Spreadsheet Patents

Version 1.0 of 2018-05-04

Holger Stadel Borum
Malthe Ettrup Kirkbro
Peter Sestoft

Copies may be obtained by contacting:

Preface

This technical report gives a list of US patents and patent applications related to spreadsheets. It is intended as a companion to the book *Spreadsheet Implementation Technology* [12], and extends and updates an appendix from the 2006 technical report *A Core Spreadsheet Implementation* [11].

Chapter 1

Patents and applications

This is a list of US patents (label USnnnnnnn) and US patent applications (label USyyyynnnnnn) in which the word "spreadsheet" appears in the title or abstract. Documents that were obviously not about spreadsheet implementation have been omitted from the list, but probably some documents remain that only *use* spreadsheets for some purpose. The list was created by searches of the Espacenet [8] database on 26 July 2006 and on 2 April 2018. Google Patents [4] was used for investigative work and to determine association between patents. The date shown below is the date granted for patents, and the date of submission for patent applications. The list is arranged in ascending order of this date. Unusual spelling in document titles has been preserved.

The full text of the patent documents themselves can be obtained in PDF from the European Patent Office [8] and in HTML from the US Patents and Trademarks Office [14]. In both cases, simply do a "number search" using the patent number USnnnnnnn or the patent application number USyyyynnnnnn.

Documents marked with an asterisk (*) are discussed in the main text. In most cases we give a brief summary of each patent or patent application below.

Disclaimer: Neither the author nor the IT University of Copenhagen nor the publisher can take any responsibility for the completeness of the list or the correctness and completeness of the summaries, nor for any legal, technical or monetary consequences of using the list and the summaries.

1. Process and apparatus for converting a source program into an object program; US4398249; 1983-08-09. By Rene K. Pardo and Remy Landau. Describes a procedure to compile spreadsheet-like definitions in dependency order; essentially an implementation of topological sorting, although that term is not used. Patent application filed 1970, granted 1983, and ruled unenforceable 1996; see [5] and [13].

2. Method for assisting the operator of an interactive data processing system to enter data directly into a selected cell of a spreadsheet; US5021973; 1991-06-04. By Irene Hernandez and Beverly Machart; assigned to IBM. Type the desired contents of a cell into the cell – presumably unlike early DOS-based spreadsheets, in which the text was typed in a separate editor line above the sheet.

3. System for generating worksheet files for electronic spreadsheets; US5033009; 1991-07-16. By Steven Dubnoff. Generate new sheets by inserting variable data into a pattern sheet, in the style of word processor merge files.

4. Intermediate spreadsheet structure; US5055998; 1991-10-08. By Terrence Wright, Scott Mayo and Ray Lischner; assigned to Wang Laboratories. Describes an interchange format for multidimensional spreadsheets.

5. Graphic file directory and spreadsheet; US5093907; 1992-03-03. By Yao Hwong and Mitsuro Kaneko; assigned to Axa. Display and process (miniatures of) image files in a matrix of cells.

6. Method for controlling the order of editing cells in a spreadsheet by evaluating entered next cell attribute of current cell; US5121499; 1992-06-09. By Rex McCaskill and Beverly Machart; assigned to IBM. Let each cell determine which cell is "next" in editing order.

7. Computer-aided decision making with a symbolic spreadsheet; US5182793; 1993-01-26. By Rhonda Alexander, Michael Irrgang and John Kirchner; assigned to Texas Instruments. Using a spreadsheet program to make decisions.

8. Method and system for processing formatting information in a spreadsheet; US5231577; 1993-07-27. By Michael Koss; assigned to Microsoft. Cell formatting information and how to share it among cells.

9. Spreadsheet cell having multiple data fields; US5247611; 1993-09-21. By Ronald Norden-Paul and John Brimm; assigned to Emtek Health Care Systems. Display, or not, spreadsheet cells holding mandatory as well as optional information.

10. Graph-based programming system and associated method; US5255363; 1993-10-19. By Mark Seyler; assigned to Mentor Graphics. Generalization of formulas to actions and event listeners, and of cell contents to graphical components.

11. Method for hiding and showing spreadsheet cells; US5255356; 1993-10-19. By Eric Michelman and Devin Ben-Hur; assigned to Microsoft. Hiding or showing cells that contribute to subtotals and schematic, according to the cells' formulas.

12. * Method for optimal recalculation; US5276607; 1994-01-04. By Bret Harris and Lewis Bastian; assigned to WordPerfect Corporation.

13. System and methods for improved scenario management in an electronic spreadsheet; US5303146; 1994-04-12. By Joseph Ammirato and Gavin Peacock; assigned to Borland. A form of version control permitting maintenance of several scenarios on the same spreadsheet. Closely related to patent 24.

14. Data processing apparatus and method for a reformattable multidimensional spreadsheet; US5317686; 1994-05-31. By R. Pito Salas and others; assigned to Lotus Development Corporation. Naming and display of cells.

15. System and method for storing and retrieving information from a multidimensional array; US5319777; 1994-06-07. By Manuel Perez; assigned to Sinper. Networked multidimensional spreadsheet program allowing concurrent updates.

16. * Method of bidirectional recalculation; US5339410; 1994-08-16. By Naoki Kanai; assigned to IBM. Proposes to replace the standard unidirectional computation by bidirectional constraints. This seems to require formulas to be inverted, which isn't possible in general.

17. Spreadsheet program which implements alternative range references; US5371675; 1994-12-06. By Irene Greif, Richard Landsman and Robert Balaban; assigned to Lotus De-

velopment Corporation. Use a menu to choose between different source cell ranges in a calculation.

18. Fuzzy spreadsheet data processing system; US5381517; 1995-01-10. By Karl Thorndike and Joseph Vrba; assigned to Fuziware. Computing with fuzzy numbers and displaying fuzzy results in a spreadsheet program.

19. Sorting a table by rows or columns in response to interactive prompting with a dialog box graphical icon; US5396621; 1995-03-07. By Kathryn Macgregor and Elisabeth Waymire; assigned to Claris. Choosing and indicating graphically whether sorting is by row or column.

20. Electronic spreadsheet system producing generalized answers including formulas; US5418902; 1995-05-23. By Vincent West and Edward Babb; assigned to Int Computers Ltd. Translate spreadsheet formulas into logic and evaluate symbolically; allows symbolic and bidirectional computations.

21. Spreadsheet command/function callback capability from a dynamic-link library; US5437006; 1995-07-25. By Andrzej Turski; assigned to Microsoft. Supporting callbacks into a spreadsheet program.

22. Systems and methods for automated graphing of spreadsheet information; US5461708; 1995-10-24. By Philippe Kahn; assigned to Borland. Similar to patent 29.

23. * Electronic spreadsheet system and methods for compiling a formula stored in a spreadsheet into native machine code for execution by a floating-point unit upon spreadsheet recalculation; US5471612; 1995-11-28. By Roger Schlafly; assigned to Borland. Unusually well-written and technically substantial.

24. System and methods for improved scenario management in an electronic spreadsheet; US5499180; 1996-03-12. By Joseph Ammirato and Gavin Peacock; assigned to Borland. Closely related to patent 13.

25. Visually aging scroll bar; US5532715; 1996-07-02. By Cary Bates and others; assigned to IBM. Visually "heating" a controlled cell as long as a scrollbar slider remains the same position.

26. Graphic indexing system; US5539427; 1996-07-23. By Dan Bricklin and others; assigned to Compaq Computer. Using a lasso gesture in handwriting entry to indicate items to index. Similar to patent 51.

27. Code generation and data access system; US5544298; 1996-08-06. By Walter Kanavy and Timothy Brown; assigned to Data Management Corporation. A system to speed up the creation of database queries and the like.

28. * Method and system of sharing common formulas in a spreadsheet program and of adjusting the same to conform with editing operations; US5553215; 1996-09-03. By Richard Kaethler, assigned to Microsoft; very similar to patent 43.

29. System and methods for automated graphing of spreadsheet information; US5581678; 1996-12-03. By Philippe Kahn; assigned to Borland. Automatically proposing a graph type (pie chart, curve, 2D or 3D bar chart, . . .) based on the number of data points and the complexity of selected data. Similar to patent 22.

30. System and methods for improved spreadsheet interface with user-familiar objects; US5590259; 1996-12-31. By Charles Anderson and others; assigned to Borland. Also published as US5416895.

31. Method and system for direct cell formatting in a spreadsheet; US5598519; 1997-01-28. By Raman Narayanan; assigned to Microsoft. Sharing cell formatting information

between cells by storing the formatting information in a separate formatting table, and mapping cell coordinates to entries in that table.

32. Methods for composing formulas in an electronic spreadsheet system; US5603021; 1997-02-11. By Percy Spencer and others; assigned to Borland. Displaying information about a function and its argument types during formula editing.

33. System and methods for reformatting multi-dimensional spreadsheet information; US5604854; 1997-02-18. By Colin Glassey; assigned to Borland. Transforming data from relational to multi-dimensional tabular form, and swapping axes, in the manner of pivot tables.

34. Auto-formatting of tables in a spreadsheet program; US5613131; 1997-03-18. By Ken Moss and Andrew Kwatinetz; assigned to Microsoft. Describes table autoformatting using heuristics, as known from Excel.

35. System and methods for building spreadsheet applications; US5623591; 1997-04-22. By Istvan Cseri; assigned to Borland. Linking objects with events and actions.

36. Method and system for the direct manipulation of cells in an electronic spreadsheet program or the like; US5623282; 1997-04-22. By Christopher Graham, Ross Hunter and Lisa James; assigned to Microsoft. Appears closely related to application 102.

37. * Methods for compiling formulas stored in an electronic spreadsheet system; US5633998; 1997-05-27. By Roger Schlafly; assigned to Borland. Related to patent 23.

38. System and methods for improved spreadsheet interface with user-familiar objects; US5664127; 1997-09-02. By Charles Anderson and others; assigned to Borland. A workbook containing multiple spreadsheets. Closely related to patent 74.

39. Method and system for automatically entering a data series into contiguous cells of an electronic spreadsheet program or the like; US5685001; 1997-11-04. By Brian Capson and others; assigned to Microsoft. Use mouse and/or keyboard to quickly enter series such as 1, 2, . . . ; or Monday, Tuesday, . . . , as used in Excel.

40. Method and apparatus for entering and manipulating spreadsheet cell data; US5717939; 1998-02-10. By Daniel Bricklin, William Lynch and John Friend; assigned to Compaq Computer. Similar to patent 50.

41. Method and system for linking controls with cells of a spreadsheet; US5721847; 1998-02-24. By Jeffrey Johnson; assigned to Microsoft. Associating graphic controls (a view and a controller) with spreadsheet cells (a model).

42. Method and apparatus for retrieving data and inputting retrieved data to spreadsheet including descriptive sentence input means and natural language interface means; US5734889; 1998-03-31. By Tomoharu Yamaguchi; assigned to Nippon Electric Co. Translating a natural language phrase to a database query an executing it in a spreadsheet.

43. * Method and system of sharing common formulas in a spreadsheet program and of adjusting the same to conform with editing operations; US5742835; 1998-04-21. By Richard Kaethler,, assigned to Microsoft; very similar to patent 28. First, describes a technique to identify identical formulas in a contiguous block of cells, and to share a single representation of the formula between all cells in the block. The need for this presupposes a particular formula representation, which is not made explicit, but which clearly is different from that chosen in Corecalc. Second, notes that the sharing makes insertion and deletion of entire rows and columns more complicated, should they happen to intersect with a block.

This problem is discussed also in [12, Section 2.19], but the patent's solution makes a point of creating small cell blocks, distinguishing between blocks with 1 to 4, 5 to 16, and 16 or more columns; and with 1 to 15, 16 to 31, 31 to 48, and 49 to 200 rows. The point of this is not yet clear.

Maybe a faulty implementation of this approach caused bugs number KB171339 ("Some values not recalculated when using multiple formulas") and KB154134 ("Functions in filled formulas may not be recalculated") in Excel'97; see Microsoft Developer Network Knowledge base at http://support.microsoft.com/kb/q174868/.

44. Process and device for the automatic generation of spreadsheets; US5752253; 1998-05-12. By Jean Paul Geymond and Massimo Paltrinieri; assigned to Bull SA. Generating a spreadsheet from the schema of a relational database.

45. Computer-based system and method for data processing; US5768158; 1998-06-16. By Dan Adler, Roberto Salama and Gerald Zaks; assigned to Inventure America Inc. A spreadsheet program in which a cell may contain any object.

Piersol's 1986 paper [10] is mentioned in the application but apparently not considered prior art, because a formula cannot change the value of another cell in Piersol's system.

46. * Constraint-based spreadsheet system capable of displaying a process of execution of programs; US5799295; 1998-08-25. By Yasuo Nagai; assigned to Tokyo Shibaura Electric Co. A spreadsheet based on constraints in addition to formulas.

47. Automatic spreadsheet forms; US5819293; 1998-10-06. By Ross Comer, John Misko and Troy Link; assigned to Microsoft. Generating multiple spreadsheet form instances from a template, associating each form with a database row. Closely related to patent 58.

48. Method and system for detecting and correcting errors in a spreadsheet formula; US5842180; 1998-11-24. By Karan Khanna and Edward Martinez; assigned to Microsoft. Parsing of formula expressions with error recovery and display of dialog box.

49. Method and apparatus for suggesting completions for a partially entered data item based on previously-entered, associated data items; US5845300; 1998-12-01. By Ross Comer, Adam Stein and David Williams Jr; assigned to Microsoft. How to propose completion of partially typed cell entries from a dynamically updated list.

50. Method and apparatus for entering and manipulating spreadsheet cell data; US5848187; 1998-12-08. By Daniel Bricklin, William Lynch and John Friend; assigned to Compaq Computer. How to read and then assign hand-written data to spreadsheet cells. Similar to patent 40.

51. Graphic indexing system; US5867150; 1999-02-02. By Dan Bricklin and others; assigned to Compaq Computer. Similar to patent 26.

52. Method and system for mapping non-uniform table-structure input data to a uniform cellular data structure; US5881381; 1999-03-09. By Akio Yamashita and Yuki Hirayama; assigned to IBM. Pasting a table from a text document into a spreadsheet, such that each spreadsheet cell receives one table item.

53. Spreadsheet image showing data items as indirect graphical representations; US5880742; 1999-03-09. By Ramana Rao and Stuart Card; assigned to Xerox. Displaying multidimensional data graphically and manipulating the graphs in the user interface.

54. System and methods for building spreadsheet applications; US5883623; 1999-03-16. By Istvan Cseri; assigned to Borland. Seems closely related to patent 35.

55. Method and system for constructing a formula in a spreadsheet; US5890174; 1999-03-30. By Karan Khanna and Edward Martinez; assigned to Microsoft. Displaying information about a function and its argument types during formula editing.

56. System and method of integrating a spreadsheet and external program having output data calculated automatically in response to input data from the spreadsheet; US5893123; 1999-04-06. By Paul Tuinenga. Using OLE to call an external function from a spreadsheet (when recalculating) and getting the result back into the spreadsheet.

57. Transformation of real time data into times series and filtered real time data within a spreadsheet application; US5926822; 1999-07-20. By Mark Garman; assigned to Financial Engineering. A spreadsheet program that permit real-time update of cells reflecting a stream of input values.

58. Automatic spreadsheet forms; US5966716; 1999-10-12. By Ross Comer, John Misko and Troy Link; assigned to Microsoft. Closely related to patent 47.

59. Spreadsheet-calculating system and method; US5970506; 1999-10-19. By Hiroki Kiyan, Takaki Tokuyama and Motohide Tamura; assigned to Justsystem Corporation. A cell area can be held fixed when the sheet is scrolled.

60. Method and apparatus for using label references in spreadsheet formulas; US5987481; 1999-11-16. By Eric Michelman, Joseph Barnett and Jonathan Lange; assigned to Microsoft. Using names (symbolic labels) to refer to ranges in a spreadsheet. The intersection of a row name and a column name denotes a cell.

61. Location structure for a multi-dimensional spreadsheet; US6002865; 1999-12-14. By Erik Thomsen.

62. Method and system for allowing multiple users to simultaneously edit a spreadsheet; US6006239; 1999-12-21. By Anil Bhansali and Rohit Wad; assigned to Microsoft. Describes a kind of concurrent versioning system for multiple users to edit and save the same spreadsheet.

63. Method and system for establishing area boundaries in computer applications; US6005573; 1999-12-21. By William Beyda and Gregory Noel; assigned to Siemens. Limiting scrolling and editing in a graphical user interface.

