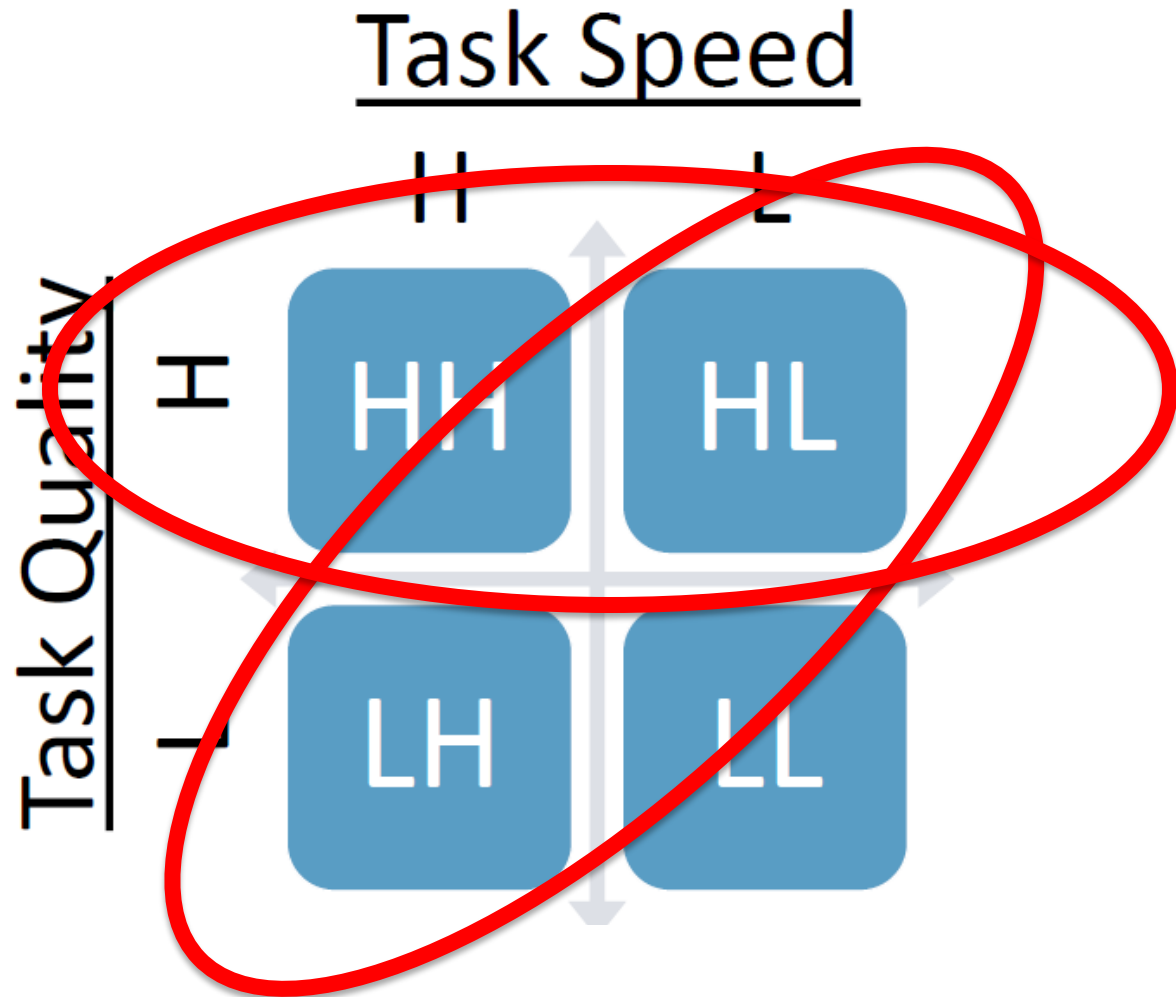


Organizational Design and Space: The Good, The Bad, and The Productive

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Research Question: How should we design an organization across physical space to drive performance?

