh	L	25	27	40	24,50	4
*	NA	NA					...

To the right of the table is a "Visualization" panel. It contains a section titled "Area" with three input fields: "Crown covered:" (empty), "On sample plot:" (empty), and "Sum crown area:" (1.095,54) with a unit of "m²". Below these fields are three buttons: "Accept", "Calc. areas" (circled in red), and "Specify raster" (with an unchecked checkbox). The visualization area shows a 2D plot with a blue rectangular boundary and several green polygons representing tree crowns. A red dot is visible at the center of one of the crowns.

The status bar at the bottom of the window shows the file path: "C:\Debug\Example_File.xml".

Calculate crown covered area

The screenshot displays the CrownPro software interface. The main window is titled "CrownPro" and has a menu bar with "File", "Edit", and "Extras". Below the menu bar is a toolbar with icons for file operations. The interface is divided into three tabs: "Sample plot", "Tree data", and "Visualization".

The "Tree data" tab is active, showing a table with the following columns: ID, Species, Layer, Azimut, Dist., DBH, C-area, and CP. The data is as follows:

ID	Species	Layer	Azimut	Dist.	DBH	C-area	CP
1	Bu	U	45	50	70	77,26	3
2	Bu	U	45	45	65	97,28	3
3	Bu	U	70	39	60	181,02	8
4	Bu	U	10	45	67	59,59	3
5	Bu	U	15	40	66	43,29	3
6	Bu	U	12	25	65	77,26	3
7	Bu	U	28	35	70	101,83	8
8	Bu	U	28	50	68	117,32	4
9	Bu	U	45	20	64	218,00	4
10	BAh	L	10				
11	BAh	L	22				
12	BAh	L	18				
13	BAh	L	25				
*	NA	NA					

The "Visualization" tab is also active, showing a 2D plot of the sample area. The plot displays a rectangular boundary (blue lines) and several irregular polygons representing tree crowns (green lines). A red dot is visible in the center of the plot, likely representing a tree trunk location. The plot is titled "Area" and has input fields for "Crown covered" (m²), "On sample plot" (m²), and "Sum crown area" (1.095,54 m²). Below the plot are buttons for "Accept", "Calc. areas", and "Specify raster".

A "Calculating..." dialog box is overlaid on the table, featuring a progress bar and an "Abbrechen" button.

The status bar at the bottom of the window shows the file path: "C:\Debug\Example_File.xml".

Calculate crown covered area

The screenshot displays the CrownPro software interface. On the left, a table lists tree data with columns for ID, Species, Layer, Azimut, Dist., DBH, C-area, and CP. The first row is selected. On the right, a 'Visualization' panel shows a plot with green polygons representing tree crowns. A red circle highlights the 'Crown covered' area value of 1.051,16 m² in the 'Area' summary box.

