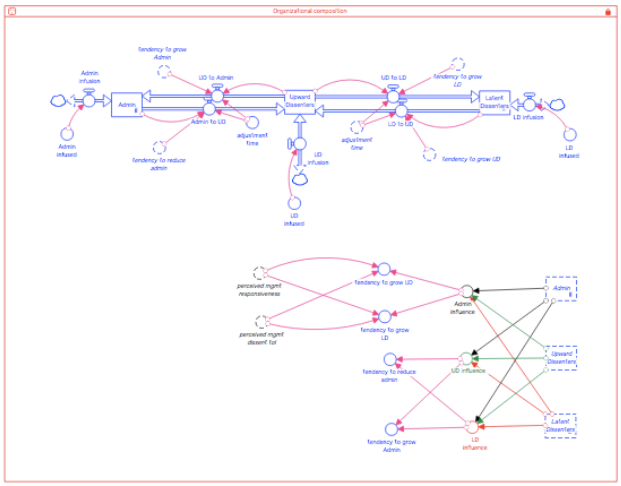
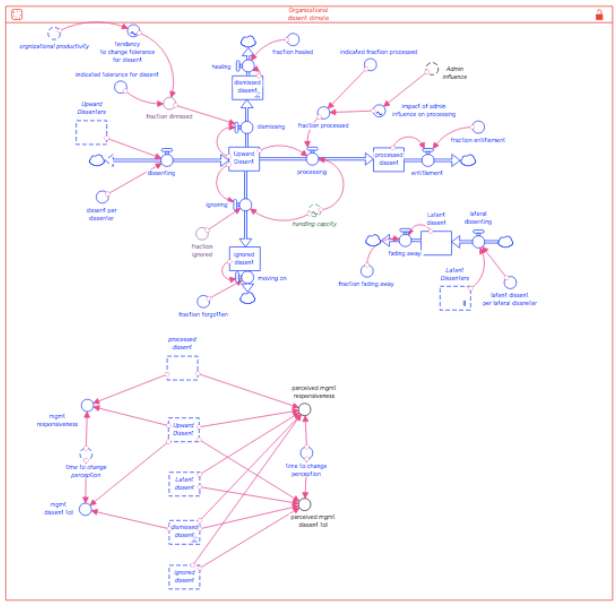
Appendix C: Dissent Model Structure and Equations for Chapter 4 & 5

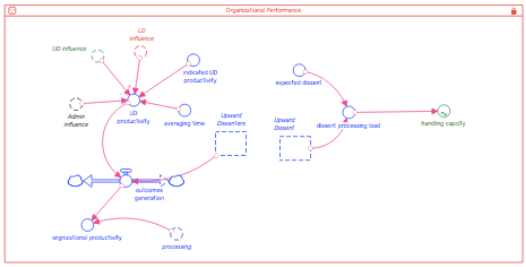
The model is composed of 3 sectors with a total of 8 stocks

