Användargränssnitt för proaktiv störningshantering för utilities

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2012

Document Version:
Förlagets slutgiltiga version

Citation for published version (APA):
Carlson, M. (2012). *Användargränssnitt för proaktiv störningshantering för utilities*. (Technical Reports TFRT-7623). Department of Automatic Control, Lund Institute of Technology, Lund University.

Total number of authors:
1

ISSN 0280-5316
ISRN LUTFD2/TFRT--7623--SE

Användargränssnitt för proaktiv störningshantering för utilities

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August 2012

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Document name
Internal Report

Date of issue
August 2012

Document Number
ISRN LUTFD2/TFRT--7623--SE

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Sponsoring organization

Title and subtitle
Användargränssnitt för proaktiv störningshantering för utilities

Abstract

Keywords

Classification system and/ or index terms (if any)

Supplementary bibliographical information

ISSN and key title
0280-5316

ISBN

Language
Swedish

Number of pages
1-27

Recipient's notes

Security classification

Innehåll

Syfte

Syftet med detta projekt har varit att skapa ett Grafical User Interface (GUI) i Excel för Utility Disturbance Management (UDM) i en process industri.

Användarmanual

1.

I steg 1 kan man ladda in ny data på två sätt beroende på om man använder sig av Mac eller PC.

PC:

1. Tryck på "Clear old data from worksheet"
2. Spara och stäng exceldokumentet (UserInterface-UDM.xlsm)
3. Starta Matlab och kör i tur och ordning m-filerna "import123" och "load123".
   När man kör "import123" så öppnas en browser och man får välja vilken data man vill ladda in. När man kör "load123" så laddas datan in i GUI:t, samt number of utilities (nu) ocn number of samples (ns). Här är det viktigt att m-filerna tillsammans med GUI:t (UserInterface-UDM.xlsm) ligger i samma directory.
4. Starta sedan exceldokumentet igen (UserInterface-UDM.xlsm)

Mac:

1. Tryck på "Clear old data from worksheet"
2. - (behöver ej stänga Excel-dokumentet)
3. Starta Matlab och kör i tur och ordning m-filerna "import123" och "load123_Mac".
   När man kör "load123_Mac" skapas en CSV-fil med namnet data.csv. Öppna flik "Data 2" i GUI:t, markera ruta A1 och välj "Import..." i File-menyn. Tryck "Import" (CSV-fil är markerat) och välj filen "data.csv". Tryck "Finish" och "OK".
4. Skriv in number of utilities (nu) och number of samples (ns) manuellt.

2.

I detta steg väljer man number of areas (na) och samplings intervallet (ts), alltså hur ofta mätningarna har gjorts. Oavsätt om nu och ns har skrivts in automatiskt eller manuellt så är det en förutsättning att dessa inte ändras på för att analysen ska gå att genomföra.
När alla dimensioner är valda trycker man på OK.

3.

I detta steg kan man välja att skriva in namnet på de utilities och produkter som är valda. När detta är gjort trycker man på OK. Det går även att hoppa över detta steg och trycka på OK med en gång. Alla utilities och produkter kommer då istället att anges som siffror, vilket är default.

4.

I detta steg skriver man in information om varje produkt, i form av kvantitet (qm) och marginal (p).

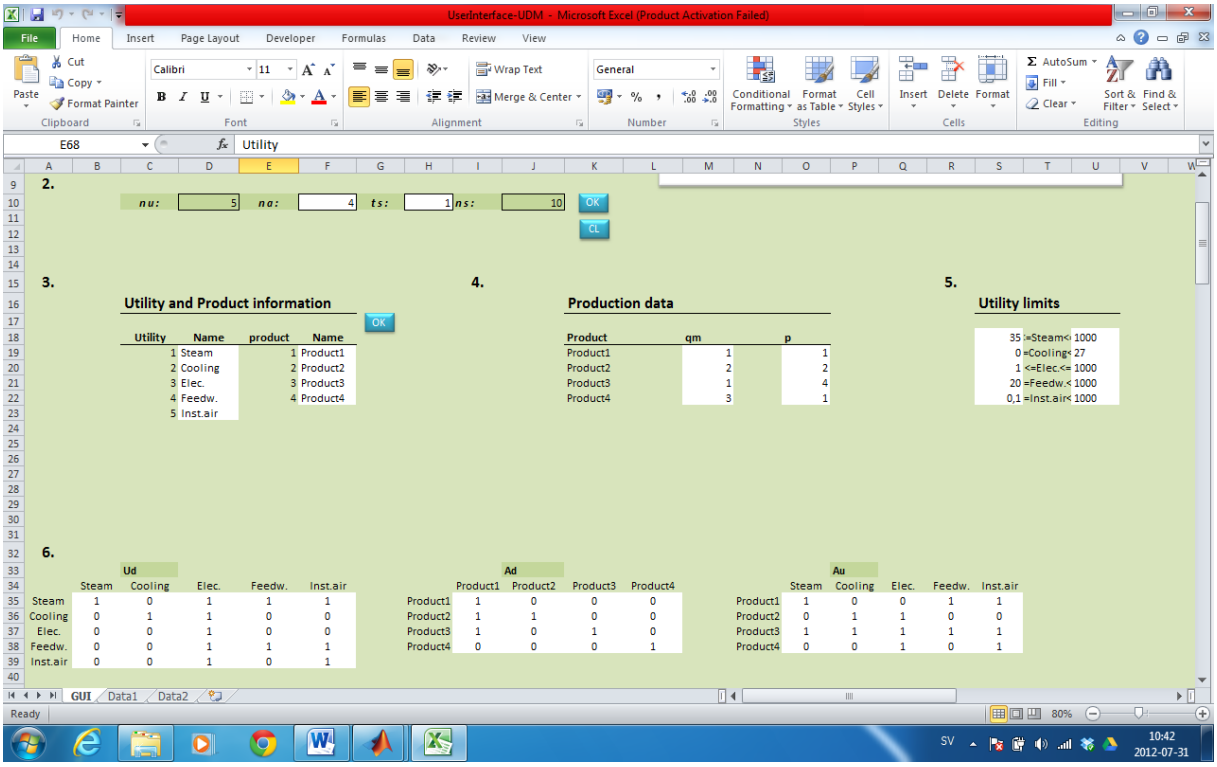
5.

