NVivo (version 15) Distinguishing features

This document is intended to be read in conjunction with the 'Choosing a CAQDAS Package Working Paper' which provides a more general commentary of common CAQDAS functionality. This document does not provide an exhaustive account of all the capabilities of NVivo v15 but is designed to highlight some of its distinguishing features. The Comment section at the end details our opinions on certain aspects of functionality and usability. See also Silver & Lewins (2014) *Using Software in Qualitative Research: A Step-by-Step Guide*, Sage Publications and Woolf & Silver (2018) *Qualitative analysis with NVivo: The Five-Level QDA method,* Routledge.

Background https://lumivero.com/products/nvivo/ Tom Richards and Lyn Richards developed NUD*IST (the predecessor to NVivo) in the 1980s at La Trobe University, Melbourne, to support Lyn Richards' research. Lumivero now develops NVivo ■ There are Windows and Mac versions ■ NVivo enables managing and analysing textual, audio, video, images, and spreadsheet data. Information from bibliographic and referencing tools (e.g. Endnote, RefWorks, Citavi) can also be integrated. In addition, NCapture (free browser add-on) can capture webpages and social media content for analysis ■ Variety of interrogation tools including text and coding queries, and powerful matrix coding and crosstab queries ■ Visual tools including mind maps and concept maps to show associations in data and ideas ■ NVivo Transcription provides automated audio/video transcriptions in NVivo-ready formats (extra cost) ■ NVivo Collaboration Cloud allows NVivo projects to be used across Mac/Windows platform and enables concurrent team-working (extra cost) ■ The Mac version contains most, but not all, of the same functionality as the Windows version ■ The Lumivero AI Assistant is an add-on module providing tools that utilize generative artificial intelligence capabilities (extra cost)

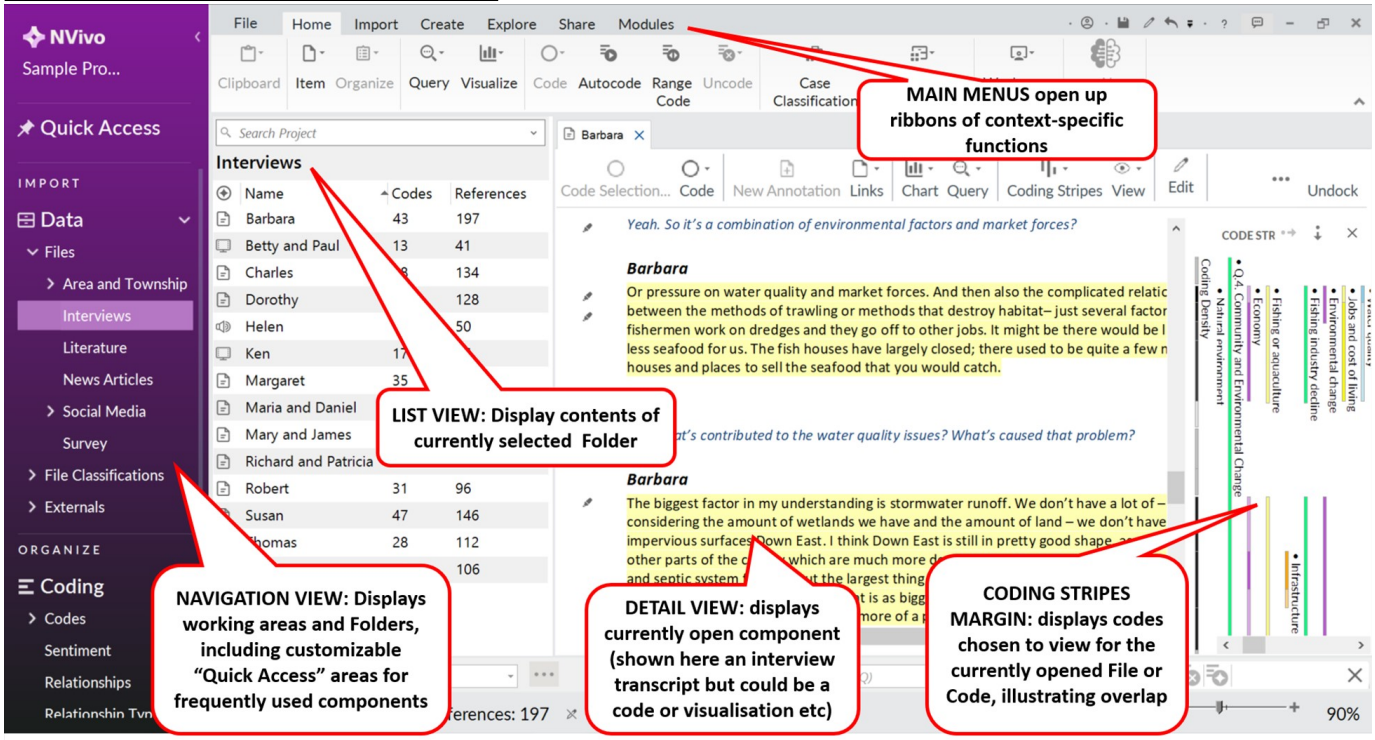
Recommended System Specifications (recommended by developer) Windows version 3.0 GHz dual-core processor or faster. 64-bit support only ■ 8 GB RAM ■ 1920 x 1080 screen resolution or higher ■ Microsoft Windows 10 or later ■ At least 8 GB of available hard-disk space ■ Internet connection ■ For NCapture: Google Chrome 44 or later ■ For the NVivo Add-In for OneNote: Microsoft OneNote (2007 or 2010) and Microsoft Word (2007 or 2010) ■ Mac version: Mac computer with an Intel Core i5, Core i7, or Xeon processor ■ Mac OS X 10.13 (Monterey) or later ■ 8GB of RAM ■ 1440 x 900 screen resolution ■ 8GB SSD of available disk space ■ Internet connection ■ For NCapture: Google Chrome 44 or later ■ NVivo Collaboration Cloud: 1.4 GHz Pentium 4-compatible processor or faster ■ Microsoft Windows Server 2012 R2 (with update KB2919355 installed), 2016, or 2019 (Web editions of Windows Server are not supported) ■ 2 GB RAM ■ 10 GB of available hard-disk space ■ x64-compatible (64-bit only) processor. Itanium (64-bit) processors are NOT supported. ■ NVivo Integration: Internet connection required.