File: Ch_4_5_dissent_FBS_8.8_ISDC14_2.itmx

Best run by iThink 10.1

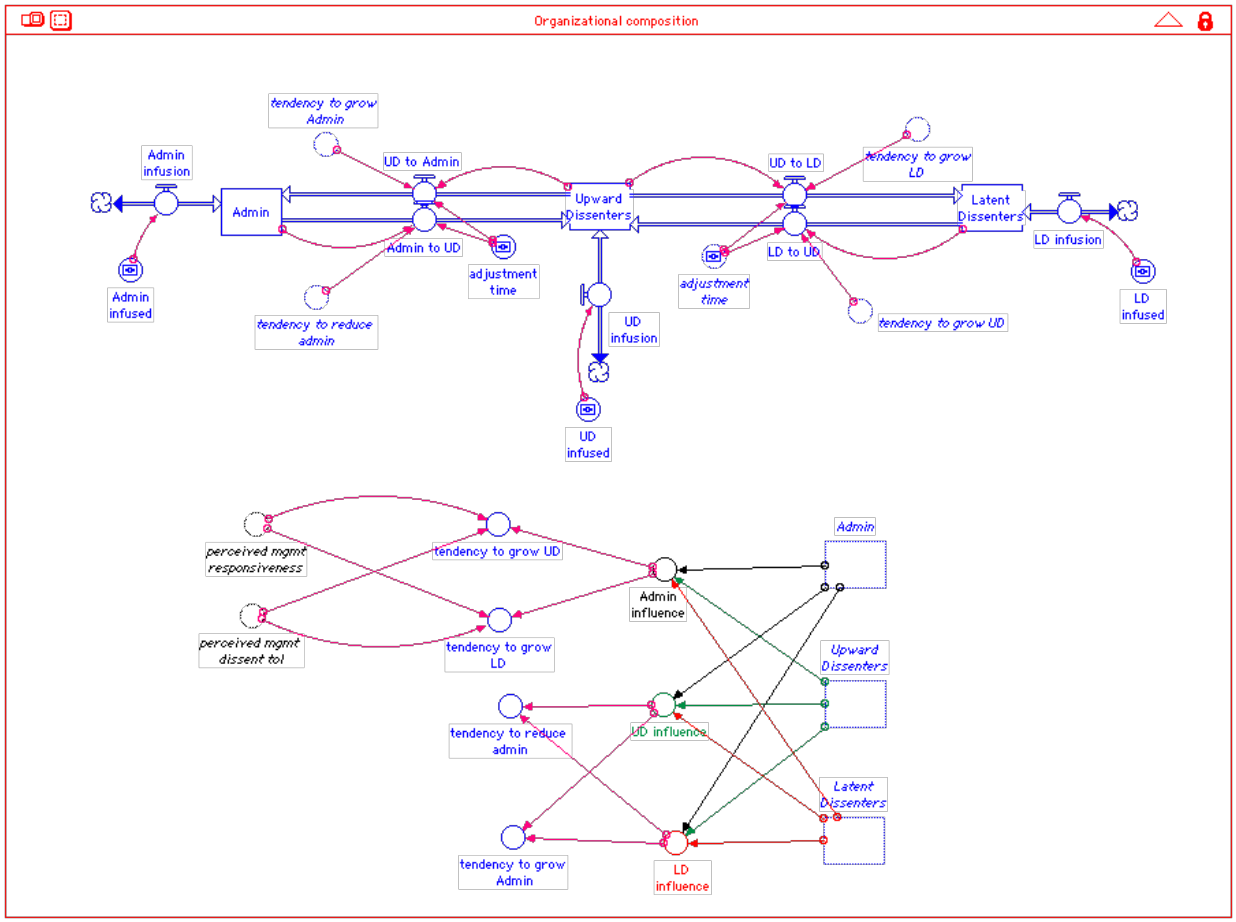






1. Organizational Composition

The organizational composition sector includes the three main populations (Upward dissenter, Latent dissenters, and Admins) the movement between them, and the influence factors that control those movements.



Admin(t) = Admin(t - dt) + (UD_to_Admin + Admin_infusion - Admin_to_UD) * dt

INIT Admin = 5

Units: person

INFLOWS:

UD_to_Admin = 1*Upward_Dissenters*tendency_to_grow__Admin/adjustment_time

Units: person/time

Admin_infusion = PULSE(Admin_infused*dt/dt,0,0)

Units: person/time

OUTFLOWS:

Admin_to_UD = 2*1*Admin*tendency_to_reduce__admin/adjustment_time

Units: person/time

Latent_Dissenters(t) = Latent_Dissenters(t - dt) + (UD_to_LD + LD_infusion - LD_to_UD) * dt

INIT Latent_Dissenters = 5

Units: person

INFLOWS:

UD_to_LD = 1*Upward_Dissenters*tendency_to_grow_LD/adjustment_time

Units: person/time

LD_infusion = PULSE(LD_infused*dt/dt,0,0)

Units: person/time

OUTFLOWS:

LD_to_UD = 2*1*Latent_Dissenters*tendency_to_grow_UD/adjustment_time

Units: person/time

Upward_Dissenters(t) = Upward_Dissenters(t - dt) + (UD_infusion + LD_to_UD + Admin_to_UD - UD_to_Admin - UD_to_LD) * dt