I detta steg ställer man in utility limits, alltså inom vilket interval varje utility är igång.

6.

I detta steg fyller man i matriserna, utility dependence (Ud), area dependence (Ad) och area-utility dependence (Au).

När steg 3-6 är gjorda ska det se ut på följande sätt:

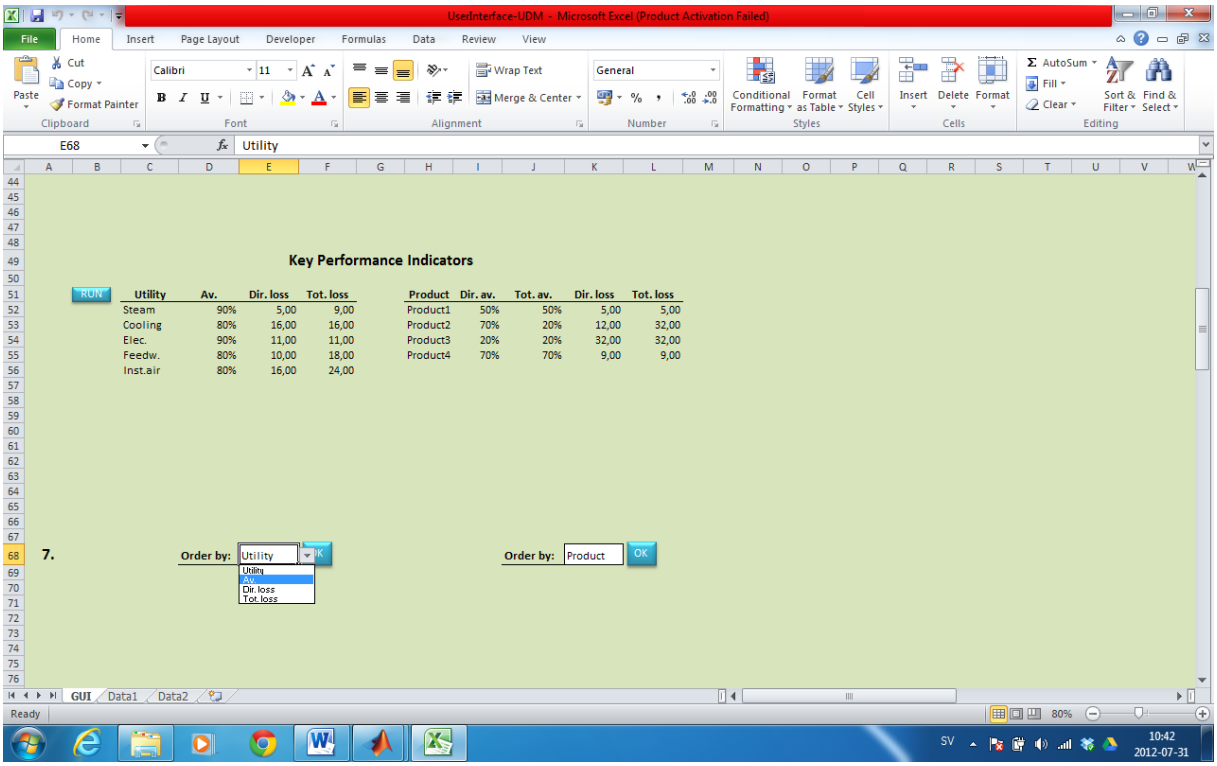


Figur 1

För att sedan köra själva analysen så trycker man på knappen "RUN", som finns till vänster om rubriken "Key Performance Indicators".

7.

När anlysen är gjort kommer resultatet upp under rubriken "Key Performance Indicators". I steg 7 finns då möjligheten att sortera i storleksordning efter olika parametrar, såsom utility/product, availability och dir loss, som man kan välja mellan i en lista (se figur 2). När detta är gjort så trycker man på OK.



