

Table E1. Demographic profiles by job specialty

## Appendix E: Data Tables

Characteristics	Technology managers (n=26)	Operations specialists (n=26)	Systems specialists (n=107)	Database specialists (n=16)	Data/telecom specialists (n=16)	Programmer (n=17)	Other technical specialists (n=357)	Business specialists (n=242)
Mean age	49	49	46	47	47	45	42	47
Age range	30 – 64	32 – 60	24 – 62	27 – 63	24 – 63	22 – 74	22 – 64	20 – 65
Percent with any college education	98 %	89 %	99 %	98 %	94 %	98 %	92 %	96 %
Percent with bachelor's degree or higher	72%	16 %	72 %	73 %	46 %	61 %	33 %	78 %
Percent with degree in a technical field (CS, IS, MIS)	44 %	11 %	46 %	45 %	29 %	47 %	31 %	19 %
Percent with certifications	13 %	7 %	14 %	12 %	23 %	15 %	22 %	18 %
Mean years of experience in NYS government	23	22	18	19	17	14	12	19
Mean years of experience in current agency	15	10	10	13	11	11	8	13
Percent with all NYS experience in a single agency	36 %	13 %	36 %	35 %	37 %	54 %	51 %	53 %
Percent with all NYS experience in two agencies	29 %	48 %	32 %	42 %	33 %	25 %	28 %	28 %
Percent with private sector IT experience	41%	42 %	50 %	47 %	60 %	53 %	51 %	32 %

## Appendix E: Data Tables

Mean years of private sector IT experience	2	4	3	3	5	4	4	2
Percent eligible to retire within 3 years (2006 – 2009)	36 %	37 %	22 %	24 %	21 %	18 %	9 %	32 %
Percent planning to retire within 3 years (2006 – 2009)	22 %	23 %	11 %	14 %	11 %	10 %	7 %	18 %
Percent eligible to retire within 6 years (2006 – 2012)	54 %	47 %	35 %	40 %	35 %	29 %	19 %	45 %
Percent planning to retire within 6 years (2006 – 2012)	41 %	40 %	20 %	28 %	25 %	21 %	14 %	35 %
Percent interested in working for NYS after retirement	77 %	78 %	76%	83 %	79 %	73 %	77 %	76 %

Table E2. Demographic profiles by grade level categories

## Appendix E: Data Tables

<b>Characteristics</b>	<b>Entry level(n=1,118)</b>	<b>Journey level(n=1,229)</b>	<b>Mid level managers(n=286)</b>	<b>Upper level managers(n=57)</b>
Mean age	43	47	49	52
Age range	20-68	24-69	30-63	35-64
Percent with any college education	94 %	98 %	98 %	100 %
Percent with bachelor's degree or higher	47 %	65 %	75 %	78 %
Percent with degree in a technical field (CS, IS, MIS)	40 %	40 %	36 %	42 %
Mean years of experience in NYS government	12	18	23	25
Mean years of experience in current agency	9	12	16	16
Percent with all NYS experience in a single agency	59 %	41 %	41 %	40 %
Percent with all NYS experience in two agencies	25 %	32 %	27 %	21 %
Percent with private sector IT experience	52 %	44 %	40 %	47 %
Mean years of private sector IT experience	5	3	2	3
Percent eligible to retire within 3 years (2006 -2009)	11 %	25 %	37 %	47 %
Percent planning to retire within 3 years (2006 – 2009)	6 %	14 %	20 %	27 %
Percent eligible to retire within 6 years (2006 -2012)	20 %	38 %	55 %	70 %
Percent planning to retire within 6 years (2006 – 2012)	14 %	28 %	41 %	60 %
Percent interested in working for NYS after retirement	74 %	76 %	78 %	75 %

**Table E3. Demographic profiles by agency size**

## Appendix E: Data Tables

Characteristics	Large Agencies(n=2,008)	Medium Agencies(n=532)	Small Agencies(n=293)
Mean age	46	46	45
Age range	20-70	21-68	22-65
Percent with any college education	94 %	96 %	98 %
Percent with bachelor's degree or higher	58 %	65 %	60 %
Percent with degree in a technical field (CS, IS, MIS)	39 %	40 %	45 %
Mean years of experience in NYS government	16	16	15
Mean years of experience in current agency	11	12	9
Percent with all NYS experience in a single agency	50 %	51 %	38 %
Percent with all NYS experience in two agencies	28 %	28 %	30 %
Percent with private sector IT experience	45 %	53 %	56 %
Mean years of private sector IT experience	4	4	4
Percent eligible to retire within 3 years (2006 – 2009)	21%	22 %	20 %
Percent planning to retire within 3 years (2006 – 2009)	13 %	9 %	13 %
Percent eligible to retire within 6 years (2006 – 2012)	33 %	37 %	31 %
Percent planning to retire within 6 years (2006 – 2012)	25 %	24 %	25 %
Percent interested in working for NYS after retirement	76%	72%	76%

**Table E4. Skill by skill proficiency ratings (listed in alphabetical order), page 1**

*\* Means include those employees who have at least basic proficiency, calculated on a four-point rating scale: 1 = Basic, 2 = Intermediate, 3= Advanced, 4 = Expert.*

*Note: Row totals may not equal 100% due to rounding.*

## Appendix E: Data Tables

Skill	N	Mean*	Basic	Intermediate	Advanced	Expert	None
Artificial Intelligence (AI)	2,759	1.28	457 (17%)	102 (4%)	20 (1%)	8 (.3%)	2172 (79%)
Backup & recovery	2,803	1.91	853 (30%)	578 (21%)	403 (14%)	141 (5%)	828 (30%)
Biometrics	2,781	1.25	481 (17%)	82 (3%)	26 (1%)	5 (.2%)	2187 (79%)
Borland JBuilder	2,771	1.36	170 (6%)	45 (2%)	12 (.4%)	5 (.2%)	2539 (92%)
Broadband technologies	2,783	1.50	722 (26%)	297 (11%)	108 (4%)	20 (1%)	1636 (59%)
Business continuity planning	2,758	1.49	706 (26%)	303 (11%)	93 (3%)	21 (1%)	1635 (59%)
Business process analysis	2,785	1.85	802 (29%)	695 (25%)	317 (11%)	99 (4%)	872 (31%)
C	2,762	1.57	630 (23%)	324 (12%)	98 (4%)	32 (1%)	1678 (61%)
C++	2,755	1.56	624 (23%)	342 (12%)	90 (3%)	29 (1%)	1670 (61%)
Call center activities	2,787	1.89	740 (27%)	511 (18%)	311 (11%)	120 (4%)	1105 (40%)
Capacity management	2,760	1.50	611 (22%)	268 (10%)	87 (3%)	17 (1%)	1777 (64%)
CASE tools	2,779	1.59	873 (31%)	505 (18%)	146 (5%)	42 (2%)	1213 (44%)
Cellular technologies	2,790	1.33	638 (23%)	156 (6%)	50 (2%)	9 (.3%)	1937 (69%)
Change management	2,768	1.66	769 (28%)	459 (17%)	191 (7%)	41 (2%)	1308 (47%)
COBOL	2,781	2.21	589 (21%)	424 (15%)	453 (16%)	249 (9%)	1066 (38%)
ColdFusion	2,759	1.72	167 (6%)	75 (3%)	39 (1%)	21 (1%)	2457 (89%)
Collaboration software	2,772	1.57	675 (24%)	273 (10%)	129 (5%)	36 (1%)	1659 (60%)
Computer forensics	2,782	1.40	532 (19%)	197 (7%)	50 (2%)	5 (.2%)	1998 (72%)
Content management	2,769	1.48	776 (28%)	354 (13%)	94 (3%)	18 (1%)	1527 (55%)
Contract management & vendor relations	2,765	1.63	676 (24%)	328 (12%)	148 (5%)	43 (2%)	1570 (57%)
Cryptography	2,778	1.28	510 (18%)	104 (4%)	32 (1%)	4 (.1%)	2128 (77%)
Customer	2,771	1.68	713 (26%)	443 (16%)	167 (6%)	51 (2%)	1397 (50%)