64. Computerized spreadsheet with auto-calculator; US6055548; 2000-04-25. By Ross Comer and David Williams Jr; assigned to Microsoft. Describes a mechanism to apply a function (such as `SUM`) to a selected cell area, where the user may interactively and graphically change the selection. Excel and other spreadsheet programs implement this functionality for `SUM` (only?), displaying the value in the status bar. Closely related to patent 87.

65. On-screen indentification and manipulation of sources that an object depends upon; US6057837; 2000-05-02. By Darrin Hatakeda and others; assigned to Microsoft. Using colors to indicate the various cell areas that a formula or graph depends on. Implemented in Excel.

66. Method and system for the direct manipulation of cells in an electronic spreadsheet program or the like; US6112214; 2000-08-29. By Christopher Graham, Ross Hunter and Lisa James; assigned to Microsoft. Moving or copying a marked block of cells by dragging its border and using control keys. Implemented in Excel. Appears related to patent 36.

67. System for displaying desired portions of a spreadsheet on a display screen by adjoining the desired portions without the need for increasing the memory capacity; US6115759; 2000-09-05. By Kazumi Sugimura and Shuzo Kugimiya; assigned to Sharp. How to hide and later redisplay selected rows and columns.

68. System and method for processing data in an electronic spreadsheet in accordance with a data type; US6138130; 2000-10-24. By Dan Adler and Roberto Salama; assigned to

Inventure Technologies. Seems related to patent 45 but additionally mentions the Java programming language.

69. Method and apparatus for organizing and processing information using a digital computer; US6166739; 2000-12-26. By Kent Lowry and others; assigned to Microsoft. Initiate cell editing by two single-clicks rather than one double-click when a spreadsheet program (Excel) runs as component in a web browser (Internet Explorer).

70. Spreadsheet view enhancement system; US6185582; 2001-02-06. By Polle Zellweger; assigned to Xerox. Related to patent 72.

71. Analytic network engine and spreadsheet interface system; US6199078; 2001-03-06. By Philip Brittan and others; assigned to Sphere Software Engineering. A calculation mechanism that attempts to handle circular cell dependencies.

72. Animated spreadsheet for dynamic display of constraint graphs; US6256649; 2001-07-03. By Jock Mackinlay and others; assigned to Xerox. Related to patent 70.

73. Multi-dimensional table data management unit and recording medium storing therein a spreadsheet program; US2001016855; 2001-08-23. By Yuko Hiroshige. Selecting and manipulating three-dimensional data.

74. System and methods for improved spreadsheet interface with user-familiar objects; US6282551; 2001-08-28. By Charles Anderson and others; assigned to Borland. Closely related to patent 38.

75. Graphical environment for managing and developing applications; US6286017; 2001-09-04. By Ágúst Egilsson. An extended spreadsheet paradigm in which a spreadsheet may refer to external program fragments and the like. Closely related to patents 369 and 117.

76. Method and system for detecting and selectively correcting cell reference errors; US6317758; 2001-11-13. By Robert Madsen, Daren Thayne and Gary Gibb; assigned to Corel. Changing a reference in a formula from relative to absolute after copying the formula.

77. Method and apparatus for accessing multidimensional data; US6317750; 2001-11-13. By Thomas Tortolani and Nouri Koorosh; assigned to Hyperion Solutions. Manipulating and displaying data from an external (database) source, with automatic replication of formulas.

78. Parallel execution mechanism for spreadsheets; US2001056440; 2001-12-27. By David Abramson and Paul Roe. A method for explicitly initiating a parallel computation from a spreadsheet cell; not a parallel implementation of the standard recalculation mechanism.

79. Method and system for distributing and collecting spreadsheet information; US2002010743; 2002-01-24. By Mark Ryan, David Keeney and Ronald Tanner. Assigning individual sheets of a master workbook to one or more contributors, sending copies of the sheets to the contributors for updating, and reintegrating them into the master workbook.

80. Method and apparatus for handling scenarios in spreadsheet documents; US2002055953; 2002-05-09. By Falko Tesch and Matthias Breuer. Preserving, and displaying a tree structure, the scenarios explored using a spreadsheet.

81. Method and system in an electronic spreadsheet for applying user-defined options; US2002059233; 2002-05-16. By Bauchot and Albert Harari; application by IBM. How to set options to true or false.

82. Spreadsheet Web server system and spreadsheet Web system; US2002065846; 2002-05-30. By Atsuro Ogawa and Hideo Takata. A server-side spreadsheet component that generates HTML tables for display in a web browser on the client side.

83. User interface for creating a spreadsheet pivottable; US6411313; 2002-06-25. By Thomas Conlon and Paul Hagger; assigned to Microsoft. The pivot table user interface as known from Excel.

84. Apparatus and method for dynamically updating a computer-implemented table and associated objects; US6411959; 2002-06-25. By Todd Kelsey; assigned to IBM. Automatically copying formulas and extending references to a table when new rows or columns are added. Much the same idea as Microsoft's patent 107.

85. Method for dynamic function loading in spreadsheets on small devices; US2002087593; 2002-07-04. By Paul Rank. On demand loading of functions and features in spreadsheet program for PDAs.

86. Multidimensional electronic spreadsheet system and method; US2002091728; 2002-07-11. By Henrik Kjaer and Dan Pedersen. A three-dimensional spreadsheet in which a usual cell (in the two-dimensional grid) can contain a stack of cells.

87. Computerized spreadsheet with auto-calculator; US6430584; 2002-08-06. By Ross Comer and David Williams Jr; assigned to Microsoft. Closely related to patent 64.

88. System and methods for improved scenario management in an electronic spreadsheet; US6438565; 2002-08-20. By Joseph Ammirato and Gavin Peacock; assigned to Borland. Closely related to patent 13.

89. The applications and patents US2002143811, US2002143831, US2002143809, US2002143730, US6742162, US2004205676, US6961898 and US2002143830 are all by Paul Bennett, Round Rock, Texas, USA:

    - System and method for vertical calculation using multiple columns in a screen display; US2002143811; 2002-10-03.

    - System and method for calculation using spreadsheet lines and vertical calculations in a single document; US2002143831; 2002-10-03.

    - System and method for calculation using multi-field columns with hidden fields; US2002143809; 2002-10-03.

    - System and method for calculation using a calculator input mode; US2002143730; 2002-10-03.

    - System and method for calculation using multi-field columns with modifiable field order; US2002143830; 2002-10-03. Unclear what is new relative to the general concept of a spreadsheet.

    - System and method for calculation using formulas in number fields; US6742162; 2004-05-25.

    - System and method for calculation using a subtotal function; US2004205676; 2004-10-14. Describes a graphical way to specify subtotal computations.

    - System and method for calculation using vertical parentheses; US6961898; 2005-11-01.

90. Method and system for automated data manipulation in an electronic spreadsheet program or the like; US2002174141; 2002-11-21. By Shing-Ming Chen. Spreadsheet as database front-end, addressing cells with ranges and cell collections, and recording macros.

91. Multidimensional data entry in a spreadsheet; US2002184260; 2002-12-05. By Paul Martin, William Angold, and Nicolaas Kichenbrand. Accessing, displaying, editing and writing back multidimensional data, as obtained from a relational database. Closely related to application 93.

92. Visualization spreadsheet; US6496832; 2002-12-17. By Ed Chi and others. The authors and the patent seem unrelated to Nuñez [7], but the general idea is the same.

93. Dynamic conversion of spreadsheet formulas to multidimensional calculation rules; US2003009649; 2003-01-09. By Paul Martin, William Angold, and Nicolaas Kichenbrand. Calculating on multidimensional data, as obtained from a relational database. Closely related to application 91.

94. Method and apparatus for entry and editing of spreadsheet formulas; US2003033329; 2003-02-13. By Eric Bergman and Paul Rank. Terminate the editing of a formula on a PDA when user selects a different cell while the cursor in the formula is at a point inappropriate for insertion of a cell reference.

95. Spreadsheet recalculation engine version stamp; US6523167; 2003-02-18. By Timothy Ahlers and Andrew Becker, assigned to Microsoft. Explains how recalculation – or not – at loading can be controlled by calculation engine version stamp. This technique appears to be used in Excel 2000 and later to enforce a full recalculation when loading a workbook that was last saved by Excel'97 or older, and avoid that recalculation otherwise. (Maybe the intention is to guard against an Excel'97 recalculation flaw; see note under patent 43).

96. System and method for displaying spreadsheet cell formulas in two dimensional mathematical notation; US2003056181; 2003-03-20. By Sharad Marathe. Displaying spreadsheet formulas in usual mathematical notation. This would seem to be what symbolic mathematics programs such as Maple and Mathematica routinely perform.

97. System and method for editing a spreadsheet via an improved editing and cell selection model; US6549878; 2003-04-15.

98. Calculating in spreadsheet cells without using formulas; US2003120999; 2003-06-26. By Michelle Miller and others; application possibly by Texas Instruments. Formula entry on a graphical calculator.

99. Individually locked cells on a spreadsheet; US2003117447; 2003-06-26. By Gayle Mujica and Michelle Miller; application possibly by Texas Instruments. Allow individual locking of cells (instead of bulk locking and individual unlocking as in Excel), and graphical marking of locked cells.

100. Method and system in an electronic spreadsheet for processing different cell protection modes US6592626; 2003-07-15. By Frederic Bauchot and Albert Harari; assigned to IBM. Changing the protection mode of single cells.

101. Method for automatically protecting data from being unintentionally overwritten in electronic forms; US2003159108; 2003-08-21. By Gerhard Spitz. Rules for automatically determining cells whose contents should be protected from overwriting.

102. Method and system for the direct manipulation of cells in an electronic spreadsheet program or the like; US2003164817; 2003-09-04. By Christopher Graham, Ross Hunter and Lisa James; application by Microsoft. Describes how keys and mouse can be used to control whether insertion of cell blocks overwrite cells or add new rows and columns. Implemented in Excel. Appears closely related to patent 36.

103. Interface for an electronic spreadsheet and a database management system; US2003182287; 2003-09-25. By Carlo Parlanti. Accessing relational databases from a spreadsheet with ODBC and UDA.

104. Automatic formatting of pivot table reports within a spreadsheet; US6626959; 2003-09-30. By Wesner Moise, Thomas Conlon and Michelle Thompson; assigned to Microsoft. The automatic formatting of finished pivot tables as known from Excel.

105. System and method in an electronic spreadsheet for displaying and/or hiding range of cells; US2003188258; 2003-10-02. Much the same as patent 225.

106. Binding data from data source to cells in a spreadsheet; US6631497; 2003-10-07. By Ardeshir Jamshidi, Farzad Farahbod and Hardeep Singh; assigned to IBM. Dynamically importing data from external sources (such as databases), with no need for programming.

107. Extension of formulas and formatting in an electronic spreadsheet; US6640234; 2003-10-28. By Wayne Coffen and others; assigned to Microsoft. Describes a system by which a previously blank but newly edited cell, which extends a list of consistently typed and formatted cells, will automatically be formatted like those cells and will be included in existing formulas and aggregating expressions that include all of those cells. Closely related to patent 197.

108. Method of feeding a spreadsheet type tool with data; US2003212953; 2003-11-13. By Jacob Serraf; application by Eurofinancials. Transmitting spreadsheet data on a network.

109. * Method in connection with a spreadsheet program; US2003226105; 2003-12-04. By Mattias Waldau. Describes cross-compilation to another platform, such as a mobile phone or web service. This is a technically substantial patent with references to relevant prior art, such as Schlafly's patents. It describes compilation to dynamically typed and statically typed languages (JavaScript and Java), and how to present the generated code as a WML service, say. Probably the technology described by this application is that used in the SpreadsheetConverter product [3].

110. Binding spreadsheet cells to objects; US6701485; 2004-03-02. By Mark Igra, Eric Matteson and Andrew Milton; assigned to Microsoft. Binding a spreadsheet cell to an external event source, such as a stock ticker, for instance when a spreadsheet program (Excel) runs as component in a web browser (Internet Explorer).

111. Data-bidirectional spreadsheet; US2004044954; 2004-03-04. By Michael Hosea; application possibly by Texas Instruments. Interfacing a spreadsheet program to an external calculation engine, as in an electronic graphical pocket calculcator.

112. Method for generating a stand-alone multi-user application from predefined spreadsheet logic; US2004064470; 2004-04-01. By Kristian Raue; application by Jedox GmbH. Compiling a spreadsheet to web scripts (in PHP) supporting multi-user distributed access.

113. Method and system in an electronic spreadsheet for introducing new elements in a cell named range according to different modes; US6725422; 2004-04-20. By Frederic Bauchot and Albert Harari; assigned to IBM. Differentiating between closed and open named ranges of cells; the latter can be expanded by insertion of new rows and columns in the open direction.

114. System and method for automated data extraction, manipulation and charting; US2004080514; 2004-04-29. By Richard Dorwart. Automatically creating appropriate charts from tabular spreadsheet data, and exporting the charts to a presentation program.

115. System, method, and computer program product for an integrated spreadsheet and database; US2004103365; 2004-05-27. By Alan Cox. Integrating relational queries

in a spreadsheet program, so that a query can create and populate a new worksheet, containing appropriately copied and adjusted formulas.

116. Software replicator functions for generating reports; US2004111666; 2004-06-10. By James Hollcraft. Specifying automatic replication of formulas to grow with data.

117. Graphical environment for managing and developing applications; US6763498; 2004-07-13. By Ágúst Egilsson. Closely related to patents 75 and 369.

118. * Methodology for testing spreadsheet grids; US6766509; 2004-07-20. By Andrei Sheretov, Margaret Burnett and Gregg Rothermel; assigned to University of Oregon. Two methods for using du-associations to test spreadsheets; in the more advanced method, the testing of a single representative cell can increase the testedness of a range of cells containing similar formulas.

119. * Methods and systems for generating a structured language model from a spreadsheet model; US6766512; 2004-07-20. By Farzad Khosrowshahi and Murray Woloshin at JP Morgan & Co; assigned to Furraylogic Ltd. Compiling a spreadsheet model, with designated input cells and output cells, to code for a function in a procedural programming language.

120. Storing objects in a spreadsheet; US6779151; 2004-08-17. By Jason Cahill and Jason Allen; assigned to Microsoft. Very similar to patent 157.

121. Thin client framework deployment of spreadsheet applications in a web browser based environment; US2004181748; 2004-09-16. By Ardeshir Jamshidi and Hardeep Singh; application by IBM. Client and server collaborating to support a browser-based spreadsheet program.

122. Spreadsheet data processing system; US2004205524; 2004-10-14. By John Richter, Christopher Tregenza and Morten Siersted; application by F1F9. A method for processing, not implementing, a spreadsheet.

123. System and method for generating an executable procedure; US2005028136; 2005-02-03. By Ronald Woodley. Generating C++ (or other) source code, where the code generation is controlled by data stored in a spreadsheet; not about generating code from spreadsheet formulas.

124. Visual programming system and method; US2005081141; 2005-04-14. By Gunnlaugur Jonsson; application by Einfalt EHF. Object-oriented software development from spreadsheets. Seems related to Piersol [10].

125. Universal graph compilation tool; US6883161; 2005-04-19. By Andre Chovin and Chatenay Alain; assigned to Crouzet Automatismes. Compilation of a visual software model, drawn in spreadsheet program, to code for embedded devices.

126. Method and system for handling data available in multidimensional databases using a spreadsheet; US2005091206; 2005-04-28. By Francois Koukerdjinian and Jean-Philippe Jauffret. Extracting data from a database to create a local database, from which a spreadsheet can then draw its data.

127. Reporting status of external references in a spreadsheet without updating; US6898760; 2005-05-24. By Jesse Bedford and others; application by Microsoft. Closely related to patents 303 and 274.

128. User interface for a multi-dimensional data store; US6907428; 2005-06-14. By Alexander Fitzpatrick and Sasan Seydnejad. Spreadsheet user interface to multi-dimensional data, so-called "planning data repository".

129. Method and system in an electronic spreadsheet for persistently copy-pasting a source range of cells onto one or more destination ranges of cells; US6912690; 2005-06-28.

By Frederic Bauchot; application by IBM. Mechanism to make persistent copies of a formula, so that the copies are automatically updated when the original is updated. Closely related to patent 276. This seems similar to Montigel's Wizcell [6].

130. Method of updating a database created with a spreadsheet program; US2005149482; 2005-07-07. By Patrick Dillon; application by Thales. Ensuring the correctness of database updates performed from a spreadsheet.

131. System and method for schemaless data mapping with nested tables; US2005172217; 2005-08-04. By Yiu-Ming Leung ; application possibly by Microsoft. Handling and displaying nested tables of data, as from an XML document, without the need for a predetermined schema or XML map. Closely related to patent 199.

132. Program / method for converting spreadsheet models to callable, compiled routines; US2005193379; 2005-09-01. By Richard Tanenbaum. How to compile spreadsheet formulas to C source code. Closely related to application 149.