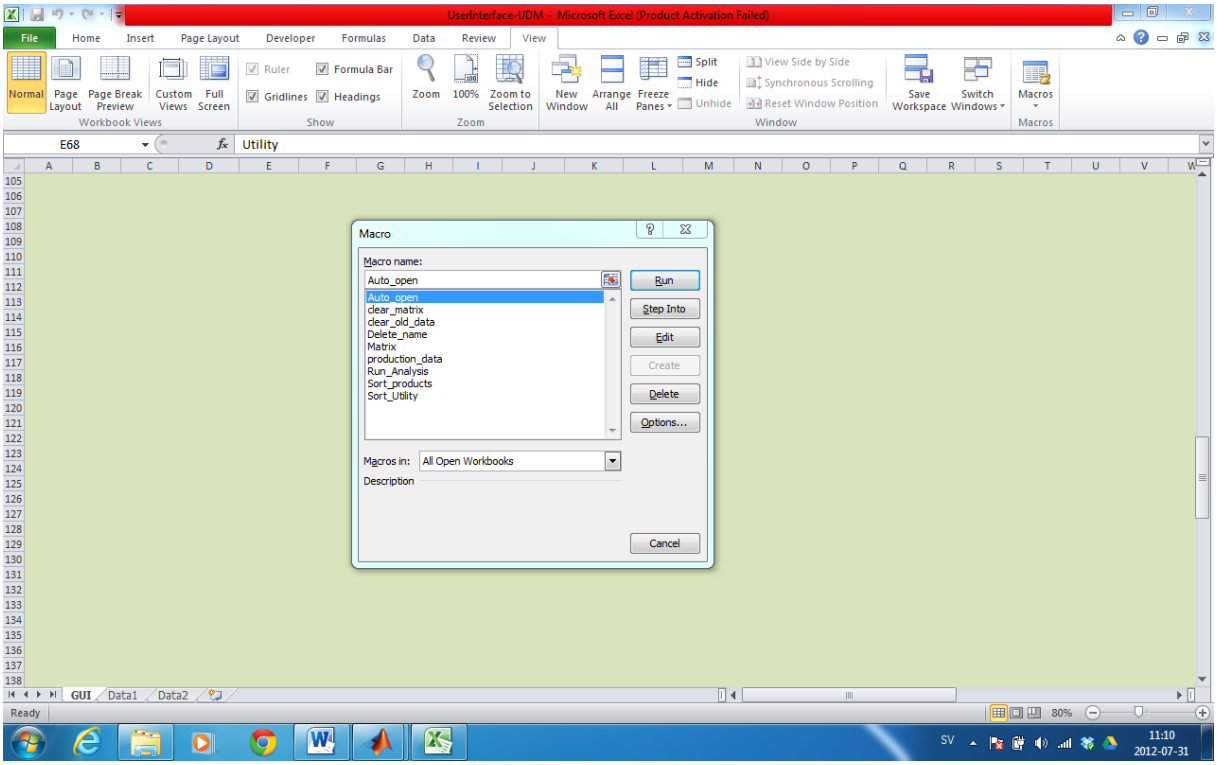
Figur 2

När anlaysen är gjord kan man gå tillbaka till steg 2 och trycka på knappen "Cl" för att börja om från början. Eller så kan man gå tillbaka till steg 3,4,5 och ändra information, för att sedan trycka "RUN" en gång till, om man hellre vill göra små ändringar än att börja om helt från början.

Programkod

I Excel skapas all kod i ett program som heter Visual Basic for Applications (VBA). I detta program är det vanligast att man väljer att dela upp koden i olika makron för att då ha möjlighet att exekvera delar av koden med hjälp av exempelvis knappar. Detta gör det väldigt fördelaktigt att skapa ett GUI i Excel.

Väljer man ”View” och sedan ”Macros” så kommer en lista upp (se figur 3) med alla makro som är skapade i exceldokumentet.