## Appendix E: Data Tables

Relationship Management (CRM)							
Customer service	2,790	2.16	691 (25%)	830 (30%)	628 (23%)	221 (8%)	420 (15%)
Data warehousing	2,791	1.48	913 (33%)	381 (14%)	112 (4%)	25 (1%)	1360 (49%)
Database applications development techniques	2,760	1.87	862 (31%)	627 (23%)	378 (14%)	116 (4%)	777 (28%)
Database design & development standards	2,777	1.87	929 (34%)	678 (24%)	388 (14%)	135 (5%)	647 (23%)

**Table E4. Skill by skill proficiency ratings (listed in alphabetical order), page 2**

*\* Means include those employees who have at least basic proficiency, calculated on a four-point rating scale: 1 = Basic, 2 = Intermediate, 3= Advanced, 4 = Expert.*

*Note: Row totals may not equal 100% due to rounding.*

## Appendix E: Data Tables

Skill	N	Mean*	Basic	Intermediate	Advanced	Expert	None
Decision support systems	2,774	1.43	585 (21%)	208 (8%)	61 (2%)	16 (1%)	1904 (69%)
DHTML/HTML/XHTML	2,770	1.75	806 (29%)	440 (16%)	227 (8%)	94 (3%)	1203 (43%)
Disaster recovery & planning	2,790	1.57	933 (33%)	545 (20%)	169 (6%)	24 (1%)	1119 (40%)
Eclipse	2,771	1.51	155 (6%)	61 (2%)	18 (1%)	9 (.3%)	2528 (91%)
Encryption	2,789	1.33	1002 (36%)	256 (9%)	78 (3%)	9 (.3%)	1444 (52%)
Enterprise Resource Planning (ERP) systems	2,762	1.44	563 (20%)	184 (7%)	61 (2%)	18 (1%)	1936 (70%)
Financial management	2,770	1.60	804 (29%)	460 (17%)	154 (6%)	36 (1%)	1316 (48%)
Firewalls	2,777	1.39	646 (23%)	233 (8%)	53 (2%)	9 (.3%)	1836 (66%)
Fortran	2,742	1.43	636 (23%)	217 (8%)	63 (2%)	20 (1%)	1806 (66%)
Geographic Information Systems (GIS)	2,772	1.35	566 (20%)	139 (5%)	39 (1%)	17 (1%)	2011 (73%)
Hardware & maintenance support	2,795	2.09	710 (25%)	559 (20%)	477 (17%)	207 (7%)	842 (30%)
Help desk activities	2,803	2.05	792 (28%)	627 (22%)	497 (18%)	196 (7%)	691 (25%)
IBM mainframe	2,792	1.76	710 (25%)	404 (15%)	239 (9%)	68 (2%)	1371 (49%)
IBM WebSphere Studio	2,786	1.38	291 (10%)	74 (3%)	20 (1%)	13 (1%)	2388 (86%)
IBM/ DB2	2,737	1.69	473 (17%)	256 (9%)	128 (5%)	35 (1%)	1845 (67%)
Identity management & directory services	2,790	1.51	810 (29%)	379 (14%)	120 (4%)	19 (1%)	1462 (52%)
Internal controls	2,766	1.72	861 (31%)	626 (23%)	240 (9%)	60 (2%)	979 (35%)
Intrusion detection	2,802	1.34	1132 (40%)	295 (11%)	83 (3%)	20 (1%)	1272 (45%)
IT asset management	2,769	1.56	715 (26%)	360 (13%)	127 (5%)	25 (1%)	1542 (56%)



## Appendix E: Data Tables

IT procurement	2,776	1.59	723 (26%)	360 (13%)	138 (5%)	37 (1%)	1518 (55%)
IT project portfolio management	2,781	1.55	770 (28%)	369 (13%)	132 (5%)	29 (1%)	1481 (53%)
IT risk assessment & management	2,772	1.52	738 (27%)	380 (14%)	99 (4%)	23 (1%)	1532 (55%)
IT strategic planning	2,775	1.56	745 (27%)	362 (13%)	120 (4%)	34 (1%)	1514 (55%)
Java	2,773	1.50	642 (23%)	239 (9%)	85 (3%)	29 (1%)	1778 (64%)
JavaScript	2,770	1.65	546 (20%)	238 (9%)	131 (5%)	40 (1%)	1815 (66%)
Java studio	2,783	1.38	277 (10%)	70 (3%)	23 (1%)	10 (.4%)	2403 (86%)
Joint Application Development (JAD)	2,781	1.70	610 (22%)	407 (15%)	167 (6%)	37 (1%)	1560 (56%)
Knowledge Management (KM)	2,781	1.56	941 (34%)	465 (17%)	175 (6%)	29 (1%)	1171 (42%)
Leadership	2,790	2.14	692 (25%)	895 (32%)	668 (24%)	185 (7%)	350 (13%)
Linux operating systems	2,776	1.45	606 (22%)	219 (8%)	73 (3%)	17 (1%)	1861 (67%)

**Table E4. Skill by skill proficiency ratings (listed in alphabetical order), page 3**

*\* Means include those employees who have at least basic proficiency, calculated on a four-point rating scale: 1 = Basic, 2 = Intermediate, 3= Advanced, 4 = Expert.*

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## Appendix E: Data Tables

Skill	N	Mean*	Basic	Intermediate	Advanced	Expert	None
Mac OS/OS X operating systems	2,757	1.34	528 (19%)	141 (5%)	39 (1%)	8 (0.3%)	2041 (74%)
Mainframe operations	2,791	1.71	670 (24%)	305 (11%)	172 (6%)	72 (3%)	1572 (56%)
Managing agency staff	2,778	1.93	749 (27%)	747 (27%)	412 (15%)	94 (3%)	776 (28%)
Managing consultant staff	2,775	1.88	703 (25%)	584 (21%)	325 (12%)	88 (3%)	1075 (39%)
Metadata management	2,761	1.42	519 (19%)	191 (7%)	48 (2%)	12 (.4%)	1991 (72%)
Microsoft Access	2,798	1.77	1013 (36%)	728 (26%)	299 (11%)	109 (4%)	649 (23%)
Microsoft SQL	2,746	1.59	753 (27%)	361 (13%)	138 (5%)	40 (2%)	1454 (53%)
Mobile computing	2,774	1.59	747 (27%)	408 (15%)	144 (5%)	27 (1%)	1448 (52%)
Modeling & simulation	2,775	1.44	669 (24%)	252 (9%)	75 (3%)	14 (1%)	1765 (64%)
MySQL	2,718	1.52	400 (15%)	187 (7%)	64 (2%)	9 (.3%)	2058 (76%)
Negotiation & conflict resolution	2,777	1.93	811 (29%)	850 (31%)	436 (16%)	108 (4%)	572 (21%)
Network architecture & design principles	2,763	1.62	978 (35%)	512 (19%)	210 (8%)	48 (2%)	1015 (37%)
Network configuration	2,800	1.69	900 (32%)	505 (18%)	257 (9%)	57 (2%)	1081 (39%)
Novell operating systems	2,775	1.58	661 (24%)	306 (11%)	121 (4%)	35 (1%)	1652 (60%)
Object-oriented analysis & design principles	2,786	1.72	875 (31%)	585 (21%)	255 (9%)	61 (2%)	1010 (36%)
Open systems server administration	2,784	1.80	673 (24%)	382 (14%)	222 (8%)	87 (3%)	1420 (51%)
Oracle	2,777	1.70	643 (23%)	361 (13%)	172 (6%)	50 (2%)	1551 (56%)
Oracle JDdevelopment studio	2,787	1.42	195 (7%)	58 (2%)	24 (1%)	4 (.1%)	2506 (90%)