133. Clipboard content and document metadata collection; US2005203935; 2005-09-15. By James McArdle; application by IBM. An enhanced clipboard collects information about the source of clippings (date, time, source document, URL, or the like) so that such metadata can be saved in the target document along with the pasted text or data.

134. * Methodology for testing spreadsheets; US6948154; 2005-09-20. By Gregg Rothermel, Margaret Burnett, and Lixin Li; assigned to University of Oregon. Using du-associations to gradually test a spreadsheet, displaying each cell's testedness.

135. Methods of updating spreadsheets; US2005210369; 2005-09-22. By John Damm. How to update a cell by tapping on it and/or selecting from a drop-down list, intended for PDAs.

136. Code assist for non-free-form programming; US2005240984; 2005-10-27. By George Farr and David McKnight; application by IBM. Suggesting completions while typing data into a spreadsheet or similar.

137. Method and apparatus for viewing and interacting with a spreadsheet from within a web browser; US2005268215; 2005-12-01. By Daniel Battagin and Yariv Ben-Tovim; application by Microsoft. Using server-side scripts and a server-side spreadsheet engine to generate HTML, possibly with scripts for inactivity, that when displayed in a client-side browser will provide a spreadsheet user interface.

138. System and method for automatically populating a dynamic resolution list; US2006004843; 2006-01-05. By John Tafoya and others; application by Microsoft. Closely related to patent 289.

139. System and method for spreadsheet data integration; US2006010367; 2006-01-12. By Juergen Sattler and Joachim Gaffga. Interfacing spreadsheet program with server data, using access control. Closely related to application 140.

140. System and method for role-based spreadsheet data integration; US2006010118; 2006-01-12. By Juergen Sattler and Joachim Gaffga. Closely related to application 139.

141. Client side, web-based spreadsheet; US6988241; 2006-01-17. By Steven Guttman and Joseph Ternasky; assigned to IBM. Describes a spreadsheet that can be run in a browser, permitting people collaborate and share spreadsheets on the web, and permitting the sheet to use real-time data from the web (such as stock quotes). How similar is Google's recently announced web-based spreadsheet to this?

142. Method and system for presenting editable spreadsheet page layout view; US2006015804; 2006-01-19. By Kristopher Barton, Aaron Mandelbaum and Tisha Abastillas; application by Microsoft. Indicating spreadsheet page layout while maintaining the ability to edit sheets.

143. Method and apparatus for integrating a list of selected data entries into a spreadsheet; US2006026137; 2006-02-02. By Juergen Sattler and others. Appears related to application 139.

144. Dynamic data display having slide drawer windowing; US7000181; 2006-02-14. By Robert Press; application by IBM. A graphical display of data in which multiple "drawers", each displaying a fragment of a spreadsheet, may be visible simultaneously, and may automatically resize themselves.

145. Support for user-specified spreadsheet functions; US2006036939; 2006-02-16. Craig Hobbs and Daniel Clay; application by Microsoft. Permits a user to define a function with named parameters in a spreadsheet cell and call it from other cells. Calls have the syntax `F(funcell, "arg1name", arg1, ..., "argNname", argN)`. Within the function cell, an argument is referred to using the expression `R("argname")`.

146. Management of markup language data mappings available to a spreadsheet application workbook; US7007033; 2006-02-28. By Chad Rothschiller and others; application by Microsoft. Processing and using XML maps and XML schemas in a spreadsheet program.

147. Graphically defining a formula for use within a spreadsheet program; US2006053363; 2006-03-09. By Christopher Bargh, Gregory Johnston and Russell Jones. How to call a function defined using an external graphical tool.

148. Two pass calculation to optimize formula calculations for a spreadsheet; US2006085386; 2006-04-20. By Lakshmi Thanu, Peter Eberhardy and Xiaohong Yang; application by Microsoft. How to efficiently access external data such as relational databases for OLAP queries and similar.

149. Program / method for converting spreadsheet models to callable, compiled routines; US2006090156; 2006-04-27. By Richard Tanenbaum. Closely related to application 132.

150. Method and apparatus for automatically producing spreadsheet-based models; US2006095833; 2006-05-04. By Andrew Orchard and Geoffrey Bristow. A way to describe expandable formulas. Possibly similar ideas as in patent 254 and Gencel [2].

151. Spreadsheet application builder; US2006101391; 2006-05-11. By Markus Ulke, Kai Wachter and Gerhild Krauthauf. Application development by drag-and-drop in a spreadsheet style development environment.

152. Method, system, and apparatus for providing access to asynchronous data in a spreadsheet application program; US7047484; 2006-05-16. By Andrew Becker and others; patent assigned to Microsoft. Protocol for reading and using external data streams from a spreadsheet.

153. Method for expanding and collapsing data cells in a spreadsheet report; US2006107196; 2006-05-18. By Lakshmi Thanu and others; application by Microsoft. Showing and hiding subitems in a report, as generated by the subtotals and group-and-outline features of Excel. Closely related to patent 367 and application 440.

154. System and method for a spreadsheet application supporting diverse formulaic functions; US8726143; 2006-07-20. By Roy Simkhay and others; application by Microsoft. Defines various spreadsheet functions, e.g. `IFERROR`, `COUNTIFS`, `FILTER`, `DISTINCT`. Closely related to patent 463.

155. Systems and methods providing dynamic spreadsheet functionality; US7082569; 2006-07-25. By Perlie Voshell. Dynamic report creation in relation to databases.

156. Importing and exporting markup language data in a spreadsheet application document; US7640493; 2006-08-24. By Robert Collie and others; application by Microsoft.

Uses mapping between cell references and XML elements for import and export of spreadsheets.

157. Storing objects in a spreadsheet; US7099890; 2006-08-29. By Jason Cahill and Jason Allen; application by Microsoft. A mechanism to store general objects (in addition to numbers, texts and errors) in spreadsheet cells, and to invoke methods on them from other cells. The objects may be external and the method calls performed using COM, so this is probably a generalization of Piersol [10] and Nuñez [7]. Very similar to patent 120.

158. Spreadsheet-based user interface creation; US7107519; 2006-09-12. By Steven Webster and others; application by Cognex. Defines methods for creating GUIs in a spreadsheet.

159. Method and system to associate cell and item metadata; US7693860; 2006-09-21. By Alexander Babanov and others; application by Microsoft. Storing metadata about cells and cell contents, like cell names and units.

160. Spreadsheet error checker; US7117430; 2006-10-03. By Justin Maguire; application by Microsoft. A rule-based error checker for individual cells of a spreadsheet.

161. Spreadsheet programming; US2006224946; 2006-10-05. By Robert Barrett and others; application by IBM. Imperative programming for spreadsheets. Cell expressions can be code blocks and evaluate to objects, whose fields and methods are accessible from other cells. Defines event based execution model for such code block cells.

162. Scrollable and re-sizeable formula bar; US7590944; 2006-10-05. By Brandon Weber and Charles Ellis; application by Microsoft. Visualizing long expressions in GUI.

163. Spreadsheet fields in text; US7120866; 2006-10-10. By Matthew Kotler and others; application by Microsoft. Closely related to patents 346, 294 and 288.

164. Creating and managing structured data in an electronic spreadsheet; US7127672; 2006-10-24. By Eric Patterson and others; application by Microsoft. UI for creating cell lists.

165. System and method for exporting spreadsheet data; US2006248443; 2006-11-02. By Ramin Bagheri; application by SAP. Exporting database contents to a spreadsheet.

166. Method and system in an electronic spreadsheet for handling absolute references in a copy/cut and paste operation according to different modes; US7143338; 2006-11-28. By Frederic Bauchot and Albert Harari; application by IBM. Describes a method and conditions for replacing absolute cell references to the source range by (other) absolute cell references in the target range when copying formulas.

167. Method and system in an electronic spreadsheet for comparing series of cells; US7146561; 2006-12-05. By Bauchot and Daniel Mauduit; application by IBM. Use Boolean functions to determine whether two ranges of cells overlap, are disjoint, are equal or are contained one in the other.

168. Interactive formula builder; US2006282818; 2006-12-14. By Stuart Despain; application by Microsoft. UI for building formulas suggesting functions, visualizing referenced cells etc.

169. Pre-formulated spreadsheet cell groups; US7424668; 2006-12-21. By Stuart Despain; application by Microsoft. Presenting templates for invoicing, tracking bills etc., with relevant formulas already present, in spreadsheet UI.

170. User interface for integrated spreadsheets and word processing tables; US7155667; 2006-12-26. By Matthew Kotler and others; application by Microsoft. Closely related to patents 285, 306, 335, 243, 284 and 251.

171. Method for creating an embedded database in a spreadsheet; US7155665; 2006-12-26. By Kevin Browne and others; application by Microsoft. UI for creating lists with row-wise database functionality over a range of cells or imported data.

172. Auditing and tracking changes of data and code in spreadsheets and other documents; US9734139; 2007-01-11. By Andrew Reeves and others; application by Cluster Seven Limited. Version control for spreadsheets.

173. System for controlling the display size of a formula bar in a spreadsheet; US7805674; 2007-01-18. By Bo Chen and others; application by Zhuhai Kingsoft Software CO LT. Automatic and manual control over formula bar size, scroll and position.

174. Method and system for hiding sensitive data in an electronic spreadsheet environment; US7743316; 2007-01-25. By Frederic Bauchot; application by IBM. Obfuscating formulas by recursively inlining dependencies and simplifying the final formula.

175. Structuring data for spreadsheet documents; US2007022128; 2007-01-25. By Chad Rothschiller and others; application by Microsoft. Modular file format for spreadsheets (code module, shared strings module, module for each sheet etc.).

176. Change-oriented electronic spreadsheet application; US2007028159; 2007-02-01. By Rui Ying and Wang Fengli. Store timestamped cell updates tracking the revision history of a spreadsheet.

177. Method and system for the graphical modeling of data and calculations of a spreadsheet; US7984371; 2007-02-08. By Andrew Zdenek. UI visualizing abstract syntax tree of a formula.

178. Method and system in an electronic spreadsheet for handling user-defined options in a copy/cut - paste operation; US7178098; 2007-02-13. By Bauchot and Albert Harari; application by IBM. How to control the setting of user-defined options in a cell copying operation, when the options were set for the source range of cells.

179. Compile-time optimizations of queries with SQL spreadsheet; US7177855; 2007-02-13. By Andrew Witkowski and others; application by Oracle. Closely related to patents 355 and 188.

180. Integrated spreadsheet expanding table with collapsable columns; US2007050697; 2007-03-01. By Alister Lewis-Bowen and Louis Weitzman; application by IBM. GUI collapses columns and/or rows with same value.

181. Add-in tool and method for rendering financial data into spreadsheet compliant format; US2007050698; 2007-03-01. By Stefan Chopin and Robert Krugman. Process for integrating online datasets into spreadsheets.

182. Customizable spreadsheet table styles; US8549392; 2007-03-01. By Roy Simkhay and others; application by Microsoft. Closely related to application 444.

183. Formattable spreadsheet table elements with automatic updating; US2007050700; 2007-03-01. By Roy Simkhay and others; application by Microsoft. Multiple cells can be formated as one.

184. System and method for rendering of financial data; US7877678; 2007-03-01. By Stefan Chopin and Robert Krugman; application by Edgar Online. Method for letting users request financial data from web-services.

185. Button for adding a new tabbed sheet; US7853868; 2007-03-08. By Brandon Weber and David Gainer; application by Microsoft. A button for creating a new sheet next to sheet tab.

186. Automatic report generation; US2007055688; 2007-03-08. By Donald Blattner; application by IBM. Map spreadsheet to data for translation to (and from?) reports.

187. Autocompleting with queries to a database; US8234293; 2007-03-08. By Alexander Martynov and others; application by Microsoft. Autocomplete partial data-entries based upon predefined coordinates, operands and/or commands.

188. Compile-time optimizations of queries with SQL spreadsheet; US7809712; 2007-03-08. By Andrew Witkowski and others; application by Oracle. Closely related to patents 179 and 355.

189. Designating, setting and discovering parameters for spreadsheet documents; US7752536; 2007-03-15. By Eran Megiddo and others; application by Microsoft. Using cells as parameters for spreadsheet functionality, such as expressing a cell range to lock.

190. User interface for creating a spreadsheet data summary table; US8601383; 2007-03-15. By Allan Folting and others; application by Microsoft. Closely related to application 553.

191. Converting structured reports to formulas; US7792847; 2007-03-15. By Howard Dickerman and others; application by Microsoft. Structured, multidimensional spreadsheet reports are converted to spreadsheets with no dependency on the original report.

192. System, method and computer program product to populate data into spreadsheets and execute functions and programs within the same; US7197696; 2007-03-27. By Pavan Muzumdar. Data from a database and a spreadsheet template is used to create a spreadsheet report of the data.

193. System and method for converting complex multi-file database structures to HTML; US7565371; 2007-03-29. By Rudolf Zeller; application by Siemens. Converting a workbook into HTML using a two pass algorithm.

194. System and method for generating a bill of material file; US2007073679; 2007-03-29. By Chang-Wen Fu and others. Storing a BOM file as a spreadsheet and checking requirements in the spreadsheet.

195. Apparatus and method for parsing unstructured data; US7792814; 2007-04-05. By Ronen Cohen; application by SAP. Using regular expressions to find patterns in unstructured data, which can be turned into a spreadsheet.

196. Method and system in an electronic spreadsheet for adding or removing elements from a cell named range according to different modes; US6757867; 2007-04-17. By Frederic Bauchot and Albert Harari; application by IBM. Mechanism for updating referring formulas when rows or columns are added to or deleted from a cell range.

197. Extension of formulas and formatting in an electronic spreadsheet; US7222294; 2007-05-22. By Wayne Coffen and Kent Lowry; application by Microsoft. Closely related to patent 107.

198. Data source write back and offline data editing and storage in a spreadsheet; US7225189; 2007-05-29. By Michael McCormack and others; application by Microsoft. Synchronizing between spreadsheet and database, caching changes when disconnected.

199. System and method for schemaless data mapping with nested tables; US8584003; 2007-05-31. By Yiu-Ming Leung; application by Microsoft. Closely related to application 131.

200. Systems and methods providing dynamic spreadsheet functionality; US8275974; 2007-06-07. By Perlie Voshell; application by Outlooksoft. Defines new built-ins for importing and creating reports from external database. Added built-ins are also used to specify properties of reports. Closely related to patent 155.

201. System and method for managing a spreadsheet; US7231593; 2007-06-12. By Ramkumar Raja and others; application by Balenz Software. Closely related to patent 234 and

234.

202. Spreadsheet cell-based notifications; US9501463; 2007-06-14. By Dan Khen and others; application by Microsoft. Integrating spreadsheets into workflows, exactly like US7908549, but allowing for e.g. email notifications.

203. Extensible value types in cells; US8161372; 2007-06-14. By Charles Ellis and others; application by Microsoft. User-defined value types and functions acting hereon.

204. Spreadsheet calculation as part of workflow; US7908549; 2007-06-14. By Dan Khen and others; application by Microsoft. Integrating spreadsheets into workflows, allowing e.g. actions to be performed depending on cell-value thresholds.

205. Method and system for numerical computation visualization; US2007136406; 2007-06-14. By William Softky. Visualizing computations in a spreadsheet, focusing on computation flow rather than cell-expressions. (Patent 177 deals with cell-expression visualization.)

206. Spreadsheet grid-like control for a web-based collaboration system; US7233951; 2007-06-19. By David Gainer and Jonathan Sigler; application by Microsoft. Collaborating on a spreadsheet over a network.

207. Method and apparatus for data; US7233956; 2007-06-19. By Corrado Balducci and others; application by IBM. Transforming a spreadsheet into server-side components (such as Java servlets) that generate HTML for spreadsheet display in a browser at client-side.

208. System and method for editing a spreadsheet via an improved editing and cell selection model; US7237186; 2007-06-26. By Matthew Androski and others; application by Microsoft. Detailed description of editing gestures in a spreadsheet program.

209. Converting spreadsheet applications to web-based applications; US9009582; 2007-07-12. By Jonathan Rochelle and others; application by Google. Closely related to patent 502.

210. Method and apparatus for loading data from a spreadsheet to a relational database table; US7685152; 2007-07-12. By Balakrishna Chivukula and Kuppayi Rajendran; application by IBM. Importing data into relational database from spreadsheet, inferring column names and types.

211. Diagram creation device and program for the same; US7945593; 2007-07-12. By Hirobumi Sasaki; application by I N Information Systems. Importing data into spreadsheet from database using built-in functions.

212. Query aggregation; US2007168323; 2007-07-19. By Howard Dickerman and Kaicheng Hu; application by Microsoft. Imports data from multidimensional database (e.g. OLAP) using built-in query-functions. Aggregates queries of equal dimensionality for performance gain.

