```
>> [data, model, estimation, misc] = OpenBDLM_main;    Step 1: Start
                                                        OpenBDLM
_____

      Starting OpenBDLM_V1.0
_____

            Time series analysis using
            Bayesian Dynamic Linear Models
_____
— Start a new project:

      *      Enter a configuration filename
      0    —> Interactive tool

— Type D to Delete project(s), V for Version control, Q to Quit.

    ( choice >> 0 )    Step 2: Choose the interactive tool


_____

          Starting a new project...
_____


— Enter a project name (max 25 characters):
    ( choice >> Example_DISP )    Step 3: Enter the project name

— Does this project aim to create synthetic data ? (y/n)
    ( choice >> no )    Step 4: Disregard generating synthetic data

      Load data...

— Choose a database

      0    —> Build a new database

    ( choice >> 0 )    Step 5: Load new data

— Data available:

    Time series number #        Reference name            Size
    _____

    1                           DISP                      [19366x1]
    _____


    — How many model classes do you want for each time-series?
    ( choice >> 1 )    Step 6a: Select the number of model classes
```

```
    _____

    BDLM Component reference numbers
    _____

    11: Local level
    12: Local trend
    13: Local acceleration
    21: Local level compatible with local trend
    22: Local level compatible with local acceleration
    23: Local trend compatible with local acceleration
    31: Periodic
    41: Autoregressive process (AR(1))
    51: Kernel regression
    61: Level Intervention
    _____


―  Identify components for time series #1; e.g. [11 31 41]
    choice >> [11 31 31 41]    Step 6b: Select the block components

    Building model...
    Saving project...
    Project saved in saved_projects/PROJ_Example_DISP.mat.
    Printing configuration file...
    Saving data...

    Database saved in data/mat/DATA_Example_DISP.mat
    Configuration file saved in config_files/CFG_Example_DISP.m.



    _____

/    OpenBDLM main menu. Choose from
_____


    1  ―>  Learn model parameters values
    2  ―>  Estimate initial hidden states values
    3  ―>  Estimate hidden states values

    11 ―>  Display and modify current model parameter values
    12 ―>  Display and modify current initial hidden states values
    13 ―>  Display and modify current training period
    14 ―>  Plots
    15 ―>  Display model matrices
    16 ―>  Create synthetic data
    17 ―>  Export
    18 ―>  Display current options in configuration file format
```

```
      Type Q to Save and Quit

      choice >> 1

_____

/ Learn model parameters
_____


    1 —>  Newton—Raphson
    2 —>  Stochastic Gradient Ascent

    Type R to return to the previous menu

   ( choice >> 1 )   Step 7b: Start the Newton-Raphson algorithm

    Learning model parameters (Newton—Raphson) ...

   \Start Newton—Raphson maximization  algorithm
   (finite difference method)

     Training period:                          1—Inf [days]
     Maximal number of iteration:              3
     Total time limit for calibration :        60 [min]
     Convergence criterion:                    1e—07*LL
     Nb. of search levels for \lambda:         4*2

         Initial LL: 36627.6547
                      AR|M1|1         AR|M1|1       |M1|1
     parameter names: \phi            \sigma_w      \sigma_v
      initial values: +7.50e—01       +1.74e—02     +8.70e—03
_____
    Loop #1 : AR|M1|1 | \sigma_w
       delta_param: 0.0048527
    log—likelihood : 40472.2846
    param change    : 0.0174 —> 0.022253


                   AR|M1|1         AR|M1|1        |M1|1
   parameter names: \phi            \sigma_w       \sigma_v
    current values: +7.50e—01       +2.23e—02      +8.70e—03
 current f.o. std: +0.00e+00       +5.63e—05      +0.00e+00
     previous dLL: +1.00e+06       +3.84e+03      +1.00e+06
        converged: +0.00e+00       +0.00e+00      +0.00e+00


_____
```

```
    Loop #2 : AR|M1|1 | \phi
        delta_param: 0.16243
      log-likelihood : 46976.3494
      param change    : 0.75 --> 0.91243

                       AR|M1|1        AR|M1|1        |M1|1
    parameter names: \phi            \sigma_w        \sigma_v
      current values: +9.12e-01      +2.23e-02      +8.70e-03
   current f.o. std: +1.94e-03       +5.63e-05      +0.00e+00
       previous dLL: +6.50e+03       +3.84e+03      +1.00e+06
          converged: +0.00e+00       +0.00e+00      +0.00e+00

_____

    Loop #3 : |M1|1 | \sigma_v
        delta_param: -0.0056165
      log-likelihood : 47795.5556
      param change    : 0.0087002 --> 0.0030837

                       AR|M1|1        AR|M1|1        |M1|1
    parameter names: \phi            \sigma_w        \sigma_v
      current values: +9.12e-01      +2.23e-02      +3.08e-03
   current f.o. std: +1.94e-03       +5.63e-05      +2.02e-04
       previous dLL: +6.50e+03       +3.84e+03      +8.19e+02
          converged: +0.00e+00       +0.00e+00      +0.00e+00

        Warning: the optimization has reached the
        maximum number of loops (3) without convergence

 _____

    Final results
 _____

   log-likelihood: 47795.5556
                    AR|M1|1        AR|M1|1        |M1|1
 parameter names: \phi            \sigma_w        \sigma_v
   current values: +9.12e-01      +2.23e-02      +3.08e-03
 current f.o. std: +1.94e-03       +5.63e-05      +2.02e-04

_____
/     OpenBDLM main menu. Choose from
_____
```

(choice >>   2) Step 8: Estimate the initial hidden states values

```
 _____
/     OpenBDLM main menu. Choose from
```

```
_____

      choice >> 3    Step 9a: Access hidden states estimation menu

_____
/    State estimation
_____


      1 →  Filter
      2 →  Smoother

      Type R to return to the previous menu

      choice >> 1    Step 9b: Estimate the hidden states

_____
/    OpenBDLM main menu. Choose from
_____


      choice >> 17    Step 10a: Access the export menu

_____
/    Export menu
_____


      1 →  Export the project in a configuration file
      2 →  Export data in CSV format
      3 →  Export results in CSV format
      4 →  Create and export figures

      Type R to return to the previous menu

      choice >> 1    Step 10b: Export the project in a configuration file
      Printing configuration file...
      Saving data...
      Database saved in data/mat/DATA_Example_DISP.mat
      Configuration file saved in config_files/CFG_Example_DISP.m.


_____
/    OpenBDLM main menu. Choose from
_____

      choice >> Q    Step 11: Save and quit
```