## Appendix E: Data Tables

Oral communication	2,797	2.21	628 (23%)	969 (35%)	753 (27%)	210 (8%)	237 (9%)
Organizational awareness & business knowledge	2,774	1.90	814 (29%)	764 (28%)	415 (15%)	96 (4%)	685 (25%)
Perl/CGI	2,759	1.46	328 (12%)	109 (4%)	33 (1%)	16 (1%)	2273 (82%)
PHP	2,741	1.61	132 (5%)	53 (2%)	24 (1%)	11 (.4%)	2521 (92%)
Public Key Infrastructure (PKI)	2,779	1.31	628 (23%)	160 (6%)	41 (2%)	7 (.3%)	1943 (70%)
Planning & evaluation	2,776	1.90	842 (30%)	815 (29%)	409 (15%)	103 (4%)	607 (22%)
PowerBuilder	2,755	1.76	200 (7%)	111 (4%)	48 (2%)	29 (1%)	2367 (86%)
Principles of operating systems	2,759	2.18	710 (26%)	922 (33%)	729 (26%)	217 (8%)	181 (7%)
Principles of programming	2,588	2.36	566 (22%)	645 (25%)	722 (28%)	329 (13%)	326 (13%)
Project management	2,800	1.84	984 (35%)	816 (29%)	396 (14%)	106 (4%)	498 (18%)
Quality assurance	2,767	1.77	879 (32%)	644 (23%)	289 (10%)	76 (3%)	879 (32%)
Rapid Application Development (RAD) / prototyping	2,770	1.68	615 (22%)	359 (13%)	153 (6%)	46 (2%)	1597 (58%)

**Table E4. Skill by skill proficiency ratings (listed in alphabetical order), page 4**

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## Appendix E: Data Tables

Skill	N	Mean*	Basic	Intermediate	Advanced	Expert	None
Records management	2,768	1.54	909 (33%)	467 (17%)	146 (5%)	27 (1%)	1219 (44%)
Requirements analysis	2,786	1.97	726 (26%)	743 (27%)	419 (15%)	123 (4%)	775 (28%)
Satellite technologies	2,783	1.27	479 (17%)	87 (3%)	27 (1%)	7 (.3%)	2183 (78%)
SQL	2,766	1.89	519 (19%)	397 (14%)	239 (9%)	75 (3%)	1536 (56%)
Structured system analysis & design principles	2,793	1.98	743 (27%)	749 (27%)	457 (16%)	125 (5%)	719 (26%)
Supervisory skills	2,799	2.12	689 (25%)	958 (34%)	677 (24%)	159 (6%)	316 (11%)
Support for desktop applications	2,793	2.13	669 (24%)	666 (24%)	506 (18%)	211 (8%)	741 (27%)
Systems implementation	2,791	2.04	717 (26%)	822 (30%)	498 (18%)	157 (6%)	597 (21%)
System security applications	2,786	1.50	1055 (38%)	475 (17%)	158 (6%)	20 (1%)	1078 (39%)
Systems architecture	2,790	1.69	919 (33%)	617 (22%)	249 (9%)	54 (2%)	951 (34%)
Systems integration	2,788	1.75	866 (31%)	672 (24%)	280 (10%)	62 (2%)	908 (33%)
Systems life cycle planning principles	2,793	2.02	759 (27%)	707 (25%)	506 (18%)	145 (5%)	676 (24%)
Technical documentation	2,786	1.93	810 (29%)	883 (32%)	417 (15%)	123 (4%)	553 (20%)
Technology training activities	2,778	1.76	873 (31%)	647 (23%)	240 (9%)	95 (3%)	923 (33%)
Telephone /PBX	2,776	1.41	641 (23%)	162 (6%)	72 (3%)	22 (1%)	1879 (68%)
Testing & evaluation	2,797	1.98	791 (28%)	866 (31%)	454 (16%)	151 (5%)	535 (19%)
Unified messaging services	2,787	1.70	816 (29%)	481 (17%)	234 (8%)	51 (2%)	1205 (43%)
Unified Modeling Language	2,744	1.50	427 (16%)	192 (7%)	58 (2%)	11 (.4%)	2056 (75%)

## Appendix E: Data Tables

(UML)							
Unisys mainframe	2,783	1.70	491 (18%)	260 (9%)	129 (5%)	41 (2%)	1862 (67%)
Unix	2,790	1.50	979 (35%)	406 (15%)	149 (5%)	27 (1%)	1229 (44%)
Visual Basic	2,781	1.65	876 (32%)	399 (14%)	185 (7%)	74 (3%)	1247 (45%)
Visual Basic Script	2,770	1.60	627 (23%)	239 (9%)	125 (5%)	44 (2%)	1735 (63%)
Video imaging	2,760	1.43	568 (21%)	184 (7%)	64 (2%)	16 (1%)	1928 (70%)
Visual Studio .NET	2,794	1.51	399 (14%)	149 (5%)	50 (2%)	22 (1%)	2174 (78%)
Voice over IP	2,778	1.35	600 (22%)	155 (6%)	48 (2%)	11 (.4%)	1964 (71%)
Web servers	2,785	1.61	654 (24%)	262 (9%)	137 (5%)	45 (2%)	1687 (61%)
Web/ IP	2,788	1.68	957 (34%)	510 (18%)	230 (8%)	77 (3%)	1014 (36%)
Web-based graphics & multimedia	2,773	1.52	423 (15%)	141 (5%)	72 (3%)	19 (1%)	2118 (76%)
Website accessibility	2,790	1.63	764 (27%)	351 (13%)	152 (5%)	60 (2%)	1463 (52%)

**Table E4. Skill by skill proficiency ratings (listed in alphabetical order), page 5**

*\* Means include those employees who have at least basic proficiency, calculated on a four-point rating scale: 1 = Basic, 2 = Intermediate, 3= Advanced, 4 = Expert.*

*Note: Row totals may not equal 100% due to rounding.*

## Appendix E: Data Tables

Skill	N	Mean*	Basic	Intermediate	Advanced	Expert	None
Website design & development	2,809	1.72	930 (33%)	455 (16%)	232 (8%)	105 (4%)	1087 (39%)
Website management	2,794	1.74	718 (26%)	357 (13%)	213 (8%)	78 (3%)	1428 (51%)
Website privacy	2,779	1.53	702 (25%)	255 (9%)	123 (4%)	30 (1%)	1669 (60%)
Website search & administration	2,788	1.59	623 (22%)	249 (9%)	130 (5%)	32 (1%)	1754 (63%)
Wide Area Networks (WAN)	2,784	1.62	833 (30%)	421 (15%)	178 (6%)	45 (2%)	1307 (47%)
Windows operating systems	2,809	2.35	544 (19%)	926 (33%)	916 (33%)	283 (10%)	140 (5%)
Windows network operating systems	2,798	1.86	873 (31%)	591 (21%)	371 (13%)	115 (4%)	848 (30%)
Wireless technologies	2,797	1.52	842 (30%)	377 (14%)	140 (5%)	22 (1%)	1416 (51%)
Workflow management	2,793	1.56	1020 (37%)	519 (19%)	184 (7%)	32 (1%)	1038 (37%)
Written communication	2,798	2.27	576 (21%)	988 (35%)	814 (29%)	240 (9%)	180 (6%)
XML/XSL	2,748	1.48	522 (19%)	170 (6%)	71 (3%)	22 (1%)	1963 (71%)

Table E5. Skill proficiency ratings by job specialty, page 1

\* Means calculated on a five-point rating scale: 1 = None, 2 = Basic, 3= Intermediate, 4 = Advanced, 5 = Expert.