213. Custom summary views for screen reader; US9818313; 2007-07-19. By Eric Damery and others; application by Freedom Scientific. Using cell range labeling for screen reader functionality (e.g. text to speech or braille support).

214. Method and system for integrating calculation and presentation technologies; US2007168868; 2007-07-19. By Richard Korzenko and others; application by Lehman Brothers. Generating (slide show) presentations from spreadsheets.

215. Facilitating the development of computer programs; US2007169206; 2007-07-19. By Angelina McMullin; application by IBM. Wrapping spreadsheet in custom user interface, using the spreadsheet calculation engine as back end.

216. Importing and exporting markup language data in a spreadsheet application document; US7249316; 2007-07-24. By Robert Collie and others; application by Microsoft.

Processing and using XML maps and XML schemas in a spreadsheet program.

217. System and method for efficiently and flexibly utilizing spreadsheet information; US7251776; 2007-07-31. By Robert Handsaker, Gregory Rasin and Andrey Knourenko. Creating and using a family of parametrized spreadsheet workbooks.

218. Systems, methods, and media for processing a spreadsheet for storage in a database; US2007185935; 2007-08-09. By Ricardo Olivieri and Mark Whelan. Passing spreadsheet data to back end application for processing or database storage.

219. System and method for rendering data; US7917841; 2007-08-16. By Stefan Chopin and others; application by Edgar Online. Analyse and categorize sentences in a text document to find and import financial data into a spreadsheet. Closely related to patent 386.

220. * User defined spreadsheet functions; US7266763; 2007-09-04. By Simon Peyton Jones, Alan Blackwell and Margaret Burnett; application by Microsoft. Describes the concepts presented also in their paper [9].

221. Method and system in an electronic spreadsheet for managing and handling user-defined options; US7272783; 2007-09-18. By Bauchot and Albert Harari; application by IBM. How to create or change user-defined options using a table.

222. Excel spreadsheet parsing to share cells, formulas, tables, etc.; US2007219956; 2007-09-20. By Michael Milton. Spreadsheets are saved and sent to a library. The library can be searched for spreadsheets objects which can be modified after being downloaded.

223. Excel spreadsheet parsing to share cells, formulas, tables or entire spreadsheets across an enterprise with other users; US2007220415; 2007-09-20. By Morgan Cheng and others. Closely related to application 222.

224. System and method for performing processing, such as spreadsheet processing; US7783966; 2007-09-20. By Kinichi Mitsui; application by IBM. Spreadsheet gets data from external sources and recomputes when data is updated.

225. System and method in an electronic spreadsheet for displaying and/or hiding range of cells; US7275207; 2007-09-25. By Jean-Jacques Aureglia and Frederic Bauchot; application by IBM. Hiding and displaying cells in a multi-dimensional spreadsheet program.

226. Collaborative online spreadsheet application; US8307119; 2007-10-04. By Jonathan Rochelle and others; application by Google. Closely related to patent 438.

227. Using a spreadsheet engine as a server-side calculation model; US8082489; 2007-10-25. By Xin Jiang; application by Oracle. Transform a spreadsheet into a program that can run outside of the sheet. This program can be hosted on a server, making the functionality of the spreadsheet available.

228. Method for validating dynamically a spreadsheet formula; US2007256004; 2007-11-01. By Raymond Payette. A formula level assert function that allows for data/model validation.

229. Method for presentation of revisions of an electronic document; US8209308; 2007-11-08. By Gabriel Jakobson. Revision history for general documents including spreadsheets.

230. Multi-thread spreadsheet processing with dependency levels; US8032821; 2007-11-08. By Jeffrey Duzak and others; application by Microsoft. Formulas are divided into dependency levels wherein each formulas of a level only depends on formulas of prior levels. This is seemingly detected by starting with a single calculation chain and then reordering the chain based on dependencies. Claim 1 seems like the best description.

231. Client side, web-based calculator; US7296219; 2007-11-13. By Steve Guttman and Joseph Ternasky; application by IBM. Create an calculator mode where some cells are non-editable. This calculator can be embedded in a website.

232. Spreadsheet to SQL translation; US7299223; 2007-11-20. By Aman Naimat and others; application by Oracle. A form of query-by-example, where a model is developed on sample database data within a spreadsheet program. Then the spreadsheet model is compiled into SQL queries that can be run on the entire database, possibly through a web interface.

233. Representing spreadsheet document content; US7299406; 2007-11-20. By Jeffrey Schnurr. Transmitting part of a spreadsheet to display it on a mobile device.

234. System and method for managing a spreadsheet; US7882427; 2007-11-29. By Ramkumar Raja and others; application by Balenz Software. Closely related to patent 201 and 379.

235. System and method for cross attribute analysis and manipulation in online analytical processing (OLAP) and multi-dimensional planning applications by dimension splitting; US7305408; 2007-12-04. By Richard Morris; application by Retek. Manipulating and displaying hierarchical multi-dimensional data.

236. Method and system for formulaically bounding data in a spreadsheet; US7318192; 2008-01-08. By Craig Hobbs and others; application by Microsoft. Bounding values that may be entered into a cell.

237. Spreadsheet-based relational database interface; US2008016041; 2008-01-17. By Brandon Frost and Scott Stanton. Use spreadsheet as UI for relational database.

238. Adapting a spreadsheet for use with a complex object; US8656271; 2008-01-31. By Julien Vayssiere and others; application by SAP. Storing "complex" objects in cells that may be a process that creates a new complex object. Seemingly a complex object is an XML-object, but it is formulated mostly in terms of code.

239. System and method for dynamic binding of a spreadsheet with external parameters; US2008034281; 2008-02-07. By Robert Handsaker and others; application by Netview Technologies. Closely related to patent 415.

240. Change-oriented spreadsheet application; US8656270; 2008-02-21. By Suying Rui and others; application by IBM. Revision history of a spreadsheet.

241. Viewing multi-dimensional data in two dimensions; US8232994; 2008-02-28. By David Aronson and others; application by Microsoft. Ways of showing multi-dimensional data in two dimensions.

242. Systems, methods and computer program products for modeling an event in a spreadsheet environment; US7346485; 2008-03-18. By Trevor Crowe; application by Boeing. Event-driven computation in a spreadsheet program.

243. User interface for integrated spreadsheets and word processing tables; US7350141; 2008-03-25. By Matthew Kotler and others; application by Microsoft. Closely related to patents 284, 294, 284, 335, 251 and 170.

244. Dynamically merging columns within a table; US2008104498; 2008-05-01. By Mark Molander and Frank Jania, application by IBM. Combine columns through GUI. If a user wants column `C=A+B*100` then this can be done through GUI.

245. Methods and apparatus for generating a spreadsheet report template; US7370271; 2008-05-06. By Brian Killen and others; application by Actuate. Extracting data from a relational database and creating reports in a spreadsheet program.

246. Automatically creating a relational database from a spreadsheet; US2008126395; 2008-05-29. By Amichai Marueli; application by Ocyrhoe Technologies. Export a spreadsheet as a relational database.

247. Spreadsheet in-cell graphical display method; US2008148140; 2008-06-19. By Kimiyasu Nakano. In-cell graphics. E.g. 80% may be represented as a 80% bar.

248. Method and system in an electronic spreadsheet for handling graphical objects referring to working ranges of cells in a copy/cut and paste operation; US7392478; 2008-06-24. By Jean-Jacques Aureglia, Frederic Bauchot and Catherine Soler; application possibly by IBM. Extended mechanism for copying and pasting a range of cells and graphical objects.

249. Digital spreadsheet formula automation; US2008168341; 2008-07-10. By Raymond Payette. Given a recognized formula name the system recognizes/guesses named cells that should be used as parameters for the formula.

250. Cyclical and synchronized multi-source spreadsheet imports and exports; US8140958; 2008-08-07. By Andrew Garrett and others; application by IBM. Method for synchronizing spreadsheets with each other.

251. User interface for integrated spreadsheets and word processing tables; US7412645; 2008-08-12. By Matthew Kotler and others; application by Microsoft. General table architecture providing spreadsheet functionality (formulas, recalculation and so on) also within word processors and other programs, and permitting nested tables. Closely related to patents 284, 294, 284, 335, 243 and 170.

252. Mapping raw spreadsheet data into graphs on arbitrary subsets of the data; US8301993; 2008-08-14. By Moshe Matsa and Eric Perkins; application by IBM. Creating a graph (data plot) from data by first selecting whether data series follows rows or columns and then by selecting concrete rows/columns.

253. Use of temporary optimized settings to reduce cycle time of automatically created spreadsheets; US8904340; 2008-08-14. By Scott Hicks and others; application by IBM. Closely related to patent 485.

254. System and method in a spreadsheet for exporting-importing the content of input cells from a scalable template instance to another; US7415664; 2008-08-19. By Jean-Jacques Aureglia and Frederic Bauchot. Extended mechanism for copying and pasting a range of cells between scalable templates. Is a "scalable template" somehow related to the hex and vex groups of Erwig's Gencel [2] system?

255. Method and implementation for referencing of dynamic data within spreadsheet formulas; US7415481; 2008-08-19. By Andrew Becker and others; application by Microsoft. Notation for referring to tables by symbolic name in spreadsheets, as well as parts of tables and data computed from tables. Related to patent 344.

256. Method and system for enabling undo across object model modifications; US7418460; 2008-08-26. By Lakshmi Thanu, Peter Eberhardy and Vijay Baliga; application by Microsoft. Improved undo mechanism using two stacks of acts.

257. Method, system and program product for defining imports into and exports out from a database system using spread sheets by use of a control language; US9058370; 2008-08-28. By Andrew Garrett and others; application by IBM. On import/export from databases, cells may be used as parameters for the operations providing information such as source field, destination field, or formatting information. The operation is done by a "linker"; seemingly an external program.

258. System and method for schemaless data mapping; US7421646; 2008-09-02. By Yiu-Ming Leung; application by Microsoft. Closely related to application 131.

259. Method and system for generating a media stream in a media spreadsheet; US2008215959; 2008-09-04. By David Lection. In-cell media streams.

260. Method and system for decomposing a spreadsheet; US2008222507; 2008-09-11. By Huy Nguyen and others. Decomposing, via GUI, spreadsheet parts that can be stored in a database. Closely related to application 261.

261. Method and system for converting a source spreadsheet to a target spreadsheet; US2008222509; 2008-09-11. By Huy Nguyen and others. Closely related to application 260.

262. Method and system for generating a history log associated with a spreadsheet; US2008222510; 2008-09-11. By Huy Nguyen and others. Revision history of a spreadsheet.

263. Embedded spreadsheet commands; US7426688; 2008-09-16. By Bill Serra, Salil Pradhan and Antoni Drudis; application by Hewlett-Packard. Store commands in the comment fields of spreadsheet cells, and interpreting those commands as ties to external events, thus making the spreadsheet update itself – for instance, when a signal from an RFID device indicates that an item has been moved.

264. Advanced spreadsheet cell navigation; US8321780; 2008-10-02. By Martin Erwig and others; application by Redrover Software. Identifying often used cells and provides an easy access to these.

265. Apparatus and method for generating spreadsheet function source code for use in a source code application; US7840889; 2008-10-02. By Brian Mantuano and others; application by Business Objects Sa. A spreadsheet with designated input cells can be translated to source code for use by other programs. This is a compilation of an entire spreadsheet.

266. System for financial documentation conversion; US8099370; 2008-10-09. By Michael Ohata; application by Microsoft. Convert a spreadsheet into the financial format XBRL.

267. Copy and paste of cells in a multi-dimensional spreadsheet; US7895511; 2008-10-16. By Jean-Jacques Aureglia and others; application by IBM. Copy-paste in a multidimensional spreadsheet.

268. Method and system for formulaically redirecting and modifying formula set operations in a spreadsheet application; US7444584; 2008-10-28. By Craig Hobbs; application by Microsoft. In context of Microsoft Visio. Defines SETATREF, SETATREFEXPR, SETATREFEVAL.

269. Spreadsheet rotating cell object; US2008276161; 2008-11-06. By James Slavens. A cell is defined to be able to contain a range of values. The user can cycle through these while the GUI provides a rotation animation.

270. System and method for automatically completing spreadsheet formulas; US7451397; 2008-11-11. By Brandon Weber and Charles Ellis; application by Microsoft. Proposing possible completion of a partially entered formula, in the style of "intellisense" as known from integrated development environments.

271. Sending a range; US7454471; 2008-11-18. By Terri Sorge and others; application by Microsoft. Facility in a spreadsheet program to extract data from a spreadsheet, format it and automatically send it by email to an indicated recipient.

272. Authenticity assurance system for spreadsheet data; US2008294903; 2008-11-27. By Kunihiko Miyazaki and Yasuo Hatano. Authentication-system for spreadsheets on a cell level. The system allows for signatures to be verified even after a cell is redacted.

273. Digital paper-enabled spreadsheet systems; US2008301542; 2008-12-04. By David McGee and others. Spreadsheet that can receive input from a digital pen.

274. Reporting status of external references in a spreadsheet without updating; US7467148; 2008-12-16. By Jesse Bedford and others; application by Microsoft. Describes how to check existence of external workbooks and so on before attempting to update links to them. Closely related to patents 303 and 127.

275. System and method in an electronic spreadsheet for copying and posting displayed elements of a range of cells; US7467350; 2008-12-16. By Jean-Jacques Aureglia and Frederic Bauchot; application by IBM. Cell copy-and-paste in a multi-dimensional spreadsheet when some cells of the source region are hidden. Closely related to application 293.

276. Method and system in an electronic spreadsheet for persistently self-replicatig multiple ranges of cells through a copy-paste operation; US7472339; 2008-12-30. By Frederic Bauchot; application by IBM. Closely related to patent 129.

277. Managing extensible value types in spreadsheet cells; US2009006466; 2009-01-01. By Charles Ellis and others; application by Microsoft. User-defined types and functions that can manipulate that type. These types are not managed in cells but by GUI.

278. Task-specific spreadsheet worksheets; US2009006939; 2009-01-01. By Stuart Despain and others; application by Microsoft. A user may select a task specific spreadsheet template, e.g. household budget, that has limited but specific functionality.

279. System and method for formatting source text files to be imported into a spreadsheet file; US7484170; 2009-01-27. By Jean-Luc Collet, Jean-Christophe Mestres and Carole Truntschka; application by IBM. Using a file format profile to guide the import of text files into a spreadsheet program.

280. System in a spreadsheet for exporting-importing the content of input cells from a scalable template instance to another; US8006174; 2009-01-29. By Jean-Jacques Aureglia and Frederic Bauchot; application by IBM. Closely related to patent 254.

281. System in an electronic spreadsheet for persistently self-replicating multiple ranges of cells through a copy-paste operation and a self-replication table; US8250461; 2009-02-05. By Frederic Bauchot; application by IBM. A cell is self-replicating if it was, or inferred to could have been, constructed through a copy-paste operation from another cell. When a cell in a self-replicating range is changed, all of the cells are automatically updated.

282. Auto-completion of names; US9342496; 2009-02-12. By Peter Rapp; application by Apple.

283. Calendar and spreadsheet user interfaces; US2009063947; 2009-03-05. By Donna Anderson; application by DMA INK. Method for printing spreadsheet.

284. System and method for integrating spreadsheets and word processing tables; US7506242; 2009-03-17. By Matthew Kotler and others; application by Microsoft. Closely related to patents 306, 284, 335, 243 and 251.

285. System and method for integrating spreadsheets and word processing tables; US7506243; 2009-03-17. Closely related to patents 284, 306, 335, 243, 251 and 170.

286. Method and apparatus for a file format for storing spreadsheets compactly; US7509571; 2009-03-24. By Paul Rank and others. Storing a spreadsheet on a PDA in a number of database records.

287. System and method for optimizing information display in spreadsheets and tables; US2009083614; 2009-03-26. By Gerald Wedekind; application by Xerox. Column widths are determined by optimization techniques such as simulated annealing.

288. Spreadsheet fields in text; US7702998; 2009-03-26. By Matthew Kotler and others; application by Microsoft. Having a spreadsheet within a text-document. Closely related to patents 294, 346 and 163.

289. System and method for facilitating user input by providing dynamically generated completion information; US7512654; 2009-03-31. By John Tafoya and others; application by Microsoft. Dynamic input completion based on multiple data sources such as sent and received emails, text documents and other spreadsheet files. Closely related to application 138.

290. Spreadsheet workbook part libraries; US2009089067; 2009-04-02. By Johnny Campbell and others; application by Microsoft. Divide workbooks into separate parts that can be stored on a file-system, while dependencies across the parts are maintained.