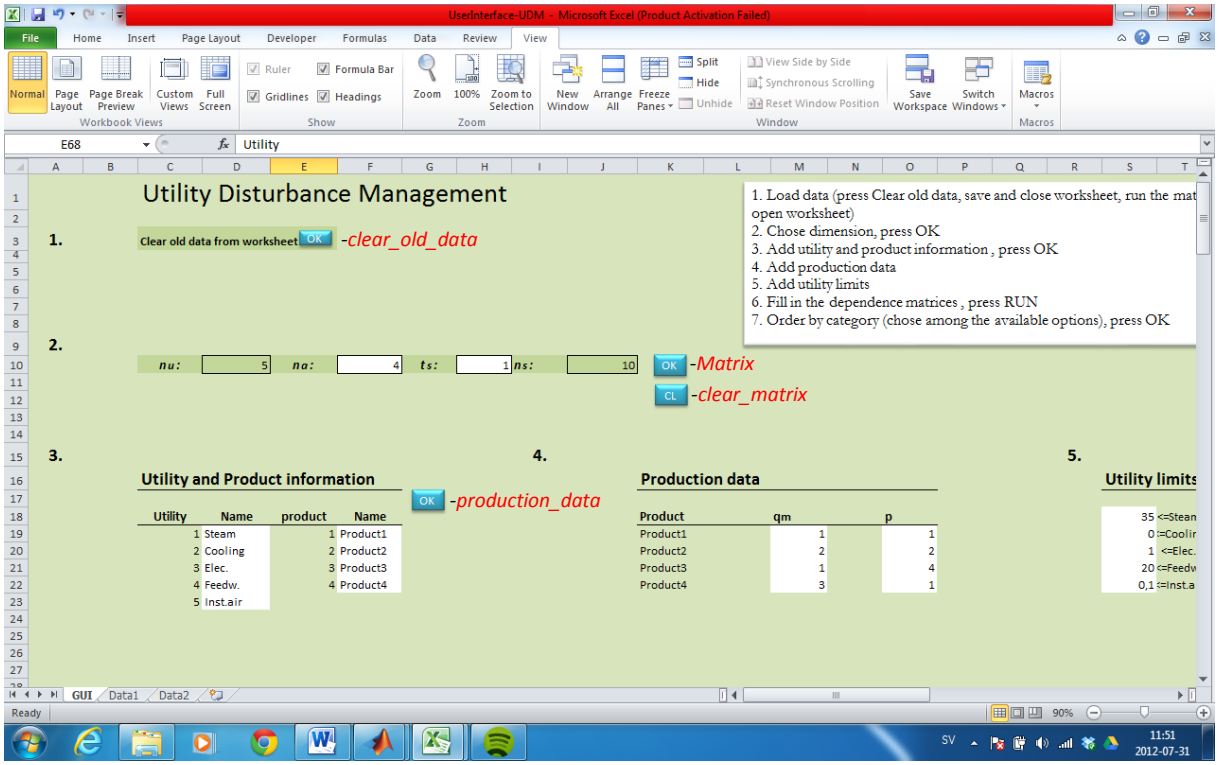


Figur 3

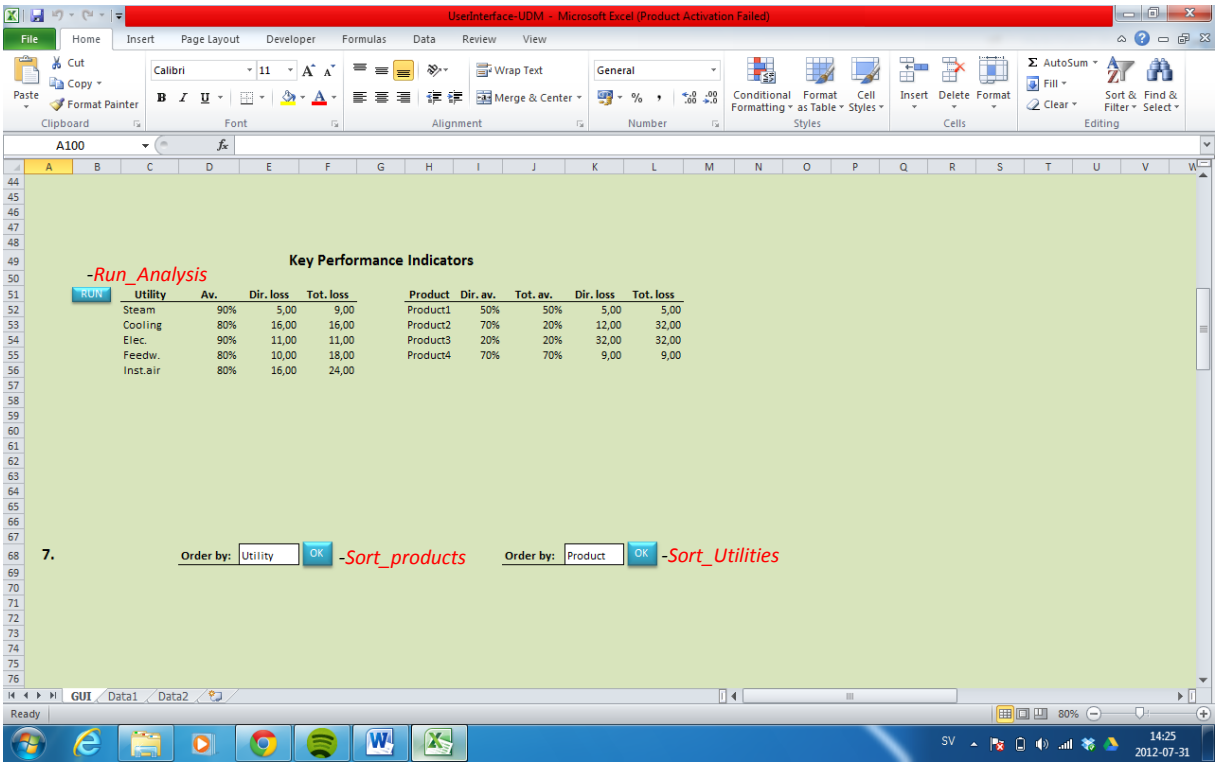
Alla makron sparas i en eller flera moduler och i det här fallet så ligger samtliga makron i modul2. Vill man redigera ett makro så markerar man ett i listan och trycker på edit.

- *Auto_open:* Gör så att det första Excel arket (GUI) alltid visas då UserInterface-UDM.xlsm öppnas oavsett i vilket ark den var sparad senast.
- *clear_matrix:* Återställer GUI:t till default läge.
- *clear_old_data:* Raderar alla rådata från GUI:t.
- *Delete_name:* Raderar namnen på alla områden som Excel skapar då analysen genomförs.
- *Matrix:* Återställer GUI:t till default läge och skapar sektion 3.
- *production_data:* Skapar sektionerna 4-6.
- *Run_Analysis:* Gör analysen.
- *Sort_products:* Sorterar produkterna efter ett antal olika parametrar i steg 7.
- *Sort_Utilities:* Sorterar utilities efter ett antal olika parametrar i steg 7.

Figur 4 och 5 visar vilket makro som är kopplat till varje knapp.