## Appendix E: Data Tables

<b>Technology managers</b>		<b>Database specialists</b>		<b>Datacomm/telecomm specialists</b>	
<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>
Supervisory skills	3.76	Principles of Programming	3.80	Windows operating system	3.34
Leadership	3.70	Database design & development standards	3.61	Principles of operating systems	3.19
Written communication	3.69	Database applications development techniques	3.43	Network configuration	3.14
Managing agency staff	3.63	Written communication	3.28	Written communication	2.99
Planning & evaluation	3.54	COBOL	3.14	Oral communication	2.94
Oral communication	3.53	Windows operating system	3.12	Windows network operating systems	2.94
Principles of Programming	3.51	Structured system analysis & design principles	3.02	Network architecture & design principles	2.90
Organizational awareness & business knowledge	3.47	System life cycle planning principles	3.01	Hardware maintenance & support	2.88
Project management	3.40	Testing & evaluation	2.97	Customer service	2.86
Managing consultant staff	3.37	Oral communication	2.96	Supervisory skills	2.84
System life cycle planning principles	3.35	Principles of operating systems	2.95	Help desk activities	2.81
Customer service	3.32	Systems implementation	2.93	Leadership	2.81
Negotiation & conflict resolution	3.26	Technical documentation	2.85	Wide Area Networks (WAN)	2.77
Systems implementation	3.23	Requirements analysis	2.81	Backup & recovery	2.64
Structured system analysis & design principles	3.18	Supervisory skills	2.77	Support for desktop applications	2.61
Requirements analysis	3.17	Leadership	2.72	Web/ IP	2.53

## Appendix E: Data Tables

Testing & evaluation	3.05	SQL	2.65	Planning & evaluation	2.51
Business process analysis	2.98	Business process analysis	2.61	Managing agency staff	2.47
COBOL	2.98	Customer service	2.56	Wireless technologies	2.47
Technical documentation	2.98	Oracle	2.54	Principles of Programming	2.47
Internal controls	2.97	Project management	2.53	Negotiation & conflict resolution	2.45
Principles of operating systems	2.94	Backup & recovery	2.51	Project management	2.44
Systems integration	2.83	Planning & evaluation	2.49	Mobile computing	2.43
Change management	2.83	Systems architecture	2.47	Unified messaging services	2.42
Windows operating system	2.77	Quality assurance	2.44	Organizational awareness & business knowledge	2.39
Database design & development standards	2.73	Systems integration	2.43	Call center activities	2.34
Quality assurance	2.73	Microsoft Access	2.41	Open systems server administration	2.30
Systems architecture	2.71	Managing agency staff	2.38	Systems implementation	2.28
IT procurement	2.62	Object-oriented analysis & design principles	2.37	Disaster recovery & planning	2.26
IT project portfolio management	2.62	Negotiation & conflict resolution	2.35	Intrusion detection	2.24
IT strategic planning	2.61	Organizational awareness & business knowledge	2.33	Broadband technologies	2.22
Database applications development techniques	2.59	Data warehousing	2.26	Technical documentation	2.22
Contract management &	2.58	IBM mainframe	2.25	Managing consultant staff	2.18



## Appendix E: Data Tables

vendor relations					
Financial management	2.55	Managing consultant staff	2.21	Technology training activities	2.17
Disaster recovery & planning	2.54	Microsoft SQL	2.20	System security applications	2.16
IT risk assessment & management	2.50	Support for desktop applications	2.19	Testing & evaluation	2.16
Backup & recovery	2.49	CASE Tools	2.19	Internal controls	2.13
Business continuity planning	2.43	UNIX operating systems	2.19	Telephone/ PBX	2.11

Table E5. Skill proficiency ratings by job specialty, page 2

*\* Means calculated on a five-point rating scale: 1 = None, 2 = Basic, 3= Intermediate, 4 = Advanced, 5 = Expert.*

## Appendix E: Data Tables

<b>Technology managers</b>		<b>Database specialists</b>		<b>Datacomm/telecomm specialists</b>	
<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>
Customer Relationship Management (CRM)	2.43	Rapid Application Development (RAD)/ Prototyping	2.13	System life cycle planning principles	2.08
Help desk activities	2.39	Disaster recovery & planning	2.11	Identity management & directory services	2.06
IT asset management	2.36	IBM/ DB2	2.10	Microsoft Access	2.05
Joint Application Development (JAD)	2.34	Joint Application Development (JAD)	2.08	Novell operating systems	1.99
Object-oriented analysis & design principles	2.33	Help desk activities	2.08	Systems architecture	1.98
Hardware maintenance & support	2.32	Website design & development	2.06	Structured system analysis & design principles	1.97
Workflow management	2.30	DHTML/ HTML/ XHTML	2.04	Encryption	1.96
Technology training activities	2.28	Internal controls	2.03	IT procurement	1.95
System security applications	2.25	Technology training activities	1.96	Requirements analysis	1.94
Support for desktop applications	2.24	Workflow management	1.92	Voice over IP	1.91
Network architecture & design principles	2.21	Hardware maintenance & support	1.91	UNIX operating systems	1.91
Capacity management	2.20	System security applications	1.90	Systems integration	1.91
Rapid Application Development (RAD)/ Prototyping	2.19	Knowledge Management (KM)	1.85	Customer Relationship Management (CRM)	1.90
Knowledge Management (KM)	2.14	Mainframe operations	1.85	COBOL	1.90
Windows network operating systems	2.11	Visual Basic	1.85	Change management	1.88
Microsoft Access	2.10	Change	1.84	Contract	1.88

## Appendix E: Data Tables

		management		management & vendor relations	
Identity management & directory services	2.09	Records management	1.84	Firewalls	1.88
Records management	2.09	Metadata management	1.82	Database design & development standards	1.85
Data warehousing	2.07	Fortran	1.82	CASE Tools	1.85
CASE Tools	2.06	Financial management	1.78	Financial management	1.84
Web/ IP	2.04	Windows network operating systems	1.77	IT asset management	1.84
Network configuration	2.04	C	1.77	Business process analysis	1.81
IBM mainframe	2.03	Website management	1.77	Video imaging	1.79
Mainframe operations	1.97	Network architecture & design principles	1.75	Quality assurance	1.77
Call center activities	1.96	IT project portfolio management	1.71	Cellular technologies	1.77
Website design & development	1.93	C ++	1.71	Workflow management	1.75
Content management	1.93	Modeling & simulation	1.69	Database applications development techniques	1.74
Open systems server administration	1.91	Call center activities	1.69	IT strategic planning	1.73
Encryption	1.90	Identity management & directory services	1.66	Linux operating systems	1.73
Intrusion detection	1.85	Web/ IP	1.65	Capacity management	1.71
Wide Area Networks (WAN)	1.83	Unisys mainframe	1.64	IT risk assessment & management	1.71
Oracle	1.83	Content management	1.64	Object-oriented analysis & design principles	1.70
Website	1.83	Capacity	1.64	Visual Basic	1.67

## Appendix E: Data Tables

management		management			
UNIX operating systems	1.82	Encryption	1.63	Knowledge Management (KM)	1.67
Mobile computing	1.81	Web servers	1.63	Business continuity planning	1.67
Unified messaging services	1.78	Decision support systems	1.62	Public Key Infrastructure (PKI)	1.67
SQL	1.77	Open systems server administration	1.62	Web servers	1.67
Collaboration software	1.76	IT risk assessment & management	1.61	Website design & development	1.65
Fortran	1.75	Website accessibility	1.61	DHTML/ HTML/ XHTML	1.64
Wireless technologies	1.74	IT strategic planning	1.60	IT project portfolio management	1.62
DHTML/ HTML/ XHTML	1.74	Intrusion detection	1.59	Computer forensics	1.61
Website accessibility	1.73	Collaboration software	1.58	Records management	1.57