291. Spreadsheet to webpage conversion system and method; US8984086; 2009-04-02. By Kevin Krueger; application by Rockwell Automation Tech. Method for translating tabular web-pages into spreadsheets.

292. Auto-generation and syndication of tables as forms; US2009089653; 2009-04-02. By John Campbell and others; application by Microsoft. An input form is automatically generated from a table.

293. System and method in an electronic spreadsheet for copying and pasting displayed elements of a range of cells; US2009100325; 2009-04-16. By Jean-Jacques Aureglia and Frederic Bauchot. Closely related to patent 275.

294. Spreadsheet fields in text; US7523390; 2009-04-21 By Matthew Kotler and others; application by Microsoft. Provide individual text elements, such as a text field in an HTML forms, to have spreadsheet functionality: formulas, references to other text elements, and recalculation. Closely related to patents 163, 346 and 288.

295. Methods and arrangements of processing and presenting information; US8140549; 2009-04-30. By Juan Barinaga. Seemingly displaying multidimensional data in a spreadsheet.

296. Spreadsheet collaboration between rich and browser clients; US7756824; 2009-04-30. By Johnny Campbell and others; application by Microsoft. Method for multiple clients working on the same spreadsheet. This is handled by a host machine that handles individual updates with techniques for handling simultaneous events.

297. Private views of data and local calculations during real time collaboration; US8190987; 2009-04-30. By Johnny Campbell and others; application by Microsoft. In a collaborative spreadsheet system it is determined which computations can be performed locally since they are deterministic. Closely related to patent 411.

298. Calculation of spreadsheet data; US8006175; 2009-04-30. By Sanjay Kulkarni and others; application by Microsoft. A large spreadsheet can be calculated on a remote computer cluster, with the potential of using parallelism with some non-described method.

299. Model based spreadsheet scripting language; US8407668; 2009-04-30. By Gregory Lindhorst; application by Microsoft. Spreadsheet scripting language to create spreadsheet. E.g. `A1=1; A2:A5=A1+B$1` sets the range `A2:A5` with `A1` as a relative cell.

300. Methods, systems and computer program products for incorporating spreadsheet formulas of multi-dimensional cube data into a multi-dimentional cube; US7530012; 2009-05-05. By John Medicke, Feng-Wei Chen Russell, and Stephen Rutledge. Converting a spreadsheet formula into a query on multi-dimensional data.

301. Method and system for transferring data from a scanned document into a spreadsheet; US9753908; 2009-05-07. By David Gitlin and others; application by Digital Business Processes.

302. * Method and system for multithread processing of spreadsheet chain calculations; US7533139; 2009-05-12. By Bruce Jones and others; assigned to by Microsoft. Describes multiprocessor recalculation of spreadsheet formulas, and by the way, also describes a uniprocessor implementation, probably similar to that of Excel.

303. Reporting status of external references in a spreadsheet without updating; US7546521; 2009-06-09. By Jesse Bedford and others; application by Microsoft. Closely related to patents 274 and 127.

304. System and method in an electronic spreadsheet for displaying and/or hiding range of cells; US7546523; 2009-06-09. Much the same as patent 225.

305. Worldwide number format for a spreadsheet program module; US7549117; 2009-06-16. By Marise Chan and others; application by Microsoft. Using locale metadata to control the conversion from a numeric time value (as used in spreadsheet programs) to a displayed date appropriate for the user: month names, weekday names, Gregorian or non-Gregorian calendar, and so on.

306. System and method for integrated spreadsheets and word processing tables; US7549115; 2009-06-16. By Matthew Kotler and others; application by Microsoft. Closely related to patents 284, 284, 335, 243 and 251.

307. Methods and systems for generating a markup-language-based resource from a media spreadsheet; US2009158139; 2009-06-18. By Robert Morris and B Lection. Export a media spreadsheet to a markup-language.

308. Spreadsheet in-cell range graph display method; US2009160861; 2009-06-25. By Kimiyasu Nakano. Graphically displaying numerical ranges in a cell.

309. Methods and systems for generating a media stream expression for association with a cell of an electronic spreadsheet; US2009164880; 2009-06-25. By David Lection. Functions for media streams in spreadsheets.

310. Multi-threaded codeless user-defined functions; US2009172063; 2009-07-02. By Joseph Chirilov and others; application by Microsoft. User-defined functions can be executed in parallel. "Codeless" seemingly refers to the fact that the user-defined functions are sheet-defined functions.

311. Spreadsheet software services; US8812950; 2009-07-02. By Vishal Sikka and Shai Agassi; application by SAP. Spreadsheet service that can analyse a spreadsheet to extract an output schema. The service makes the functionality of the spreadsheet accessible over the network.

312. Method, system, and computer-readable medium for determining whether to reproduce chart images calculated from a workbook; US7581168; 2009-08-25. By Sean Boon, application by Microsoft. Using a hash value of data to avoid re-creating a chart when data are unchanged.

313. Dynamic formulas for spreadsheet cells; US2009228776; 2009-09-10. By Allan Folting and others; application by Microsoft. Multiple formulas can be associated to a base formula, if the base formula is updated so is the associated formulas.

314. Method, system, and apparatus for providing access to workbook models through remote function calls; US8578399; 2009-09-17. By Dan Khen and others; application by Microsoft. Closely related to patents 152 and 416.

315. Embedded ad hoc browser web to spreadsheet conversion control; US7594165; 2009-09-22. By Yen-Fu Chen , John Handy-Bosma and Keith Walker. A web browser plug-in that allows any displayed HTML table to be turned into a spreadsheet component.

316. Functions acting on arbitrary geometric paths; US7612776; 2009-11-03. By Craig Hobbs; application by Microsoft. Functions for a spreadsheet component used to calculate and transform graphical objects as in Microsoft Visio.

317. Automated offloading of user-defined functions to a high performance computing system; US8108466; 2009-11-05. By Chris Rae and others; application by Microsoft. If a UDF is marked as safe it can be computed over a network on a high performance computing system.

318. Flexible multiple spreadsheet data consolidation system; US7617443; 2009-11-10. By Scott Mills and others; application by SBC Knowledge Ventures. Consolidating multiple spreadsheets into one. Closely related to application 331.

319. Method and system for automatically generating template based excel pivots from web analytics; US7818661; 2009-11-12. By Dilip Patel. Creating and importing data into pivot table templates.

320. Process for obtaining a result between a first numerical value and a second numerical value which are separated by a common character in a spreadsheet; US2009282326; 2009-11-12. By Carlos Espinosa-Montalvo. As title, e.g. `4??5 == true; 5??4 == false`.

321. Method for integrating software components into a spreadsheet application; US7624372; 2009-11-24. By James Stewart; application by Mathworks. Closely related to patent 551.

322. Spreadsheet formula translation of server calculation rules; US8527865; 2009-11-26. By Baomin Li and others; application by Microsoft. On a client-server system where calculations are performed and saved on the server, some of these calculations can be expressed as formulas which can be calculated client side for better performance.

323. Micro browser spreadsheet viewer; US2009313537; 2009-12-17. By Tsui-Ying Fu and others; application by Microsoft. Closely related to application 488.

324. Systems and methods to automatically replace content in a range of spreadsheet cells with information from a database; US2009319542; 2009-12-24. By Pierre Le Brazidec and Florent Migeon. Automatically fill in cells with data from database depending on content of surrounding cells.

325. Systems and methods to dynamically recognize a database member identifier entered into a spreadsheet cell; US8145990; 2009-12-24. By Pierre Le Brazidec and Florent Migeon; application by SAP. When a user enters a field name it may dynamically be recognized as a database identifier. This is within a framework to import/export data to/from spreadsheets.

326. Utilizing spreadsheet references with grouped aggregate views; US8185817; 2009-12-24. By Robert Collie and others; application by Microsoft. Making references and calculations work with pivot tables.

327. Method, system, and computer-readable medium for controlling the calculation of volatile functions in a spreadsheet; US7640490; 2009-12-29. By Sean Boon, application by Microsoft. How to use time stamps to mostly avoid needless recalculation of volatile functions that vary only slowly, such as `TODAY()`.

328. Methods and systems for inputting data into spreadsheet documents; US7640489; 2009-12-29. By Matthias Breuer. User input, undo and recalculation based on previous value.

329. Reusable macro markup language; US7650355; 2010-01-19. By Russell Davis; application by Numerate Solutions. Defines the reusable markup language RMML for macro functions.

330. Method and system for creating graphical and interactive representations of input and output data; US7650576; 2010-01-19. By Santiago Becerra. Controlling input to spreadsheet cells, and displaying output from them, using graphical components such as charts, sliders, and so on. This was proposed also by Piersol [10] and Nuñez [7].

331. Flexible multiple spreadsheet data consolidation system; US2010017698; 2010-01-21. By Hills Scott and others; application by AT&T. UI for combining data from different spreadsheets into a report spreadsheet. Closely related to patent 318.

332. The applications US2010049723, US2010049565, US2010049745,US2010049746, US2010050230, US2010050264 are all by Russell Aebig and Jolyan Oldershaw:

    - Spreadsheet risk reconnaissance network for automatically detecting risk conditions in spreadsheet documents within an organization using principles of objective-relative risk analysis; US2010049723; 2010-02-25.

    - Method of computing spreadsheet risk within a spreadsheet risk reconnaissance network employing a research agent installed on one or more spreadsheet file servers; US2010049565; 2010-02-25.

    - Method of implementing an organization's policy on spreadsheet documents monitored using a spreadsheet risk reconnaissance network; US2010049745; 2010-02-25.

    - Method of classifying spreadsheet files managed within a spreadsheet risk reconnaissance network; US2010049746; 2010-02-25.

    - Method of inspecting spreadsheet files managed within a spreadsheet risk reconnaissance network; US2010050230; 2010-02-25.

    - Spreadsheet risk reconnaissance network for automatically detecting risk conditions in spreadsheet files within an organization; US2010050264; 2010-02-25.

    Spreadsheet risk analysis determining the likelihood of an error in a spreadsheet and the impact of such an error.

333. Error correction mechanisms in spreadsheet packages; US7665013; 2010-02-16. By Stephen Todd; application by IBM. Introduces pairs of a referencing array and a bound array. If a cell within a referencing array refers to some cell outside the corresponding bound array, an error is signaled.

334. Method, system, and apparatus for exposing workbook ranges as data sources; US7664804; 2010-02-16. By Amir Netz and others; application by Microsoft. Accessing parts of a spreadsheet document using the same interface (such as ODBC) as for a database.

335. User interface for integrated spreadsheets and word processing tables; US7673227; 2010-03-02. By Matthew Kotler and others; application by Microsoft. Closely related to patents 284, 294, 284, 243 251 and 170.

336. Spreadsheet system and method for managing photos; US8166385; 2010-03-04. By Hector Garcia-Molina and others; application by Univ Leland Stanford Junior. UI and interactions for displaying photos in a spreadsheet in a user-friendly way.

337. Formula display and search; US9037959; 2010-04-01. By Peter Rapp and others; application by Apple. Displaying cell formulas, cell results, and cell addresses of a spreadsheet in a single searchable list.

338. Locking spreadsheet cells; US9223771; 2010-04-01. By Matthew Lehrian and others; application by Apple. Variant of cell freezing (e.g. in Microsoft Excel) where frozen cells may disappear when scrolling far enough.

339. System and method for management of common decentralized applications data and logic; US8122340; 2010-04-01. By Bruce Tow and Neil Savasta. Spreadsheet file management system.

340. Providing spreadsheet features; US8255789; 2010-04-01. By Peter Berger and Yaniv Gur; application by Apple. Closely related to patent 417.

341. Context sensitive computations; US2010083090; 2010-04-01. By Michael Coblenz and others; application by Apple. Semantics sensitive to cell formatting (e.g. dates and durations).

342. Dynamic text escaping; US2010083091; 2010-04-01. By Peter Berger and Lynn Abell; application by Apple. Determining whether or not to treat special characters (e.g. tab and newline) as plain text.

343. Dynamic schema creation; US8103951; 2010-04-01. By Geoff Schuller and Yan Guo; application by Apple. Copying cells from a spreadsheet and pasting onto database table, expanding the database schema to fit the content if needed (adding columns or records).

344. Design of spreadsheet functions for working with tables of data; US7698287; 2010-04-13. By Andrew Becker and others; application by Microsoft. Using database-style queries on named tables in spreadsheets. Related to patent 255.

345. Defining spreadsheet functions; US2010095195; 2010-04-15. By Michael Coblenz and others; application by Apple. The behavior associated with the arguments of a function is abstracted from the function definition. E.g. a function may only accept numerical values.

346. Spreadsheet fields in text; US7702997; 2010-04-20. By Matthew Kotler and others; application by Microsoft. Closely related to patents 163, 294 and 288.

347. Computer product, spreadsheet generating apparatus, and spreadsheet generating method; US2010100803; 2010-04-22. By Hirotoshi Okushiro and others; application by Fujitsu. Generating spreadsheet based on form. Automatically determines cell positions and column and row sizes.

348. Logical spreadsheets; US7707486; 2010-04-27. By Michael Genesereth, Michael Kassoff and Nathaniel Love. A spreadsheet in which logical constraints on the values of cells can be specified, and the values of cells can be set in any order, possibly restricting or conflicting with values in other cells. Binary decision diagrams [1] would seem ideal for implementing this in the case of discrete cell values.

349. Document processor and document processing method; US2010107048; 2010-04-29. By Takashi Takahara; application by Justsystems. Displaying data described in user-defined XML tag-set in a spreadsheet.

350. Multiple conditional formatting; US8713422; 2010-05-13. By Benjamin Chamberlain and others; application by Microsoft. Combining layout properties of multiple conditional formatting rules.

351. Minimap navigation for spreadsheet; US2010146434; 2010-06-10. By Tomi Blinnikka and others; application by Yahoo. Displaying a miniature map of the shown spreadsheet.

352. Systems and methods to create a multidimensional expression calculated member in a spreadsheet cell; US8386916; 2010-07-01. By Pierre Le Brazidec and others; application by SAP. Importing data from multidimensional database (e.g. OLAP) using built-in query-functions.

353. System and method for comparing digital data in spreadsheets or database tables; US2010174678; 2010-07-08. By Deepak Massand. Comparing two spreadsheets and generating a document detailing changes.

354. User programmable deductive spreadsheet apparatus which supports solutions to circular definitions; US7761782; 2010-07-20. By David Warren and others; application by XSB. Logic programming in spreadsheet.

355. Run-time optimizations of queries with SQL spreadsheet; US7761403; 2010-07-20. By Andrew Witkowski and others; application by Oracle. Efficient queries and recalculation in a spreadsheet drawing data from a relational data base; pruning; parallelization; use of a dependency graph. Closely related to patents 179 and 188. This looks like a rather substantial patent application.

356. System and method for transforming an XML file into an add-in function for implementation into a spreadsheet application; US7770110; 2010-08-03. By Howard Mansell and others; application by Credit Suisse Securities. Calling functions from COM add-in through spreadsheet functions.

357. System and computer program product for displaying and/or hiding a range of cells in an electronic spreadsheet; US8230321; 2010-08-05. By Jean-Jacques Aureglia and Frederic Bauchot; application by IBM. Hiding cells ranges based on their priority level.

358. Grid presentation in web-based spreadsheet services; US8689095; 2010-08-12. By Dan Parish and others; application by Micrososoft. Synchronizing spreadsheet cells with web-client.

359. Networked spreadsheet template designer; US7779431; 2010-08-17. By Wallace Robert. Plug-in for designing spreadsheet templates. Closely related to patent 365.

360. Facilitating spreadsheet and database views on common data store; US2010211862; 2010-08-19. By Dan Parish and others; application by Microsoft. Spreadsheet as database UI.

361. * Method and apparatus for formula evaluation in spreadsheets on small devices; US7793210; 2010-09-07. By Paul Rank and John Pampuch. Describes the idea, but few technical details, of cross-compilation of spreadsheet formulas for space-conserving execution on a PDA. This involves, for instance, leaving out unused library functions.

362. System and method for performing over time statistics in an electronic spreadsheet environment; US7810032; 2010-10-05. By Frederic Bauchot and Gerard Marmigere; application by IBM. Computing statistics from a stream of values, appearing one value at a time in a particular cell.

363. Render engine for spreadsheet; US8707156; 2010-10-07. By Wei Xue and others; application by Business Objects SA. Pasting cell range overlapping with non-empty cells pushes these non-empty cell ranges out of the way.

364. Systems, methods and machine readable mediums for defining and executing new commands in a spreadsheet software application; US8645911; 2010-10-21. By Gregory Dorman; application by Exigen Properties. Closely related to patent 478.

365. Networked spreadsheet template designer; US8584150; 2010-10-28. By Robert Wallace; application by Arcplan. Closely related to patent 359.