Structure of work in NVivo 15 Data are imported into an NVivo project such that one project file contains everything, unless working with multi-media when it is recommended to keep large files 'un-embedded' to reduce project file size and increase processing speed, or when using the 'Externals' Files feature that links to websites or locally stored files ■ The NVivo interface contains a customizable navigation view and context specific ribbons ■ NVivo handles Unicode data, therefore text in most languages including character-based languages (e.g. Japanese, Mandarin) can be displayed. There are limitations to working in languages written left to right, such as Arabic ■ The user interface can be displayed in English, French, German, Spanish, Japanese, Portuguese or Simplified Chinese (Windows only) ■ The main workspace (see Figure 1.) comprises the Navigation View (providing access to project folders e.g. Data, Codes, Maps, Queries etc.); the List View (listing items within each folder); and the Detail View (where the content of an item is displayed) ■ Functions can also be accessed via main menu ribbons ■ Various aspects of the user interface can be customized according to preference ■ Multi-level 'undo' function allows recent steps to be re-traced.

Data types and format in NVivo 15 Various forms of text, audio/video, graphic and spreadsheet/survey formats can be imported into NVivo projects ■ See Lumivero website for full list of supported formats ■ Material can be directly imported from other programs, including Survey Monkey, Qualtrics, EndNote, RefWorks, Zotero, Mendeley, MS Outlook, EverNote, OneNote, and Citavi ■ NCapture is a browser add-on designed for NVivo to capture web-content for import.

Closeness to data and interactivity in NVivo 15 Files are viewed in the Detail View ■ Tabs provide quick access to multiple opened Files, which can be 'undocked' for side-by-side display ■ Text does not line wrap ■ Viewing coded data initially lifts segments out of source context ■ Hyperlinks provide in-context highlighting of coded segments within original files ■ Linking devices (see below) increase integration between project items.