**Table E5. Skill proficiency ratings by job specialty, page 3**

*\* Means calculated on a five-point rating scale: 1 = None, 2 = Basic, 3= Intermediate, 4 = Advanced, 5 = Expert.*

## Appendix E: Data Tables

Technology managers		Database specialists		Datacomm/telecomm specialists	
Skill	Mean*	Skill	Mean*	Skill	Mean*
Enterprise Resource Planning (ERP) systems	1.71	Unified messaging services	1.58	Website management	1.56
Decision support systems	1.70	Java	1.58	Satellite technologies	1.55
Unisys mainframe	1.67	Network configuration	1.58	Mainframe operations	1.55
Website privacy	1.67	Enterprise Resource Planning (ERP) systems	1.57	Collaboration software	1.54
Web servers	1.67	Customer Relationship Management (CRM)	1.56	C	1.53
Microsoft SQL	1.66	Visual Basic Script	1.56	IBM mainframe	1.53
Modeling & simulation	1.65	Business continuity planning	1.53	Data warehousing	1.49
Visual Basic	1.64	JavaScript	1.53	Microsoft SQL	1.49
Public Key Infrastructure (PKI)	1.61	Website privacy	1.52	C ++	1.49
IBM/ DB2	1.59	Contract management & vendor relations	1.50	Website accessibility	1.48
Metadata management	1.59	Linux operating systems	1.50	Cryptology	1.47
Firewalls	1.57	Geographic Information Systems (GIS)	1.48	Website privacy	1.45
Website search administration	1.56	IT procurement	1.48	Visual Basic Script	1.45
Novell operating systems	1.56	XML/XSL	1.47	Mac OS/ OS X operating systems	1.44
Broadband technologies	1.55	IT asset management	1.45	Website search administration	1.44
C	1.49	Mobile computing	1.45	Fortran	1.43
Visual Basic	1.46	Website search	1.42	Content	1.43

## Appendix E: Data Tables

Script		administration		management	
Geographic Information Systems (GIS)	1.45	Wide Area Networks (WAN)	1.41	Unisys mainframe	1.38
Computer forensics	1.44	Novell operating systems	1.39	Modeling & simulation	1.37
Linux operating systems	1.43	PowerBuilder	1.39	Biometrics	1.37
Unified Modeling Language (UML)	1.41	MYSQL	1.38	SQL	1.35
Biometrics	1.41	Unified Messaging Language (UML)	1.36	Geographic Information Systems (GIS)	1.33
Voice over IP	1.40	Wireless technologies	1.35	Rapid Application Development (RAD)/ Prototyping	1.32
XML/XSL	1.39	Firewalls	1.34	Joint Application Development (JAD)	1.31
Video imaging	1.38	Perl/CGI	1.34	Oracle	1.30
C ++	1.38	Public Key Infrastructure (PKI)	1.33	JavaScript	1.28
JavaScript	1.38	Mac OS/ OS X operating systems	1.31	Java	1.26
Java	1.37	Computer forensics	1.30	Decision support systems	1.25
Cryptology	1.37	Broadband technologies	1.29	Enterprise Resource Planning (ERP) systems	1.23
Telephone/ PBX	1.36	Cryptology	1.27	MYSQL	1.23
Artificial Intelligence (AI)	1.32	Visual Studio .NET	1.26	Visual Studio .NET	1.21
Cellular technologies	1.32	Artificial Intelligence (AI)	1.23	IBM/ DB2	1.20
Visual Studio .NET	1.26	Oracle Jdeveloper Studio	1.21	XML/XSL	1.20
Satellite technologies	1.24	Telephone/ PBX	1.18	Metadata management	1.20
Web-based graphics & multimedia	1.24	Cellular technologies	1.18	Perl/CGI	1.19

## Appendix E: Data Tables

MYSQL	1.23	Video imaging	1.17	Unified Modeling Language (UML)	1.19
PowerBuilder	1.21	Biometrics	1.17	Web-based graphics & multimedia	1.19
IBM WebSphere Studio	1.21	Voice over IP	1.16	Artificial Intelligence (AI)	1.18
Perl/CGI	1.21	Web-based graphics & multimedia	1.15	IBM WebSphere Studio	1.15
ColdFusion	1.16	Satellite technologies	1.14	Java Studio	1.12
Mac OS/ OS X operating systems	1.12	IBM WebSphere Studio	1.11	PowerBuilder	1.11
Java Studio	1.12	Java Studio	1.10	ColdFusion	1.09
Eclipse	1.11	ColdFusion	1.09	Oracle Jdeveloper Studio	1.09
Oracle Jdeveloper Studio	1.09	Eclipse	1.08	Borland JBuilder	1.07
Borland JBuilder	1.05	PHP	1.08	PHP	1.07
PHP	1.04	Borland JBuilder	1.07	Eclipse	1.06

Table E5. Skill proficiency ratings by job specialty, page 4

## Appendix E: Data Tables

<b>Operations specialists</b>		<b>Programmers</b>		<b>Other technical specialists</b>	
<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>
Mainframe operations	3.70	Principles of Programming	3.39	Windows operating system	3.63
Principles of operating systems	3.41	Windows operating system	3.25	Principles of operating systems	3.29
Windows operating system	3.34	Written communication	3.04	Support for desktop applications	3.28
Supervisory skills	3.13	Principles of operating systems	2.98	Help desk activities	3.23
Leadership	2.89	Oral communication	2.95	Hardware maintenance & support	3.22
IBM mainframe	2.83	Testing & evaluation	2.80	Customer service	3.06
Written communication	2.78	Supervisory skills	2.76	Written communication	2.89
Oral communication	2.71	Leadership	2.75	Oral communication	2.88
Unisys mainframe	2.70	Systems implementation	2.74	Windows network operating systems	2.85
Customer service	2.53	System life cycle planning principles	2.70	Call center activities	2.76
Negotiation & conflict resolution	2.45	Customer service	2.69	Backup & recovery	2.73
Backup & recovery	2.41	Technical documentation	2.69	Leadership	2.70
Hardware maintenance & support	2.41	Structured system analysis & design principles	2.67	Supervisory skills	2.61
Help desk activities	2.33	COBOL	2.61	Technology training activities	2.54
Managing agency staff	2.30	Database design & development standards	2.61	Unified messaging services	2.41
Planning & evaluation	2.08	Requirements analysis	2.58	Microsoft access	2.41
Organizational	2.03	Database	2.55	Negotiation &	2.40



## Appendix E: Data Tables

awareness & business knowledge		applications development techniques		conflict resolution	
Principles of Programming	1.97	Microsoft access	2.49	Web/ IP	2.39
Call center activities	1.95	Support for desktop applications	2.49	Network configuration	2.34
Support for desktop applications	1.89	Project management	2.46	Principles of Programming	2.24
Workflow management	1.88	Negotiation & conflict resolution	2.42	Open systems server administration	2.21
UNIX operating systems	1.86	Business process analysis	2.40	Wide Area Networks (WAN)	2.18
Windows network operating systems	1.86	Help desk activities	2.40	Technical documentation	2.16
Disaster recovery & planning	1.83	Planning & evaluation	2.35	Network architecture & design principles	2.13
Managing consultant staff	1.77	Quality assurance	2.32	Planning & evaluation	2.09
Internal controls	1.74	Object-oriented analysis & design principles	2.30	Mobile computing	2.08
Open systems server administration	1.71	Organizational awareness & business knowledge	2.29	Organizational awareness & business knowledge	2.08
Web/ IP	1.69	Hardware maintenance & support	2.29	Wireless technologies	2.07
Technology training activities	1.68	Systems integration	2.26	Testing & evaluation	2.05
Records management	1.66	Managing agency staff	2.22	Project management	2.05
Knowledge Management (KM)	1.65	Website design & development	2.19	Systems implementation	2.05
COBOL	1.64	Windows network operating systems	2.18	Website design & development	2.03
Unified messaging services	1.62	Systems architecture	2.16	DHTML/ HTML/ XHTML	1.97

