

ONLINE APPENDIX

Appendix A: Name-generator Questions

Network

Please specify your individual contacts below by answering the following questions. The individuals you mention can be either from within or outside Neptune.

1. Over the last six months, from which work-related contacts did you regularly seek information and advice as input for your research and development work?
2. Suppose you were moving to a new job and wanted to leave behind the best network advice that you could for the person moving into the current job. Which individuals would you name whose knowledge and expertise is critical as a source of new ideas?
3. Which work-related contacts do you regard as a source of support for implementing your new ideas—that is, someone you are comfortable with discussing your new ideas?
4. Please list anyone who has been an important source of new knowledge and ideas to you over the last six months who you have not listed in the previous questions.

Decision Makers and Opinion Leaders

The following questions are about decision makers and opinion leaders in your work context.

Please specify the individuals within Neptune who have direct or indirect influence on important decisions that affect your work by answering the following questions.

1. Over the last six months, which people were involved in making important decisions regarding projects that you worked on?
2. Are there any individuals whose opinion was critical during review or evaluation of projects but who were not formally making the decision?

Appendix B: Correlation Tables

Table B1. Correlations for the Sample of Technologists (N = 187)*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Innovation performance														
2. Shared technical expertise	.026													
3. Ego prominence	.053	.115												
4. Ego speed to promotion	.155	.157	.204											
5. Ego seniority	-.188	.085	.575	.072										
6. Ego number of partners	.121	-.199	.202	.063	.124									
7. Ego research portfolio time horizon	-.137	-.056	.166	.058	.196	-.007								
8. Ego network degree	-.150	-.097	.221	.091	.156	.110	.066							
9. Ego network closure	.019	-.026	-.018	-.042	-.032	.053	-.008	-.232						
10. Partner prominence	-.079	.142	.299	.152	.333	-.058	.167	.023	-.022					
11. Partner speed to promotion	.014	.031	-.093	-.015	-.078	-.087	-.075	-.018	-.170	-.014				
12. Partner support	.002	.088	.097	.069	.049	.150	-.199	.027	.082	.097	.012			
13. Partner number of partners	.179	.149	.003	.280	.007	.031	.097	-.108	-.043	.254	-.077	.109		
14. Overlapped networking	.059	.025	.106	.057	.059	.036	-.049	.117	.085	.010	-.032	-.064	-.199	
15. Dual networking	.111	-.025	-.100	-.078	-.189	.001	-.097	.082	-.048	-.168	.077	.119	-.043	-.021

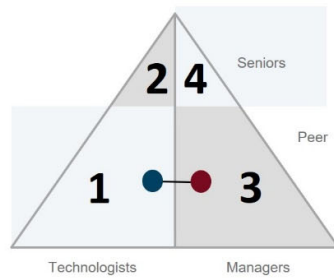
* Correlations >|0.143| are significant at 5%.

Table B2. Correlations for the Sample of Managers (N = 213)*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Innovation performance														
2. Shared technical expertise	.020													
3. Ego prominence	.191	.179												
4. Ego speed to promotion	.198	-.031	.009											
5. Ego seniority	.011	.044	.594	-.057										
6. Ego number of partners	.182	.131	.082	.012	-.102									
7. Ego research portfolio time horizon	-.089	.066	.050	-.033	-.008	.237								
8. Ego network degree	.105	.138	.088	-.046	.071	.132	.058							
9. Ego network closure	-.025	.097	-.054	-.026	.010	-.151	-.133	-.181						
10. Partner prominence	.112	.093	.241	.006	.208	-.039	.099	.015	-.031					
11. Partner speed to promotion	.122	.070	.072	.008	.074	.043	.113	.042	-.075	.153				
12. Partner support	.194	.022	.186	.007	.094	-.112	-.046	.025	.015	.124	.024			
13. Partner number of partners	.042	-.057	.169	.052	.208	-.106	-.024	-.071	.041	.310	.075	-.035		
14. Overlapped networking	-.026	.016	.011	-.080	.087	-.045	-.036	-.106	.170	.020	.087	-.097	.076	
15. Dual networking	.090	-.061	-.051	.069	-.047	.083	.045	.061	.007	-.110	-.121	.162	-.081	-.071

* Correlations >|0.132| are significant at 5%.

