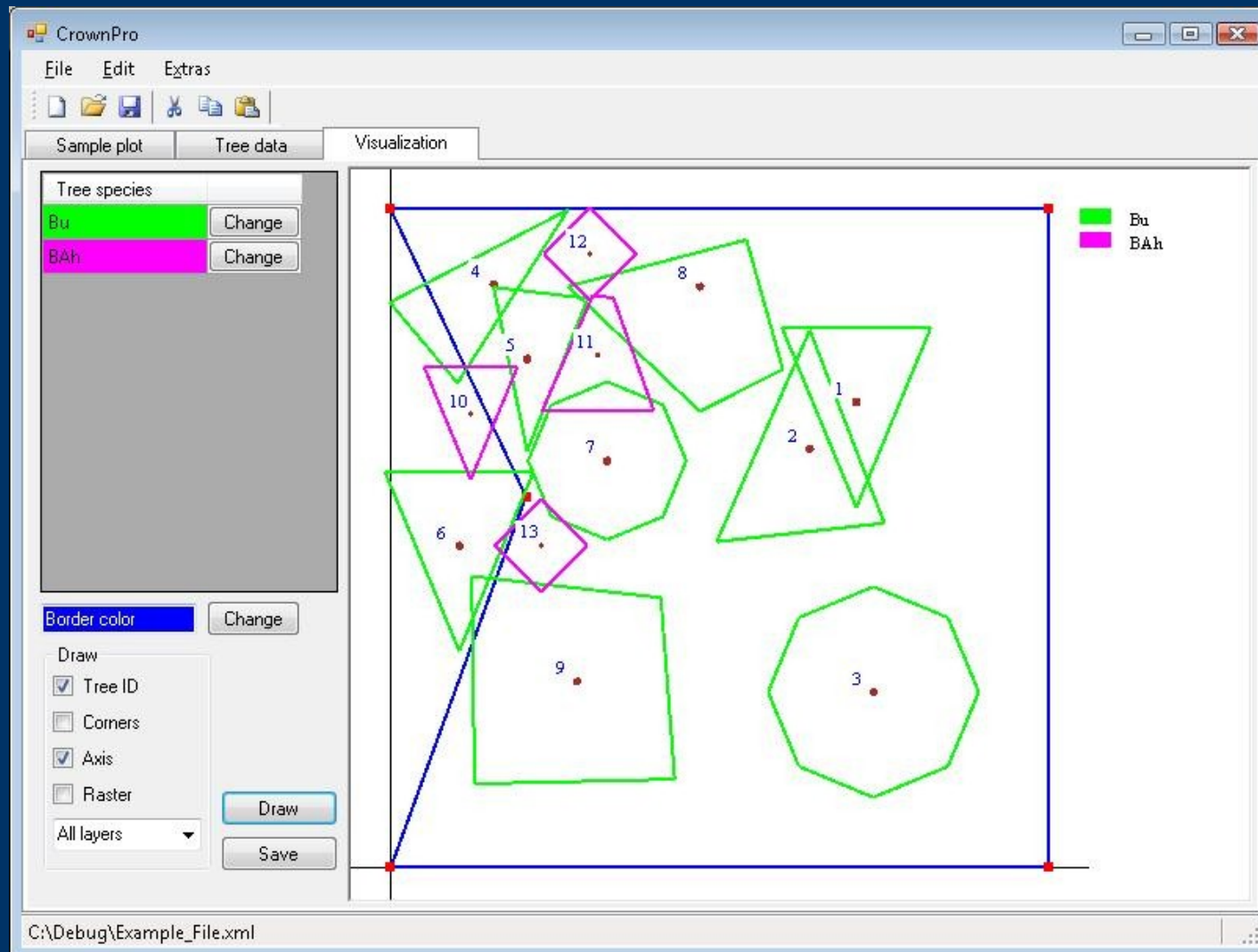
ID	Species	Layer	Azimut	Dist.	DBH	C-area	CP
1	Bu	U	45	50	70	77,26	3
2	Bu	U	45	45	65	97,28	3
3	Bu	U	70	39	60	181,02	8
4	Bu	U	10	45	67	59,59	3
5	Bu	U	15	40	66	43,29	3
6	Bu	U	12	25	65	77,26	3
7	Bu	U	28	35	70	101,83	8
8	Bu	U	28	50	68	117,32	4
9	Bu	U	45	20	64	218,00	4
10	BAh	L	10	35	40	30,18	3
11	BAh	L	22	42	40	43,50	4
12	BAh	L	18	49	40	24,50	4
13	BAh	L	25	27	40	24,50	4
*	NA	NA					...

Area
Crown covered: 1.051,16 m²
On sample plot: 936,17 m²
Sum crown area: 1.095,54 m²