## Appendix E: Data Tables

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Project management	1.60	DHTML/ HTML/ XHTML	2.16	System security applications	1.95
Technical documentation	1.58	Backup & recovery	2.15	Broadband technologies	1.93

Table E5. Skill proficiency ratings by job specialty, page 5

## Appendix E: Data Tables

<b>Operations specialists</b>		<b>Programmers</b>		<b>Other technical specialists</b>	
<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>
Microsoft access	1.56	Visual Basic	2.11	Database design & development standards	1.91
Network configuration	1.48	SQL	2.07	Workflow management	1.91
Wide Area Networks (WAN)	1.45	Technology training activities	2.06	Knowledge Management (KM)	1.90
Testing & evaluation	1.45	Call center activities	2.01	Managing agency staff	1.89
Intrusion detection	1.45	Web/ IP	1.99	Website management	1.88
Network architecture & design principles	1.41	Internal controls	1.98	Intrusion detection	1.86
Quality assurance	1.41	Managing consultant staff	1.98	Website accessibility	1.86
Financial management	1.40	Workflow management	1.97	Mainframe operations	1.85
Database design & development standards	1.39	IBM mainframe	1.96	Customer Relationship Management (CRM)	1.85
Broadband technologies	1.38	CASE Tools	1.95	Novell operating systems	1.85
Systems implementation	1.38	Website management	1.92	Records management	1.84
Customer Relationship Management (CRM)	1.35	Knowledge Management (KM)	1.90	Internal controls	1.83
System security applications	1.34	Network architecture & design principles	1.90	Collaboration software	1.83
Mac OS/ OS X operating systems	1.34	Oracle	1.90	Disaster recovery & planning	1.82
Data warehousing	1.33	Network configuration	1.89	Database applications development techniques	1.81
Systems architecture	1.33	Microsoft SQL	1.87	Quality assurance	1.80

## Appendix E: Data Tables

Linux operating systems	1.32	Unified messaging services	1.87	System life cycle planning principles	1.79
Mobile computing	1.32	Records management	1.86	Visual Basic	1.79
Novell operating systems	1.30	UNIX operating systems	1.85	Systems integration	1.78
Wireless technologies	1.30	Website accessibility	1.84	Identity management & directory services	1.76
System life cycle planning principles	1.30	Joint Application Development (JAD)	1.83	CASE Tools	1.75
DHTML/ HTML/ XHTML	1.29	System security applications	1.81	Structured system analysis & design principles	1.75
Website accessibility	1.29	Rapid Application Development (RAD)/ Prototyping	1.80	UNIX operating systems	1.75
IBM/ DB2	1.28	Disaster recovery & planning	1.79	Requirements analysis	1.75
Collaboration software	1.27	Data warehousing	1.76	Managing consultant staff	1.74
Contract management & vendor relations	1.27	Open systems server administration	1.75	IT asset management	1.74
Telephone/ PBX	1.27	Change management	1.75	IBM mainframe	1.72
Fortran	1.27	C ++	1.75	Systems architecture	1.72
Database applications development techniques	1.27	Wide Area Networks (WAN)	1.74	Video imaging	1.69
Requirements analysis	1.27	C	1.72	Cellular technologies	1.69
Structured system analysis & design principles	1.27	Financial management	1.72	Telephone/ PBX	1.68
Systems integration	1.27	JavaScript	1.72	Encryption	1.68
Website design & development	1.27	Customer Relationship Management (CRM)	1.71	Object-oriented analysis & design principles	1.67

## Appendix E: Data Tables

Change management	1.26	IBM/ DB2	1.70	Business process analysis	1.66
Cellular technologies	1.25	Visual Basic Script	1.70	Website privacy	1.65
Encryption	1.25	Content management	1.68	Contract management & vendor relations	1.65
Business process analysis	1.24	Java	1.68	IT procurement	1.64
Website management	1.22	Web servers	1.65	Change management	1.64
Microsoft SQL	1.22	Website search administration	1.64	Financial management	1.64
Website privacy	1.21	Website privacy	1.64	Web servers	1.62
C ++	1.20	Mainframe operations	1.63	Content management	1.62

Table E5. Skill proficiency ratings by job specialty, page 6

## Appendix E: Data Tables

<b>Operations specialists</b>		<b>Programmers</b>		<b>Other technical specialists</b>	
<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>
Web servers	1.19	Intrusion detection	1.63	Website search administration	1.62
CASE Tools	1.18	IT project portfolio management	1.63	Firewalls	1.61
IT project portfolio management	1.18	Wireless technologies	1.61	Microsoft SQL	1.60
Web-based graphics & multimedia	1.17	Collaboration software	1.61	C ++	1.59
Oracle	1.17	Identity management & directory services	1.61	Data warehousing	1.59
C	1.16	Mobile computing	1.60	Visual Basic Script	1.59
Identity management & directory services	1.16	Novell operating systems	1.59	IT strategic planning	1.58
Joint Application Development (JAD)	1.16	Unisys mainframe	1.57	Voice over IP	1.58
Website search administration	1.16	IT risk assessment & management	1.56	Linux operating systems	1.55
Business continuity planning	1.16	Encryption	1.56	C	1.55
Visual Basic	1.16	Modeling & simulation	1.56	Mac OS/ OS X operating systems	1.53
Enterprise Resource Planning (ERP) systems	1.15	IT strategic planning	1.55	IT risk assessment & management	1.52
IT procurement	1.15	IT procurement	1.54	Unisys mainframe	1.50
IT strategic planning	1.15	IT asset management	1.54	Web-based graphics & multimedia	1.50
Firewalls	1.15	Contract management & vendor relations	1.54	JavaScript	1.50
Object-oriented	1.15	XML/XSL	1.52	IT project portfolio	1.49

## Appendix E: Data Tables

analysis & design principles				management	
IT risk assessment & management	1.14	Broadband technologies	1.52	COBOL	1.48
Satellite technologies	1.14	Fortran	1.52	Java	1.48
Video imaging	1.14	Business continuity planning	1.47	Modeling & simulation	1.47
IT asset management	1.13	Unified Modeling Language (UML)	1.46	Business continuity planning	1.45
Public Key Infrastructure (PKI)	1.13	Decision support systems	1.46	Computer forensics	1.45
Content management	1.11	MYSQL	1.44	SQL	1.44
Geographic Information Systems (GIS)	1.11	Linux operating systems	1.44	Satellite technologies	1.44
Java	1.11	Capacity management	1.42	Capacity management	1.40
SQL	1.11	Enterprise Resource Planning (ERP) systems	1.42	Oracle	1.39
Visual Basic Script	1.11	Visual Studio .NET	1.40	Public Key Infrastructure (PKI)	1.39
Capacity management	1.10	Metadata management	1.40	MYSQL	1.37
Modeling & simulation	1.10	Web-based graphics & multimedia	1.39	Geographic Information Systems (GIS)	1.37
Computer forensics	1.10	Telephone/ PBX	1.36	Decision support systems	1.37
Cryptology	1.10	Firewalls	1.36	Enterprise Resource Planning (ERP) systems	1.37
Voice over IP	1.10	Video imaging	1.35	Rapid Application Development (RAD)/ Prototyping	1.36
JavaScript	1.10	Geographic Information	1.35	Joint Application Development	1.35