366. Method for requesting and viewing a preview of a table attachment on a mobile communication device; US2010287467; 2010-11-11. By Olav Sylthe and others; application by Research In Motion. Providing a preview of a spreadsheet.

367. Method for expanding and collapsing data cells in a spreadsheet report; US8473837; 2010-11-18. By Laksmi Thanu and others; application by Microsoft. Closely related to

applications 153 and 440.

368. Multidimensional cube functions; US2010312748; 2010-12-09. By Howard Dickerman and others; application by Microsoft. Imports data from multidimensional database (e.g. OLAP) using built-in query-functions.

369. Modular application development in a spreadsheet using indication values; US7853867; 2010-12-14. By Ágúst Egilsson. Closely related to patents 117 and patent 75.

370. Filter and sort by format; US8745482; 2010-12-23. By Charles Ellis and others; application by Microsoft. Filtering and sorting cells by their visual formatting.

371. System and methodology for data processing combining stream processing and spreadsheet computation; US8788928; 2011-01-20. By William McColl and Antony Faustini; application by Cloudscale. Cloud stream processing from a spreadsheet client.

372. Data access; US2011022629; 2011-01-27. By Tiimothy Glover. Interacting with data store from spreadsheet using RDF queries.

373. Metadata creation; US8335981; 2011-02-03. By Alexis Naibo and Philippe Meiniel; application by Business Objects Software. Extracting meta data from spreadsheets (e.g. finding tables, table orientation, table headers).

374. Conditional cell execution in electronic spreadsheets; US2011035652; 2011-02-10. By John McGarry. Cell evaluation is conditioned by user-defined expression.

375. Transforming a portion of a database into a custom spreadsheet; US7904800; 2011-03-08. By Jo-Ann Geuss and others. Creating a spreadsheet from a database view.

376. Modeling system and method; US2011072340; 2011-03-24. By Darren Miller and Gary Miller. User-defined column and row naming, allowing cell references by column- and row name.

377. Determining a location for placing data in a spreadsheet based on a location of the data source; US7930626; 2011-04-19. By Bill Serra, Salil Pradhan and Antoni Drudis; application possibly by Hewlett-Packard. Handling streams of input values, as from multiple external sensors, in a continually updated spreadsheet. Mentions "dependency trees".

378. One click conditional formatting method and system for software programs; US7933862; 2011-04-26. By Benjamin Chamberlain and others; application by Microsoft. Using logical conditions to control formatting of spreadsheet cells, and using graphical components (such as histograms) in spreadsheet cells.

379. System and method for managing a spreadsheet; US8407579; 2011-05-05. By Ramkumar Raja and others; application by Balenz Software. Importing data from digital image into spreadsheet (e.g. scanned utility bill). Defines various UI components and functionality to accomplish this. Closely related to patent 201 and 234.

380. Method and system in an electronic spreadsheet for persistently filling by samples a range of cells; US7971134; 2011-06-28. By Frederic Bauchot; application by IBM. Fill a cell range by sampling and interpolating from existing values.

381. FormDB: a process to create a forms database in Excel without user programming; US2011161796; 2011-06-30. By Edward Laikin. Creating forms in a spreadsheet.

382. Method, system, and apparatus for exposing workbooks as data sources; US7991804; 2011-08-02. By Daniel Battagin and others; application by Microsoft. Appears related to patent 334.

383. Systems and methods for processing color information in spreadsheets; US8589783; 2011-08-11. By Chris Williamson; application by Konica Minolta Laboratory. Cache colors in palette table and reference by index.

384. Systems and methods for processing markup language specified spreadsheet styles; US8365066; 2011-08-11. By Chris Williamson; application by Konica Minolta Laboratory. Cache cell formats in table and reference by index.

385. Method for generating source code in a procedural, re-entrant-compatible programming language using a spreadsheet representation; US8015481; 2011-09-06. By Bruno Jager and Matthias Rosenau. Describes a method to implement database queries by compiling a spreadsheet, extended with some reflective capabilities, to source code in a procedural language.

386. System and method for rendering data; US8468442; 2011-09-22. By Stefan Chopin and others; application by Edgar Online. Closely related to patent 219.

387. Multi-threaded sort of data items in spreadsheet tables; US2011264993; 2011-10-27. By Peter Leong Weng Keong and others; application by Microsoft. Divides rows into blocks which are sorted in parallel. Uses two threads to merge blocks. Closely related to patent 389.

388. Method and system for converting a schema-based hierarchical data structure into a flat data structure; US8051373; 2011-11-01. By Chad Rothschiller, Michael McCormack and Ramakrishnan Natarajan; application by Microsoft. Using schema-derived layout rules to allocate the elements of an XML document to cells in a spreadsheet.

389. Multi-threaded sort of data items in spreadsheet tables; US8527866; 2011-11-03. By Carl Sutter IV and others; application by Microsoft. Closely related to application 387.

390. Multi-threaded adjustment of column widths or row heights; US2011276868; 2011-11-10. By Thomas Hoke and others; application by Microsoft. Find cell requiring the most width in a column in parallel to decide column width.

391. Calculation of spreadsheet data; US2011276870; 2011-11-10. By Sanjay Kulkarni and others; application by Microsoft. Evaluate cells in parallel. Relates to formulas referencing constant/input cells (i.e no dependencies between parallel tasks).

392. Creating text functions from a spreadsheet; US8499290; 2011-12-15. By John Messerly and others; application by Microsoft. Define and compile function based on existing cells. Select cells to substitute with function arguments.

393. Decompiling loops in a spreadsheet; US2011314365; 2011-12-22. By John Messerly and others; application by Microsoft. Detect loops by finding circular dependencies or repeating expressions in R1C1 notation.

394. Method and system for inferring a schema from a hierarchical data structure for use in a spreadsheet; US8086959; 2011-12-27. By Chad Rothschiller and others; application by Microsoft. Inferring a schema for XML data stored in a spreadsheet program.

395. URL-facilitated access to spreadsheet elements; US8825745; 2012-01-12. By Shahar Prish; application by Microsoft. Identify and access parts of spreadsheets through URL (e.g. a range of cells or a chart).

396. Methods, apparatus, systems and computer readable mediums for use in association with electronic spreadsheets; US9069747; 2012-03-01. By Thorsten Ueberschaer and Gilbert Karbach. Multiple layers of cells in a spreadsheet. Layer priorities decide which cells are shown when cells overlap.

397. Systems and methods for fast remote data access from a spreadsheet; US8271519; 2012-05-03. By Brian Young. Import data to a spreadsheet using user-defined functions.

398. Spreadsheet model for distributed computations; US2012110428; 2012-05-03. By Heinricus Meijer; application by Microsoft. Distributing spreadsheets and cells while promis-

ing eventual consistency of calculations.

399. Synthetic navigation elements for electronic documents; US2012117452; 2012-05-10. By Zachary Lloyd and others; application by Google. UI model anchoring content to a base layer. Viewport navigates and shows part of the base layer.

400. Computer-implemented method for displaying data values calculated by a spreadsheet-function; US9075787; 2012-05-31. By Arno Schoedl. Define a function by supplying the set of input cells, intermediate cells, and the output cell.

401. Automatic spreadsheet validation; US9298687; 2012-05-31. By Lukas Petrovicky and Jiri Pechanec; application by Red Hat. Automated spreadsheet unit testing.

402. Systems and methods to provide dynamic local members associated with an add-in for a spreadsheet application; US9098483; 2012-06-07. By Pierre Le Brazidec and Florent Migeon. Define a formula dependent on external data. Attach a formula relative to some anchor in the spreadsheet (e.g. next to column C).

403. Location aware spreadsheet actions; US9811516; 2012-06-14. By John Campbell and others; application by Microsoft. Location based (e.g. GPS) formulas, filtering, etc.

404. Enhanced find and replace for electronic documents; US8205149; 2012-06-19. By Marise Chan and others; application by Microsoft. A find-and-replace function that handles multiple sheets in a workbook; can find and change formatting attributes; and can be suspended for editing and later resumed. Closely related to application 587.

405. Generating customized data bound visualizations; US9384181; 2012-06-21. By Danyel Fisher and others; application by Microsoft. Customized data visualization using primitive shapes with data-dependent properties.

406. * Parser, code generator, and data calculation and transformation engine for spreadsheet calculations; US8209661; 2012-06-26. By Michael Rubin and Michael Smialek. Describes compilation of spreadsheets to Java source code. There are other patents and applications with the same title and by the same authors: US7010779, US7836425 and US2014149962.

407. Web page application controls; US9003298; 2012-07-05. By Tom Hoke and others; application by Microsoft. Gesture and touch based controls for web-based spreadsheet application.

408. Structured domain specific language and grid valued machine for creating spreadsheets and numerical plans; US2012179956; 2012-07-12. By Daniel Winterstein. DSL and abstract machine for expressing spreadsheets.

409. Hybrid client/network service application integration; US2012192052; 2012-07-26. By Josh Caplan and Sergei Gundorov; application by Microsoft. Mixing local calculations for local data with non-local calculations for non-local data.

410. Processing a spreadsheet for storage in a database; US8856284; 2012-08-16. By Ricardo Olivieri and Mark Whelan; application by IBM. Process a spreadsheet to store its data in a database. This is done with a configuration file that identifies the data type of each record.

411. Private views of data and local calculations during real time collaboration; US9275032; 2012-08-23. By Johnny Campbell and others; application by Microsoft. Closely related to patent 297.

412. Code generation based on spreadsheet data models; US8583530; 2012-09-20. By Peter Esbensen; application by Hartford Fire Insurance Co. Generation of code, C or C++, based on a spreadsheet. This allows for compilation and potential GPGPU execution.

413. Spreadsheet control program, spreadsheet control apparatus and spreadsheet control method; US8782511; 2012-10-11. By Ryo Shimizu; application by UEI. Lines drawn on a touch screen forming a grid is interpreted as a spreadsheet.

414. Methods and systems to facilitate providing spreadsheet and database data to users via a social network; US9330080; 2012-12-27. By Christian Muenkel; application by SAP. Users may subscribe to data in other users' spreadsheets ensuring that their data is up-to-date.

415. System and method for dynamic data access in a spreadsheet with external parameters; US2013013994; 2013-01-10. By Robert Handsaker. A workbook defines external values it depends on, several such parameterized workbooks can be created. When the parameters are known a concrete workbook can chosen upon some criteria. Closely related to patent 239.

416. Method, system, and apparatus for providing access to workbook models through remote function calls; US9317495; 2013-01-10. By Dan Khen and others; application by Microsoft. A workbook can be used to define a model with input and output cells. This model can be uploaded to a server and accessed through remote procedure calls. Closely related to patents 152 and 314.

417. Providing spreadsheet features; US2013055057; 2013-02-28. By Peter Berger and Yaniv Gur; Application by Hydradx. Spreadsheet features, e.g. a summary of a selection, are provided and potentially degraded based on a heuristic. Closely related to patent 340.

418. Animation for recalculating formulas, sparklines and conditional formatting in an electronic document; US2013055058; 2013-02-28. By Josh Leong and others; application by Microsoft. Animation during recalculation of cells.

419. Multi-cell selection using touch input; US2013061122; 2013-03-07. By Manish Sethi and Rajat Bhargav; application by Microsoft.

420. Data from web documents in a spreadsheet; US2013061123; 2013-03-07. By Jonathan Rochelle and others; application by United Technologies. Facts from a fact repository may be inserted into a spreadsheet. The fact repository may be populated from web documents.

421. Network-based data consolidation, calculation and reporting engine; US8601360; 2013-03-21. By Milliken Fernandes and others; application by Morgan Stanley. The cells of a workbook may be tagged to allow multiple workbook analyses and report generation.

422. Data reporting; US2013073940; 2013-03-21. By Jeffrey Honsowetz. Data may be imported into a spreadsheet from external sources through an add-in function.

423. Spreadsheet based data store interface; US9092412; 2013-04-04. By David Salch and others; application by Cirro. Use spreadsheets as a an interface for data store.

424. Automatic scoping of data entities; US9069748; 2013-04-04. By Allan Folting and others; application by Microsoft. Method for displaying data summary tables, such as a pivot table, with suggestions for columns in the table.

425. Spreadsheet program-based data classification for source target mapping; US2013110884; 2013-05-02. By Christopher Eakins; application by Microsoft. External data sets can be marked up to classify their attributes into standard information types, which allows a spreadsheet program to import or manipulate the data.

426. Spreadsheet data processing method and system; US9053082; 2013-05-09. By Samuel Boutin; application by Knowledge Inside. A hierarchical model of workbook data is build and graphically presented.

427. Structured modeling of data in a spreadsheet; US2013124957; 2013-05-16. By Diego Oppenheimer and others; application by Microsoft. Modeling the the structure of data in a spreadsheet, allowing for automatic updates of the model and for queries to be performed on the model.

428. Application generation apparatus, application generation method, and computer-readable recording medium; US2013124959; 2013-05-16. By Kouji Miyahara; application by Casio.

429. Automated suggested summarizations of data; US8793567; 2013-05-16. By Amit Velingkar and others; application by Microsoft. Suggestions for data summarization by combining field names of a table.

430. Method and system for repurposing a spreadsheet to save paper and ink; US8799761; 2013-05-23. By Naveen Goel and others; application by Adobe. When printing a spreadsheet, identify print zones of logically related cells which may be transformed to save paper.

431. Quick analysis tool for spreadsheet application programs; US2013145244; 2013-06-06. By Chad Rothschiller and others; application by Microsoft. Upon data selection a quick analysis button is shown. The button opens a toolbar with data-analysis options.

432. Browser spreadsheet integration; US8640022; 2013-06-13. By Lawrence Waldman and others; application by Microsoft. A spreadsheet within a browser with the ability to reference objects outside of the sheet.

433. Input trail on data entry; US9043693; 2013-07-04. By Christian Baeck and others; application by SAP. When recalculations prompted by cell changes are lengthy, recalculations can be set to only happen upon user request. The spreadsheet keeps track of modified cells.

434. Custom browser-side spreadsheet functions; US9389891; 2013-07-11. By Daniel Battagin and Shahar Prish; application by Microsoft. In a spreadsheet running on a client server architecture, UDFs may be allowed to be computed on the client as to not pose a security risk to the server.

435. Data cell cluster identification and table transformation; US9311371; 2013-09-12. By Mayur Mohan and others; application by Business Objects Software. Method for automatically identifying visual cell clusters/groupings for export or reports.

436. Computer-implemented methods and systems for associating files with cells of a collaborative spreadsheet; US2013254157; 2013-09-26. By Brian Havlin and others; application by Adobe. Include a file in the cell of a spreadsheet and store the file with the sheet in the cloud.

437. Tabular widget with mergable cells; US2013262974; 2013-10-03. By Michael Anstis and Mark Proctor; application by Red Hat. Handling manipulation of decision tables with a grid widget that handles (un)grouping, (un)merging and collapsing cells.

438. Collaborative online spreadsheet application; US9280533; 2013-10-03. By Jonathan Rochelle and others; application by Google. Synchronization and computation of a collaborative spreadsheet hosted on a server that may receive requests from several browsers. Portions of the spreadsheet calculations are done by the clients other portions by the server. Closely related to patent 226.

439. Spreadsheet-based programming language adapted for report generation; US2013290822; 2013-10-31. By Michael Chen; application by Bibo Labs. Markup language within a spreadsheet for report generation.

440. Method for expanding and collapsing data cells in a spreadsheet report; US2013290823; 2013-10-31. By Thanu Lakshmi and others; application by Microsoft. Closely related to application 153 and patent 367.

441. Structuring and editing a recursively multi-dimensional spreadsheet; US9098484; 2013-11-07. By Patrick Viry. Handling n-dimension data in a spreadsheet.

442. System and method for OLAP report generation with spreadsheet report within the network user interface; US8607138; 2013-12-10. By Herbert Liebl, Inbarajan Selvarajan and Lee Harold; application by Microstrategy. Presenting server-side enterprise data from an OLAP cube, using a spreadsheet interface on the client side.

443. Progressive loading for web-based spreadsheet applications; US2013332811; 2013-12-12. By Ming-Hsiung Chang and others; application by Microsoft. On web-based spreadsheet only load portion of sheet.

444. Customizable spreadsheet table styles; US2013339832; 2013-12-19. By Roy Simkhay and others; application by Microsoft. Customizable table styles for repeated usage. Closely related to patent 182.

445. Block properties and calculated columns in a spreadsheet application; US8621340; 2013-12-31. By Joseph Chirilov and others; application by Microsoft. How to prescribe properties, such as formatting, for blocks, where a block is a logical area of a spreadsheet that grows or shrinks as rows and columns are added to or removed from it. Closely related to application 448.

