

```
Sub vaccination_scenario_modules()
```

```
'++++++  
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```

```
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```

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```

```
'++++++  
'vba and xlsx files are deposited for open access at:  
'DOI: 10.5281/zenodo.4589333  
'++++++
```

```
Dim Staff_Iterator As String
```

```
Dim Infected, Symptoms, Test_Positive, Infectious, Vaccinated, Unit, Unit_Count
```

```
Dim New_Infected, New_Symptoms, New_Test_Positive, New_Infectious, New_Vaccinated, New_Unit, New_Unit_Count
```

```

Dim String_Split As String
Dim New_Staff_Status, Staff_Status_yesday
    'array entries
    'Staff_Status(0) : days since infected
    'Staff_Status(1) : symptomatic
    'Staff_Status(2) : positive in tests
    'Staff_Status(3) : infectious for environment
    'Staff_Status(4) : number vaccinations
    'Staff_Status(5) : assigned unit
    'Staff_Status(6) : staff count on unit
    'Staff_Status(7) : staff age
    'Staff_Status(8) :
    'Staff_Status(9) :
    'Staff_Status(10) :
    '...
'parameter variation
    Dim v_11, v_12, v_21, v_22, v_23, v_24, v_25, v_26
    Dim v_11_start, v_12_start, v_21_start, v_22_start, v_23_start, v_24_start, v_25_start, v_26_start
    Dim v_11_stop, v_12_stop, v_21_stop, v_22_stop, v_23_stop, v_24_stop, v_25_stop, v_26_stop
    Dim n, swap

'total counters
    Dim Chief, Executive_Senior_Physician, Senior_Physician, Physician, Nurse As Integer
'counters per unit
    Dim AandE_Phys, Ward_1_Phys, Ward_2_Phys, Ward_3_Phys As Integer
    Dim AandE_Senior, Ward_1_Senior, Ward_2_Senior, Ward_3_Senior As Integer
    Dim AandE_ExecSenior, Ward_1_ExecSenior, Ward_2_ExecSenior, Ward_3_ExecSenior As Integer
    Dim AandE_Nurse, Ward_1_Nurse, Ward_2_Nurse, Ward_3_Nurse As Integer
'positive, non-symptomatic staff per unit
    Dim Staff_pos_nonSymptomatic_AandE, Staff_pos_nonSymptomatic_AandE_yesday As Integer
    Dim Staff_pos_nonSymptomatic_ward_1, Staff_pos_nonSymptomatic_ward_1_yesday As Integer
    Dim Staff_pos_nonSymptomatic_ward_2, Staff_pos_nonSymptomatic_ward_2_yesday As Integer
    Dim Staff_pos_nonSymptomatic_ward_3, Staff_pos_nonSymptomatic_ward_3_yesday As Integer
'infection events

```

```
Dim Infection_event_AandE, Infection_event_Ward_1, Infection_event_Ward_2, Infection_event_Ward_3 As Integer
```

```
'unit operational
```

```
Dim AandE_open, Ward_1_open, Ward_2_open, Ward_3_open
```

```
'rollout plan
```

```
Dim Staff_counter, Vaccines_today As Integer
```

```
Dim AE_not_vaccinated, AE_not_vaccinated_yesday As Integer
```

```
'vaccination rollout plans
```

```
Dim Rollout_plan(3)
```

```
Rollout_plan(0) = 1 '1 : hierarchy top down
```

```
Rollout_plan(1) = 2 '2 : exposure focused
```

```
'with units per day
```

```
Dim Rollout_rate(10)
```

```
Rollout_rate(0) = 0 'vaccines applied to staff per day
```

```
Rollout_rate(1) = 1
```

```
Rollout_rate(2) = 2
```

```
Rollout_rate(3) = 5
```

```
Rollout_rate(4) = 7
```

```
Rollout_rate(5) = 10
```

```
Rollout_rate(6) = 20
```

```
Rollout_rate(7) = 30
```

```
Rollout_rate(8) = 40
```

```
'exposure modelling
```

```
Dim AE_pat_pos(10)
```

```
AE_pat_pos(0) = 0 'positive rate A&E patients
```

```
AE_pat_pos(1) = 0.1
```

```
AE_pat_pos(2) = 0.25
```

```
AE_pat_pos(3) = 0.5
```

```
AE_pat_pos(4) = 0.75
```

```
AE_pat_pos(5) = 0.9
```

```
AE_pat_pos(6) = 1
```

```
Dim AE_pat_shift As Integer
```

```

    AE_pat_shift = 20 'patients per shift on A&E
Dim Transmission, Probab
Dim R_S(10)
    R_S(0) = 0.1      'R_S as used by TU Berlin, DOI: 10.14279/depositonce-11387
    R_S(1) = 0.5      'in model, risk shared by 5 people
    R_S(2) = 1
    R_S(3) = 2
    R_S(4) = 4
    R_S(5) = 7
    R_S(6) = 10
    R_S(7) = 14
    R_S(8) = 20
Dim Pat_Contact_factor(5)
    Pat_Contact_factor(0) = 1 'factor of reduced contact of chief and senior executives to patients and unit
staff
    Pat_Contact_factor(1) = 2
    Pat_Contact_factor(2) = 5
    Pat_Contact_factor(3) = 10
    Pat_Contact_factor(4) = 20

'disease time parameters
Dim t_incubate(5)
    t_incubate(0) = 0 ' time between transmission and clinical symptoms
    t_incubate(1) = 5
Dim t_recovery(5)
    t_recovery(0) = 1 'time after which staff returns to work
    t_recovery(1) = 5
    t_recovery(2) = 10
    t_recovery(3) = 14
    t_recovery(4) = 20

'staff age
Dim Age As Integer
Dim Age_Factor(10)
    Age_Factor(0) = 1 'define by what factor transmission risk increases for 65 years of age, compared to 18
years