## Appendix E: Data Tables

		Systems (GIS)		(JAD)	
Rapid Application Development (RAD)/ Prototyping	1.10	Mac OS/ OS X operating systems	1.33	XML/XSL	1.33
XML/XSL	1.08	Computer forensics	1.33	Cryptology	1.32
Artificial Intelligence (AI)	1.07	Cellular technologies	1.32	Visual Studio .NET	1.32
Decision support systems	1.06	PowerBuilder	1.31	Metadata management	1.29
Biometrics	1.06	Public Key Infrastructure (PKI)	1.31	Artificial Intelligence (AI)	1.26
ColdFusion	1.05	Voice over IP	1.31	Biometrics	1.26
IBM WebSphere Studio	1.05	Perl/CGI	1.30	Unified Modeling Language (UML)	1.25
Java Studio	1.05	Artificial Intelligence (AI)	1.29	IBM/ DB2	1.24
Oracle Jdeveloper Studio	1.05	Cryptology	1.25	Java Studio	1.22
Metadata management	1.03	ColdFusion	1.24	Perl/CGI	1.21
MYSQL	1.03	IBM WebSphere Studio	1.23	Fortran	1.21
Unified Modeling Language (UML)	1.03	Java Studio	1.23	PHP	1.18
Eclipse	1.03	Biometrics	1.22	IBM WebSphere Studio	1.17
Perl/CGI	1.02	Satellite technologies	1.21	ColdFusion	1.15
PowerBuilder	1.02	Oracle Jdeveloper Studio	1.18	PowerBuilder	1.15
Borland JBuilder	1.02	Eclipse	1.17	Borland JBuilder	1.13
Visual Studio .NET	1.02	PHP	1.16	Eclipse	1.11
PHP	1.00	Borland JBuilder	1.15	Oracle Jdeveloper Studio	1.11

Table E5. Skill proficiency ratings by job specialty, page 7



## Appendix E: Data Tables

<b>Business specialists</b>		<b>Systems specialists</b>	
<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>
Written communication	3.46	Principles of operating systems	3.51
Oral communication	3.27	Principles of Programming	3.45
Leadership	3.05	Windows operating system	3.20
Supervisory skills	3.04	Written communication	3.09
Customer service	3.01	Oral communication	3.00
Windows operating system	3.01	Backup & recovery	2.83
Negotiation & conflict resolution	2.77	Supervisory skills	2.83
Organizational awareness & business knowledge	2.76	Systems implementation	2.76
Planning & evaluation	2.68	COBOL	2.75
Principles of operating systems	2.67	Leadership	2.74
Project management	2.66	Technical documentation	2.72
Managing agency staff	2.65	Hardware maintenance & support	2.66
Support for desktop applications	2.60	Customer service	2.65
Help desk activities	2.59	System life cycle planning principles	2.64
Internal controls	2.44	Testing & evaluation	2.60
Technology training activities	2.42	Structured system analysis & design principles	2.57
Hardware maintenance & support	2.38	Project management	2.55
Managing consultant staff	2.34	Help desk activities	2.50
Microsoft Access	2.34	Planning & evaluation	2.43
Systems implementation	2.31	Open systems server administration	2.43
Testing & evaluation	2.29	Support for desktop applications	2.42
Call center activities	2.27	Windows network operating systems	2.41
Principles of Programming	2.24	Managing agency staff	2.41
Backup & recovery	2.23	Negotiation & conflict resolution	2.38

## Appendix E: Data Tables

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Windows network operating systems	2.20	Systems architecture	2.37
Technical documentation	2.16	UNIX operating systems	2.33
Financial management	2.16	Organizational awareness & business knowledge	2.32
Business process analysis	2.14	Requirements analysis	2.32
Requirements analysis	2.13	Disaster recovery & planning	2.28
Database design & development standards	2.10	System security applications	2.28

Table E5. Skill proficiency ratings by job specialty, page 8

## Appendix E: Data Tables

<b>Business specialists</b>		<b>Systems specialists</b>	
<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>
System life cycle planning principles	2.08	Database design & development standards	2.26
Customer Relationship Management (CRM)	2.07	Web/ IP	2.23
Records management	2.02	Systems integration	2.23
Workflow management	2.02	Managing consultant staff	2.22
Quality assurance	2.01	Database applications development techniques	2.22
Unified messaging services	2.01	Network architecture & design principles	2.21
Web/ IP	2.00	Technology training activities	2.19
Website design & development	1.99	DHTML/ HTML/ XHTML	2.16
Network configuration	1.97	Network configuration	2.15
Knowledge Management (KM)	1.97	Quality assurance	2.13
Database applications development techniques	1.96	Microsoft Access	2.13
Structured system analysis & design principles	1.95	Mainframe operations	2.12
Change management	1.92	Object-oriented analysis & design principles	2.12
IT strategic planning	1.91	Website design & development	2.12
Network architecture & design principles	1.91	IBM mainframe	2.10
Systems integration	1.89	Website management	2.04
System security applications	1.89	Business process analysis	2.03
IT procurement	1.86	Internal controls	2.00
IT project portfolio management	1.84	Visual Basic	1.98
Website management	1.84	Call center activities	1.98
Disaster recovery & planning	1.83	Unified messaging services	1.94
IT risk assessment & management	1.83	Intrusion detection	1.91
Mobile computing	1.82	Web servers	1.91

## Appendix E: Data Tables

Wireless technologies	1.82	Workflow management	1.90
Contract management & vendor relations	1.81	Linux operating systems	1.89
IT asset management	1.80	Change management	1.88
DHTML/ HTML/ XHTML	1.78	Identity management & directory services	1.87
Systems architecture	1.78	Wide Area Networks (WAN)	1.86
Identity management & directory services	1.75	Website accessibility	1.86
Website accessibility	1.75	Encryption	1.79
Business continuity planning	1.74	JavaScript	1.79
Open systems server administration	1.73	Collaboration software	1.78
Wide Area Networks (WAN)	1.72	Mobile computing	1.78
Data warehousing	1.68	CASE Tools	1.77
Intrusion detection	1.67	SQL	1.77
Content management	1.67	Fortran	1.76
Object-oriented analysis & design principles	1.67	Knowledge Management (KM)	1.76
Novell operating systems	1.66	Wireless technologies	1.76
CASE Tools	1.64	C	1.75
Website privacy	1.62	Visual Basic Script	1.74
Broadband technologies	1.60	Rapid Application Development (RAD)/ Prototyping	1.74
Visual Basic	1.60	Records management	1.72

Table E5. Skill proficiency ratings by job specialty, page 9

## Appendix E: Data Tables

<b>Business specialists</b>		<b>Systems specialists</b>	
<b>Skill</b>	<b>Mean*</b>	<b>Skill</b>	<b>Mean*</b>
COBOL	1.58	Oracle	1.71
Website search administration	1.58	IT project portfolio management	1.71
Encryption	1.57	Content management	1.70
Joint Application Development (JAD)	1.54	Customer Relationship Management (CRM)	1.70
Web servers	1.52	C ++	1.70
UNIX operating systems	1.50	IT procurement	1.69
Collaboration software	1.50	Novell operating systems	1.69
Firewalls	1.49	Java	1.68
SQL	1.47	Data warehousing	1.67
Video imaging	1.47	IT strategic planning	1.67
Microsoft SQL	1.47	Public Key Infrastructure (PKI)	1.66
Rapid Application Development (RAD)/ Prototyping	1.47	Contract management & vendor relations	1.66
Capacity management	1.46	Financial management	1.65
Decision support systems	1.46	IT asset management	1.65
Telephone/ PBX	1.45	Website privacy	1.64
Modeling & simulation	1.45	IT risk assessment & management	1.63
Computer forensics	1.45	Capacity management	1.63
IBM mainframe	1.45	Firewalls	1.62
Geographic Information Systems (GIS)	1.44	Website search administration	1.62
Web-based graphics & multimedia	1.44	Microsoft SQL	1.62
Mainframe operations	1.43	Joint Application Development (JAD)	1.61
Oracle	1.42	Computer forensics	1.61
Cellular technologies	1.41	IBM/ DB2	1.57
Public Key Infrastructure (PKI)	1.40	Unisys mainframe	1.57
Enterprise Resource Planning (ERP) systems	1.39	Business continuity planning	1.56
Visual Basic Script	1.39	Modeling & simulation	1.56