Figure 1. The NVivo 15 User Interface



Coding scheme in NVivo 15 Codes are stored in the 'Coding' area and can be as hierarchical as required ■ Folders store different types of Code. In addition to user-created Codes are Sentiment Codes that can optionally capture attitudes in data, and Relationships that can be used to indicate relations between other codes (Mac version does not include all types of code) ■ Sub-folders can be created to organise codes ■ Contents of folders are viewed in the corresponding List View ■ Codes can be used for storing conceptual categories and other purposes ■ Codes can be moved within and between folders, merged, renamed, recoded, aggregated, and assigned colour ■ Relationships (Windows only) connect project items and can act as Codes themselves i.e. the 'evidence' for the relationship they express can be coded at them ■ Static Sets and Dynamic Sets, which operate as short-cuts, enable the grouping of Codes (and/or other project items) from multiple folders in additional ways.

Coding processes in NVivo 15 There are several ways to code, e.g. 'drag and drop', 'In Vivo' coding, auto-coding, Text Search coding and coding on basis of query results ■ The Detail View-based 'Code Panel' and 'Code' button allow for coding at existing codes. The Quick Coding bar and the Ribbon can be used to create new codes and to code at recently used codes ■ Auto-code by paragraph styles for inherent structure (e.g. broad topic areas in semi-structured interviews or standardized interview questions) and by speaker within text Files ■ Auto-code using Natural Language Processing (NLP) capabilities, by Theme, Sentiment or existing coding patterns ■ AI Assistant suggests "Child"/sub codes from references coded at "parent"/ top-level codes, on request ■ Codes can also be created by importing e.g. from spreadsheet containing open-ended questions or social media datasets.

Basic retrieval of coded data in NVivo 15 Straightforward retrieval of coded data happens by opening a Code and viewing content in the Detail View ■ Detail Views are 'live', allowing re-coding, annotating and linking without returning to the source context ■ Side tabs offer alternative visualisations of Detail View content – options vary according to data type ■ Coding stripes display coding visually, sequentially throughout a data file, or associated with data coded in a particular way, or in a particular section, via a margin display (see Figure 1.). Colour assigned to Codes can be shown in the Coding Stripes view ■ A 'coding density bar' shows concentrations of coding and co-occurrence with other Codes ■ 'Highlight coding' shows content coded at particular groups of codes, with highlight colour corresponding to that of the codes.

Data organisation in NVivo 15 Factual organization happens via Classification Sheets that enable Attribute-Values to be associated with Files or Cases ■ Where a File pertains to an exclusive entity (e.g. unit of analysis) the use of File Classifications is sufficient ■ For more complex research designs (e.g. where different speakers occur within a File,

such as in a focus-group, or where multiple files relate to the same respondent, such as with longitudinal research) Case Classifications offer more flexibility ■ Cases contain qualitative data from units such as people, places and organisations, to which known attribute values (e.g. demographic data) can be associated ■ Attributes and their values can be imported from a text file or spreadsheet and associated with Files or Codes ■ Dynamic Sets can be created on the basis of Attributes and other data, and used to gather project items relating to a particular project sub-set.

Writing tools in NVivo 15 The Notes area of the Navigation stores reflections made in several spaces ■ Memos are a type of Note that can be created at any time or imported. Memos can be linked to one existing File, Code or Case and their content can be coded like any other File ■ Annotations are comments linked to segments within Files. They can be outputted along with raw or coded data as endnotes and are centrally listed in the Annotations folder in Notes ■ Framework Matrices were designed to support Framework Analysis but can be used for a range of other purposes, providing a way of summarizing coded data in a tabular format of cases by themes (Codes). AI Assistant can be used to generate summaries of coded content in Framework Matrices ■ See Also Links: References (data segments) within Files can be linked to other references within the same or another File ■ All project items have Description fields where the function of the item can be defined.