```

```
Age_Factor(1) = 1.5
Age_Factor(2) = 2.5
Age_Factor(3) = 5
Age_Factor(4) = 10
Age_Factor(5) = 20
```

```
'saving path
```

```
Dim Path_xlsm(10, 10, 10, 5, 5, 10, 5)
```

```
'-----
'clear statistical data in table 6 and 7
Tabelle6.Activate
Tabelle6.Range("D119:CY50000").Select
Selection.ClearContents
Tabelle7.Activate
Tabelle7.Range("D119:CY50000").Select
Selection.ClearContents
Tabelle2.Activate
```

```
'#####
```

```
'build vaccination model iterator
```

```
'rollout
```

```
'v_11 : rollout plan
```

```
'v_12 : rollout rate per day
```

```
'exposure
```

```
'v_21 : positive rate A&E patients
```

```
'v_22 : R_S as used by TU Berlin
```

```
'v_23 : factor of reduced contact of chief and senior executives to patients and unit staff
```

```
'v_24 : incubation time
```

```
'v_25 : age factor, transmission risk increases for 65 years of age, compared to 18 years
```

```
'v_26 : 'time after which staff returns to work
```

```
'define saving path
```

```
v_12 = 0
```

```
Do 'loop v_12 - rollout rate per day
```

```
v_21 = 0
```

```

Do 'loop v_21 - positive rate A&E patients
  v_22 = 0
  Do 'loop v_22 - R_S as used by TU Berlin
    v_23 = 0
    Do 'loop v_23 - factor of reduced contact of chief and senior executives to patients and
unit staff
      v_24 = 0
      Do 'loop v_24 - incubation time
        v_25 = 0
        Do 'loop v_25 - age factor, transmission risk increases for 65 years of age,
compared to 18 years
          v_26 = 0
          Do 'loop v_26 - recovery time
            'create path for saving model run
            Path_xlsm(v_12, v_21, v_22, v_23, v_24, v_25, v_26) = _
              "daily_rate_" & Rollout_rate(v_12) _
              & "_AE_pospat_" & AE_pat_pos(v_21) & "_R_s_" & R_S(v_22) _
              & "_contact_fac_" & Pat_Contact_factor(v_23) & "_incubate_" &
t_incubate(v_24) _
              & "_age_fac_" & Age_Factor(v_25) & "_t_recovery_" & t_recovery(v_26)
            Path_xlsm(v_12, v_21, v_22, v_23, v_24, v_25, v_26) = _
              "C:\400 Heidelberg\200 projects\02_hos_op_mgm\03 parameter studies\" _
              & Path_xlsm(v_12, v_21, v_22, v_23, v_24, v_25, v_26)
            v_26 = v_26 + 1
            Loop While v_26 <= 4
            v_25 = v_25 + 1
            Loop While v_25 <= 5
            v_24 = v_24 + 1
            Loop While v_24 <= 1
            v_23 = v_23 + 1
            Loop While v_23 <= 4
            v_22 = v_22 + 1
            Loop While v_22 <= 8
            v_21 = v_21 + 1
            Loop While v_21 <= 6
            v_12 = v_12 + 1
            Loop While v_12 <= 8

```

'boundaries for parameter variation

v_11_start = 0

v_12_start = 1

v_21_start = 2

v_22_start = 5

v_23_start = 2

v_24_start = 1

v_25_start = 2

v_26_start = 2

v_11_stop = 1

v_12_stop = 1

v_21_stop = 2

v_22_stop = 5

v_23_stop = 2

v_24_stop = 1

v_25_stop = 2

v_26_stop = 2

'parameters base case

'v_11_start = 0

'v_12_start = 1

'v_21_start = 2

'v_22_start = 5

'v_23_start = 2

'v_24_start = 1

'v_25_start = 2

'v_26_start = 2

'v_11_stop = 1

'v_12_stop = 1

'v_21_stop = 2

'v_22_stop = 5

'v_23_stop = 2

'v_24_stop = 1

'v_25_stop = 2

'v_26_stop = 2

```

'loop vaccination model for parameter variation
  v_12 = v_12_start
  Do 'loop v_12 - rollout rate per day
    v_21 = v_21_start
    Do 'loop v_21 - positive rate A&E patients
      v_22 = v_22_start
      Do 'loop v_22 - R_S as used by TU Berlin
        v_23 = v_23_start
        Do 'loop v_23 - factor of reduced contact of chief and senior executives to patients and unit staff
          v_24 = v_24_start
          Do 'loop v_24 - incubation time
            v_25 = v_25_start
            Do 'loop v_25 - age factor, transmission risk increases for 65 years of age, compared to 18
years
              v_26 = v_26_start
              Do 'loop v_26 - recovery time
                'optimise excel
                Application.ScreenUpdating = False
                'in each run, do both rollout plans
                v_11 = v_11_start
                Do 'loop v_11 - rollout plan

'#####
'loop around hospital model, too even out statistical outliers
n = 1
Do While n <= 500

```



```

=====
'module-1: define staff age once at t=1

    i = 43
    Staff_Iterator = Tabelle2.Cells(i, 1).Value
    Do While Staff_Iterator <> ""
        '-----
        'set age by hierarchy group
        'nurses
        If Staff_Iterator = "Nurse" Then
            Age = WorksheetFunction.RandBetween(18, 65)
        'chief
        ElseIf Staff_Iterator = "Chief" Then
            Age = WorksheetFunction.RandBetween(51, 65)
        'senior executives
        ElseIf Staff_Iterator = "Executive_Senior_Physician" Then
            Age = WorksheetFunction.RandBetween(41, 50)
        'seniors
        ElseIf Staff_Iterator = "Senior_Physician" Then
            Age = WorksheetFunction.RandBetween(33, 40)
        'physician
        ElseIf Staff_Iterator = "Physician" Then
            Age = WorksheetFunction.RandBetween(25, 32)
        End If

'-----
'get staff status @ t=0
t = 0
String_Split = Tabelle2.Cells(i, t + 3).Value
Staff_Status_yesday = Split(String_Split, ",")

'read out staff status @ t-1
Infected = Staff_Status_yesday(0)
Symptoms = Staff_Status_yesday(1)
Test_Positive = Staff_Status_yesday(2)
Infectious = Staff_Status_yesday(3)

```

```
Vaccinated = Staff_Status_yesday(4)
Unit = Staff_Status_yesday(5)
Unit_Count = Staff_Status_yesday(6)
```

```
'-----
-----
```

```

'.....
'build new staff status @ t=1
  t = 1
  New_Staff_Status = Infected & "," & Symptoms & "," &
Test_Positive & "," & Infectious & "," & Vaccinated & "," & Unit & "," & Unit_Count & "," & Age
  Tabelle2.Cells(i, t + 3).Value = New_Staff_Status
'.....

i = i + 1 'loop to next staff member
Staff_Iterator = Tabelle2.Cells(i, 1).Value
Loop
```

```
'=====
```

```
'calculate staff development over time
t = 1
Do While t <= 100
```

```

'add timeline
Tabelle2.Cells(26, t + 3).Value = t
Tabelle2.Cells(42, t + 3).Value = t
Tabelle6.Cells(5, t + 3).Value = t
Tabelle6.Cells(53, t + 3).Value = t
'reset total staff counter
Chief = 0
Executive_Senior_Physician = 0
Senior_Physician = 0
```

```

Physician = 0
Nurse = 0
'reset counters per unit
AandE_Nurse = 0
Ward_1_Nurse = 0
Ward_2_Nurse = 0
Ward_3_Nurse = 0
AandE_Phys = 0
Ward_1_Phys = 0
Ward_2_Phys = 0
Ward_3_Phys = 0
AandE_ExecSenior = 0
Ward_1_ExecSenior = 0
Ward_2_ExecSenior = 0
Ward_3_ExecSenior = 0
AandE_Senior = 0
Ward_1_Senior = 0
Ward_2_Senior = 0
Ward_3_Senior = 0
'reset vaccines of the day
Vaccines_today = 0

```

```

'loop for each time step (dt = 1d) entire staff matrix 3 times

```

```

'=====

```

```

'module-2 : vaccination rollout

```

```

'get staff yesterday not vaccinated on A&E
AE_not_vaccinated_yesterday = AE_not_vaccinated
AE_not_vaccinated = 0
'new value for AE_not_vaccinated set in module-4 after unit

```

assignment

```

'at t=0 all A&E staff not vaccinated
If t = 1 Then

```

```

        AE_not_vaccinated_yesday =
Application.WorksheetFunction.CountIf(Range("C43:C2000"), "*" & "A&E" & "*")
    End If

```

```

Staff_counter = 1
i = 43
Staff_Iterator = Tabelle2.Cells(i, 1).Value
Do While Staff_Iterator <> ""