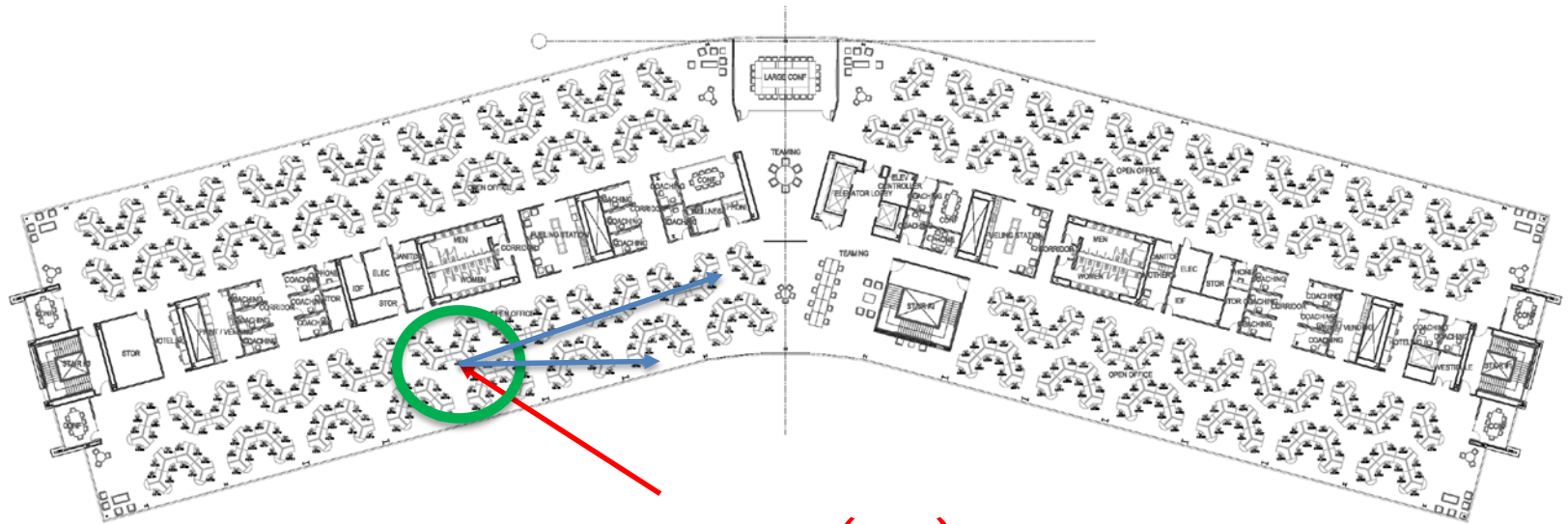
Multi-dimensional Spillover



Data

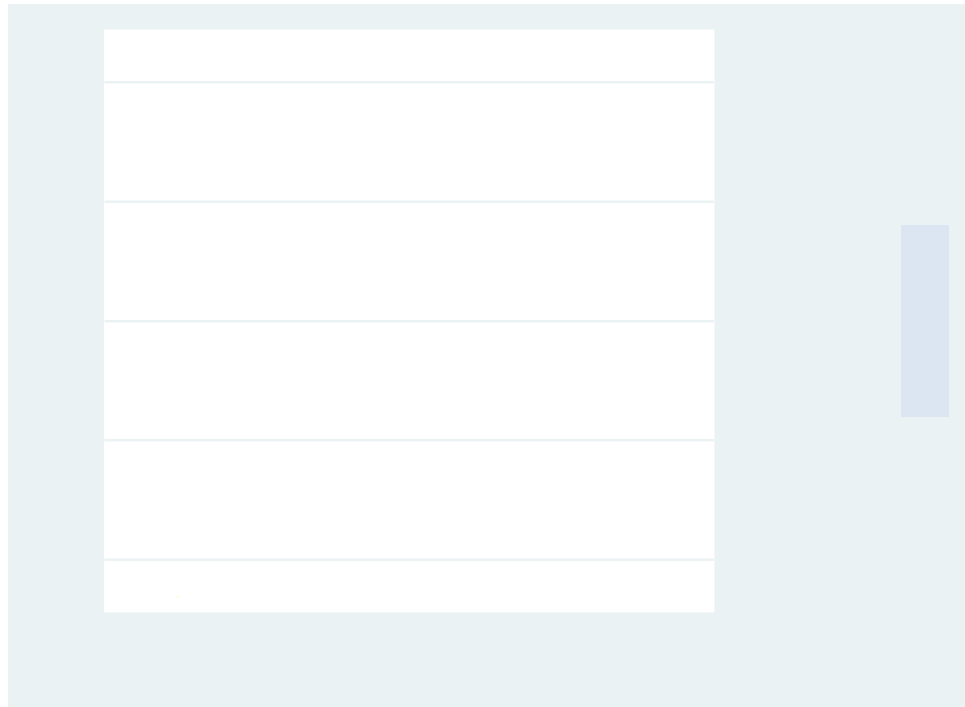
- Approximately 2,000 technology-based workers from a large technology firm followed from June 2013 through May 2015.
- Information was obtained on position, hire and termination dates (if applicable), and direct managers.
- We identified the physical location of workers by month, as given by their desk location. This information combined with building layouts allowed for mapping all workers into physical space across time.
- Workers are assigned seating by centralized human resources and exact assignment is a function of matching supply and demand of work flow and considered “pretty random.”
- Performance data was gathered on the three most important KPIs: productivity, effectiveness, and quality, as well as whether or not the worker was terminated for misconduct (“toxic”)

We mapped floor plans of technology-based workers into space coordinates and measured spillover from “exogenous” placements