Searching and interrogating the dataset in NVivo 15 Eight types of Query ■ Text Search Query for finding individual or collections of words and phrases ■ Word Frequency Query for counting words (and optionally synonyms) across all Files, or subsets, providing limited Key Word In Context (KWIC) retrieval ■ Coding Query: simple queries to find e.g. where cases with a particular attribute are coded at a particular Code, or advanced queries allow searching for position of Codes in the data (e.g. Boolean or Proximity operators) ■ Matrix Coding Query compares pairs of project items and displays in a table ■ Compound Query searches for specified text in or near coded data ■ Coding Comparison Query reports percentage coder agreement, and, optionally, Kappa coefficients, facilitating comparison of how different team members have coded Files. ■ Group Query to find associated project items ■ Crosstab Query to find occurrence of coding across cases and attributes and to generate descriptive statistics, boxplots, and principal component analysis (PCA) biplot visualisation ■ Queries can be scoped to individual or multiple Files, Codes, Folders, and Sets ■ Query Results can be previewed, saved and outputted as snapshots ■ Queries can be saved and re-run ■ Coding Matrices are where the results of Matrix Queries (see Figure 2) can be stored.

Linking devices in NVivo 15 Three types of Linking device ■ Memo Links: Link a Memo to one other entire project item (another File, External, Code, Relationship, Case, Framework Matrix) ■ See Also Links: (see above) ■ Hyperlinks: Link data segments to externally held files or websites ■ Note - Annotations (see above) and Relationship Codes (see above) are sometimes referred to or thought of as linking devices. In addition, Connectors are ways of linking project items within Maps (see below) but they operate differently because they only exist within Maps.

Mapping in NVivo 15 Three types of Maps ■ Mind Maps are designed to brainstorm ideas and have a 'central idea' from which other ideas branch. Codes can be created from the ideas created in Mind Maps ■ Concept Maps are designed to express connections between concepts and data. Existing project items can be added to Concept Maps and linked using connectors ■ Project Maps (Windows only) display the items and links in an NVivo project according to work done elsewhere ■ Underlying data can be accessed from project items within Maps.

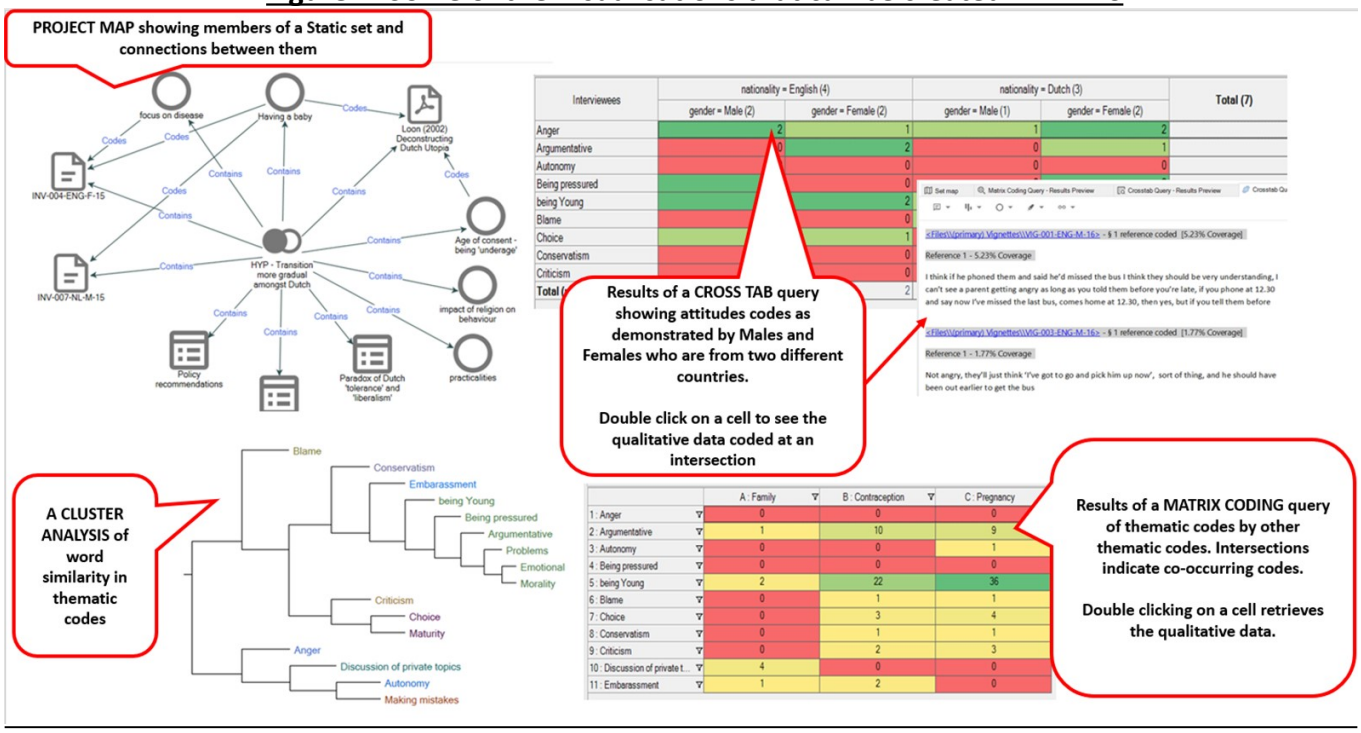
Other visualisation tools in NVivo 15 Various additional ways to visualise connections, ideas and findings ■ Charts (e.g. column, bar, pie) show different aspects of a project, e.g. items associated to a Code, File or other item ■ Tree maps and Sunburst maps hierarchically visualise relative volumes of coded data ■ Cluster analysis tools group data according to similarity using various visualisations, e.g. 2D and 3D Cluster Maps, Dendograms, and Circle Graphs. Similarity metrics (Pearson correlation, Jaccard's, and Sørensen's coefficients) are available ■ Comparison Diagrams visualise the similarities and differences between two project items ■ Explore Diagrams show all the associations of an individual project item ■ Word clouds and Word trees, respectively, display frequently occurring and searched-for words in selected Files or Codes. Surrounding context can be accessed from Word Clouds and Word Trees and they can be outputted as graphics ■ Geovisualisation of social media data captured using NCapture ■ Coding enhancements help visualise Sociograms e.g. based on "X" (formally Twitter) and MS Outlook data or groups of cases and their relationships.