Figur 4



Figur 5

Appendix A

Module2 - 1

```
Sub Matrix()
Application.ScreenUpdating = False

Dim xrow As Integer
Dim nr_samples As Integer

xrow = Cells(10, 4).Value
nr_samples = Cells(10, 10).Value

Dim Rng As Range

'-----------------Load data from Data2--------------------------

Sheets("Data2").Select

Cells(1, 1).Select



ActiveSheet.UsedRange.Select
Set Rng = Selection

ActiveWorkbook.Names.Add Name:="Radata", RefersTo:=Rng

Cells(100, 1).Select
Sheets("GUI").Select

'-----------------Clear old contents-------------------------


Range("A33:AV48").Select
    Selection.ClearContents
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.599993896298105
        .PatternTintAndShade = 0
    End With

Range("C19:F32").Select
    Selection.ClearContents
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.599993896298105
        .PatternTintAndShade = 0
    End With

    Range("K19:O32").Select
    Selection.ClearContents
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.599993896298105
        .PatternTintAndShade = 0
    End With

    Range("S17:U32").Select
    Selection.ClearContents
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.599993896298105
        .PatternTintAndShade = 0
    End With

     Cells(200, 1).Select
    Selection.ClearContents

'-----------------Making Utility and Product information-------------------------
```

```
Module2 - 2


Dim yrow As Integer


yrow = Cells(10, 6).Value

    For utilitynr = 1 To xrow
    For productnr = 1 To yrow
    Cells(18 + utilitynr, 3) = utilitynr
    Cells(18 + utilitynr, 3 + 1) = "Add"
    Cells(18 + utilitynr, 3 + 1).Select

    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorDark1
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With

    Cells(18 + productnr, 5) = productnr
    Cells(18 + productnr, 5 + 1) = "Add"
    Cells(18 + productnr, 5 + 1).Select

    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorDark1
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With
    Next
    Next

    '-----------------Making diagonal matrix used in the calculation of the Uud--------------
------------

    For a1 = 1 To xrow
    For a2 = 1 To xrow

    If a1 = a2 Then

    Cells(150 + a1, (1 + a2)) = "1"

    Else
    Cells(150 + a1, (1 + a2)) = "0"
    End If

    Next
    Next


 Range("A100").Select
Application.ScreenUpdating = True


End Sub
Sub clear_matrix()
'

Application.ScreenUpdating = False
On Error Resume Next
'
Sheets("Data2").Select
Cells(200, 1).Select
Sheets("GUI").Select

    Range("A33:AV48").Select
    Selection.ClearContents
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.599993896298105
        .PatternTintAndShade = 0
```

```
    End With

     Range("C19:F32").Select
    Selection.ClearContents
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.599993896298105
        .PatternTintAndShade = 0
    End With

      Range("S18:U32").Select
    Selection.ClearContents
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.599993896298105
        .PatternTintAndShade = 0
    End With

    Range("K19:O32").Select

    Selection.ClearContents
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.599993896298105
        .PatternTintAndShade = 0
    End With


      Range("B151:S185").Select
    Selection.ClearContents



    Range("C52:L67").Select
    Selection.ClearContents


    Sheets("Data1").Select
    Cells.Select
    Selection.ClearContents
    Range("A1").Select

     Sheets("Data2").Select

    Range("ONES").Select
     Selection.ClearContents

     Range("B52").Select
    Selection.ClearContents
     Range("A100").Select

    Sheets("GUI").Select

    Cells(200, 1).Select
    Selection.ClearContents

     Call Delete_name

     Cells(68, 5) = "Utility"
    Cells(68, 11) = "Product"

    Range("A100").Select

    Application.ScreenUpdating = True

End Sub

Sub Auto_open()
'
```

```
Module2 - 4

' Auto_open Makro
'

'
    Sheets("GUI").Select
    Range("A1").Select

End Sub

Sub production_data()
Application.ScreenUpdating = False



Dim products As Integer
Dim xrow As Integer
Dim Rng As Range
Dim nr_samples As Integer


products = Cells(10, 6).Value
xrow = Cells(10, 4).Value
nr_samples = Cells(10, 10).Value



Cells(200, 1).Select

'-----------------If this module already is used then this part jumps to spechandler which is
 handeling the renaming of the utilities and products --------------------------


If Application.WorksheetFunction.CountA(Selection) = 1 Then GoTo spechandler



 Cells(200, 1) = "=1"


     Range("A33:AV48").Select
    Selection.ClearContents
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.599993896298105
        .PatternTintAndShade = 0
    End With
'-----------------Making production data--------------------------


    For nrofprod = 1 To products
    Cells(18 + nrofprod, 13) = "Add"
    Cells(18 + nrofprod, 13).Select
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorDark1
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With

 Cells(18 + nrofprod, 13 + 2) = "Add"
    Cells(18 + nrofprod, 13 + 2).Select
     With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorDark1
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With

    Next
'-----------------Making Utility Limits--------------------------
```

```
Module2 - 5

     For a = 1 To xrow
     Cells(17 + a, 19) = "Add"
     Cells(17 + a, 19).Select


With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorDark1
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With

    Cells(17 + a, 21) = "Add"
    Cells(17 + a, 21).Select



With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorDark1
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With


    Next

'-----------------Making Ud Ad Au--------------------------


Dim yrow As Integer


yrow = Cells(10, 6).Value


For a1 = 1 To xrow
For a2 = 1 To xrow
For b1 = 1 To yrow
For b2 = 1 To yrow

If a1 = a2 Then

Cells(34 + a1, (1 + a2)) = "1"

Else
Cells(34 + a1, (1 + a2)) = "0"
End If

Cells(34 + a1, (1 + a2)).Select

With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorDark1
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With

    If Cells(18 + a1, 4) = "Add" Then
    Cells(34 + a1, 1) = Cells(18 + a1, 3)
    Cells(34, 1 + a1) = Cells(18 + a1, 3)
    Cells(34, 1 + xrow + 2 + a1 + yrow + 2) = Cells(18 + a1, 3)

    Else
    Cells(34, 1 + a1) = Cells(18 + a1, 4)
    Cells(34 + a1, 1) = Cells(18 + a1, 4)
    Cells(34, 1 + xrow + 2 + a1 + yrow + 2) = Cells(18 + a1, 4)

    End If
```