INIT Upward_Dissenters = 10

Units: person

INFLOWS:

UD_infusion = PULSE(UD_infused*dt/dt,0,0)

Units: person/time

LD_to_UD = 2*1*Latent_Dissenters*tendency_to_grow_UD/adjustment_time

Units: person/time

Admin_to_UD = 2*1*Admin*tendency_to_reduce__admin/adjustment_time

Units: person/time

OUTFLOWS:

UD_to_Admin = 1*Upward_Dissenters*tendency_to_grow__Admin/adjustment_time

Units: person/time

UD_to_LD = 1*Upward_Dissenters*tendency_to_grow_LD/adjustment_time

Units: person/time

adjustment_time = 4

Units: time

Admin_influence = 3*Admin/(Upward_Dissenters+Latent_Dissenters)

Units: unitless

Admin_infused = 0

Units: person

LD_influence = 3*Latent_Dissenters/(Admin+Upward_Dissenters)

Units: unitless

LD_infused = 0

Units: person

tendency_to_grow_LD =

1/(Admin_influence*perceived_mgmt__dissent_tol*perceived_mgmt_responsiveness)

Units: unitless

tendency_to_grow__Admin = LD_influence/UD_influence

Units: unitless

tendency_to_grow_UD =

(Admin_influence*perceived_mgmt_responsiveness*perceived_mgmt__dissent_tol)