Generative-AI features in NVivo 15 Lumivero's AI Assistant is an add-on module offering several tools allowing users to utilize generative artificial intelligence drawing OpenAI's models ■ Summarize Text summarizes a user-selected

segment of text data, which are stored as Annotations, and can be generated in various languages and different lengths. Coded data can also be summarized using AI Assistant in Framework Matrices in tables ■ AI Summarize summarizes Files, Codes and Cases and summaries can be stored as linked memos in different languages and lengths ■ Suggest Child Codes creates a list of subcode suggestions and related references for all the content coded with a specific code. Choose whether to accept just the child code suggestions or to also code to them (based selected contexts). ■ AI Assistant's features can be disabled via a Registry Key.

Output in NVivo 15 Project items e.g. Files or Codes can be printed or exported in several qualitative and quantitative formats (e.g. .rtf, .docx, .pdf, .xls, .html, xml) ■ Formatted Reports summarize elements of a project (e.g. Project summary, File summary, Code summary, Coding Reports) ■ Text reports allow specific content to be identified for outputting ■ Tables and graphic visualizations can be outputted in different formats ■ Coding frequencies across cases can be exported as Excel file for further statistical analysis.

Figure 2. Some of the Visualisations that can be created in NVivo



Team working in NVivo 15 Several features for working collaboratively if using the standalone installation ■ Users split work and import projects into one another (a 'merge' process) ■ The Event log automatically records changes to a project, keeping track of each user's actions ■ Contributions can be viewed after separate projects are merged ■ See who created a project item, last modified it and the content team members' have coded ■ Coding stripes can be used to view and compare coding undertaken by different users ■ Queries can be run on work completed by different users (e.g. query all the coding undertaken by one team member) ■ 'Coding comparison' queries can show the percentage of coding agreement or disagreement amongst teams and researchers can opt for results to include Kappa coefficients, a measurement of coding reliability.■ NVivo Collaboration Cloud allows cross-platform and concurrent team-working.

Comment on NVivo 15

The Mac version is still not yet fully equivalent *to the Windows version which can cause issues for users who need to cross platforms. However, the Collaboration Cloud options facilitate concurrent team-working in NVivo, including across operating systems, which is welcome for may users.*

The addition of the AI Assistant is one of the main differences in functionality between version 15 and version 14, *allowing for selected text, textual files, codes, cases to be summarised into Annotations/Memos and into Framework*

Matrices and suggestions for sub-codes based on existing coded references. The ability to create and store AI Summaries and AI Child Code suggestions in multiple languages is welcomed by some researchers.