```

```

'-----
-----

```

```

'get staff status @ t-1
String_Split = Tabelle2.Cells(i, t + 3 - 1).Value
Staff_Status_yesday = Split(String_Split, ",")
'get staff status @ t
String_Split = Tabelle2.Cells(i, t + 3).Value
Staff_Status = Split(String_Split, ",")

```

```

'read out staff status @ t-1
Infected = Staff_Status_yesday(0)
Symptoms = Staff_Status_yesday(1)
Test_Positive = Staff_Status_yesday(2)
Infectious = Staff_Status_yesday(3)
Vaccinated = Staff_Status_yesday(4)
Unit = Staff_Status_yesday(5)
Unit_Count = Staff_Status_yesday(6)
'read out age
If t = 1 Then 'age only defined from t=1 onwards
    Age = Staff_Status(7)
Else
    Age = Staff_Status_yesday(7)
End If

```

```

'assume continuation of disease status, amended if vaccine applied to
staff member

New_Infected = Infected
New_Symptoms = Symptoms

```

```

New_Test_Positive = Test_Positive
New_Infectious = Infectious
'reset new_vaccinated from previous loop
New_Vaccinated = 0

```

```

'-----
-----

```

```

'if staff member not yet vaccinated and currently non-symptomatic
If Vaccinated = 0 And Symptoms = 0 Then

```

```

'.....

```

```

'rollout plan: top down

```

```

If Rollout_plan(v_11) = 1 Then

```

```

'multiply time by doses per time, check if it is staff

```

member's turn

```

If Staff_counter <= t * Rollout_rate(v_12) Then

```

```

'set member as vaccinated

```

```

New_Vaccinated = 1

```

```

'if during incubation time, assume healing of infection

```

```

New_Infected = 0

```

```

New_Infectious = 0

```

```

End If

```

```

End If

```

```

'.....

```

```

'rollout plan: by exposure

```

```

If Rollout_plan(v_11) = 2 Then

```

```

'add vaccines if still under daily rate

```

```

If Vaccines_today < Rollout_rate(v_12) Then

```

```

'vaccines given to staff by exposure:

```

```

'priority 1 = A&E

```

```

'priority 2 = all other units

```

```

'A&E, by 1st priority

```

```

If Unit = "A&E" Then

```

infection

Staff_Iterator & "_" & Unit

(Rollout_rate(v_12) - Vaccines_today) Then

infection

Staff_Iterator & "_" & Unit

```
New_Vaccinated = 1
Vaccines_today = Vaccines_today + 1
'if during incubation time, assume healing of
```

```
New_Infected = 0
New_Infectious = 0
```

```
'debug who gets vaccinated
'Tabelle2.Cells(105, t + 3).Value =
```

```
End If
'remaining units with 2nd priority
If Unit <> "A&E" And AE_not_vaccinated_yesday <
```

```
New_Vaccinated = 1
Vaccines_today = Vaccines_today + 1
'if during incubation time, assume healing of
```

```
New_Infected = 0
New_Infectious = 0
```

```
'debug who gets vaccinated
'Tabelle2.Cells(106, t + 3).Value =
```

```
End If
```

```
End If
```

```
End If
'.....
'additional plans possible
'eg rollout plan: bottom up
```

```

'.....
'build new staff status
New_Staff_Status = New_Infected & "," & New_Symptoms & "," &
New_Test_Positive & "," & New_Infectious & "," & New_Vaccinated & "," & Unit & "," & Unit_Count & "," & Age
Tabelle2.Cells(i, t + 3).Value = New_Staff_Status
'.....

Else

'-----
-----
symptomaic
'copy staff status, if staff member already vaccinated or currenlty
New_Staff_Status = Tabelle2.Cells(i, t + 3 - 1).Value
Tabelle2.Cells(i, t + 3).Value = New_Staff_Status
End If

'-----
-----

i = i + 1 'loop to next staff member
Staff_Iterator = Tabelle2.Cells(i, 1).Value
'and increase staff_counter
Staff_counter = Staff_counter + 1
Loop

'=====
'module-3 : disease status

'shift notvacc to yesterday's variable, and reset variable
Staff_pos_nonSymptomatic_AandE_yesday =
Staff_pos_nonSymptomatic_AandE

```

```

Staff_pos_nonSymptomatic_ward_1
Staff_pos_nonSymptomatic_ward_2
Staff_pos_nonSymptomatic_ward_3
after unit assignment

```

```
Staff_pos_nonSymptomatic_ward_1_yesday =
```

```
Staff_pos_nonSymptomatic_ward_2_yesday =
```

```
Staff_pos_nonSymptomatic_ward_3_yesday =
```

```
'new values for non-symptomatic staff per unit set in loop-3,
```

```
'reset variables of infection_events
```

```
Infection_event_Ward_1 = 0
```

```
Infection_event_Ward_2 = 0
```

```
Infection_event_Ward_3 = 0
```

```
Infection_event_AandE = 0
```

```
i = 43
```

```
Staff_Iterator = Tabelle2.Cells(i, 1).Value
```

```
Do While Staff_Iterator <> ""
```

```
'-----
```

```
'get staff status @ t-1
```

```
String_Split = Tabelle2.Cells(i, t + 3 - 1).Value
```

```
Staff_Status_yesday = Split(String_Split, ",")
```

```
'get staff status @ t
```

```
String_Split = Tabelle2.Cells(i, t + 3).Value
```

```
Staff_Status = Split(String_Split, ",")
```

```
'read out staff status @ t-1
```

```
Infected = Staff_Status_yesday(0)
```

```
Symptoms = Staff_Status_yesday(1)
```

```
Test_Positive = Staff_Status_yesday(2)
```

```
Infectious = Staff_Status_yesday(3)
```

```
Vaccinated = Staff_Status_yesday(4)
```

```
Unit = Staff_Status_yesday(5)
```



```

Unit_Count = Staff_Status_yesday(6)
'read out staff status @ t
New_Infected = Staff_Status(0)
New_Symptoms = Staff_Status(1)
New_Test_Positive = Staff_Status(2)
New_Infectious = Staff_Status(3)
New_Vaccinated = Staff_Status(4)
New_Unit = Staff_Status(5)
New_Unit_Count = Staff_Status(6)
Age = Staff_Status(7)

```

'-----

```

'amend and print staff status @ t, unless vaccinated
If New_Vaccinated = 0 Then

    '.....
    'define New_Infection for staff member
    '1. staff currently infected?
    'add 1 more illness day
    If Infected > 0 Then
        New_Infected = Infected + 1
    End If
    'symptomatic when incubation_time over
    If New_Infected = t_incubate(v_24) Then
        New_Symptoms = 1
    End If
    'assume recovery after t_recovery
    'convert to int
    Infected = Infected * 1
    If Infected = t_incubate(v_24) + t_recovery(v_26) Then
        New_Infected = 0
        New_Infectious = 0
        New_Symptoms = 0
    End If
End If

```

```

End If

'2. staff yesterday not infected and coming to work
If Infected = 0 Then
    'staff on A&E
    'exposed to patients, positive at rate of AE_pat_pos
    'exposed to other staff
    If Unit = "A&E" Then
        'new infectious status by exposure during work
        Transmission = WorksheetFunction.RandBetween(0, 100)
        'calculate Probab for A&E situation
        'positive rate patients * patients per shift
        Probab = AE_pat_pos(v_21) * AE_pat_shift
        'add positive, non-symptomatic staff, depending on

        Probab = Probab +

        'Probab age adjusted:
        '18 -> transmission unchanged
        '65 -> transmission * age_factor
        Probab = Probab _
            * ((Age_Factor(v_25) - 1) / (65 - 18) * (Age
- 18) + 1)

        'Probab adjusted to R_S
        Probab = Probab * R_S(v_22) / 5
        'reduce probability for chief and senExec due to

        If Staff_Iterator = "Chief" Or Staff_Iterator =

            Probab = Probab / Pat_Contact_factor(v_23)
        End If

        'transmission within probab?
        If Transmission <= Probab Then
            'set staff member as infected
            New_Infected = 1
            New_Infectious = 1