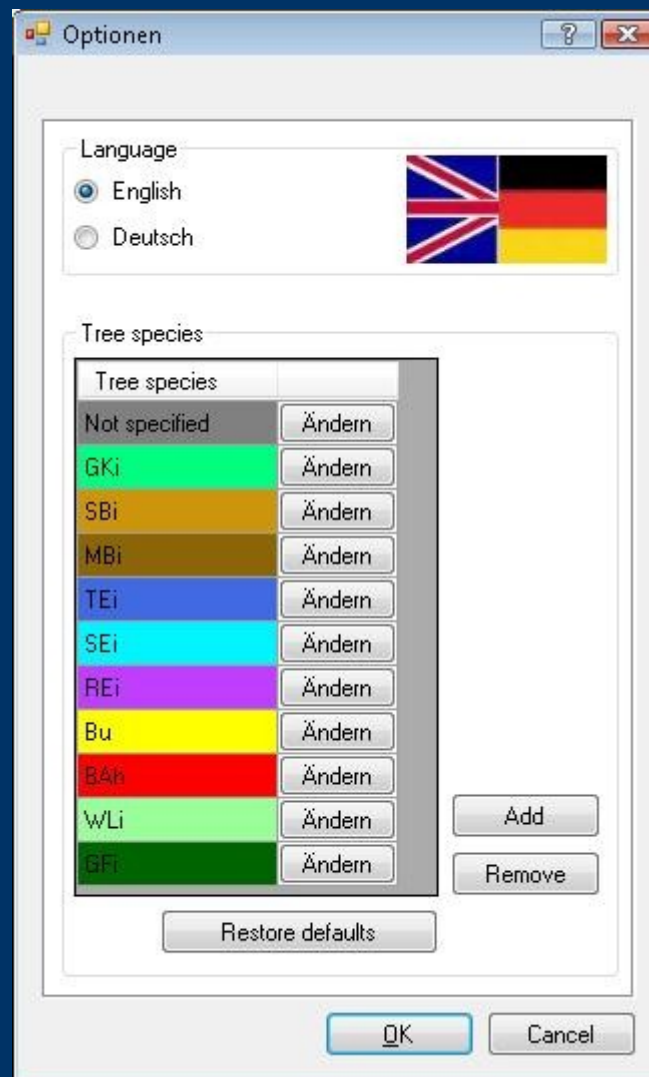
Accept Calc. areas Specify raster

C:\Users\Gnarpf\Desktop\Debug\Example_File.xml

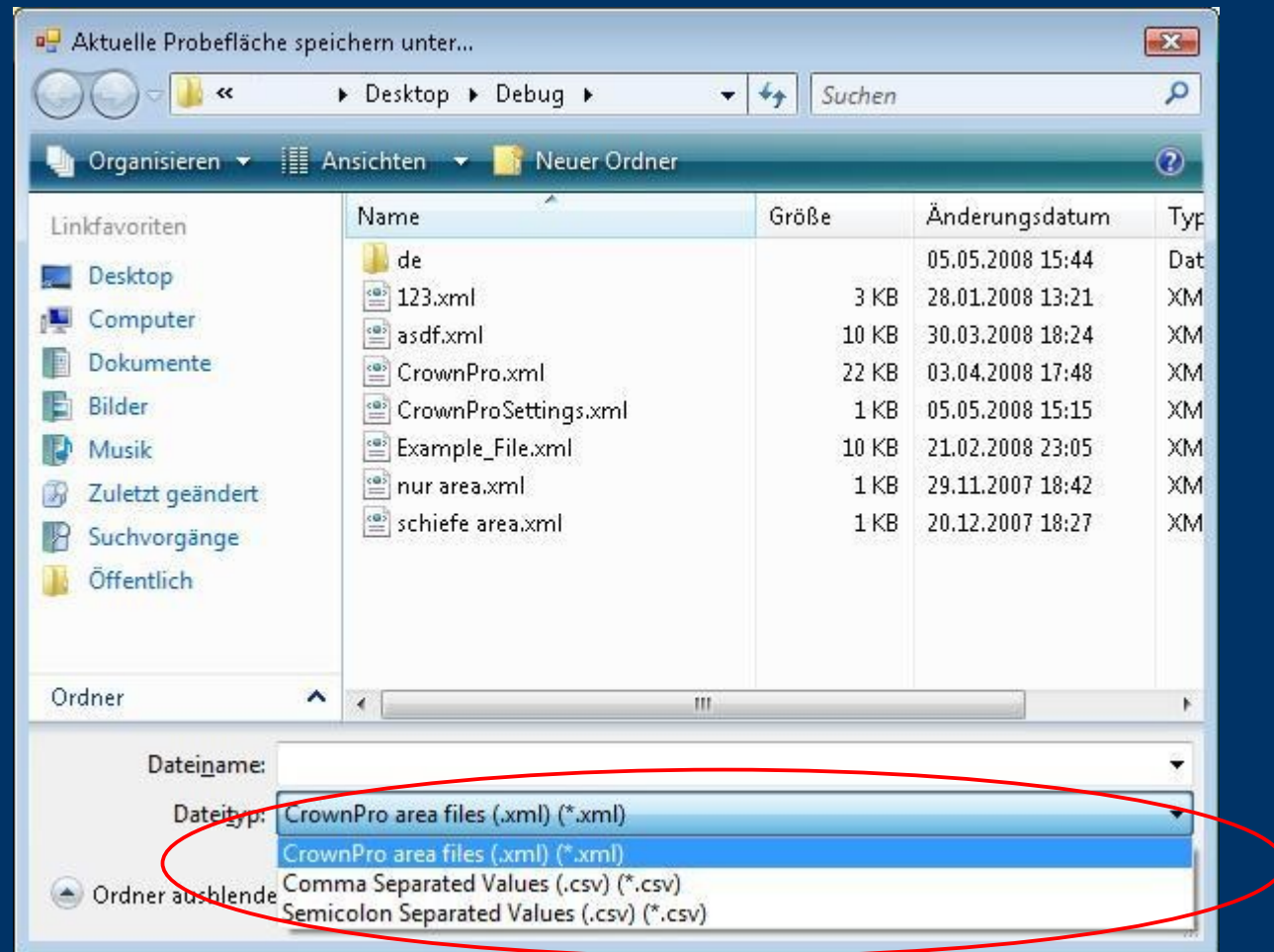
Visualization



Options



Saving / exporting results



Future development

- Exporting to Excel format (.xls)
- Allow for measuring tree locations from varying point of origins
- Representation of crowns by “splines”
- 3D capabilities