CLAIMS

What is claimed is:

1. A graphical user interface that provides rapid analysis of chamber matching performance for semiconductor manufacturing tools, comprising:

an importer that receives information indicative of a reference chamber and at least one focus chamber;

a generate component that creates at least one matrix based on the information;

a transform component that generates one or more additional matrices of data by transforming the at least one matrix; and

an output component that renders a progression of windows as a function of the one or more additional matrices, wherein the progression of windows comprises performance analysis results that compare the reference chamber and the at least one focus chamber.

2. The graphical user interface of claim 1, the information indicative of the reference chamber and the at least one focus chamber comprises sensor measurements, tool performance counter readings, metrology data, process recipes, system recipes, or combination thereof.

3. The graphical user interface of claim 1, is a front end for a biologically based learning system that directly connects to one or more tools to receive the information, to display the performance analysis results, or combinations thereof.

4. The graphical user interface of claim 1, is supported by an autonomous system that learns behavior of a tool associated with the reference chamber or the at least one focus chamber.

5. The graphical user interface of claim 1, the importer receives the information collected at an arbitrary sampling frequency and the generate component constructs the at least one matrix at a lower frequency.

6. The graphical user interface of claim 1, the generate component creates at least two matrixes, wherein each matrix comprises a different time resolution.

7. The graphical user interface of claim 1, the generate component creates summary statistics for the information, wherein the summary statistics comprise, for each time resolution, a mean, a standard deviation, a range, a maximum, a minimum, or combinations thereof.

8. The graphical user interface of claim 1, the output component renders a first window that receives a selection of one or more chambers and a selection of one or more tools from several tools for performance analysis.

9. The graphical user interface of claim 8, the output component renders a second window that comprises a list of tool performance measures and receives at least one of:

a selection of the reference chamber and the at least one focus chamber from a plurality of chambers;

a selection of performance levels or performance level ranges; or

a selection of a set of system recipes and process recipes as a focus of the analysis.

10. The graphical user interface of claim 8, the output component renders a second window that can receive a selection of the same chamber as the at least one focus chamber and the reference chamber.

11. The graphical user interface of claim 10, wherein the output component renders a third window that comprises a time-based trend as a function of the selection in the second window, wherein the trend is based on a configurable date range.

12. The graphical user interface of claim 11, the third window receives a selection of at least one lot from a set of lots, wherein the selection identifies at least one lot for the at least one focus chamber and at least one lot for the reference chamber.

13. The graphical user interface of claim 11, the output component renders a fourth window that displays a first chart for the reference chamber and a second chart for the at least one focus chamber.

14. The graphical user interface of claim 13, the fourth window is an error comparison window that is dynamically modified as a function of changes to a start date or an end date for the at least one focus chamber or the reference chamber.

15. The graphical user interface of claim 13, is supported, at least in part, by an autonomous system that learns a functional relationship and the fourth window uses the functional relationship to identify tool parameters that impact a measure of merit from the second window.

16. The graphical user interface of claim 13, the output component renders a fifth window that displays tick-by-tick trend lines at a wafer level.

17. The graphical user interface of claim 16, the output component renders a sixth window that displays a third chart for the at least one focus chamber and a fourth chart for the reference chamber, wherein the third chart and the fourth chart indicate performance levels of wafers in the at least one focus chamber and the reference chamber.

18. The graphical user interface of claim 1, further comprising a notification component that propagates one or more changes to each window in the progression of windows.

19. A system for biologically based chamber matching, comprising:

an autonomous learning system that determines a behavior of a tool; and

a graphical user interface that expresses an output of interest, based on the behavior, as a function of one or more tool sensors, tool maintenance counters, or other metrology data, wherein the output of interest is a performance comparison of a focus chamber and a reference chamber.

20. The system of claim 19, wherein the graphical user interface is a front end for the autonomous learning system and directly connects to one or more tools to receive data, to display analysis results, or combinations thereof.

21. The system of claim 20, wherein the graphical user interface imports sensor measurements, tool performance counters readings, metrology data, process recipes, system recipes, or combinations thereof.

22. The system of claim 19, wherein the graphical user interface creates one or more matrixes and the autonomous learning system learns each column of the one or more matrixes as a function of other columns and generates a sample for each column.

23. The system of claim 19, the graphical user interface expresses the output of interest as a progression of windows that build upon each other.

24. The system of claim 19, the graphical user interface provides a means to drill down into details of the focus chamber, the reference chamber, or both the focus chamber and the reference chamber.

25. The system of claim 19, the graphical user interface is tool independent.

26. The system of claim 19, wherein the reference chamber and the focus chamber are the same chamber.

27. The system of claim 19, wherein the reference chamber and the focus chamber are different chambers.

28. A method for providing chamber matching performance analysis results, comprising:

receiving data indicative of a focus chamber and a reference chamber;

creating at least one matrix based on the received data;

generating additional matrices by transforming the at least one matrix; and

rendering a series of windows that provide performance analysis information between the focus chamber and the reference chamber.

29. The method of claim 28, further comprises receiving a selection of a first chamber as the reference chamber and a second chamber as the focus chamber, wherein the first chamber and the second chamber are different chambers.

30. The method of claim 28, further comprises receiving a selection of a first chamber as both the reference chamber and the focus chamber.

31. The method of claim 28, wherein the series of windows comprise a tool and chamber selection window, a measures of merit window, a data range window, an error comparison window, a wafer level comparison window, a report window, or combinations thereof.

32. The method of claim 28, further comprises receiving a change to a first parameter in at least one window of the series of windows and automatically updating at least a second parameter in all dependent windows of the series of windows.