Units: unitless

tendency_to_reduce__admin = UD_influence/LD_influence

Units: unitless

UD_infused = 0

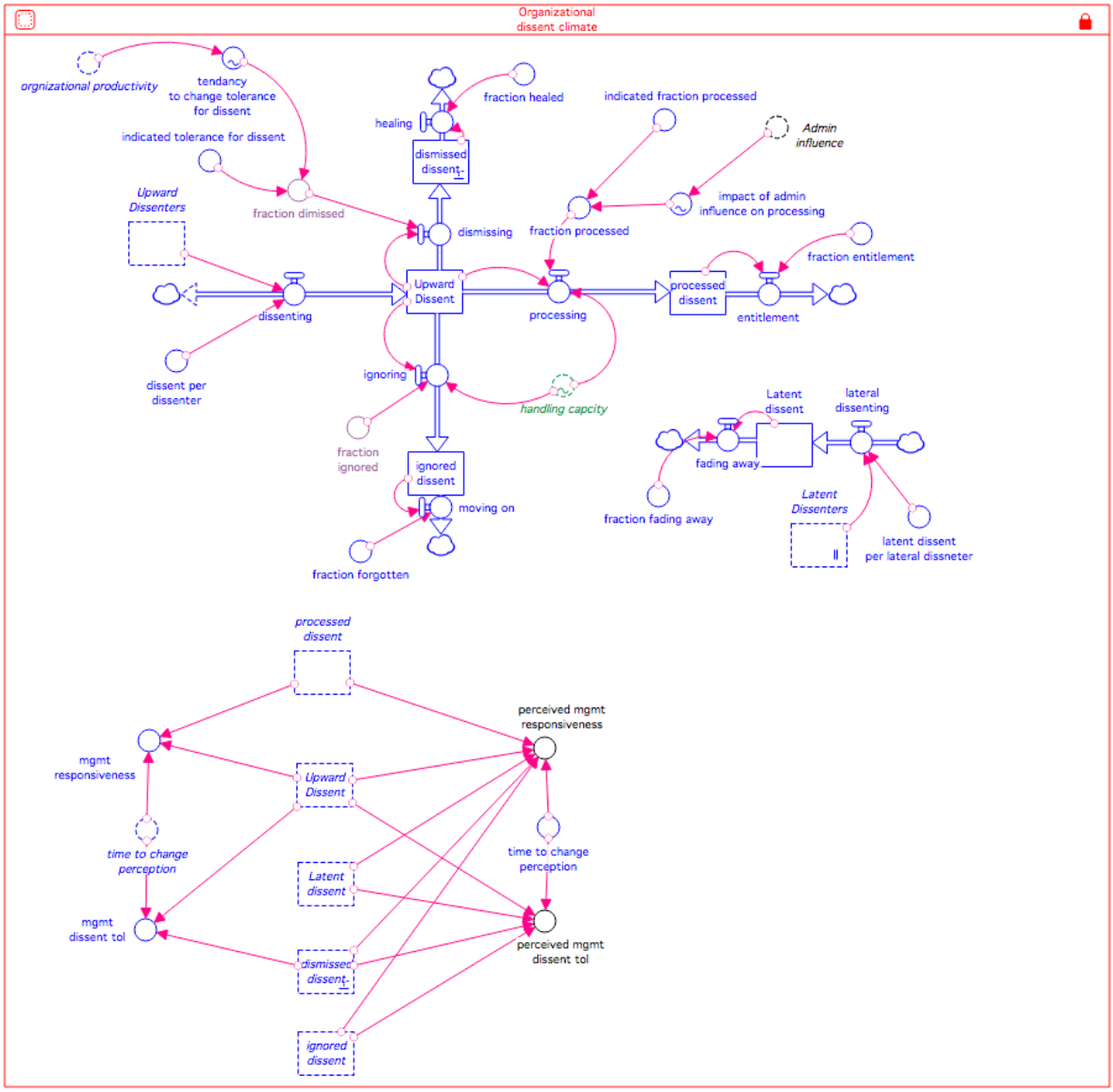
Units: person

UD_influence = Upward_Dissenters/(Latent_Dissenters+Admin)

Units: unitless

2. Organizational Dissent Climate

This includes the different dissent expression mechanisms (upward dissent and latent dissent) and how they are managed (dismissing, ignoring, and processing) and their permanence in the organizational memory (dismissed, ignored, and processed dissent). It also includes the two performance measures: perceived management tolerance and responsiveness.



dismissed__dissent(t) = dismissed__dissent(t - dt) + (dismissing - healing) * dt

INIT dismissed__dissent = 1

Units: unitless

INFLOWS:

dismissing = Upward__Dissent*fraction_dimissed

Units: 1/time

OUTFLOWS:

healing = dismissed__dissent*fraction_healed

Units: 1/time

ignored_dissent(t) = ignored_dissent(t - dt) + (ignoring - moving_on) * dt

INIT ignored_dissent = 1

Units: unitless

INFLOWS:

ignoring = Upward__Dissent*fraction_ignored/handling_capcity

Units: 1/time

OUTFLOWS:

moving_on = ignored_dissent*fraction_forgotten

Units: 1/time

Latent__dissent(t) = Latent__dissent(t - dt) + (lateral__dissenting - fading_away) * dt

INIT Latent__dissent = 1

Units: Unitless

INFLOWS:

lateral__dissenting = Latent_Dissenters*latent_dissent_per_lateral_dissneter

Units: 1/time

OUTFLOWS:

fading_away = Latent__dissent*fraction_fading_away

Units: 1/time

processed__dissent(t) = processed__dissent(t - dt) + (processing - entitlement) * dt

INIT processed__dissent = 1

Units: unitless

INFLOWS:

processing = min(fraction_processed*handling_capcity,Upward__Dissent)

Units: 1/time

OUTFLOWS:

entitlement = processed__dissent*fraction_entitlement

Units: 1/time

Upward__Dissent(t) = Upward__Dissent(t - dt) + (dissenting - processing - ignoring - dismissing) * dt

INIT Upward__Dissent = 1

Units: unitless

INFLOWS:

dissenting = Upward_Dissenters*dissent_per_dissenter

Units: 1/time

OUTFLOWS:

processing = min(fraction_processed*handling_capcity,Upward__Dissent)

Units: 1/time

ignoring = Upward__Dissent*fraction_ignored/handling_capcity

Units: 1/time

dismissing = Upward__Dissent*fraction_dimissed

Units: 1/time

dissent_per_dissenter = 0.1

Units: unitless/person/time

fraction_ignored = 0.25

Units: unitless/time

fraction_dimissed =

indicated_tolerance_to_dissent*tendancy__to_change_tolerance_to_dissent/time_to_change_tolerance