Module2 - 6

```
If b1 = b2 Then

Cells((34 + b1), (1 + b2 + xrow + 2)) = "1"

Else

Cells((34 + b1), (1 + b2 + xrow + 2)) = "0"
End If

Cells((34 + b1), (1 + b2 + xrow + 2)).Select

With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorDark1
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With

 If Cells(18 + b1, 6) = "Add" Then

    Cells(34, 1 + xrow + 2 + b1) = Cells(18 + b1, 5)
    Cells(34 + b1, 1 + xrow + 2) = Cells(18 + b1, 5)
    Cells(34 + b1, 1 + xrow + 2 + yrow + 2) = Cells(18 + b1, 5)
    Else
    Cells(34, 1 + xrow + 2 + b1) = Cells(18 + b1, 6)
    Cells(34 + b1, 1 + xrow + 2) = Cells(18 + b1, 6)
    Cells(34 + b1, 1 + xrow + 2 + yrow + 2) = Cells(18 + b1, 6)
    End If



Cells((34 + b1), (1 + a1 + xrow + yrow + 4)) = "0"

Cells((34 + b1), (1 + a1 + xrow + yrow + 4)).Select

With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorDark1
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With



Next
Next
Next
Next

Cells(33, 3).Select
    Selection.Font.Bold = True
    ActiveCell.FormulaR1C1 = "Ud"
    Cells(33, 3).Select
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.399975585192419
        .PatternTintAndShade = 0
    End With

Cells(33, 3 + xrow + 2).Select
    Selection.Font.Bold = True
    ActiveCell.FormulaR1C1 = "Ad"
    Cells(33, 3 + xrow + 2).Select
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
```

```
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.399975585192419
        .PatternTintAndShade = 0
    End With

Cells(33, 3 + xrow + yrow + 4).Select
    Selection.Font.Bold = True
    ActiveCell.FormulaR1C1 = "Au"
    Cells(33, 3 + xrow + yrow + 4).Select
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .ThemeColor = xlThemeColorAccent3
        .TintAndShade = 0.399975585192419
        .PatternTintAndShade = 0
    End With


spechandler:


For nrofprod = 1 To products


 If Cells(18 + nrofprod, 6) = "Add" Then

    Cells(18 + nrofprod, 11) = Cells(18 + nrofprod, 5).Value
    Else

     Cells(18 + nrofprod, 11) = Cells(18 + nrofprod, 6).Value
     End If

Next


    For a = 1 To xrow
    If Cells(18 + a, 4) = "Add" Then

    Cells(17 + a, 20) = "<=" & Cells(18 + a, 3).Value & "<="
    Else

     Cells(17 + a, 20) = "<=" & Cells(18 + a, 4).Value & "<="
     End If

     If Cells(18 + a, 4) = "Add" Then

     Cells(34 + a, 1) = Cells(18 + a, 3)
     Cells(34, 1 + a) = Cells(18 + a, 3)
     Else
     Cells(34 + a, 1) = Cells(18 + a, 4)
     Cells(34, 1 + a) = Cells(18 + a, 4)
     End If

     Next




Application.ScreenUpdating = True

End Sub


Sub Delete_name()
On Error Resume Next

ActiveWorkbook.Names("Ud").Delete
ActiveWorkbook.Names("Ad").Delete
ActiveWorkbook.Names("Au").Delete
ActiveWorkbook.Names("Identity").Delete
ActiveWorkbook.Names("U").Delete
ActiveWorkbook.Names("ONES").Delete
```

```
ActiveWorkbook.Names("ONE_NR_S").Delete
ActiveWorkbook.Names("DIAG_AVAIL").Delete
ActiveWorkbook.Names("qm_p").Delete
ActiveWorkbook.Names("Ts").Delete
ActiveWorkbook.Names("nr_samples").Delete
ActiveWorkbook.Names("Uud").Delete
ActiveWorkbook.Names("L1_1").Delete
ActiveWorkbook.Names("L1_2").Delete
ActiveWorkbook.Names("L2_1").Delete
ActiveWorkbook.Names("L2_2").Delete
ActiveWorkbook.Names("L3_1").Delete
ActiveWorkbook.Names("L3_2").Delete
ActiveWorkbook.Names("L4_1").Delete
ActiveWorkbook.Names("L4_2").Delete
ActiveWorkbook.Names("L5_1").Delete
ActiveWorkbook.Names("L5_2").Delete
ActiveWorkbook.Names("L6_1").Delete
ActiveWorkbook.Names("L6_2").Delete
ActiveWorkbook.Names("L7_1").Delete
ActiveWorkbook.Names("L7_2").Delete
ActiveWorkbook.Names("L8_1").Delete
ActiveWorkbook.Names("L8_2").Delete
ActiveWorkbook.Names("L9_1").Delete
ActiveWorkbook.Names("L9_2").Delete
ActiveWorkbook.Names("L10_1").Delete
ActiveWorkbook.Names("L10_2").Delete
ActiveWorkbook.Names("L11_1").Delete
ActiveWorkbook.Names("L11_2").Delete
ActiveWorkbook.Names("L12_1").Delete
ActiveWorkbook.Names("L12_2").Delete
ActiveWorkbook.Names("L13_1").Delete
ActiveWorkbook.Names("L13_2").Delete
ActiveWorkbook.Names("L14_1").Delete
ActiveWorkbook.Names("L14_2").Delete

ActiveWorkbook.Names("Data1").Delete
ActiveWorkbook.Names("Data2").Delete
ActiveWorkbook.Names("Data3").Delete
ActiveWorkbook.Names("Data4").Delete
ActiveWorkbook.Names("Data5").Delete
ActiveWorkbook.Names("Data6").Delete
ActiveWorkbook.Names("Data7").Delete
ActiveWorkbook.Names("Data8").Delete
ActiveWorkbook.Names("Data9").Delete
ActiveWorkbook.Names("Data10").Delete
ActiveWorkbook.Names("Data11").Delete
ActiveWorkbook.Names("Data12").Delete
ActiveWorkbook.Names("Data13").Delete
ActiveWorkbook.Names("Data14").Delete
ActiveWorkbook.Names("Adir").Delete
ActiveWorkbook.Names("Atot").Delete
ActiveWorkbook.Names("ONES_Atot").Delete



End Sub



Sub Run_Analysis()

'1 Make matrix U %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
'%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
Application.ScreenUpdating = False
On Error Resume Next

 Sheets("Data1").Select
    Cells.Select
    Selection.ClearContents


     Sheets("Data2").Select
```

```
Module2 - 9

    Range("ONES").Select
     Selection.ClearContents

     Range("B52").Select
    Selection.ClearContents
Sheets("GUI").Select
Range("C52:L66").Select
    Selection.ClearContents

    Cells(68, 5) = "Utility"
    Cells(68, 11) = "Product"


Dim xrow As Integer
Dim yrow As Integer
Dim Rng As Range
Dim nr_samples As Integer


        ' Give each row a range

xrow = Cells(10, 4).Value
yrow = Cells(10, 6).Value
nr_samples = Cells(10, 10).Value



For a = 1 To xrow


 Cells(17 + a, 19).Select

     Set Rng = Selection


ActiveWorkbook.Names.Add Name:="L" & a & "_1", RefersTo:=Rng

Cells(17 + a, 21).Select

     Set Rng = Selection


ActiveWorkbook.Names.Add Name:="L" & a & "_2", RefersTo:=Rng


Next



Sheets("Data2").Select


For a = 1 To xrow

   Range("Radata").Cells(a, 1).Select
   Range(Selection, Selection.End(xlToRight)).Select


Set Rng = Selection


ActiveWorkbook.Names.Add Name:="Data" & a, RefersTo:=Rng


Next
 Range("Radata").Select
    Selection.Copy

   Range("Radata").Cells(xrow + 2, 1).Select
    ActiveSheet.Paste
    Application.CutCopyMode = False
    Selection.FormulaArray = "=1"

    Set Rng = Selection
```

```
  ActiveWorkbook.Names.Add Name:="ONES", RefersTo:=Rng

Sheets("Data1").Select

For b = 1 To xrow


  Range(Cells(2 + b, 2), Cells(2 + b, nr_samples + 1)).Select

  Selection.FormulaArray = "=IF((Data" & b & ")>=L" & b & "_" & 1 & ",IF((Data" & b & ")<=L"
& b & "_" & 2 & ",1,0),0)"
Next

Range(Cells(3, 2), Cells(3 + xrow - 1, 2 + nr_samples - 1)).Select

Set Rng = Selection

  ActiveWorkbook.Names.Add Name:="U", RefersTo:=Rng


  ' Name Range %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
  '%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


Sheets("GUI").Select


Set Rng = Sheets("GUI").Range(Cells(35, 2), Cells(35 + xrow - 1, 2 + xrow - 1))

ActiveWorkbook.Names.Add Name:="Ud", RefersTo:=Rng

Set Rng = Sheets("GUI").Range(Cells(35, 2 + xrow + 2), Cells(35 + yrow - 1, 2 + yrow - 1 + xr
ow + 2))

ActiveWorkbook.Names.Add Name:="Ad", RefersTo:=Rng