```

```

End If

End If

If Unit <> "A&E" Then
    'new infectious status by exposure during work
    Transmission = WorksheetFunction.RandBetween(0, 100)
    'calculate Probab for A&E situation
    'basic probability at home, false_negative tests
    Probab = 1 / 100
    'positive, non-symptomatic staff, depending on unit
    If Unit = "ward1" Then
        Probab = Probab +

Staff_pos_nonSymptomatic_ward_1_yesday

        ElseIf Unit = "ward2" Then
            Probab = Probab +

Staff_pos_nonSymptomatic_ward_2_yesday

        ElseIf Unit = "ward3" Then
            Probab = Probab +

Staff_pos_nonSymptomatic_ward_3_yesday

        End If
        'Probab age adjusted:
        '18 -> transmission unchanged
        '65 -> transmission * age_factor
        Probab = Probab _
            * ((Age_Factor(v_25) - 1) / (65 - 18) * (Age
- 18) + 1)

        'Probab adjusted to R_S
        Probab = Probab * R_S(v_22) / 5

        'transmission within probab?
        If Transmission <= Probab Then
            'set staff member as infected
            New_Infected = 1
            New_Infectious = 1
        End If
    End If

```

End If

'infection events

If New_Infected = 1 Then

 'count infection events by unit

 If Unit = "A&E" Then

 Infection_event_AandE = Infection_event_AandE + 1

 ElseIf Unit = "ward1" Then

 Infection_event_Ward_1 = Infection_event_Ward_1 + 1

 ElseIf Unit = "ward2" Then

 Infection_event_Ward_2 = Infection_event_Ward_2 + 1

 ElseIf Unit = "ward3" Then

 Infection_event_Ward_3 = Infection_event_Ward_3 + 1

 End If

End If

End If

 'count infected staff

 If New_Infected > 0 Then

 'count staff infected

 If Staff_Iterator = "Chief" Then

 Chief = Chief + 1

 ElseIf Staff_Iterator = "Executive_Senior_Physician"

Then

 Executive_Senior_Physician =

Executive_Senior_Physician + 1

 ElseIf Staff_Iterator = "Senior_Physician" Then

 Senior_Physician = Senior_Physician + 1

 ElseIf Staff_Iterator = "Physician" Then

 Physician = Physician + 1

 ElseIf Staff_Iterator = "Nurse" Then

 Nurse = Nurse + 1

 End If

End If

```

'.....
'build new staff status
New_Staff_Status = New_Infected & "," & New_Symptoms & "," &
New_Test_Positive & "," & New_Infectious & "," & New_Vaccinated & "," & Unit & "," & Unit_Count & "," & Age
Tabelle2.Cells(i, t + 3).Value = New_Staff_Status
'.....

```

End If

```

'-----
-----

```

```

i = i + 1 'loop to next staff member
Staff_Iterator = Tabelle2.Cells(i, 1).Value
Loop

```

```

'=====
'module-4 : assign staff to units

'reset counter of infectious, non-symptomatic staff
Staff_pos_nonSymptomatic_AandE = 0
Staff_pos_nonSymptomatic_ward_1 = 0
Staff_pos_nonSymptomatic_ward_2 = 0
Staff_pos_nonSymptomatic_ward_3 = 0

i = 43
Staff_Iterator = Tabelle2.Cells(i, 1).Value
Do While Staff_Iterator <> ""

```

```

'-----

```

```

-----
'get staff status @ t-1
String_Split = Tabelle2.Cells(i, t + 3 - 1).Value
Staff_Status_yesday = Split(String_Split, ",")
'get staff status @ t
String_Split = Tabelle2.Cells(i, t + 3).Value
Staff_Status = Split(String_Split, ",")

'read out staff status @ t-1
Infected = Staff_Status_yesday(0)
Symptoms = Staff_Status_yesday(1)
Test_Positive = Staff_Status_yesday(2)
Infectious = Staff_Status_yesday(3)
Vaccinated = Staff_Status_yesday(4)
Unit = Staff_Status_yesday(5)
Unit_Count = Staff_Status_yesday(6)
'read out staff status @ t
New_Infected = Staff_Status(0)
New_Symptoms = Staff_Status(1)
New_Test_Positive = Staff_Status(2)
New_Infectious = Staff_Status(3)
New_Vaccinated = Staff_Status(4)
New_Unit = Staff_Status(5)
New_Unit_Count = Staff_Status(6)
Age = Staff_Status(7)

```

```

'-----
'-----

'amend and print staff status @ t, unless infected
If New_Symptoms = 0 Then

    '.....
    'define New_unit by priority:

        'reset unit variables

```

```

New_Unit = 0
New_Unit_Count = 0

'3.1 chief
If Staff_Iterator = "Chief" Then
    'chief sent to A&E
    AandE_ExecSenior = 1
    'set new unit and counter
    New_Unit = "A&E"
    New_Unit_Count = Unit_Count
End If
'3.2 senior execs
If Staff_Iterator = "Executive_Senior_Physician" Then
    'update staff per unit by priority
    'ward_3
    If AandE_ExecSenior = 1 And
Ward_1_ExecSenior = 1 And Ward_2_ExecSenior = 1 And Ward_3_ExecSenior = 0 Then
        Ward_3_ExecSenior = Ward_3_ExecSenior +
1
        'set new_unit and new_unit_count
        New_Unit = "ward3"
        New_Unit_Count = Ward_3_ExecSenior
    End If
    'ward_2
    If AandE_ExecSenior = 1 And Ward_1_ExecSenior =
1 And Ward_2_ExecSenior = 0 And Ward_3_ExecSenior = 0 Then
        Ward_2_ExecSenior = Ward_2_ExecSenior + 1
        'set new_unit and new_unit_count
        New_Unit = "ward2"
        New_Unit_Count = Ward_2_ExecSenior
    End If
    'ward_1
    If AandE_ExecSenior = 1 And Ward_1_ExecSenior = 0
And Ward_2_ExecSenior = 0 And Ward_3_ExecSenior = 0 Then
        Ward_1_ExecSenior = Ward_1_ExecSenior + 1
        'set new_unit and new_unit_count
        New_Unit = "ward1"