What is claimed is:

1. A graphical user interface that provides rapid analysis of chamber matching performance for semiconductor manufacturing tools, comprising:

an importer that receives information indicative of a reference chamber and at least one focus chamber;

a generate component that creates at least one matrix based on the information;

a transform component that generates one or more additional matrices of data by transforming the at least one matrix; and

an output component that renders a progression of windows as a function of the one or more additional matrices, wherein the progression of windows comprises performance analysis results that compare the reference chamber and the at least one focus chamber.

2. The graphical user interface of claim **1**, the information indicative of the reference chamber and the at least one focus chamber comprises sensor measurements, tool performance counter readings, metrology data, process recipes, system recipes, or combinations thereof.

3. The graphical user interface of claim **1**, is a front end for a biologically based learning system that directly connects to one or more tools to receive the information, to display the performance analysis results, or combinations thereof.

4. The graphical user interface of claim **1**, is supported by an autonomous system that learns behavior of a tool associated with the reference chamber or the at least one focus chamber.

5. The graphical user interface of claim **1**, wherein the information received by the importer is collected at an arbitrary sampling frequency and the generate component constructs the at least one matrix at a frequency that is different from the arbitrary sampling frequency.

6. The graphical user interface of claim **1**, the generate component creates at least a second matrix, wherein each of the at least one matrix and the second matrix comprise different time resolutions.

7. The graphical user interface of claim **1**, the generate component creates summary statistics for the information, wherein the summary statistics comprise, for each time resolution, a mean, a standard deviation, a range, a maximum, a minimum, or combinations thereof.

8. The graphical user interface of claim **1**, the output component renders a first window that receives a selection of one or more chambers from a plurality of chambers and a selection of one or more tools from several tools for performance analysis.

9. The graphical user interface of claim 8, the output component renders a second window that comprises a list of tool performance measures and receives at least one of:

a selection of the reference chamber and the at least one focus chamber from the plurality of chambers;

a selection of performance levels or performance level ranges; or

a selection of a set of system recipes and process recipes as a focus of the performance analysis.

10. The graphical user interface of claim 8, the output component renders a second window that can receive a selection that indicates the at least one focus chamber and the reference chamber are the same chamber.

11. The graphical user interface of claim 10, wherein the output component renders a third window that comprises a time-based trend as a function of the selection in the second window, wherein the time-based trend is based on a configurable date range.

12. The graphical user interface of claim 11, the third window receives another selection of a first lot from a first set of lots for the at least one focus chamber, and a second lot from a second set of lots for the reference chamber.

13. The graphical user interface of claim 11, the output component renders a fourth window that displays a first chart for the reference chamber and a second chart for the at least one focus chamber.

14. The graphical user interface of claim 13, the fourth window is an error comparison window that is dynamically modified as a function of changes to a start date or an end date for the at least one focus chamber or the reference chamber.

15. The graphical user interface of claim 13, is supported, at least in part, by an autonomous system that learns a functional relationship and the fourth window uses the functional relationship to identify tool parameters that impact a measure of merit from the second window.

16. The graphical user interface of claim 13, the output component renders a fifth window that displays tick-by-tick trend lines at a wafer level.

17. The graphical user interface of claim 16, the output component renders a sixth window that displays a third chart for the at least one focus chamber and a fourth chart for the reference chamber, wherein the third chart and the fourth chart indicate performance levels of wafers in the at least one focus chamber and the reference chamber.

18. The graphical user interface of claim **1**, further comprising a notification component that propagates one or more changes to each window in the progression of windows.

19. A system for biologically based chamber matching, comprising:

using a processor to execute the following computer executable components stored in a memory:

an autonomous learning engine that determines a behavior of a tool; and

a graphical user interface that expresses an output of interest, based on the behavior, as a function of one or more tool sensors, tool maintenance counters, or metrology data, wherein the output of interest is a performance comparison of a focus chamber and a reference chamber.

20. The system of claim **19**, wherein the graphical user interface is a front end for the autonomous learning engine and directly connects to one or more tools to receive data, to display analysis results, or combinations thereof.

21. The system of claim **20**, wherein the graphical user interface imports sensor measurements, tool performance counters readings, metrology data, process recipes, system recipes, or combinations thereof.

22. The system of claim **19**, wherein the graphical user interface creates at least one matrix and the autonomous learning engine learns a first column of the at least one matrix as a function of at least a second column of the at least one matrix and generates a sample for the first column.

23. The system of claim **19**, the graphical user interface renders the output of interest as a progression of windows that build upon each other.

24. The system of claim **19**, the graphical user interface provides a means to drill down into details of the focus chamber, the reference chamber, or both the focus chamber and the reference chamber.

25. The system of claim **19**, the graphical user interface is tool independent.

26. The system of claim **19**, wherein the reference chamber and the focus chamber are the same chamber.

27. The system of claim **19**, wherein the reference chamber and the focus chamber are different chambers.

28. A method for providing chamber matching performance analysis results, comprising:

receiving data indicative of a focus chamber and a reference chamber;

creating at least one matrix based on the received data;

generating additional matrices by transforming the at least one matrix; and

rendering a series of windows that provide performance analysis information between the focus chamber and the reference chamber.

29. The method of claim **28**, further comprises receiving a selection of a first chamber as the reference chamber and a second chamber as the focus chamber, wherein the first chamber and the second chamber are different chambers.

30. The method of claim **28**, further comprises receiving a selection of a first chamber as both the reference chamber and the focus chamber.

31. The method of claim **28**, wherein the series of windows comprise a tool and chamber selection window, a measures of merit window, a data range window, an error comparison window, a wafer level comparison window, a report window, or combinations thereof.

32. The method of claim **28**, further comprises receiving a change to a first parameter in at least one window of the series of windows and automatically updating at least a second parameter in all dependent windows of the series of windows.