Set Rng = Sheets("GUI").Range(Cells(35, 2 + xrow + 2 + yrow + 2), Cells(35 + yrow - 1, 2 + xr
ow - 1 + xrow + 2 + yrow + 2))

ActiveWorkbook.Names.Add Name:="Au", RefersTo:=Rng

Set Rng = Sheets("GUI").Range(Cells(151, 2), Cells(151 + xrow - 1, 2 + xrow - 1))

ActiveWorkbook.Names.Add Name:="Identity", RefersTo:=Rng




    'Calculate Uud %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%
    '%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

Sheets("Data1").Select

Range("U").Select
    Selection.Copy
   Cells(4 + xrow, 2).Select
    ActiveSheet.Paste


  Application.CutCopyMode = False
    Selection.FormulaArray = "=SIGN(U+SIGN(MMULT((Identity-Ud),(U-ONES))))"

 Set Rng = Selection

  ActiveWorkbook.Names.Add Name:="Uud", RefersTo:=Rng


    ' Utility Results %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
%%%%%%%%%
    '%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


'Beräknar Availability!!!

For D = 1 To nr_samples

Cells(104 + D, 2) = 1 / nr_samples

Next


Set Rng = Sheets("Data1").Range(Cells(105, 2), Cells(105 + nr_samples - 1, 2))

ActiveWorkbook.Names.Add Name:="ONE_NR_S", RefersTo:=Rng

Sheets("GUI").Select

Range(Cells(52, 4), Cells(52 + xrow - 1, 4)).Select

Selection.FormulaArray = "=MMULT(Uud,ONE_NR_S)"

Selection.NumberFormat = "0%"

'Tar in info om utilities

For nrofutility = 1 To xrow

 If Cells(18 + nrofutility, 4) = "Add" Then

    Cells(51 + nrofutility, 3) = Cells(18 + nrofutility, 3).Value
    Else

     Cells(51 + nrofutility, 3) = Cells(18 + nrofutility, 4).Value
     End If

Next

'Beräknar estimation of revenue loss (dir)

        '1) DIAG(I-AVAIL)
 For a1 = 1 To xrow
    For a2 = 1 To xrow
    For a3 = 1 To xrow


    If a1 = a2 Then

    Cells(166 + a1, (1 + a2)) = 1 - Cells(51 + a1, 4)

    Else
    Cells(166 + a1, (1 + a2)) = "0"
    End If

    Next

    Next
     Next

    Set Rng = Sheets("GUI").Range(Cells(167, 2), Cells(167 + xrow - 1, 2 + xrow - 1))

ActiveWorkbook.Names.Add Name:="DIAG_AVAIL", RefersTo:=Rng

        '2) qm. * p

For e = 1 To yrow

Cells(166 + e, 17) = Cells(18 + e, 13) * Cells(18 + e, 15)
```

```
Next


Set Rng = Sheets("GUI").Range(Cells(167, 17), Cells(167 + yrow - 1, 17))

ActiveWorkbook.Names.Add Name:="qm_p", RefersTo:=Rng

        'give nr_sample a range

Cells(167, 19) = nr_samples
Set Rng = Sheets("GUI").Range("H10")

ActiveWorkbook.Names.Add Name:="Ts", RefersTo:=Rng

        'give Ts a range

Set Rng = Sheets("GUI").Range("S167")

ActiveWorkbook.Names.Add Name:="nr_samples", RefersTo:=Rng

Range(Cells(52, 5), Cells(52 + xrow - 1, 5)).Select

Selection.FormulaArray = "=MMULT((MMULT(DIAG_AVAIL,TRANSPOSE(Au))),qm_p)*Ts*nr_samples"

'Beräknar estimation of revenue loss (dir)

Range(Cells(52, 6), Cells(52 + xrow - 1, 6)).Select

Selection.FormulaArray = "=MMULT((MMULT(DIAG_AVAIL,TRANSPOSE(SIGN(MMULT(Ad,Au))))),qm_p)*Ts*n
r_samples"

'Calculate Adir %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
    '%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

 Sheets("Data1").Select

Range(Cells(4 + xrow + 2 + xrow, 2), Cells(4 + xrow + 2 + xrow + yrow - 1, 2 + nr_samples - 1
)).Select

    Selection.FormulaArray = "=ONES+SIGN(MMULT(Au,U-ONES))"

 Set Rng = Selection

  ActiveWorkbook.Names.Add Name:="Adir", RefersTo:=Rng


'Calculate Atot %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
    '%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    Sheets("Data2").Select

    Dim left As Range
Dim right As Range

Set left = Range("ONES").Cells(1, 1)
Set right = Range("ONES").Cells(1 + yrow - 1, 1 + nr_samples - 1)
Range(left, right).Select

Set Rng = Selection

  ActiveWorkbook.Names.Add Name:="ONES_Atot", RefersTo:=Rng



 Sheets("Data1").Select

Range(Cells(4 + xrow + 2 + xrow + 2 + xrow, 2), Cells(4 + xrow + 2 + xrow + 2 + xrow + yrow -
 1, 2 + nr_samples - 1)).Select

    Selection.FormulaArray = "=ONES_Atot+SIGN(MMULT(Ad,Adir-ONES_Atot))"

 Set Rng = Selection

  ActiveWorkbook.Names.Add Name:="Atot", RefersTo:=Rng
```

```
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  Sheets("GUI").Select

Range(Cells(52, 9), Cells(52 + yrow - 1, 9)).Select


Selection.FormulaArray = "=MMULT(Adir,ONE_NR_S)"

Selection.NumberFormat = "0%"

Range(Cells(52, 10), Cells(52 + yrow - 1, 10)).Select


Selection.FormulaArray = "=MMULT(Atot,ONE_NR_S)"

Selection.NumberFormat = "0%"

'Tar in info om utilities


For nrofproducts = 1 To yrow


 If Cells(18 + nrofproducts, 6) = "Add" Then

    Cells(51 + nrofproducts, 8) = Cells(18 + nrofproducts, 5).Value
    Else

     Cells(51 + nrofproducts, 8) = Cells(18 + nrofproducts, 6).Value
     End If

Next

For a = 1 To yrow

T = Cells(10, 8).Value


Cells(51 + a, 11) = (1 - Cells(51 + a, 9)) * Cells(166 + a, 17) * nr_samples * T

Next

For a = 1 To yrow

T = Cells(10, 8).Value


Cells(51 + a, 12) = (1 - Cells(51 + a, 10)) * Cells(166 + a, 17) * nr_samples * T

Next

Range(Cells(52, 3), Cells(52 + xrow, 12)).Select
Selection.Copy
Range("O51").Select
    Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
        :=False, Transpose:=False

Range(Cells(52, 3), Cells(52 + xrow, 12)).Select
Selection.ClearContents

Range(Cells(51, 15), Cells(52 + xrow, 24)).Select
Selection.Copy
Range("C52").Select
 ActiveSheet.Paste
Range(Cells(51, 15), Cells(52 + xrow, 24)).Select
Selection.ClearContents

Range(Cells(52, 4), Cells(52 + xrow, 4)).Select
Selection.NumberFormat = "0%"

Range(Cells(52, 9), Cells(52 + xrow, 10)).Select
Selection.NumberFormat = "0%"
Range(Cells(52, 5), Cells(52 + xrow, 6)).Select
 Selection.NumberFormat = "0.00"
```

```
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 Range(Cells(52, 11), Cells(52 + yrow, 12)).Select
 Selection.NumberFormat = "0.00"
Range("A100").Select
Application.ScreenUpdating = True

End Sub


Sub Sort_Utility()
Application.ScreenUpdating = False
Dim xrow As Integer

xrow = Cells(10, 4).Value

Range("C51:F" & 51 + xrow).Select


If Cells(68, 5) = "Utility" Then

If Cells(19, 4) = "Add" Then


    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("C52:C" & 51 + xrow), _
        SortOn:=xlSortOnValues, Order:=xlAscending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("C51:F" & 51 + xrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With
    Else
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("C52:C" & 51 + xrow), _
        SortOn:=xlSortOnValues, Order:=xlAscending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("C51:F" & 51 + xrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With
   End If


ElseIf Cells(68, 5) = "Av." Then



ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("D52:D" & 51 + xrow), _
        SortOn:=xlSortOnValues, Order:=xlDescending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("C51:F" & 51 + xrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With

    ElseIf Cells(68, 5) = "Dir. loss" Then


     ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("E52:E" & 51 + xrow), _
        SortOn:=xlSortOnValues, Order:=xlDescending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("C51:F" & 51 + xrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
```