```

```

Ward_2_ExecSenior = 0 And Ward_3_ExecSenior = 0 Then
    New_Unit_Count = Ward_1_ExecSenior
    End If
    'A&E
    If AandE_ExecSenior = 0 And Ward_1_ExecSenior = 0 And
        AandE_ExecSenior = AandE_ExecSenior + 1
        'set new_unit and new_unit_count
        New_Unit = "A&E"
        New_Unit_Count = AandE_ExecSenior
    End If

    End If
    '3.3 seniors
    If Staff_Iterator = "Senior_Physician" Then
        'update staff per unit by priority
        'ward_3
        If AandE_Senior = 1 And Ward_1_Senior = 1
            Ward_3_Senior = Ward_3_Senior + 1
            'set new_unit and new_unit_count
            New_Unit = "ward3"
            New_Unit_Count = Ward_3_Senior
        End If
        'ward_2
        If AandE_Senior = 1 And Ward_1_Senior = 1 And
            Ward_2_Senior = Ward_2_Senior + 1
            'set new_unit and new_unit_count
            New_Unit = "ward2"
            New_Unit_Count = Ward_2_Senior
        End If
        'ward_1
        If AandE_Senior = 1 And Ward_1_Senior = 0 And
            Ward_1_Senior = Ward_1_Senior + 1
            'set new_unit and new_unit_count
            New_Unit = "ward1"

```



```

Ward_2_Senior = 0 And Ward_3_Senior = 0 Then

    New_Unit_Count = Ward_1_Senior
    End If
    'A&E
    If AandE_Senior = 0 And Ward_1_Senior = 0 And

        AandE_Senior = AandE_Senior + 1
        'set new_unit and new_unit_count
        New_Unit = "A&E"
        New_Unit_Count = AandE_Senior
    End If

End If
'3.4 physicians
If Staff_Iterator = "Physician" Then
    'update staff per unit by priority
    'ward_3
    If AandE_Phys = 4 And Ward_1_Phys = 2 And

        Ward_3_Phys = Ward_3_Phys + 1
        'set new_unit and new_unit_count
        New_Unit = "ward3"
        New_Unit_Count = Ward_3_Phys
    End If
    'ward_2
    If AandE_Phys = 4 And Ward_1_Phys = 2 And

        Ward_2_Phys = Ward_2_Phys + 1
        'set new_unit and new_unit_count
        New_Unit = "ward2"
        New_Unit_Count = Ward_2_Phys
    End If
    'ward_1
    If AandE_Phys = 4 And Ward_1_Phys <= 1 And

        Ward_1_Phys = Ward_1_Phys + 1
        'set new_unit and new_unit_count
        New_Unit = "ward1"

```

```

        New_Unit_Count = Ward_1_Phys
    End If
    'A&E
    If AandE_Phys <= 4 And Ward_1_Phys = 0 And Ward_2_Phys =
0 And Ward_3_Phys = 0 Then

        AandE_Phys = AandE_Phys + 1
        'set new_unit and new_unit_count
        New_Unit = "A&E"
        New_Unit_Count = AandE_Phys

    End If

End If
'3.5 nurses
If Staff_Iterator = "Nurse" Then
    'update staff per unit by priority
    'ward_3
    If AandE_Nurse = 10 And Ward_1_Nurse = 5 And
Ward_2_Nurse = 5 And Ward_3_Nurse < 5 Then

        Ward_3_Nurse = Ward_3_Nurse + 1
        'set new_unit and new_unit_count
        New_Unit = "ward3"
        New_Unit_Count = Ward_3_Nurse

    End If
    'ward_2
    If AandE_Nurse = 10 And Ward_1_Nurse = 5 And
Ward_2_Nurse < 5 And Ward_3_Nurse = 0 Then

        Ward_2_Nurse = Ward_2_Nurse + 1
        'set new_unit and new_unit_count
        New_Unit = "ward2"
        New_Unit_Count = Ward_2_Nurse

    End If
    'ward_1
    If AandE_Nurse = 10 And Ward_1_Nurse < 5 And
Ward_2_Nurse = 0 And Ward_3_Nurse = 0 Then

        Ward_1_Nurse = Ward_1_Nurse + 1
        'set new_unit and new_unit_count
        New_Unit = "ward1"
    End If
End If

```

```

Ward_2_Nurse = 0 And Ward_3_Nurse = 0 Then
    New_Unit_Count = Ward_1_Nurse
    End If
    'A&E
    If AandE_Nurse < 10 And Ward_1_Nurse = 0 And
        AandE_Nurse = AandE_Nurse + 1
        'set new_unit and new_unit_count
        New_Unit = "A&E"
        New_Unit_Count = AandE_Nurse
    End If
End If

Else 'ie staff member is symptomatic
    'dont assign staff to unit
    New_Unit = 0
    New_Unit_Count = 0
End If
'.....
'check each day if staff on A&E and not vaccinated
If Unit = "A&E" And New_Vaccinated = 0 Then
    'invrease counter for AE_not_vaccinated
    AE_not_vaccinated = AE_not_vaccinated + 1
End If
'.....
'build new staff status
New_Staff_Status = New_Infected & "," & New_Symptoms & "," &
New_Test_Positive & "," & New_Infectious & "," & New_Vaccinated & "," & New_Unit & "," & New_Unit_Count & "," & Age
Tabelle2.Cells(i, t + 3).Value = New_Staff_Status
'.....
'update number: new_infectious, non-symptomatic staff, for each
new_unit
If New_Infected > 0 And New_Symptoms = 0 Then
    If New_Unit = "A&E" Then
        Staff_pos_nonSymptomatic_AandE = _
        Staff_pos_nonSymptomatic_AandE + 1
    End If
End If

```

```

ElseIf New_Unit = "ward1" Then
    Staff_pos_nonSymptomatic_ward_1 = _
    Staff_pos_nonSymptomatic_ward_1 + 1
ElseIf New_Unit = "ward2" Then
    Staff_pos_nonSymptomatic_ward_2 = _
    Staff_pos_nonSymptomatic_ward_2 + 1
ElseIf New_Unit = "ward3" Then
    Staff_pos_nonSymptomatic_ward_3 = _
    Staff_pos_nonSymptomatic_ward_3 + 1
End If
End If
'.....

```

```

'-----
-----

```

```

i = i + 1 'loop to next staff member
Staff_Iterator = Tabelle2.Cells(i, 1).Value
Loop

```

```

'=====

```

```

'#####
'5. for each time step:
'5.1 update total staff count in timeline
'5.1.1 for top down rollout
If v_11 = 0 Then
    swap = Tabelle2.Cells(27, t + 3).Value
    If n = 1 Then
        swap = 0
    End If

```

```

Tabelle2.Cells(27, t + 3).Value = swap + Chief
    swap = Tabelle2.Cells(27 + 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle2.Cells(28, t + 3).Value = swap + Executive_Senior_Physician
    swap = Tabelle2.Cells(27 + 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle2.Cells(29, t + 3).Value = swap + Senior_Physician
    swap = Tabelle2.Cells(27 + 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle2.Cells(30, t + 3).Value = swap + Physician
    swap = Tabelle2.Cells(27 + 4, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle2.Cells(31, t + 3).Value = swap + Nurse
'5.1.2 for exposure focused rollout
ElseIf v_11 = 1 Then
    swap = Tabelle2.Cells(12, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle2.Cells(12, t + 3).Value = swap + Chief
    swap = Tabelle2.Cells(12 + 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle2.Cells(12 + 1, t + 3).Value = swap + Executive_Senior_Physician
    swap = Tabelle2.Cells(12 + 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If