Units: unitless/time

fraction_entitlement = 0.5

Units: unitless/time

fraction_fading_away = 0.25

Units: unitless/time

fraction_forgotten = 0.25

Units: 1/time

fraction_healed = 0.25

Units: unitless/time

fraction_processed = 2*indicated_fraction_processed*impact_of_admin_influence__on_processing

Units: unitless/time

indicated_fraction_processed = 0.5

Units: unitless/time

indicated_tolerance_to_dissent = 0.25

Units: Unitless

latent_dissent_per_lateral_dissneter = 0.050000000000000003

Units: unitless/person/time

mgmt_dissent_tol = smth1((1/1)*Upward__Dissent/(dismissed__dissent),time_to_change_perception,1)

Units: unitless

mgmt_responsiveness =

smth1((1/1)*processed__dissent/Upward__Dissent,time_to_change_perception,1)

Units: unitless

perceived_mgmt_responsiveness =

smth1((4/1)*processed__dissent/(Upward__Dissent+Latent__dissent+dismissed__dissent+ignored_dissent), time_to_change_perception, 1)

Units: unitless

perceived_mgmt__dissent_tol =

smth1((3/1)*Upward__Dissent/(ignored_dissent+dismissed__dissent+Latent__dissent),time_to_change_perception,1)

Units: unitless

time_to_change_perception = 1

Units: time

time_to_change_tolerance = 1

Units: time

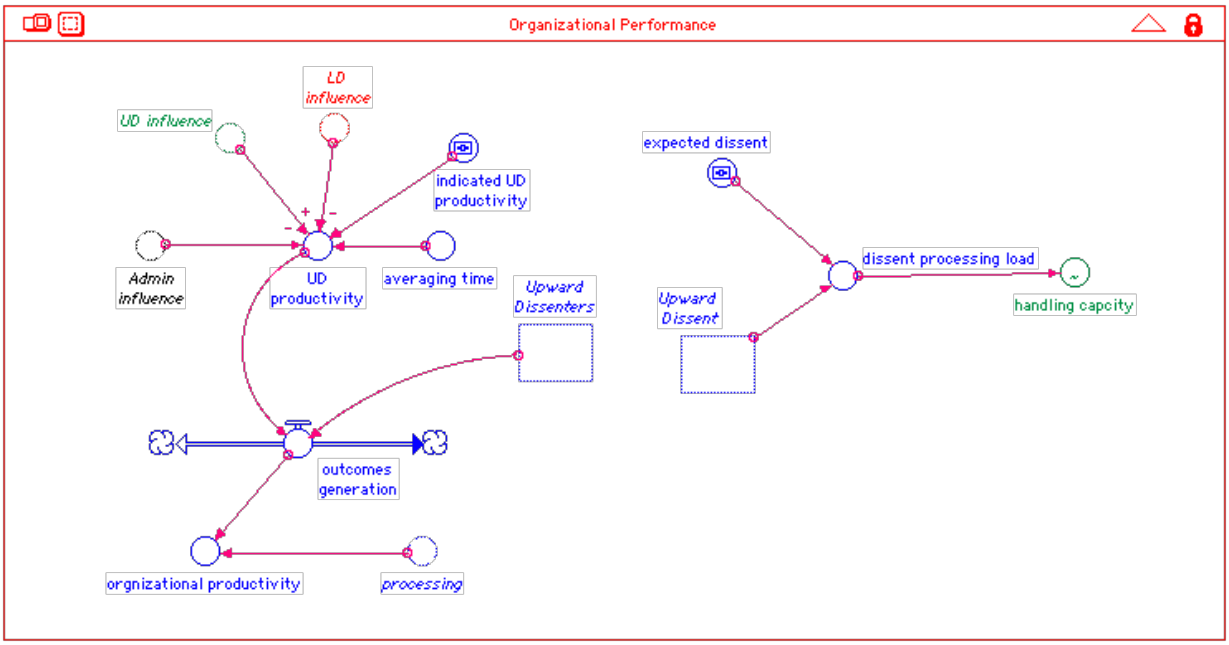
impact_of_admin_influence__on_processing = GRAPH(Admin_influence)