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```
        .SortMethod = xlPinYin
        .Apply
    End With

    ElseIf Cells(68, 5) = "Tot. loss" Then

    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("F52:F" & 51 + xrow), _
        SortOn:=xlSortOnValues, Order:=xlDescending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("C51:F" & 51 + xrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With

    ElseIf Cells(68, 5) = "Add" Then

     MsgBox "Add text to order by"

    Else

    MsgBox "Invalid input"

    End If

   Range("A100").Select
   Application.ScreenUpdating = True
End Sub


Sub Sort_products()
Application.ScreenUpdating = False


Dim yrow As Integer
yrow = Cells(10, 6).Value

Range("H51:L" & 51 + yrow).Select



If Cells(68, 11) = "Product" Then

If Cells(19, 4) = "Add" Then


    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("H52:H" & 51 + yrow), _
        SortOn:=xlSortOnValues, Order:=xlAscending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("H51:L" & 51 + yrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With

    Else

    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("H52:H" & 51 + yrow), _
        SortOn:=xlSortOnValues, Order:=xlAscending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("H51:L" & 51 + yrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With
    End If
```

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```
ElseIf Cells(68, 11) = "Dir. av." Then


ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("I52:I" & 51 + yrow), _
        SortOn:=xlSortOnValues, Order:=xlDescending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("H51:L" & 51 + yrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With

    ElseIf Cells(68, 11) = "Tot. av." Then

ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("J52:J" & 51 + yrow), _
        SortOn:=xlSortOnValues, Order:=xlDescending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("H51:L" & 51 + yrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With

    ElseIf Cells(68, 11) = "Dir. loss" Then


     ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("K52:K" & 51 + yrow), _
        SortOn:=xlSortOnValues, Order:=xlDescending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("H51:L" & 51 + yrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With

    ElseIf Cells(68, 11) = "Tot. loss" Then

    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.clear
    ActiveWorkbook.Worksheets("GUI").Sort.SortFields.Add Key:=Range("L52:L" & 51 + yrow), _
        SortOn:=xlSortOnValues, Order:=xlDescending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("GUI").Sort
        .SetRange Range("H51:L" & 51 + yrow)
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With

    ElseIf Cells(68, 11) = "Add" Then

     MsgBox "Add text to order by"

    Else

    MsgBox "Invalid input"

    End If

   Range("A100").Select
   Application.ScreenUpdating = True
```

```
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End Sub


Sub clear_old_data()
 Application.ScreenUpdating = False

Sheets("Data2").Select
    Cells.Select
    Selection.ClearContents
    Range("A100").Select

    Sheets("GUI").Select
    Range("J10").Select
     Selection.ClearContents
     Range("D10").Select
     Selection.ClearContents
     Range("A100").Select


   Application.ScreenUpdating = True

End Sub
```