```

```

    Tabelle2.Cells(12 + 2, t + 3).Value = swap + Senior_Physician
    swap = Tabelle2.Cells(12 + 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle2.Cells(12 + 3, t + 3).Value = swap + Physician
    swap = Tabelle2.Cells(12 + 4, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle2.Cells(12 + 4, t + 3).Value = swap + Nurse
End If

'.....
'5.2 update unit staff count in unit timeline
'5.2.1 v_11=0, top down rollout
If v_11 = 0 Then
    'nurses
    swap = Tabelle6.Cells(9, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(9, t + 3).Value = AandE_Nurse + swap
    swap = Tabelle6.Cells(13, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(13, t + 3).Value = Ward_1_Nurse + swap
    swap = Tabelle6.Cells(17, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(17, t + 3).Value = Ward_2_Nurse + swap
    swap = Tabelle6.Cells(21, t + 3).Value
    If n = 1 Then
        swap = 0
    End If

```

```

    Tabelle6.Cells(21, t + 3).Value = Ward_3_Nurse + swap
'physicians
swap = Tabelle6.Cells(9 - 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle6.Cells(9 - 1, t + 3).Value = AandE_Phys + swap
swap = Tabelle6.Cells(13 - 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle6.Cells(13 - 1, t + 3).Value = Ward_1_Phys + swap
swap = Tabelle6.Cells(17 - 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle6.Cells(17 - 1, t + 3).Value = Ward_2_Phys + swap
swap = Tabelle6.Cells(21 - 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle6.Cells(21 - 1, t + 3).Value = Ward_3_Phys + swap
'seniors
swap = Tabelle6.Cells(9 - 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle6.Cells(9 - 2, t + 3).Value = AandE_Senior + swap
swap = Tabelle6.Cells(13 - 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle6.Cells(13 - 2, t + 3).Value = Ward_1_Senior + swap
swap = Tabelle6.Cells(17 - 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If

```

```

Tabelle6.Cells(17 - 2, t + 3).Value = Ward_2_Senior + swap
swap = Tabelle6.Cells(21 - 2, t + 3).Value
If n = 1 Then
    swap = 0
End If
Tabelle6.Cells(21 - 2, t + 3).Value = Ward_3_Senior + swap
'senior executives
swap = Tabelle6.Cells(9 - 3, t + 3).Value
If n = 1 Then
    swap = 0
End If
Tabelle6.Cells(9 - 3, t + 3).Value = AandE_ExecSenior + swap
swap = Tabelle6.Cells(13 - 3, t + 3).Value
If n = 1 Then
    swap = 0
End If
Tabelle6.Cells(13 - 3, t + 3).Value = Ward_1_ExecSenior + swap
swap = Tabelle6.Cells(17 - 3, t + 3).Value
If n = 1 Then
    swap = 0
End If
Tabelle6.Cells(17 - 3, t + 3).Value = Ward_2_ExecSenior + swap
swap = Tabelle6.Cells(21 - 3, t + 3).Value
If n = 1 Then
    swap = 0
End If
Tabelle6.Cells(21 - 3, t + 3).Value = Ward_3_ExecSenior + swap
'5.1.2 v_11=1. exposure focused rollout
ElseIf v_11 = 1 Then
    'nurses
    swap = Tabelle7.Cells(9, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(9, t + 3).Value = AandE_Nurse + swap
    swap = Tabelle7.Cells(13, t + 3).Value
    If n = 1 Then

```



```

        swap = 0
    End If
    Tabelle7.Cells(13, t + 3).Value = Ward_1_Nurse + swap
    swap = Tabelle7.Cells(17, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(17, t + 3).Value = Ward_2_Nurse + swap
    swap = Tabelle7.Cells(21, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(21, t + 3).Value = Ward_3_Nurse + swap
'physicians
swap = Tabelle7.Cells(9 - 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(9 - 1, t + 3).Value = AandE_Phys + swap
    swap = Tabelle7.Cells(13 - 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(13 - 1, t + 3).Value = Ward_1_Phys + swap
    swap = Tabelle7.Cells(17 - 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(17 - 1, t + 3).Value = Ward_2_Phys + swap
    swap = Tabelle7.Cells(21 - 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(21 - 1, t + 3).Value = Ward_3_Phys + swap
'seniors
    swap = Tabelle7.Cells(9 - 2, t + 3).Value
    If n = 1 Then

```

```

        swap = 0
    End If
    Tabelle7.Cells(9 - 2, t + 3).Value = AandE_Senior + swap
    swap = Tabelle7.Cells(13 - 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(13 - 2, t + 3).Value = Ward_1_Senior + swap
    swap = Tabelle7.Cells(17 - 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(17 - 2, t + 3).Value = Ward_2_Senior + swap
    swap = Tabelle7.Cells(21 - 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(21 - 2, t + 3).Value = Ward_3_Senior + swap
'senior executives
swap = Tabelle7.Cells(9 - 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(9 - 3, t + 3).Value = AandE_ExecSenior + swap
    swap = Tabelle7.Cells(13 - 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(13 - 3, t + 3).Value = Ward_1_ExecSenior + swap
    swap = Tabelle7.Cells(17 - 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(17 - 3, t + 3).Value = Ward_2_ExecSenior + swap
    swap = Tabelle7.Cells(21 - 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If

```

```

        End If
        Tabelle7.Cells(21 - 3, t + 3).Value = Ward_3_ExecSenior + swap
    End If
'.....
'5.3 update infectious, non-symptomatic staff per unit
'5.3.1 infectious, non-symptomatic if v_11=0, top down
If v_11 = 0 Then
    swap = Tabelle6.Cells(54, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(54, t + 3).Value = Staff_pos_nonSymptomatic_AandE + swap
    swap = Tabelle6.Cells(54 + 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(54 + 1, t + 3).Value = Staff_pos_nonSymptomatic_ward_1 +
swap

    swap = Tabelle6.Cells(54 + 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(54 + 2, t + 3).Value = Staff_pos_nonSymptomatic_ward_2 +
swap

    swap = Tabelle6.Cells(54 + 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(54 + 3, t + 3).Value = Staff_pos_nonSymptomatic_ward_3 +
swap

'5.3.2 infectious, non-symptomatic if v_11=1, exposure focused
ElseIf v_11 = 1 Then
    swap = Tabelle7.Cells(54, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(54, t + 3).Value = Staff_pos_nonSymptomatic_AandE + swap

```

```

swap = Tabelle7.Cells(54 + 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle7.Cells(54 + 1, t + 3).Value = Staff_pos_nonSymptomatic_ward_1 +
swap

swap = Tabelle7.Cells(54 + 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle7.Cells(54 + 2, t + 3).Value = Staff_pos_nonSymptomatic_ward_2 +
swap

swap = Tabelle7.Cells(54 + 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
Tabelle7.Cells(54 + 3, t + 3).Value = Staff_pos_nonSymptomatic_ward_3 +
swap

End If
' .....
'5.4 update infection events staff per unit
'5.4.1 infection event, top down rollout
If v_11 = 0 Then
    swap = Tabelle6.Cells(60, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(60, t + 3).Value = Infection_event_AandE + swap
    swap = Tabelle6.Cells(60 + 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(60 + 1, t + 3).Value = Infection_event_Ward_1 + swap
    swap = Tabelle6.Cells(60 + 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If

```

```

Tabelle6.Cells(60 + 2, t + 3).Value = Infection_event_Ward_2 + swap
swap = Tabelle6.Cells(60 + 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(60 + 3, t + 3).Value = Infection_event_Ward_3 + swap
'5.4.2 infection event, exposure focused rollout
ElseIf v_11 = 1 Then
    swap = Tabelle7.Cells(60, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(60, t + 3).Value = Infection_event_AandE + swap
    swap = Tabelle7.Cells(60 + 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(60 + 1, t + 3).Value = Infection_event_Ward_1 + swap
    swap = Tabelle7.Cells(60 + 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(60 + 2, t + 3).Value = Infection_event_Ward_2 + swap
    swap = Tabelle7.Cells(60 + 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(60 + 3, t + 3).Value = Infection_event_Ward_3 + swap
End If