***NVivo Transcription** is one of many solutions for users requiring automated transcriptions of audio/video. These still need to be checked for content accuracy; however the service ensures the appropriate formatting for efficient use in NVivo software which streamlines the process.*

***The Codes stripes margin display** is interactive and can be filtered. The coding density stripe is unique to NVivo and analytically useful. Also useful is the flexibility to select codes to view in the margin of coded data, offering simple ways of visually exploring overlaps in coding without building complex queries. That coded text highlighting takes on the colour assigned to the code, is welcomed. The full benefit of being able to display coding stripe labels in the coding margin both horizontally and vertically is felt by users with large screens or those who work with undocked Detail Views, as the horizontal display requires more space.*

***Static Sets** are flexible in NVivo. The ability to add items of different types (e.g. codes and files and query results) to the same Static Set is particularly useful providing easy ways to isolate parts of a project, or to group aspects of work together for many different analytic or practical reasons. However, not all project items can be added to Static Sets (e.g. Maps) and this can be restrictive in analytic terms. We hope to see Mac users being able to add Static Sets to Matrix coding queries in the future.*

***The query tools** are extremely flexible, and the range of query result visualisations is good. Matrix queries offer powerful ways of conducting multiple searches at one time and accessing qualitative and quantitative results concurrently. Crosstab queries helpfully allow simultaneous interrogation of codes by two groups of attribute values or cases. The ability to save the way queries are built provides a useful history of repeatable interrogations.*

***Linking tools** are not as versatile as in many other CAQDAS packages. While it is possible to hyperlink between points in the text, because of the way linkages are presented in the data, for practical reasons it is difficult to use this tool extensively as linkages cannot be tracked easily. The inability to link a memo to more than one other project item is restrictive. **Relationships,** however, provide alternative ways of coding and linking which suit certain types of analysis particularly well, for example when hypothesis testing, for visually representing identified patterns or as an additional layer of coding. We hope to see this feature enabled for Mac users in the future.*

***Visualisation tools** provide useful ways to summarize different aspects of work. Maps allow the creation of connections which need not affect any other aspect of work. We look forward to Mac users having access to Project Maps in the future. The Chart tool is easy to use and versatile, offering a range of useful ways to visualise how data has been coded. A variety of charts and tables can be created, and they are interactively connected to data. The Matrix Query result is particularly versatile.*

***The automated coding tools** including AI Assistant: suggest Child Codes and auto-coding by sentiment or theme offer alternative ways to explore the content of data. However, the lack of ability to determine the basis upon which the latter two tools function is restrictive and means significant amount of cleaning up is needed. Their value is therefore limited in comparison to similar tools in other CAQDAS packages. Auto-coding for speakers is a very easy way of creating cases to represent units of analysis, requiring limited data preparation. When more than one level of analytic unit needs to be auto-coded, this is enabled by the additional use of Heading levels, which offers unique opportunities to capture multiple levels of structure in qualitative data.*

***Handling non-textual data directly** offers options to create indirect, parallel (possibly synchronized) notes alongside the media. Multimedia dimensions in NVivo currently provide a useful range of tools allowing the user to work directly (coding, annotating the media) or indirectly (coding/annotating notes about the media).*

***Output options** are varied, and content can be specified in several ways, but Formatted and Text Reports take time to familiarise with, and it can be difficult to achieve the desired result. Output can be created in several formats.*

Further Reading

- Bulloch, S. L., Silver, C. & Fielding N. (2017) Using Computer Packages in Qualitative Research: exemplars, developments and challenges in (eds.) Willig, C. & Stainton-Rogers, W. **The SAGE Handbook of Qualitative Research in Psychology.** SAGE
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- di Gregorio, S & Davidson J (2008) **Qualitative Research for Software Users**, McGraw Hill, Open University Press
- Lewins, A. (2015) 'Computer Assisted Qualitative Data Analysis (CAQDAS)' in (eds.) N. Gilbert & P. Stoneman **Researching Social Life** (4th edition), Sage, London
- Silver & Lewins (2014) *Using Software in Qualitative Research: A Step-by-Step Guide*, 2nd Edition, SAGE Publications

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