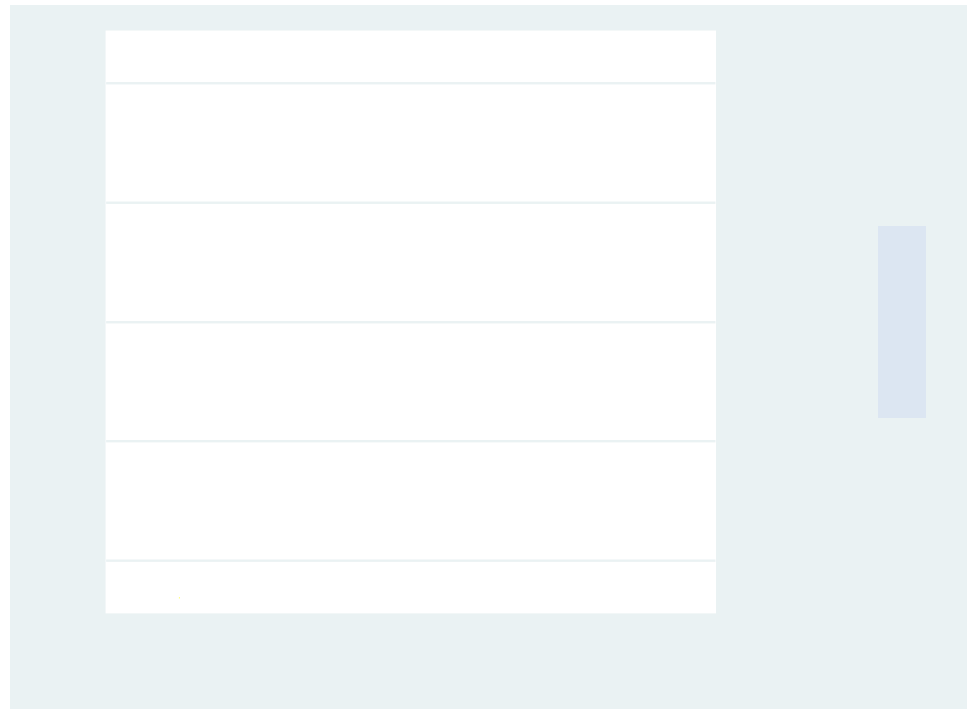


(x,y)
coordinates

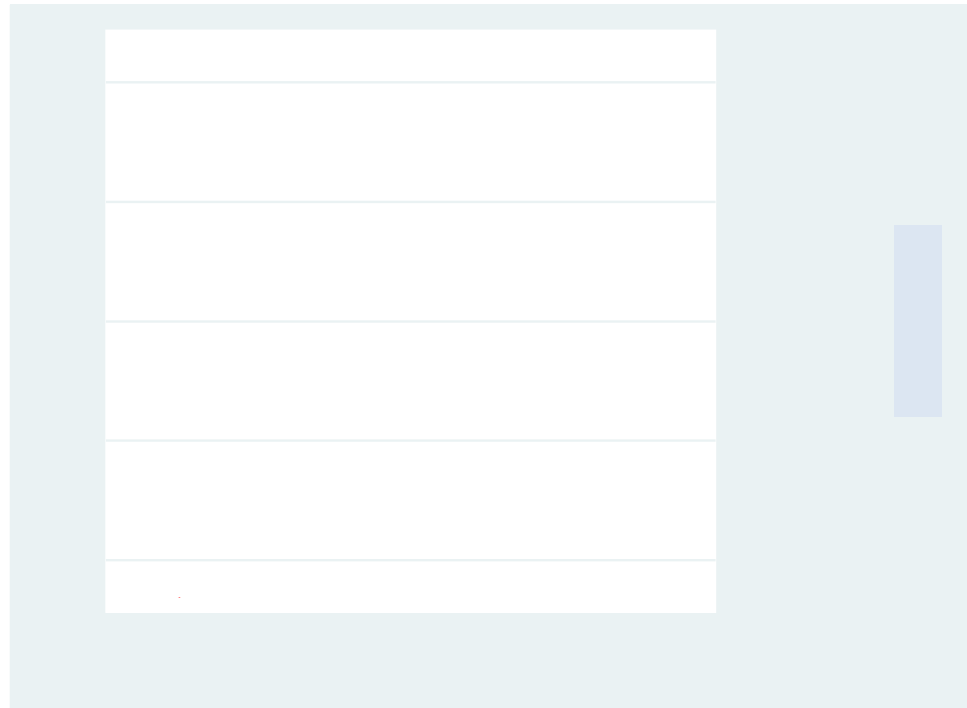
Heatmap A-01-01 Oct-14



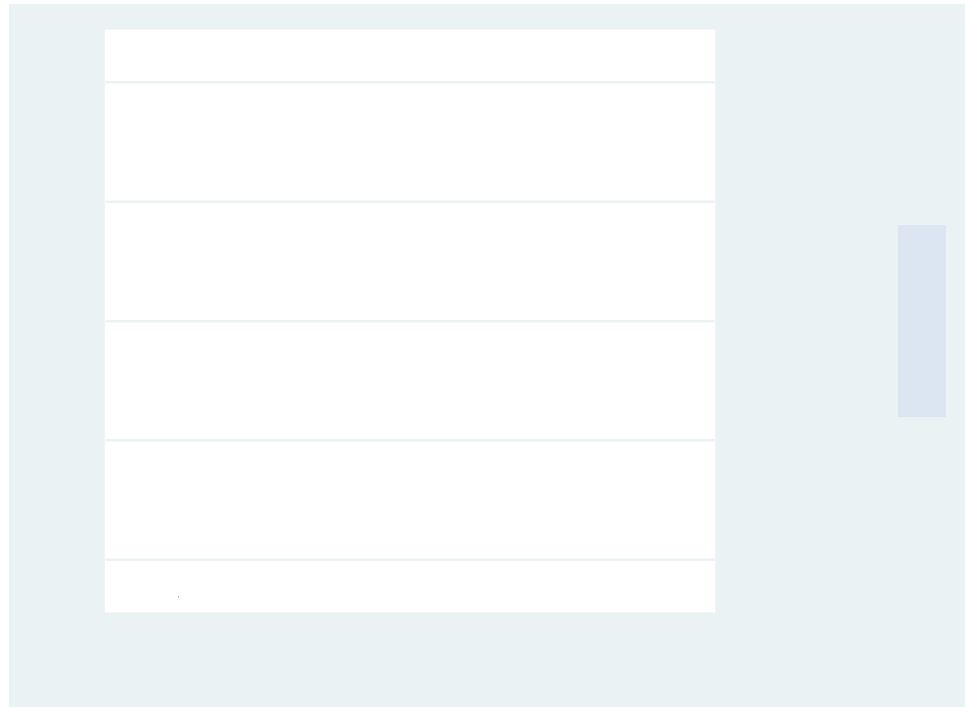
Heatmap A-01-01 Nov-14



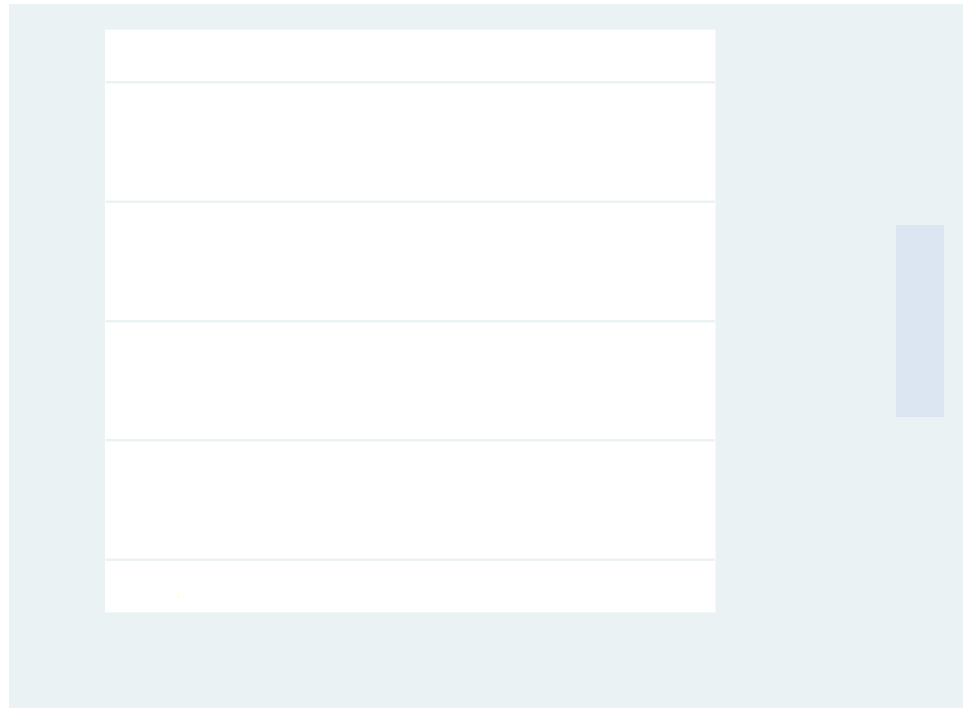
Heatmap A-01-01 Dec-14



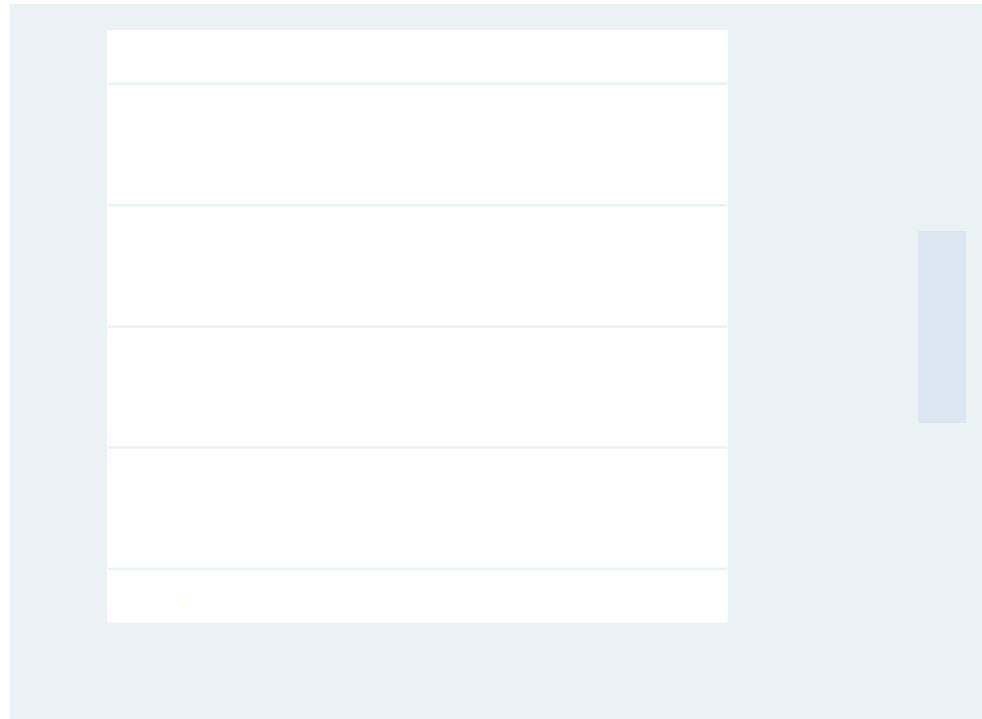
Heatmap A-01-01 Jan-15



Heatmap A-01-01 Feb-15



Heatmap A-01-01 Mar-15



Productivity is increasing in closeness

Table 2: Productivity Spillover