446. Spreadsheet schema extraction; US2014075278; 2014-03-13. By Mihaela Bornea and others; application by IBM. A schema with entry element information can be extracted from spreadsheet format.

447. Spreadtree hierarchy system for spreadsheets and related methods; US2014082470; 2014-03-20. By David Trebas and others; application by 4clicks Solutions. Solving the problem of spreadsheets referencing each other with a spreadtree that consists of several spreadsheets in a hierarchy.

448. Block properties and calculated columns in a spreadsheet application; US2014115434; 2014-04-24. By Joseph Chirilov and others; application by Microsoft. Closely related to patent 445.

449. Spreadsheet functions to call REST API sources; US2014136936; 2014-05-15. By Keyur Patel and others; application by Microsoft.

450. Providing and procuring worksheet functions through an online marketplace; US2014136937; 2014-05-15. By Keyur Patel and Chapman Battagin; application by Microsoft.

451. Dashboard visualizations using web technologies; US2014149836; 2014-05-29. By Jason Bedard and Viren Kumar; application by Business Objects Software. Export spreadsheet to JSON format so it can be rendered as a web-based dashboard system.

452. Spreadsheet cell dependency management; US9703767; 2014-05-29. By Jason Bedard and Viren Kumar; application by Business Objects Software. Closely related to application 451.

453. Dashboard formula execution; US9367535; 2014-05-29. By Jason Bedard and Viren Kumar; application by Business Objects Software. Closely related to application 451.

454. Asynchronous dashboard query prompting; US9842099; 2014-05-29. By Jason Bedard and Viren Kumar; application by Business Objects Software. Closely related to application 451.

455. System for the interaction among spreadsheets over networks; US2014157098; 2014-06-05. By Massimo Maresca; application by M3S SRL. System for handling synchronization and interaction between multiple users and spreadsheet over a network.

456. Systems and methods for managing spreadsheet models; US9575950; 2014-06-12. By David Matheson and Somik Raha; application by Smartorg. A model template can be created from a spreadsheet, which contains input/output information and deployment information. Several instances of a model template can be deployed.

457. Method and system for expanding and collapsing data cells in a spreadsheet application; US2014164896; 2014-06-12. By Thomas Schlereth; application by Can Do Gmbh. A cell/row may be expanded into a sub-row that contain more information about the parent cells.

458. Methods, systems and computer program products for facilitating visualization of interrelationships in a spreadsheet; US8745483; 2014-06-13. By Michael Chavoustie and others. Various ways to display parts of the dependency graph or support graph. Closely related to application 462.

459. Dynamic function builder; US2014173400; 2014-06-19. By Frederic Mingot and others; application by Thomson Reuters Global Resources. Translating natural language format into an spreadsheet function on a web server.

460. Spreadsheet viewer facility; US2014189483; 2014-07-03. By Wasif Awan and Mushegh Hakhinian; application by Intralinks. System for securely sharing spreadsheets between different users and businesses.

461. Translating natural language descriptions to programs in a domain-specific language for spreadsheets; US9330090; 2014-07-31. By Sumit Gulwani and Mark Marron; application by Microsoft. Natural language commands can b used to perform spreadsheet operations. E.g. "Multiply item count and quantities".

462. Methods, systems and computer program products for facilitating visualization of interrelationships in a spreadsheet; US2014223276; 2014-08-07. By Michael Chavoustie and others; application by IBM. Closely related to patent 458.

463. System and method for a spreadsheet application supporting diverse formulaic functions; US9792273; 2014-08-14. By Roy Simkhay and others; application by Microsoft. Defines various spreadsheet functions, e.g., IFERROR, COUNTIFS, FILTER, DISTINCT. Closely related to patent 154.

464. Ranking graphical visualizations of a data set according to data attributes; US8812947; 2014-08-19. By Hillel Maoz and others; application by Google. Visualization recommendations are made to the user by ranking visualizations according identified types/attributes.

465. For a given cell in a spreadsheet, evaluating an unlimited number of conditional formatting rules and applying multiple corresponding Formats to the cell; US2014237339; 2014-08-21. By Benjamin Chamberlain and others; application by Microsoft.

466. Method for controlling electronic spreadsheet on handheld touch device; US9619454; 2014-09-25. By Dong Wang and others; application by Zhuhai Kingsoft Office Software. Spreadsheet interaction with touch.

467. API wizard; US8863156; 2014-10-14. By Robert Lepanto and Chakra Kosana; application by Appcentric Solutions Llc. Database read/write from spreadsheet application.

468. Systems and methods for graphically modulating structured data; US2014359417; 2014-12-04. By Omer Bar-On. Visualize cell based on the characteristics of its formula.

469. Telling interactive, self-directed stories with spreadsheets; US2014372850; 2014-12-18. By John Campbell and others; application by Microsoft. Spreadsheet presentation engine based on concept of storytelling.

470. Conversion of data ranges to table objects; US2014372851; 2014-12-18. By Allison Rutherford and others; application by Microsoft. Manual or automatic cell range to table conversion.

471. Showing presence of multiple authors in a spreadsheet; US2014372852; 2014-12-18. By Chad Rothschiller and others; application by Microsoft. Display who is editing what in a collaborative spreadsheet.

472. Natural quick functions gestures; US2014372856; 2014-12-18. By Sam Radakovitz and others; application by Microsoft. Various natural gestures for spreadsheet application.

473. Seamless grid and canvas integration in a spreadsheet application; US2014372858; 2014-12-18. By John Campbell and C Radakovitz; application by Microsoft. Allow cells to move between being bound to the grid and being free-floating while maintaining references.

474. Filtering data with slicer-style filtering user interface; US2014372932; 2014-12-18. By Allison Rutherford and others; application by Microsoft. Closely related to application 546.

475. Automatically displaying suggestions for entry; US2014372933; 2014-12-18. By Prashant Shirolkar and others; application by Microsoft. Suggest cell contents while it is being edited.

476. Simplified data input in electronic documents; US2014372952; 2014-12-18. By Carlos Otero and others; application by Microsoft. Cell editing gestures for data completion, formula entry, etc.

477. Embedded experience through bidirectional integration of CRM applications and spreadsheet applications; US2014380139; 2014-12-25. By Ron Mondri and Madan Natu; application by Microsoft. Interfacing spreadsheet and CRM applications.

478. Systems, methods and machine readable mediums for defining and executing new commands in a spreadsheet software application; US9384182; 2015-01-15. By Gregory Dorman; application by Exigen Properties. User-defined spreadsheet functions by supplying built-in define function with name, output cell, and input cells. Closely related to patent 364.

479. Modifying electronic data layout for efficient printing of electronic data; US8937744; 2015-01-20. By Arpan Shah and others; application by Printeco. Reducing paper use when printing spreadsheet by modifying layout.

480. Control of CRM data based on spreadsheet actions; US2015026075; 2015-01-22. By Ron Mondri and others; application by Microsoft. Closely related to patent 477.

481. Non-collaborative filters in a collaborative document; US8943142; 2015-01-27. By Benjamin Simon and others; application by Google. Filters in a collaborative spreadsheet. Closely related to patents 524 and 542.

482. Analyzing files using big data tools; US2015032743; 2015-01-29. By Sanjay Agrawal; application by Cimcon Software. Converting spreadsheets to format compatible with big data tools.

483. System and method for rectangular region covering; US8983901; 2015-03-17. By Benjamin Simon; application by Google. Given a set of partially overlapping cell ranges, produce a minimal set of non-overlapping covering subranges.

484. Automatic column resizing; US9740676; 2015-03-26. By Shaun Logan and Edmund Davis; application by Oracle. When using spreadsheet as front end for an application, automatically resize columns based on application data.

485. Use of temporary optimized settings to reduce cycle time of automatically created spreadsheets; US9870354; 2015-03-26. By Scott Hicks and others; application by IBM. Improve efficiency of data conversion from native to spreadsheet format by optimizing the settings of the spreadsheet application. Closely related to patent 253.

486. Extracting relational data from semi-structured spreadsheets; US2015095312; 2015-04-02. By Sumit Gulwani and others; application by Microsoft. DSL for creating programs to extract relational data from spreadsheets.

487. Using spreadsheets as a basis for enhanced application development; US9298454; 2015-04-16. By Uzi Tuvian and others; application by Microsoft. Generating application components from spreadsheet.

488. Micro browser spreadsheet viewer; US2015113377; 2015-04-23. By Tsui-Ying Fu and others; application by Microsoft. Spreadsheet UI for small displays. Closely related to application 323.

489. Indexing spreadsheet structural attributes for searching; US2015120748; 2015-04-30. By Steven Kraynak and others; application by Microsoft. Searching for spreadsheets with certain attributes (e.g. amount of formulas, errors, etc.).

490. System and method for storing a series of calculations as a function for implementation in a spreadsheet application; US9037961; 2015-05-19. By Howard Mansell; application by Credit Suisse Securities. Given a range of input cells and an output cell, define a spreadsheet function based on the given and intermediate cells.

491. Methods, systems and computer program products for processing cells in a spreadsheet; US9047266; 2015-06-02. By Michael Chavoustie and others. Describes a kind inlining of expressions from referred-to cells.

492. Method for inserting or deleting cells, rows or columns in spreadsheet and a device therefor; US2015161095; 2015-06-11. By Hui Wang and others; application by Zhuhai Kingsoft Office Software. Inserting or deleting cells, rows or columns on a touch-enabled device.

493. Touch/gesture-enabled interaction with electronic spreadsheets; US2015169531; 2015-06-18. By John Campbell and others; application by Microsoft. Various gestures to interact with spreadsheet on touch-enabled device.

494. Interaction with spreadsheet application function tokens; US2015169532; 2015-06-18. By Carlos Otero and others; application by Microsoft. Interacting with formula expression on token-level.

495. System and method for providing online data management services; US9201858; 2015-07-09. By Ronald Ho and Fuzzy Khosrowshahi; application by Google. Freezing rows or columns, splitting the spreadsheet UI into at most three parts in each direction, allowing only the middle part to be scrolled.

496. Web-based spreadsheet interaction with large data set; US9256589; 2015-07-09. By Varouj Chitilian and others; application by Google. Interacting with spreadsheet on remote server from web-client.

497. Automatic relationship detection for spreadsheet data items; US9852121; 2015-07-09. By Allan Folting and others; application by Microsoft. Managing relationships in spreadsheets for summaries (e.g. employee IDs).

498. Resolving mutations in a partially-loaded spreadsheet model; US9311622; 2015-07-09.
     By Amod Karve and Niklaus Haldimann; application by Google. Online collaboration
     when spreadsheet is only partially loaded by collaborators.

499. Dynamically sizing chunks in a partially loaded spreadsheet model; US9462037; 2015-
     07-09. By Joshua Danziger and others; application by Google. Dynamically determin-
     ing the chunk size for loading spreadsheets hosted on a server.

500. Systems and methods for mutations and operational transforms in a collaborative
     spreadsheet environment; US9720897; 2015-07-16. By Joshua Danziger and others;
     application by Google. Conflict resolution in collaborative spreadsheet.

501. Database generation from a spreadsheet; US9305176; 2015-07-23. By David Gloski and
     Michael Lehane; application by Xovertime. Using labels in cells to layout a database
     created from the spreadsheet.

502. Converting spreadsheet applications to web-based applications; US9864812; 2015-07-
     30. By Jonathan Rochelle and others; application by Google. Server-based calculation
     engine presenting web-clients with spreadsheet UI. Closely related to patent 209.

503. Spreadsheet tool for dimensional calculations; US2015254226; 2015-09-10. By An-
     thony Renshaw and Carl Renshaw. Calculation and conversion with and between di-
     mensional units in a spreadsheet using added functions.

504. Associating captured image data with a spreadsheet; US9697193; 2015-09-10. By Amy
     Lin and others; application by Microsoft. Importing structured data from image into
     spreadsheet.

505. Enhanced indicators for identifying affected data; US2015261736; 2015-09-17. By Al-
     lison Rutherford and others; application by Microsoft. Visualize affected cells before
     performing multi-cell operations (e.g. sorting or filtering).

506. Spreadsheet data transfer objects; US9552283; 2015-10-08. By John Michelsen; appli-
     cation by CA Technologies. Generate spreadsheet template representing a data trans-
     fer object to be used for software testing.

507. Method for logical organization of worksheets; US9483458; 2015-10-29. By Martin
     Presler-Marshall and Hunter Presnall; application by IBM. Find spreadsheets in store
     with given attributes.

508. A framework for enabling user-defined functions; US2015309980; 2015-10-29. By Jonathan
     Glass and Darren Harris; application by Ariadne Insight. Using function from another
     process in spreadsheet.

509. System and method for managing data and data models; US2015317297; 2015-11-05.
     By Prasath Chandrasekaran and Ranjit Valasa. Performing various analyses on a
     spreadsheet and presenting results in a web-client.

510. Composite data creation with refinement suggestions; US2015324346; 2015-11-12. By
     Mohan Sankaran and others; application by Informatica. Merging spreadsheets by
     identifying matching columns.

511. Information processing apparatus and non-transitory computer readable medium; US2015331844;
     2015-11-19. By Tomonari Takahashi; application by Fuji Xerox. Detect when cells
     should be merged in formula-style spreadsheets.

512. Interaction between web gadgets and spreadsheets; US9514116; 2015-12-03. By Lawrence
     Waldman and others; application by Microsoft. Binding a gadget (e.g. a chart) to a
     range of cells allowing it to update whenever these are modified.

513. Persistently self-replicating cells; US2015370775; 2015-12-24. By Frederic Bauchot;
     application by IBM. Define set of cell ranges with shared content. When a cell in one

range is updated, the corresponding cells in the other ranges in the set are updated as well.

514. System and method for operating a computer application with spreadsheet functionality; US9552348; 2015-12-31. By Koustubh Moharir and others. A computation model allowing cell evaluation to create or delete cells. Uses iterative approach updating the dependency graph to account for cell creation and deletion. Orders evaluation so cell creations and deletions take priority.

515. Database management system based on a spreadsheet concept deployed in an object grid; US2015378980; 2015-12-31. By Gennaro Cuomo and Victor Moore; application by IBM. Interacting with database through spreadsheet.

516. Validation of formulas with external sources; US2016004684; 2016-01-07. By Gary Cudak and others; application by IBM. Match formula with database of known accurate formulas to validate it.

517. Rules editor; US2016019199; 2016-01-21. By Neil Thomson and others; application by Aptitude Software. Using control flow rules in spreadsheet calculations.

518. Interfacing with a relational database for multi-dimensional analysis via a spreadsheet application; US2016019281; 2016-01-21. By Sreeram Hariharan and others; application by Oracle. Inserting data from relational database into spreadsheet.

519. Presenting dataset of spreadsheet in form based view; US2016026616; 2016-01-28. By Matthew Vogel; application by Microsoft. Interacting with spreadsheet through a form.

520. Automatically adjusting spreadsheet formulas and/or formatting; US9652446; 2016-02-25. By John Creason and others; application by Smartsheet. Mimic nearby row formatting and formulas when updating a row.

521. Peer to peer spreadsheet processing; US2016055140; 2016-02-25. By Stuart McKenzie and others; application by Purple Robot Software. Separating spreadsheet content between peers. (E.g. an expert peer with proprietary formulas and a client peer supplying inputs for these formulas.)

522. Managing objects in panorama display to navigate spreadsheet; US2016062585; 2016-03-03. By Amy Lin and others; application by Microsoft. Displaying spreadsheet on narrow screen pulling in controls from the left and right when needed.

523. Tracking changes in on-line spreadsheet; US9286342; 2016-03-15. By Varouj Chitilian and others; application by Google.

524. Non-collaborative filters in a collaborative document; US9298688; 2016-03-29. By Benjamin Simon and others; application by Google. Closely related to patents 481 and 542.

525. Spreadsheet document tab conditional formatting; US9311289; 2016-04-12. By Joseph Kaptur and Elisabeth Morash; application by Google. Conditionally format spreadsheet tab depending on cell values.

526. Method and apparatus for spreadsheet automation; US9323735; 2016-04-26. By Robert Lautt and Zoltan Grose; application by A3 Solutions. Integrating spreadsheet models with enterprise data, to avoid inconsistent data, replication of work, and manual re-integration of spreadsheet models.

527. Visual aid to simplify achieving correct cell interrelations in spreadsheets; US6460059; 2002-10-01. By Robert Wisniewski. Describes a system for visualizing which cells a given cell depends on, and vice versa.

528. Data processing device and method; US2016124932; 2016-05-05. By Xiao Chen and others; application by IBM. When working with large external data sets, only part of

it is loaded into the spreadsheet while the rest is represented by a hyper-row. Cells in the hyper-row can be used like regular cells in functions like SUM

529. Hierarchical user interface; US9342497; 2016-05-17. By David Waite. Organize collection of spreadsheets in a tree structure.