Appendix C: Patterns of Divided and Dual Networking between Managers and Technologists



Census – Patterns of divided versus dual networking between R&D managers and technologists

Rows Configuration of focal manager ego-network (dark red node)
Columns Configuration of focal technologist ego-network (dark blue node)

Four digit codes indicate absence/presence (0/1) of ties to the four role sets shown in the diagram at the top left.

		Technologist																
		N	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
																		
Manager - Only ties outside four core role sets	0000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Only ties to senior managers	0001	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Only ties to peer managers	0010	16	0	0	1	1	1	0	1	2	1	0	3	0	2	0	4	0
Only ties to managers (peer + senior)	0011	11	0	0	0	0	1	0	1	0	0	3	1	1	0	3	1	
Only ties to senior technologists	0100	4	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2	0
Only ties to seniors (managers + techn.)	0101	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
Only ties to senior techn. + peer managers	0110	16	1	0	0	2	1	1	2	3	0	0	1	0	3	0	2	0
Ties to all except peer technologists	0111	14	0	0	0	1	1	0	0	4	1	0	1	1	0	0	4	1
Only ties to peer technologists	1000	6	0	1	0	0	0	0	0	0	1	0	1	0	0	1	2	0
Only ties to peer + senior technologists	1001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Only ties to peers (managers + technologists)	1010	41	0	0	0	0	2	1	4	4	5	0	7	3	3	0	12	0
Ties to all except senior technologists	1011	13	0	0	1	1	2	0	1	0	0	0	1	0	1	0	4	2
Only ties to technologists	1100	15	0	0	0	0	1	0	2	1	0	0	2	1	0	2	3	3
Ties to all except peer managers	1101	3	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0
Ties to all except senior managers	1110	52	0	1	0	0	3	5	4	2	4	0	7	0	6	1	13	6
Ties to all role sets	1111	17	0	0	1	0	0	0	0	3	1	0	2	0	1	1	7	1
N		213	1	2	3	5	12	7	16	21	13	0	28	6	21	6	56	16

	N	Extent of divided versus dual networking	Graphical representation Grey nodes indicate any role set
downward diagonal	29	Complete dual networking / No divided networking	
below diagonal	34	Mostly dual networking - Manager connects to one additional role set	
above diagonal	41	Mostly dual networking - Technologist connects to one additional role set	
	13	Dual networking with two role sets; divided networking with two other role sets	
	28	Dual networking with one role set; two sets divided; no connections to final set	
below diagonal	14	Mostly divided networking – Manager connects to two or more additional sets	
above diagonal	19	Mostly divided networking - Technologist connects to two additional role sets	
below diagonal	13	Mostly divided networking – Dual networking with one role set; two role sets connected by the manager and one by the technologist	
above diagonal	5	Mostly divided networking – Dual networking with one role set; two role sets connected by the technologist and one by the manager	
upward diagonal	6	Complete divided networking	
	11	Multiple role sets not covered by either party	

Appendix D: Additional Analyses: Dual versus Overlapped Networking

The central tenet of this paper is that collaborating managers and technologists who engage in dual networking (i.e., connect to the same role sets but different individuals) attain an innovation performance advantage over those who engage in divided networking (i.e., connect to distinct role sets). We argue that this advantage is rooted in the possibility of collaborators engaging in dual networking to benefit from dual interpretation and dual influencing. To some extent, however, overlapped networking—connecting to the same individuals—also allows for dual interpretation and dual influencing, albeit in different and more limited ways than dual networking. Although we do control for overlapped networking in all our analyses and establish that dual networking has a greater advantage for individual managers' and technologists' innovation performance compared with overlapped networking, space constraints in the paper do not allow us to engage with this issue more fully.

First, we gauge the extent to which overlapped networking may allow for dual interpretation. We argue that the information diversity that managers and technologists get from overlapping connections is much reduced compared with that obtained from different individuals from the same role sets through dual networking. Although having overlapping input from shared alters may help in the joint sensemaking process, it is conceivable that high levels of overlapped networking carry a risk of myopia and cognitive lock-in (Levinthal and March, 1993). This risk may be particularly salient for manager–technologist pairs who have spent much time in the same division and thus likely already have more overlapping expertise and similar outlooks (March, 1991; Fang, Lee, and Schilling, 2010). To test for this possibility, we performed an additional analysis in which we interacted overlapped networking with the sum of manager–technologist tenure in the division. Model 1b in table D1 demonstrates that the positive effect of overlapped networking is indeed reduced for managers when the combined tenure of the pair is high. We do not find an equivalent effect