Outcome: Individual Productivity				
	(1)	(2)	(3)	(4)
Productivity Density	0.0005*** (6.05)	0.0006*** (7.33)	0.0008*** (9.26)	0.0009*** (10.80)
Experience				1.7541*** (-21.76)
Experience^2				-0.0005*** (13.10)
Experience^3				0.0000*** (-9.16)
Intercept	-3930.1435*** (69.61)	-1839.5798*** (4.59)	-3311.9100*** (7.96)	-4184.9818*** (6.54)
Fixed Effects				
<i>Position</i>	No	Yes	Yes	Yes
<i>Time</i>	No	No	Yes	Yes
<i>Supervisor</i>	Yes	Yes	Yes	Yes
Observations	28335	28335	28335	28302
R-Squared	0.474	0.487	0.518	0.536
Adjusted R-Squared	0.470	0.483	0.514	0.532

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Standard errors clustered at the supervisor level

1 SD
increase in
productivity
density → 8%
increase in
focal
employee
productivity

Effectiveness is increasing in closeness

Table 3: Effectiveness Spillover

Outcome: Individual Effectiveness				
	(1)	(2)	(3)	(4)
Effectiveness Density	0.0020*** (21.04)	0.0021*** (22.02)	0.0015*** (13.50)	0.0016*** (14.55)
Experience				0.0004*** (-15.36)
Experience^2				-0.0000*** (9.13)
Experience^3				0.0000*** (-5.62)
Intercept	-0.5258*** (40.79)	-0.4125*** (4.84)	-0.7882*** (10.06)	-0.9804*** (11.59)
Fixed Effects				
<i>Position</i>	No	Yes	Yes	Yes
<i>Time</i>	No	No	Yes	Yes
<i>Supervisor</i>	Yes	Yes	Yes	Yes
Observations	28335	28335	28335	28302
R-Squared	0.457	0.469	0.483	0.494
Adjusted R-Squared	0.453	0.465	0.479	0.490