(0.00, 0.63), (0.2, 0.63), (0.4, 0.628), (0.6, 0.614), (0.8, 0.575), (1.00, 0.5), (1.20, 0.433), (1.40, 0.371), (1.60, 0.334), (1.80, 0.306), (2.00, 0.292)

Units: unitless

3. Organizational Performance

This shows how the organizational productivity is calculated based on the UD productivity and dissent processing. It also includes the impact of dissent processing load on the capacity to handle dissent.



outcomes_generation = UD_productivity*(Upward_Dissenters)

Units: unitless/time

averaging_time = 2

Units: time

dissent_processing_load = Upward__Dissent/(expected_dissent)

Units: unitless

expected_dissent = 1

Units: unitless

indicated_UD_productivity = 0.05

Units: unitless/person/time

orgnizational_productivity = outcomes_generation/processing

Units: unitless

UD_productivity =

smth1(indicated_UD_productivity*UD_influence/(LD_influence*Admin_influence),averaging_time,indicated_UD_productivity)

Units: unitless/person/time

handling_capcity = GRAPH(dissent_processing_load)

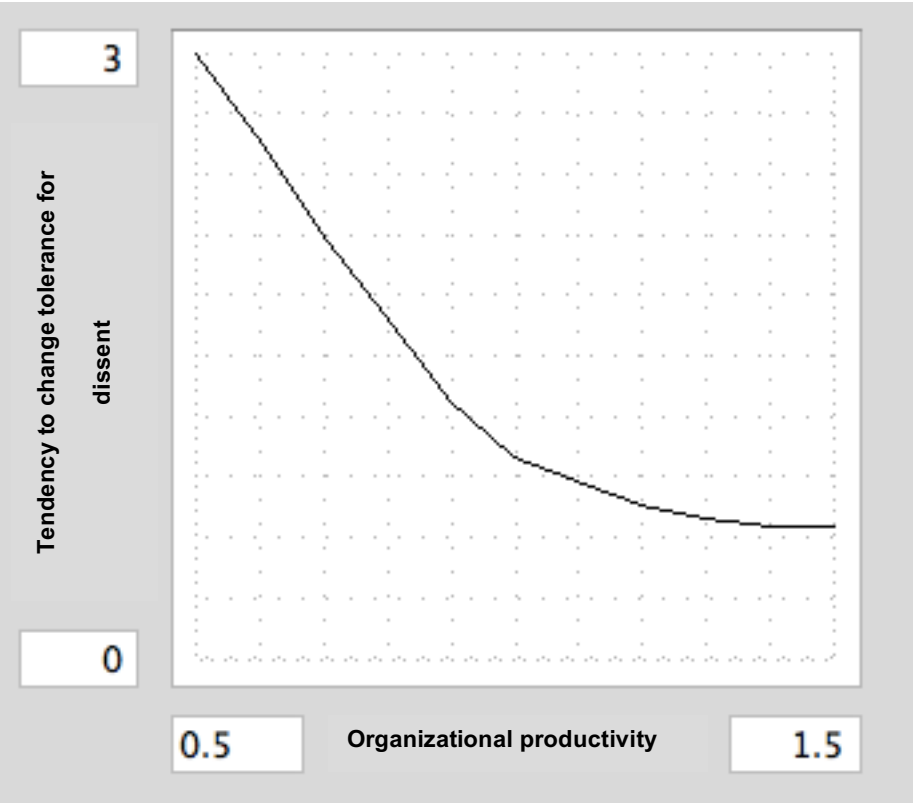
(0.00, 1.00), (0.2, 1.00), (0.4, 1.00), (0.6, 1.00), (0.8, 1.00), (1.00, 1.00), (1.20, 0.951), (1.40, 0.819), (1.60, 0.654), (1.80, 0.39), (2.00, 0.0769)