530. System and method for accessing rich objects via spreadsheets; US9880993; 2016-05-26. By Derek Cicerone; application by Palantir Technologies. Objects in cells and member access using dot-notation (e.g. A1.close).

531. Formula and function generation and use in electronic spreadsheets; US2016154780; 2016-06-02. By Carlos Otero and John Campbell; application by Microsoft. Building formulas using touch gestures.

532. Efficient copy paste in a collaborative spreadsheet; US2016162461; 2016-06-09. By Benjamin Simon and others; application by Google. Asynchronous collaboration using central server to order messages and perform transformations to resolve conflicts. (E.g. concurrent cell change and row insert. If the row insert is ordered before cell change, row number of cell change message is incremented.)

533. Presentation of content from within spreadsheet application; US2016173541; 2016-06-16. By Amit Gusain; application by Microsoft. Creating a presentation from spreadsheet content and keeping it up-to-date with the spreadsheet.

534. Cell view mode for outsized cells; US2016188187; 2016-06-30. By Rajat Bhargav and others; application by Microsoft. Visual indication that cell content is hidden (e.g. due to overflow) and option to display all content in separate view.

535. Aggregation and tracked changes of information from multiple databases using unique identification method; US2016196255; 2016-07-07. By Taryn Reynolds and R Ward; application by Northrop Grumman Systems. Importing and merging reports into spreadsheet.

536. Generating scenes and tours in a spreadsheet application; US2016196674; 2016-07-07. By Scott Ruble and others; application by Microsoft. A presentation format where a tour of a spreadsheet is given.

537. Locking spreadsheet cells; US2016210278; 2016-07-21. By Matthew Lehrian and others; application by Apple. Closely related to patent 338.

538. Automated data conversion and presentation utility; US2016224535; 2016-08-04. By Nitin Mathur and others; application by Bank Of America. Generating slide shows from spreadsheets.

539. Systems, methods and articles for a web-based spreadsheet application; US2016224536; 2016-08-04. By Peter Thomas; application by Intuit. Spreadsheet-like web-application. Notable ideas: displaying preview data and allowing an entire spreadsheet to appear in a cell or row of another spreadsheet.

540. Analysis with embedded electronic spreadsheets; US2016261577; 2016-09-08. By Jih-Shiang Chang and others; application by Microsoft. Interfacing with CRM applications.

541. Smart fill; US2016275066; 2016-09-22. By Carlos Otero and others; application by Microsoft. Closely related to application 591.

542. Non-collaborative filters in a collaborative document; US9635105; 2016-09-22. By Benjamin Simon and others; application by Google. Filtering locally when working with collaborative spreadsheet. Closely related to patents 481 and 524.

543. Computer implemented systems and methods for transforming data; US9727550; 2016-11-03. By Min He and others; application by SAP. Combining data sources for e.g.

analysis by generating data flow graph composed of operations like union, join, output, etc.

544. Computer implemented systems and methods for automatic generation of data transformations; US9824081; 2016-11-03. By Claudia Lehmann and others; application by SAP. Closely related to patent 543.

545. Computer implemented systems and methods for data usage monitoring; US2016321232; 2016-11-03. By Khuan Tan and others; application by SAP. Closely related to patent 543.

546. Slicer elements for filtering tabular data; US2016334955; 2016-11-17. By Johnny Campbell and others; application by Microsoft. GUI for filtering data by creating so called slicers: a GUI-element that shows each unique value of a column. The unique values in the slicer are used to filter data. Closely related to application 474.

547. Method and computing device for maintaining dependencies among reference elements; US2016342582; 2016-11-24. By Dustin Hiatt and others; application by Workiva. Method for keeping track of dependencies for recalculation. During recalculation cell formulas are divided into different groups where formulas of each group can be evaluated in parallel.

548. Methods and systems for dynamic graph generating; US2016350950; 2016-12-01. By Colin Ritchie and Cameron Ritchie. Dynamically creating figures suitable for the selected data in a third party program. Difficult to figure out how a figure types are chosen.

549. Apparatus, system and method of presenting views of a user's data using summary tables; US2016378811; 2016-12-29. By Anukul Kapoor and Edward Hogan; application by Apple. A way of showing summary of tabular data (not pivot table) on a small screen.

550. Enhanced mechanisms for managing multidimensional data; US9817876; 2016-12-29. By Pierre Demonsant and others; application by Planisware Sas. Import a spreadsheet and treat it as an OLAP cube.

551. Method for integrating software components into a spreadsheet application; US9582288; 2017-02-28. By James Stewart; application by Mathworks. Use programs as functions directly in a spreadsheet. This is done through GUI. Closely related to patent 321.

552. System and process for generating an internet application; US2017060830; 2017-03-02. By Kevin Liao and others; application by Ytml Consulting Pty. Convert spreadsheet to an XML-format suitable for viewing, possibly on a web-page.

553. User interface for creating a spreadsheet data summary table; US2017075874; 2017-03-16. By Allan Folting and others; application by Microsoft. User interface for creating data summary tables/pivot tables. Closely related to patent 190.

554. Representing and manipulating hierarchical data; US2017091166; 2017-03-30. By David Greenwood; application by Power Modes Pty.

555. Stream-enabled spreadsheet as a circuit; US2017097925; 2017-04-06. By Martin Hirzel and others; application by IBM. Compile transformations defined in a spreadsheet to a program that can be used on a data stream. Similar to US2017228357 also by IBM.

556. Automated structured cloud datatester; US2017116171; 2017-04-27. By Jr Bruce Villard and Henry Will I; application by IBM. Spreadsheet validation analysing consecutive cells to flag e.g. irregular cell references, shifted cells, etc.

557. Enriched compound data objects; US2017124052; 2017-05-04. By John Campbell and others; application by Microsoft. Include compound data objects in spreadsheet. Compound data objects are defined in Provisional Application Ser. No. 62/357,292, filed Jun. 30, 2016.

558. Suggesting a set of operations applicable to a selected range of data in a spreadsheet; US2017124058; 2017-05-04. By Carlos Otero and others; application by Microsoft.

559. Modern spreadsheet arrays; US2017124142; 2017-05-04. By Andrew Becker and others; application by Microsoft. An array in a cell unfolds its value over neighboring cells (e.g. `B1:` `=(A1:A2)`. The value of `B2` is `A1`). In addition array functions such as `SORT` and `UNIQUE` are included.

560. Decks, cards, and mobile UI; US2017124055; 2017-05-04. By Samuel Radakovitz and others; application by Microsoft. Create views, e.g. each row is formated as a box, of spreadsheet data to make it more readable on mobile devices. A bit reminiscent of XSLT for XML -> HTML.

561. Operations on dynamic data associated with cells in spreadsheets; US2017124047; 2017-05-04. By John Campbell and others; application by Microsoft. Including dynamic data, e.g. video/audio, in cells and functionality to process this data.

562. Generating sound files and transcriptions for use in spreadsheet applications; US2017124045; 2017-05-04. By Christian Canton and others; application by Microsoft. Closely related to application 561.

563. Application module for managing jobs asynchronously; US2017132196; 2017-05-11. By Brandon Lai and others; application by Ebay. Synchronization between an Internet based marketplace application and a spreadsheet.

564. Method and apparatus providing contextual suggestion in planning spreadsheet; US2017132195; 2017-05-11. By Shaileshbhai Gothi and others; application by SAP. Cell content suggestion based on cell context. E.g. if the cell is in a row with countries, other countries are suggested.

565. Automatically adjusting spreadsheet formulas and/or formatting; US2017139893; 2017-05-18. By Erik Rucker and Jr Thomas Maliska; application by Smartsheet. Extended functionality for consistent row formatting.

566. Spreadsheet with unit based math; US2017161251; 2017-06-08. By Terry Olkin and Brian Morris; application by Workday. Enables unit math such as $2m * 3m = 6m^2$. Does not support user defined units.

567. Spreadsheet with unit based conversions; US2017161250; 2017-06-08. By Terry Olkin and Brian Morris; application by Workday. Closely related to application 566.

568. Spreadsheet with unit parsing; US2017161249; 2017-06-08. By Terry Olkin and Brian Morris; application by Workday. Closely related to application 566.

569. Spreadsheet tool manager for collaborative modeling; US2017199728; 2017-07-13. By Roberto Woods; application by Hamilton Sundstrand Space Systems. A tool manager that lets users search for existing tools before creating their own.

570. Techniques for providing user interface enhancements for spreadsheets and tables; US2017199861; 2017-07-13. By Khurram Zia and Kevyn Arnott; application by Dropbox.

571. Systems and methods for creating an n-dimensional model table in a spreadsheet; US2017199862; 2017-07-13. By Steve Litt. Working with n-dimensional data in a spreadsheet by extending GUI with hierarchical features.

572. Parameterizing and working with math equations in a spreadsheet application; US2017220543; 2017-08-03. By Christian Canton and others; application by Microsoft. Extending spreadsheets with equations and equation related functionality such as solving an equation.

573. Encoding a spreadsheet program for stream processing; US2017228358; 2017-08-10. By Martin Hirzel and others; application by IBM. Related to application 574.

574. Spreadsheet compiler for stream processing; US2017228357; 2017-08-10. By Martin Hirzel and others; application by IBM. A spreadsheet is compiled to C++ so it can be used to process data streams. See also US2017228358.

575. Facilitating interaction with a spreadsheet; US2017242837; 2017-08-24. By Frederic Bauchot and Georges-Henri Moll; application by IBM. Detect and let the user mark input cells of a spreadsheet, so these can be visualized across sheets and easily be changed for experiments.

576. Spreadsheet with dynamic cell dimensions generated by a spreadsheet template based on remote application values; US2017242838; 2017-08-24. By Kirk Krappe; application by Apttex. Limiting user's access rights to set of columns/rows in a shared spreadsheet.

577. Techniques to present a dynamic formula bar in a spreadsheet; US2017249295; 2017-08-31. By Carlos Otero and others; application by Microsoft.

578. Dynamic disaggregation and aggregation of spreadsheet data; US2017255608; 2017-09-07. By Florent Migeon and Sebastien Lavoignat; application by Business Objects Software. Sub-rows may specify the disaggregation of a parent row.

579. Interactive graphical surface-rendering data visualization tools for tabular data and spreadsheets; US2017262425; 2017-09-14. By Lester Ludwig. Seemingly a vague idea of rendering a spreadsheet on a surface.

580. Using text messages to interact with spreadsheets; US2017300467; 2017-10-19. By John Campbell and others; application by Microsoft.

581. Natural input for spreadsheet actions; US2017300222; 2017-10-19. By John Campbell and others; application by Microsoft. Various touch gestures to interact with a spreadsheet.

582. Representation of people in a spreadsheet; US2017300466; 2017-10-19. By John Campbell and others; application by Microsoft. A person object to represent a person along with functions to e.g. send messages.

583. Spreadsheet shared region and cell permissions; US9798889; 2017-10-24. By Leonard Karpel and others; application by Workday. Handling user rights in subsets of a spreadsheet.

584. Codeless sharing of spreadsheet objects; US2017308617; 2017-10-26. By Daniel Parish and Daniel Battagin; application by Microsoft. Sharing spreadsheet objects or portions of a spreadsheet on e.g. social media through GUI.

585. Facilitating offline or other contemporaneous editing of tabular data; US2017329984; 2017-11-16. By Gary Clough and others; application by Winshuttle. Handling user rights in a shared spreadsheet.

586. Detecting errors in spreadsheets; US2017337238; 2017-11-23. By Benjamin Zorn and Emery Berger; application by Microsoft. Errors detected by comparing properties (e.g. values has $ as unit) of similar (e.g. cells of the same row) cells.

587. Enhanced find and replace for electronic documents; US2017337175; 2017-11-23. By Marise Chan and others; application by Microsoft. Closely related to patent 404.

588. Custom lightning connect adapter for Google Sheets web-based spreadsheet program; US2017337233; 2017-11-23. By Andrew Fawcett and Peralta García; application by Financialforce. Synchronization between Salesforce platform and spreadsheet through custom adapters.

589. Word processor calculations and synchronization with spreadsheet; US2017337174; 2017-11-23. By Jacques Nault. A tool for synchronizing values that are copy-pasted from a spreadsheet document into a text document.

590. Generation of classification data used for classifying documents; US2017351688; 2017-12-07. By Toshiaki Yasue; application by IBM. Classifying spreadsheet by counting number of cells that contain a common value.

591. Automatic semantic data enrichment in a spreadsheet; US2018004722; 2018-01-04. By Yaniv Naor; application by Microsoft. User may request for automatic filling of data in a spreadsheet. E.g. if column A contains countries and column B contains a single cell with the corresponding capital, then a capital relation may be determined and the rest of the cells of column B filled. Closely related to application 541.

592. Constructing new formulas through auto replacing functions; US2018005122; 2018-01-04. By Joseph McDaid and others; application by Microsoft. Rewriting formulas to equivalent and easily readable ones.

593. Performing server-side and client-side operations on spreadsheets; US9875226; 2018-01-23. By Daniel Gundrum and others; application by Google. Calculation can be balanced between client and server in a client-server spreadsheet. E.g. it may be preferable to do expensive computations server side.

594. Topological data analysis utilizing spreadsheets; US2018024981; 2018-01-25. By Huang Xia and Sanket Patel; application by Ayasdi. Analysis of topological data defined in a spreadsheet.

595. Data analysis expressions; US2018032498; 2018-02-01. By Howard Dickerman and others; application by Microsoft. Data analysis expressions (DAX) for multi-dimensional data analysis.

596. Inserting new elements in a tabular data structure; US2018039613; 2018-02-08. By Xiao Chen and others; application by IBM. Rows or columns can be added by enlarging a row/column. The expanded area is divided into new rows/cols.

597. Method, apparatus, and computer program product for solving equation system models using spreadsheet software; US9892108; 2018-02-13. By Chahid Ghaddar. Numerical optimization of a function defined by a cell. All cell references are seen as function variables. In this patent the optimization is done by an external program.

598. Collaborative spreadsheet data validation and integration; US2018046608; 2018-02-15. By Timothy Yousaf and others; application by Palantir Technologies. Collaborative spreadsheet that allows users to specify restrictions (e.g. only dates) on cells to ensure consistent data in the spreadsheet.

Bibliography

[1] Randal E. Bryant Graph-based algorithms for boolean function manipulation. *IEEE Transactions on Computers*, 35(8):677–691, 1986.

[2] Martin Erwig et al. Gencel: A program generator for correct spreadsheets. *Journal of Functional Programming*, 16(3):293–325, 2006.

[3] Framtidsforum. SpreadsheetConverter. Website. At http://www.spreadsheetconverter.com/ on 9 June 2013.

[4] Google. Google patent search. Website. At http://patents.google.com/ on 9 June 2013 and between 2 April 2018 and 1 May 2018.

[5] Brian Kahin. The software patent crisis. *Technology Review, MIT*, April 1990. At http://antipatents.8m.com/software-patents.html on 9 June 2013.

[6] Markus Montigel. Portability and reuse of components for spreadsheet languages. In *IEEE Symposia on Human Centric Computing Languages and Environments*, pages 77–79, 2002.

[7] Fabian Nuñez. An extended spreadsheet paradigm for data visualisation systems, and its implementation. Master's thesis, University of Cape Town, November 2000.

[8] European Patent Office. Espacenet. Website. At http://worldwide.espacenet.com/ on 9 June 2013 and on 2 April 2018.

[9] Simon Peyton Jones, Alan Blackwell, and Margaret Burnett. A user-centred approach to functions in Excel. In *ICFP '03: Proceedings of the Eighth ACM SIGPLAN International Conference on Functional Programming*, pages 165–176. ACM, 2003.

[10] Kurt W. Piersol. Object-oriented spreadsheets: the analytic spreadsheet package. In *Conference Proceedings on Object-Oriented Programming Systems, Languages and Applications (OOPSLA'86), Portland, Oregon*, pages 385–390. ACM Press, 1986.

[11] Peter Sestoft. A Spreadsheet Core Implementation in C#. Technical Report ITU-TR-2006-91, IT University of Copenhagen, September 2006. 135 pages.

[12] Peter Sestoft. *Spreadsheet Implementation Technology. Basics and Extensions*. MIT Press, 2014. ISBN 978-0-262-52664-7. 313 pages.

[13] United States Court of Appeals for the Federal Circuit. Refac versus Lotus. Opinion 95-1350, April 1996. At http://caselaw.findlaw.com/us-federal-circuit/1339862.html on 9 June 2013.

[14] United States Patent and Trademark Office. Patent full-text and full-page image databases. Website. At http://patft.uspto.gov/ on 9 June 2013.

Index