t statistics in parentheses

*p<0.10, **p<0.05, ***p<0.01

Standard errors clustered at the supervisor level

1 SD increase
in
effectiveness
density → 16%
increase in
focal
employee
task
effectiveness

Quality is increasing in closeness

Table 4: Quality Spillover

	Outcome: Individual Quality			
	(1)	(2)	(3)	(4)
Quality Density	0.0003*** (4.39)	0.0003*** (4.71)	0.0003*** (3.91)	0.0003*** (4.25)
Experience				-0.0013 (-1.48)
Experience^2				-0.0000 (-1.18)
Experience^3				0.0000** (2.47)
Intercept	67.6586*** (95.71)	73.9188*** (15.77)	76.6457*** (15.23)	77.8815*** (14.38)
Fixed Effects				
<i>Position</i>	No	Yes	Yes	Yes
<i>Time</i>	No	No	Yes	Yes
<i>Supervisor</i>	Yes	Yes	Yes	Yes
Observations	28356	28356	28356	28321
R-Squared	0.257	0.263	0.270	0.272
Adjusted R-Squared	0.253	0.258	0.264	0.266

t statistics in parentheses

*p<0.10, **p<0.05, ***p<0.01

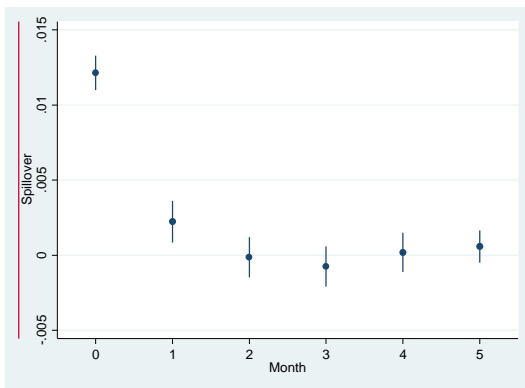
Standard errors clustered at the supervisor level

1 SD
increase
in quality
density →
3%
increase
in focal
employee
task
quality

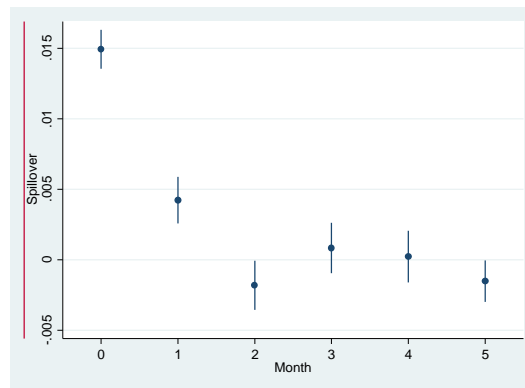
Dynamics: Effects occur quickly and dissipate after peer worker is removed

Effects can be identified within the month of exposure and decay by the next month

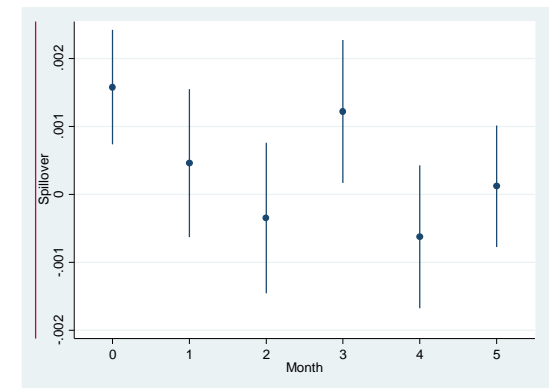
Productivity spillover across time (.016 instant)



Effectiveness spillover across time (.0198 instant)



Quality spillover across time (.004 instant)



Suggests social pressure/ inspiration over learning

How should we design the organization across space?