Units: unitless

Model Assumptions

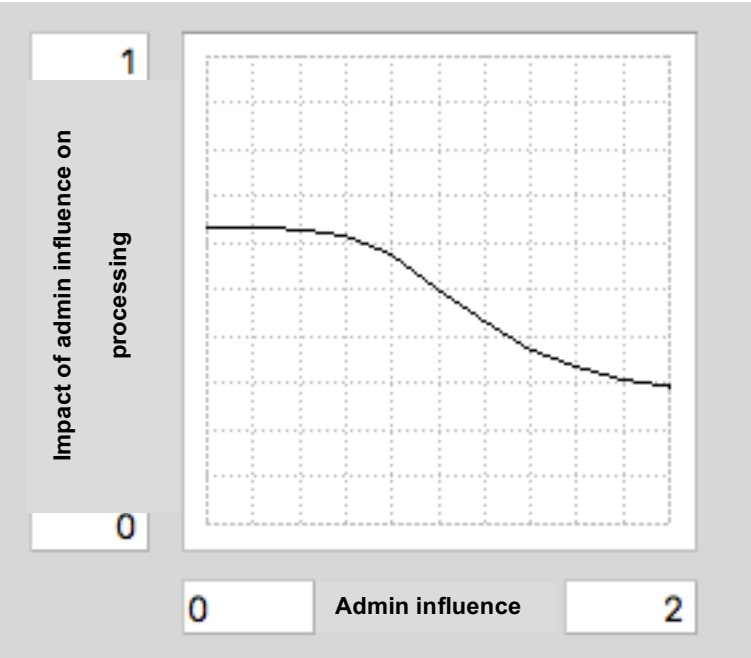
A list of graphical functions and their descriptions is presented here.

1. **Tendency to change tolerance for dissent**



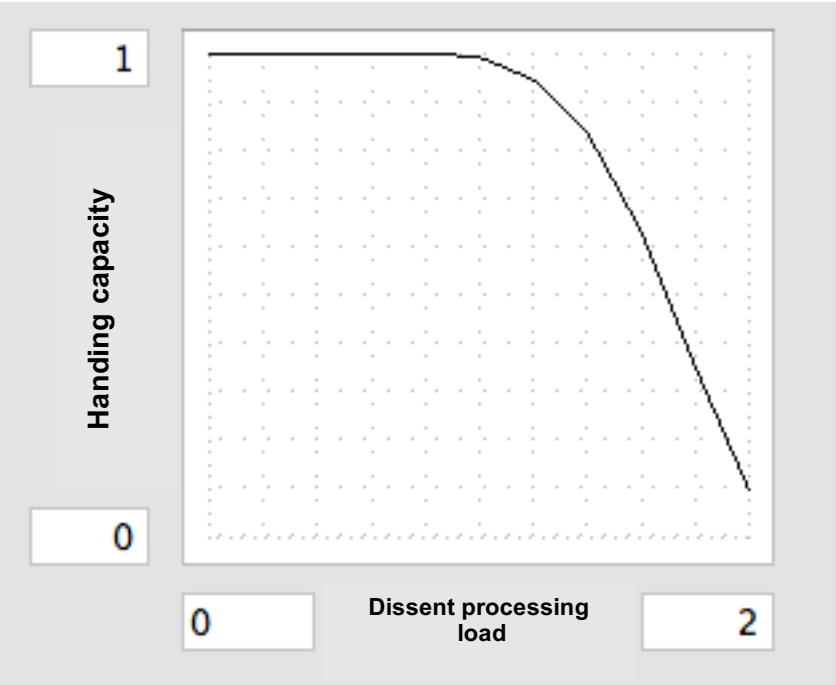
Low organizational productivity is assumed to lead to a rapid decline in the tendency to change tolerance for dissent. Above the value of one in organizational productivity, the tendency to change tolerance for dissent slows down and reach an asymptotic value. The high tendency to change tolerance for dissent means lower tolerance for dissent, hence, more dismissed dissent.