```

```

'.....
'5.4 check if unit operational or staff shortage?
AandE_open = 0
Ward_1_open = 0
Ward_2_open = 0
Ward_3_open = 0

```

```

'A&E partially open
If (AandE_ExecSenior + AandE_Senior > 0) And AandE_Phys > 1 And AandE_Nurse
> 4 Then
    AandE_open = 0.5
End If
'A&E fully open
If AandE_Nurse = 10 And AandE_Phys = 4 And AandE_ExecSenior = 1 And
AandE_Senior = 1 Then
    AandE_open = 1
End If
'ward_1 partially open
If (Ward_1_ExecSenior + Ward_1_Senior > 0) And Ward_1_Phys > 0 And
Ward_1_Nurse > 2 Then
    Ward_1_open = 0.5
End If
'ward_1 fully open
If Ward_1_Nurse = 5 And Ward_1_Phys = 2 And Ward_1_ExecSenior = 1 And
Ward_1_Senior = 1 Then
    Ward_1_open = 1
End If
'ward_2 partially open
If (Ward_2_ExecSenior + Ward_2_Senior > 0) And Ward_2_Phys > 0 And
Ward_2_Nurse > 2 Then
    Ward_2_open = 0.5
End If
'ward_2 fully open
If Ward_2_Nurse = 5 And Ward_2_Phys = 2 And Ward_2_ExecSenior = 1 And
Ward_2_Senior = 1 Then
    Ward_2_open = 1
End If
'ward_3 partially open
If (Ward_3_ExecSenior + Ward_3_Senior > 0) And Ward_3_Phys > 0 And
Ward_3_Nurse > 2 Then
    Ward_3_open = 0.5
End If
'ward_3 fully open

```

```

Ward_3_Senior = 1 Then
    If Ward_3_Nurse = 5 And Ward_3_Phys = 2 And Ward_3_ExecSenior = 1 And
        Ward_3_open = 1
    End If

'-----
'open hospital capacity
'for top down rollout
If v_11 = 0 Then
    'current n cycle - write open capacity
    Tabelle6.Cells(118 + n, 3 - 1).Value = n
    Tabelle6.Cells(118 + n, t + 3).Value = (AandE_open + Ward_1_open +
Ward_2_open + Ward_3_open) / 4

    'statistically averaged overview - write open capacity
    swap = Tabelle6.Cells(74, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(74, t + 3).Value = AandE_open + swap
    swap = Tabelle6.Cells(74 + 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(74 + 1, t + 3).Value = Ward_1_open + swap
    swap = Tabelle6.Cells(74 + 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(74 + 2, t + 3).Value = Ward_2_open + swap
    swap = Tabelle6.Cells(74 + 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle6.Cells(74 + 3, t + 3).Value = Ward_3_open + swap
    swap = Tabelle6.Cells(74 + 4, t + 3).Value
    If n = 1 Then
        swap = 0
    End If

```

```

End If
Tabelle6.Cells(74 + 4, t + 3).Value = (Ward_1_open + Ward_2_open +
Ward_3_open) / 3 + swap

'for exposure focused rollout
ElseIf v_11 = 1 Then
    'current n cycle - write open capacity
    Tabelle7.Cells(118 + n, 3 - 1).Value = n
    Tabelle7.Cells(118 + n, t + 3).Value = (AandE_open + Ward_1_open +
Ward_2_open + Ward_3_open) / 4

    'statistically averaged overview - write open capacity
    swap = Tabelle7.Cells(74, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(74, t + 3).Value = AandE_open + swap
    swap = Tabelle7.Cells(74 + 1, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(74 + 1, t + 3).Value = Ward_1_open + swap
    swap = Tabelle7.Cells(74 + 2, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(74 + 2, t + 3).Value = Ward_2_open + swap
    swap = Tabelle7.Cells(74 + 3, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(74 + 3, t + 3).Value = Ward_3_open + swap
    swap = Tabelle7.Cells(74 + 4, t + 3).Value
    If n = 1 Then
        swap = 0
    End If
    Tabelle7.Cells(74 + 4, t + 3).Value = (Ward_1_open + Ward_2_open +
Ward_3_open) / 3 + swap

End If

```



```
'#####
```

```
    t = t + 1
```

```
    Loop
```

```
n = n + 1
```

```
Loop
```

```
    'actual number of loops
```

```
    n = n - 1
```

```
    'write averaged
```

```
        'divide by number of runs
```

```
        'write open capacity
```

```
        t = 1
```

```
        Do While t <= 100
```

```
            'staff infected top down rollout
```

```
            If v_11 = 0 Then
```

```
                swap = Tabelle2.Cells(27, t + 3).Value
```

```
                Tabelle2.Cells(27, t + 3).Value = swap / n
```

```
                swap = Tabelle2.Cells(27 + 1, t + 3).Value
```

```
                Tabelle2.Cells(27 + 1, t + 3).Value = swap / n
```

```
                swap = Tabelle2.Cells(27 + 2, t + 3).Value
```

```
                Tabelle2.Cells(27 + 2, t + 3).Value = swap / n
```

```
                swap = Tabelle2.Cells(27 + 3, t + 3).Value
```

```
                Tabelle2.Cells(27 + 3, t + 3).Value = swap / n
```

```
                swap = Tabelle2.Cells(27 + 4, t + 3).Value
```

```
                Tabelle2.Cells(27 + 4, t + 3).Value = swap / n
```

```
            'staff infected exposure focused
```

```
            ElseIf v_11 = 1 Then
```

```
                swap = Tabelle2.Cells(12, t + 3).Value
```

```
                Tabelle2.Cells(12, t + 3).Value = swap / n
```

```
                swap = Tabelle2.Cells(12 + 1, t + 3).Value
```

```
                Tabelle2.Cells(12 + 1, t + 3).Value = swap / n
```

```
                swap = Tabelle2.Cells(12 + 2, t + 3).Value
```

```
                Tabelle2.Cells(12 + 2, t + 3).Value = swap / n
```

```

        swap = Tabelle2.Cells(12 + 3, t + 3).Value
        Tabelle2.Cells(12 + 3, t + 3).Value = swap / n
        swap = Tabelle2.Cells(12 + 4, t + 3).Value
        Tabelle2.Cells(12 + 4, t + 3).Value = swap / n
    End If

'staff on units, top down rollout
If v_11 = 0 Then
    swap = Tabelle6.Cells(6, t + 3).Value
    Tabelle6.Cells(6, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 1, t + 3).Value
    Tabelle6.Cells(6 + 1, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 2, t + 3).Value
    Tabelle6.Cells(6 + 2, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 3, t + 3).Value
    Tabelle6.Cells(6 + 3, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 4, t + 3).Value
    Tabelle6.Cells(6 + 4, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 5, t + 3).Value
    Tabelle6.Cells(6 + 5, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 6, t + 3).Value
    Tabelle6.Cells(6 + 6, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 7, t + 3).Value
    Tabelle6.Cells(6 + 7, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 8, t + 3).Value
    Tabelle6.Cells(6 + 8, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 9, t + 3).Value
    Tabelle6.Cells(6 + 9, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 10, t + 3).Value
    Tabelle6.Cells(6 + 10, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 11, t + 3).Value
    Tabelle6.Cells(6 + 11, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 12, t + 3).Value
    Tabelle6.Cells(6 + 12, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 13, t + 3).Value
    Tabelle6.Cells(6 + 13, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 14, t + 3).Value