Depends on who is most affected by spillover

Symbiotic Pairing Drives Performance

	HH MM MM LL	HH MM ML ML	HM HM MM LL	HM HM ML ML	HL HL MM MM
Quality	100.00	99.83	100.12	99.94	100.79
Productivity (task speed)	100.00	101.79	104.71	106.68	114.84
Effectiveness (task solved)	100.00	102.26	107.14	109.74	120.12

We find matching HL LH MM MM on EVERY performance dimension the best design

Negative spillover: Toxic workers

Housman and Minor (2016) find Toxic workers can have even more of an impact than “star” performers on organizational performance, when measured across time (as opposed to space)

Toxic workers spillover across space

Table 6: Toxic Worker Spillover

	Outcome: Terminated for Toxic Behavior			
	(1)	(2)	(3)	(4)
Toxic Density	0.000500*** (3.55)	0.000512*** (3.60)	0.000577*** (3.95)	0.000101** (2.41)
Experience			-0.000000 (-0.42)	-0.000000 (-0.61)
Experience^2			0.000000 (0.33)	0.000000 (0.84)
Experience^3			-0.000000 (-0.38)	-0.000000 (-1.06)
Trust Level in Manager				-0.000017** (-2.20)
Intercept	-0.000261 (-1.07)	-0.000258 (-1.12)	-0.001344** (-2.17)	0.001104* (1.72)
Fixed Effects				
<i>Position</i>	No	Yes	Yes	Yes
<i>Time</i>	No	No	Yes	Yes
<i>Supervisor</i>	Yes	Yes	Yes	Yes
Observations	50286	50286	50085	44794
R-Squared	0.006	0.006	0.007	0.009
Adjusted R-Squared	-0.000	-0.001	-0.001	0.000

t statistics in parentheses

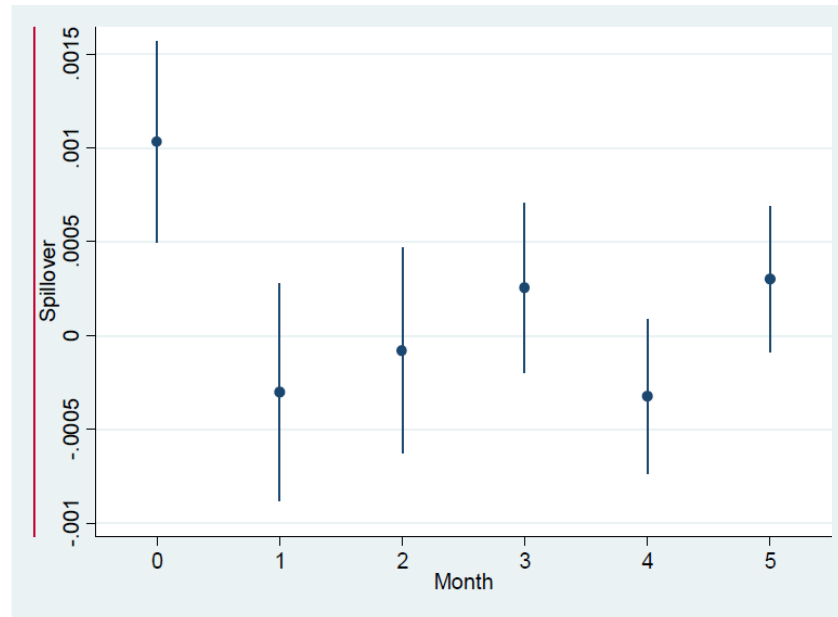
* p<0.10, ** p<0.05, *** p<0.01

Standard errors clustered at the supervisor level

1 SD increase
in toxic
density → 27%
increase in

1 SD focal
increase in ee
manager n for
trust → 22% avior
reduced
chance in
focal
employee
termination
for toxic
behavior

Dynamics of Toxic Spillover: only concurrent effects



Toxic Worker Spillover Across Time

Suggests a social pressure over learning

Organizational Design and Toxic Spillover

1. Avoid the toxic workers (don't hire them)
2. Fire (or reform) the toxic workers
3. Move them to the outer periphery of the organization





Thanks!