2. Impact of admin influence on processing



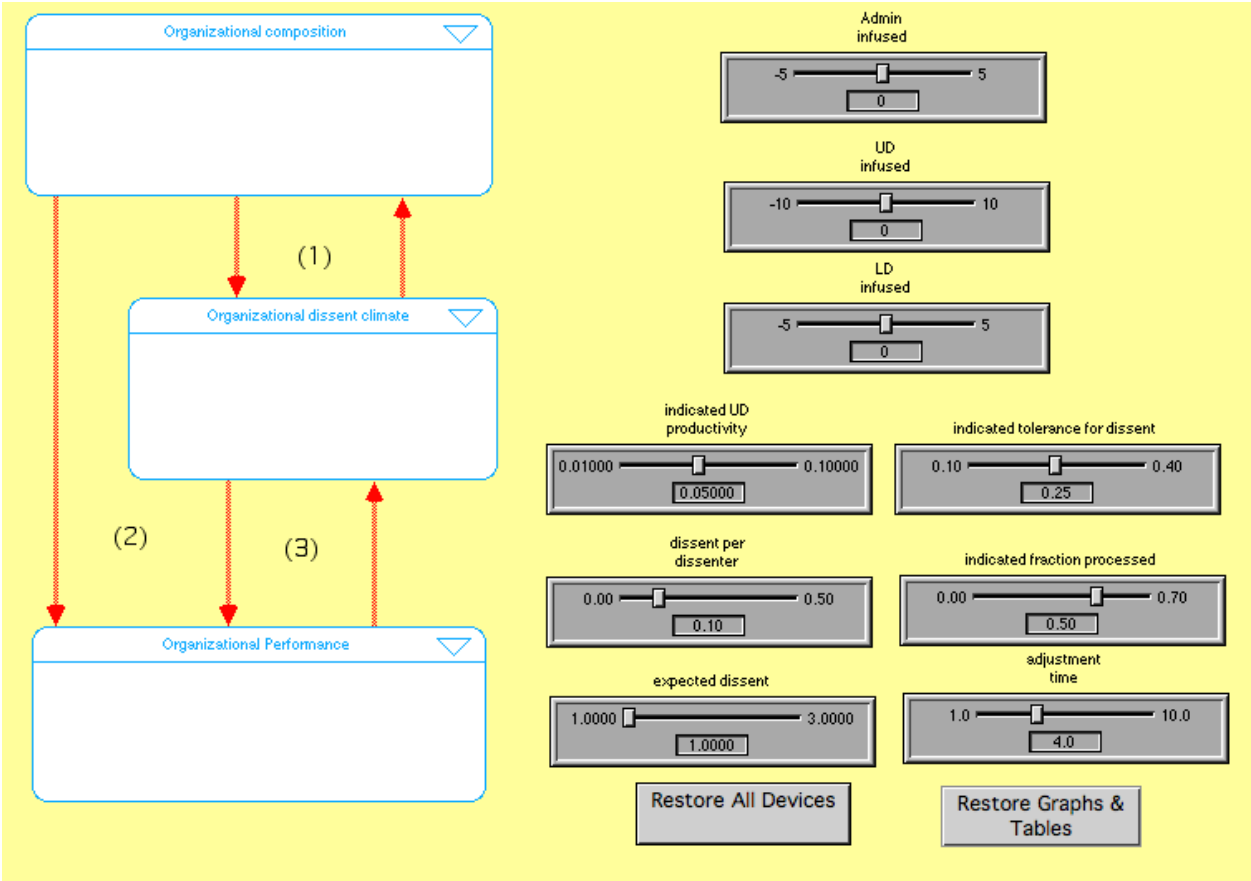
A low value of admin influence is assumed to have no effect on the processing of dissent. However, as the admin influence increases, it slows down the processing of dissent. As admin influence keeps growing, the processing continues to decrease at a slower rate indicating the creation of established protocols for dissent processing that limits the continuous decline, but it does not improve it, though.

3. Impact of faculty load on research team productivity



Dissent handling capacity is assumed to remain constant until the dissent processing load goes beyond the expected dissent level. Beyond that, handling capacity reduces sharply despite having an established protocol for dissent processing.

Model Interface



Model interface showing the sectors and input sliders for testing the model behavior under different scenarios.

Model Equilibrium Values

Table 1: Equilibrium values

Parameters and variables	Values
Upward dissenters	10
Latent dissenters	5
Administrators	5
Upward dissenter productivity	0.05
Tolerance to dissent	0.25
Processing of dissent	0.5
Fraction ignored	0.25
Upward dissent	1
Ignored dissent	1
Dismissed dissent	1
Processed dissent	1
Latent dissent	1
Dissent per dissenter	0.1