```

```

        Tabelle6.Cells(6 + 14, t + 3).Value = swap / n
    swap = Tabelle6.Cells(6 + 15, t + 3).Value
    Tabelle6.Cells(6 + 15, t + 3).Value = swap / n
'staff on units, exposure focused
ElseIf v_11 = 1 Then
    swap = Tabelle7.Cells(6, t + 3).Value
    Tabelle7.Cells(6, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 1, t + 3).Value
    Tabelle7.Cells(6 + 1, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 2, t + 3).Value
    Tabelle7.Cells(6 + 2, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 3, t + 3).Value
    Tabelle7.Cells(6 + 3, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 4, t + 3).Value
    Tabelle7.Cells(6 + 4, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 5, t + 3).Value
    Tabelle7.Cells(6 + 5, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 6, t + 3).Value
    Tabelle7.Cells(6 + 6, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 7, t + 3).Value
    Tabelle7.Cells(6 + 7, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 8, t + 3).Value
    Tabelle7.Cells(6 + 8, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 9, t + 3).Value
    Tabelle7.Cells(6 + 9, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 10, t + 3).Value
    Tabelle7.Cells(6 + 10, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 11, t + 3).Value
    Tabelle7.Cells(6 + 11, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 12, t + 3).Value
    Tabelle7.Cells(6 + 12, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 13, t + 3).Value
    Tabelle7.Cells(6 + 13, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 14, t + 3).Value
    Tabelle7.Cells(6 + 14, t + 3).Value = swap / n
    swap = Tabelle7.Cells(6 + 15, t + 3).Value
    Tabelle7.Cells(6 + 15, t + 3).Value = swap / n

```

End If

'staff infectious, non-symptomatic on unit, infection events, top down rollout

If v_11 = 0 Then

swap = Tabelle6.Cells(54, t + 3).Value

Tabelle6.Cells(54, t + 3).Value = swap / n

swap = Tabelle6.Cells(54 + 1, t + 3).Value

Tabelle6.Cells(54 + 1, t + 3).Value = swap / n

swap = Tabelle6.Cells(54 + 2, t + 3).Value

Tabelle6.Cells(54 + 2, t + 3).Value = swap / n

swap = Tabelle6.Cells(54 + 3, t + 3).Value

Tabelle6.Cells(54 + 3, t + 3).Value = swap / n

swap = Tabelle6.Cells(60, t + 3).Value

Tabelle6.Cells(60, t + 3).Value = swap / n

swap = Tabelle6.Cells(60 + 1, t + 3).Value

Tabelle6.Cells(60 + 1, t + 3).Value = swap / n

swap = Tabelle6.Cells(60 + 2, t + 3).Value

Tabelle6.Cells(60 + 2, t + 3).Value = swap / n

swap = Tabelle6.Cells(60 + 3, t + 3).Value

Tabelle6.Cells(60 + 3, t + 3).Value = swap / n

'staff infectious, non-symptomatic on unit, infection events, exposure focused

ElseIf v_11 = 1 Then

swap = Tabelle7.Cells(54, t + 3).Value

Tabelle7.Cells(54, t + 3).Value = swap / n

swap = Tabelle7.Cells(54 + 1, t + 3).Value

Tabelle7.Cells(54 + 1, t + 3).Value = swap / n

swap = Tabelle7.Cells(54 + 2, t + 3).Value

Tabelle7.Cells(54 + 2, t + 3).Value = swap / n

swap = Tabelle7.Cells(54 + 3, t + 3).Value

Tabelle7.Cells(54 + 3, t + 3).Value = swap / n

swap = Tabelle7.Cells(60, t + 3).Value

Tabelle7.Cells(60, t + 3).Value = swap / n

swap = Tabelle7.Cells(60 + 1, t + 3).Value

Tabelle7.Cells(60 + 1, t + 3).Value = swap / n

swap = Tabelle7.Cells(60 + 2, t + 3).Value

Tabelle7.Cells(60 + 2, t + 3).Value = swap / n

swap = Tabelle7.Cells(60 + 3, t + 3).Value

```

        Tabelle7.Cells(60 + 3, t + 3).Value = swap / n
    End If

```

```

'loop unit operational % and divide by number of runs
'if top down rollout
If v_11 = 0 Then
    swap = Tabelle6.Cells(74, t + 3).Value
    Tabelle6.Cells(74, t + 3).Value = swap / n
    swap = Tabelle6.Cells(74 + 1, t + 3).Value
    Tabelle6.Cells(74 + 1, t + 3).Value = swap / n
    swap = Tabelle6.Cells(74 + 2, t + 3).Value
    Tabelle6.Cells(74 + 2, t + 3).Value = swap / n
    swap = Tabelle6.Cells(74 + 3, t + 3).Value
    Tabelle6.Cells(74 + 3, t + 3).Value = swap / n
    swap = Tabelle6.Cells(74 + 4, t + 3).Value
    Tabelle6.Cells(74 + 4, t + 3).Value = swap / n
ElseIf v_11 = 1 Then 'exposure focused rollout
    swap = Tabelle7.Cells(74, t + 3).Value
    Tabelle7.Cells(74, t + 3).Value = swap / n
    swap = Tabelle7.Cells(74 + 1, t + 3).Value
    Tabelle7.Cells(74 + 1, t + 3).Value = swap / n
    swap = Tabelle7.Cells(74 + 2, t + 3).Value
    Tabelle7.Cells(74 + 2, t + 3).Value = swap / n
    swap = Tabelle7.Cells(74 + 3, t + 3).Value
    Tabelle7.Cells(74 + 3, t + 3).Value = swap / n
    swap = Tabelle7.Cells(74 + 4, t + 3).Value
    Tabelle7.Cells(74 + 4, t + 3).Value = swap / n
End If

```

```

t = t + 1
Loop

```

```

'#####

```

```

'loop parameter variation until stop value reached

```

```

        'loop both rollout plans
        v_11 = v_11 + 1
        Loop While v_11 <= v_11_stop
        'optimise excel
        Application.ScreenUpdating = True
        'save copy
        Path_xlsm(v_12, v_21, v_22, v_23, v_24, v_25, v_26) = Path_xlsm(v_12, v_21, v_22,
v_23, v_24, v_25, v_26) & "_n_" & n & "-v17.xlsm"
        ActiveWorkbook.SaveCopyAs Path_xlsm(v_12, v_21, v_22, v_23, v_24, v_25, v_26)
        v_26 = v_26 + 1
        Loop While v_26 <= v_26_stop
        v_25 = v_25 + 1
        Loop While v_25 <= v_25_stop
        v_24 = v_24 + 1
        Loop While v_24 <= v_24_stop
        v_23 = v_23 + 1
        Loop While v_23 <= v_23_stop
        v_22 = v_22 + 1
        Loop While v_22 <= v_22_stop
        v_21 = v_21 + 1
        Loop While v_21 <= v_21_stop
        v_12 = v_12 + 1
        Loop While v_12 <= v_12_stop

```

End Sub