Table D1. Post-hoc Analyses Probing the Effect of Overlapped Networking*

Variables	Technologists		Managers	
	Model 1a	Model 2a	Model 1b	Model 2b
Shared technical expertise	-.337 ⁺ (.191)	-.216 (.242)	-.301 ^{**} (.079)	-.162 ⁺ (.095)
Ego prominence	.173 ⁺ (.103)	.190 ⁺ (.105)	.214 (.200)	.211 (.191)
Ego speed to promotion	.397 ^{**} (.143)	.368 ⁺ (.193)	.491 ^{**} (.058)	.540 ^{**} (.043)
Ego seniority	-.859 [*] (.401)	-.957 [*] (.408)	-.464 ⁺ (.267)	-.419 (.258)
Ego number of partners	.431 ^{**} (.126)	.455 ^{**} (.133)	.412 ⁺ (.219)	.408 ⁺ (.230)
Ego research portfolio time horizon	-.308 (.209)	-.382 (.250)	-.603 ^{**} (.171)	-.589 ^{**} (.221)
Ego network degree	-.114 ^{**} (.0165)	-.107 ^{**} (.026)	.085 [*] (.037)	.081 ^{**} (.021)
Ego network closure	.0518 (.349)	-.006 (.343)	.172 (.605)	.009 (.387)
Partner prominence	-.117 ^{**} (.0129)	-.116 ^{**} (.010)	.045 [*] (.019)	.058 ^{**} (.003)
Partner speed to promotion	.0901 (.0793)	.130 ^{**} (.049)	.242 ^{**} (.067)	.290 ^{**} (.051)
Partner support	-.0537 ⁺ (.0299)	-.063 ^{**} (.023)	.277 ^{**} (.005)	.309 ^{**} (.003)
Partner number of partners	.224 ^{**} (.0216)	.234 ^{**} (.034)	.012 (.043)	.004 (.048)
Overlapped networking	-.523 (3.143)	-.424 (.405)	7.829 ^{**} (.419)	-.774 (.665)
Dual networking	.534 ^{**} (.101)	.443 ^{**} (.057)	.433 ^{**} (.074)	.530 ^{**} (.129)
Dyad tenure in division (log)	.170 ^{**} (.00234)		.517 (.450)	
Overlapped networking * Dyad tenure in division (log)	.445 (1.275)		-3.125 ^{**} (.046)	
Number of same decision makers		-.102 ^{**} (.005)		.213 ^{**} (.076)
Overlapped networking * Number of same decision makers		.990 ^{**} (.304)		.353 (1.059)
Cut1	1.052 ^{**} (.219)	.481 [*] (.210)	4.424 ^{**} (1.677)	3.504 ^{**} (.344)
Cut2	1.804 ^{**} (.131)	1.235 ^{**} (.116)	5.285 ^{**} (1.706)	4.363 ^{**} (.365)
McKelvey & Zavoina R ²	.306	.309	.282	.290
Log-likelihood	-161.8	-161.9	-205.6	-205.4
Observations	187	187	213	213

⁺ $p < .10$; ^{*} $p < .05$; ^{**} $p < .01$.

* Standard errors in parenthesis are clustered by ego seniority. Dummies for six business units are included.

for technologists (model 1a). This may be because managers are expected to act as generalists who can challenge specialist technologists by offering a broader perspective on their work. It may be this generalist role of the manager within the partnership that is jeopardized if the pair have spent a long time in the same division and have many overlapping ties.

Second, overlapped networking may also allow for dual influencing, albeit with the difference that managers and technologists target their influencing attempts at the same individuals rather than merely at the same role sets. Although such targeted individuals may be more easily convinced if both the manager and technologist approach them, high levels of overlapping ties occur at the expense of building a narrower base of support (see the lower graph in figure 1 in the paper). As such, from an influencing perspective, overlapped networking could be more effective in environments with a concentrated power base than in environments where power is spread. In line with this argument, model 2a in table D1 shows that technologists who indicate the same individuals that their manager does as relevant decision makers and opinion leaders benefit more from overlapped networking than those who see different individuals as influential. However, there is no equivalent effect for managers (model 2b). This is consistent with our earlier observation that overlapped networking is often targeted at prominent individuals, particularly senior technologists. Technologists may be more dependent than managers on the scientific legitimacy bestowed on them from senior technologists.

REFERENCES

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