## Appendix E: Data Tables

Voice over IP	1.39	Broadband technologies	1.56
Metadata management	1.37	XML/XSL	1.52
JavaScript	1.37	Cellular technologies	1.47
Linux operating systems	1.36	Video imaging	1.45
Biometrics	1.36	Cryptology	1.45
MYSQL	1.34	Voice over IP	1.41
C	1.31	Perl/CGI	1.40
XML/XSL	1.30	Mac OS/ OS X operating systems	1.40
C ++	1.30	Unified Modeling Language (UML)	1.39
Mac OS/ OS X operating systems	1.29	Decision support systems	1.39
Cryptology	1.29	Artificial Intelligence (AI)	1.39
Java	1.28	Metadata management	1.38
Unisys mainframe	1.28	Telephone/ PBX	1.38
Satellite technologies	1.28	Enterprise Resource Planning (ERP) systems	1.38
Fortran	1.26	MYSQL	1.36
Visual Studio .NET	1.23	Visual Studio .NET	1.33
IBM/ DB2	1.22	Web-based graphics & multimedia	1.33
Artificial Intelligence (AI)	1.21	Geographic Information Systems (GIS)	1.31
ColdFusion	1.20	Satellite technologies	1.30
Unified Modeling Language (UML)	1.19	IBM WebSphere Studio	1.30
Perl/CGI	1.17	Biometrics	1.30
Java Studio	1.13	PowerBuilder	1.25
PowerBuilder	1.13	PHP	1.21
IBM WebSphere Studio	1.11	Eclipse	1.20
PHP	1.10	Java Studio	1.18
Oracle Jdeveloper Studio	1.09	ColdFusion	1.15
Borland JBuilder	1.07	Oracle Jdeveloper Studio	1.12
Eclipse	1.06	Borland JBuilder	1.09

Table E6. Skill by skill training demand (listed in alphabetical order), page 1

**Note: Row totals may not equal 100% due to rounding.**

Skill	N	None	Basic	Intermediate	Advanced	Percent who need training at any level
Artificial Intelligence (AI)	2599	1956 (75%)	399 (15%)	163 (6%)	81 (3%)	25%
Backup & recovery	2713	1780 (66%)	249 (9%)	326 (12%)	358 (13%)	34%
Biometrics	2586	1711 (66%)	480 (19%)	266 (10%)	129 (5%)	34%
Borland JBuilder	2503	1938 (77%)	369 (15%)	122 (5%)	74 (3%)	23%
Broadband technologies	2596	1673 (65%)	391 (15%)	354 (14%)	178 (7%)	36%
Business continuity planning	2646	1652 (62%)	384 (15%)	406 (15%)	204 (8%)	38%
Business process analysis	2633	1569 (60%)	334 (13%)	402 (15%)	328 (13%)	40%
C	2375	1875 (79%)	262 (11%)	159 (7%)	79 (3%)	21%
C++	2427	1791 (74%)	304 (13%)	221 (9%)	111 (5%)	26%
Call center activities	2643	1936 (73%)	213 (8%)	258 (10%)	236 (9%)	27%
Capacity management	2656	1707 (64%)	405 (15%)	379 (14%)	165 (6%)	36%
CASE tools	2633	1614 (61%)	400 (15%)	397 (15%)	222 (8%)	39%
Cellular technologies	2567	1777 (69%)	427 (16%)	245 (10%)	118 (5%)	31%
Change management	2658	1627 (61%)	390 (15%)	412 (16%)	229 (9%)	39%
COBOL	2376	1935 (81%)	196 (8%)	131 (6%)	114 (5%)	19%
ColdFusion	2409	1843 (77%)	329 (14%)	147 (6%)	90 (4%)	23%
Collaboration software	2610	1849 (71%)	331 (13%)	297 (11%)	133 (5%)	29%

Table E6. Skill by skill training demand (listed in alphabetical order), page 2

**Note:** Row totals may not equal 100% due to rounding.

## Appendix E: Data Tables

Skill	N	None	Basic	Intermediate	Advanced	Percent who need training at any level
Computer forensics	2627	1597 (61%)	496 (19%)	347 (13%)	187 (7%)	39%
Content management	2652	1711 (65%)	423 (16%)	344 (13%)	174 (7%)	35%
Contract management & vendor relations	2666	1690 (63%)	406 (15%)	383 (14%)	187 (7%)	37%
Cryptography	2597	1693 (65%)	473 (18%)	282 (11%)	149 (6%)	35%
Customer Relationship Management (CRM)	2638	1671 (63%)	381 (14%)	379 (14%)	207 (8%)	37%
Customer service	2604	1518 (58%)	199 (8%)	406 (16%)	481 (19%)	42%
Data warehousing	2699	1694 (63%)	390 (14%)	408 (15%)	207 (8%)	37%
Database applications development techniques	2600	1522 (59%)	280 (11%)	425 (16%)	373 (14%)	41%
Database design & development standards	2586	1525 (59%)	271 (11%)	425 (16%)	365 (14%)	41%
Decision support systems	2630	1811 (69%)	433 (17%)	268 (10%)	118 (5%)	31%
DHTML/HTML/XHTML	2503	1535 (61%)	340 (14%)	369 (15%)	259 (10%)	39%
Disaster recovery & planning	2681	1460 (55%)	411 (15%)	508 (19%)	302 (11%)	46%
Eclipse	2517	1903 (76%)	387 (15%)	142 (6%)	85 (3%)	24%
Encryption	2662	1506 (57%)	494 (19%)	428 (16%)	234 (9%)	43%
Enterprise Resource Planning (ERP) systems	2610	1833 (70%)	402 (15%)	256 (10%)	119 (5%)	30%
Financial management	2606	1536 (59%)	368 (14%)	428 (16%)	274 (11%)	41%
Firewalls	2640	1534 (58%)	475 (18%)	400 (15%)	231 (9%)	42%



## Appendix E: Data Tables

Fortran	2332	2063 (89%)	180 (8%)	58 (3%)	31 (1%)	12%
Geographic Information Systems (GIS)	2607	1890 (73%)	388 (15%)	220 (8%)	109 (4%)	28%
Hardware & maintenance support	2674	1828 (68%)	218 (8%)	271 (10%)	357 (13%)	32%
Help desk activities	2664	1893 (71%)	198 (7%)	268 (10%)	305 (11%)	29%
IBM mainframe	2533	1896 (75%)	271 (11%)	225 (9%)	141 (6%)	25%
IBM WebSphere Studio	2579	1776 (69%)	490 (19%)	196 (8%)	117 (5%)	31%
IBM/ DB2	2491	1842 (74%)	290 (12%)	213 (9%)	146 (6%)	26%
Identity management & directory services	2651	1490 (56%)	448 (17%)	448 (17%)	265 (10%)	44%
Internal controls	2601	1506 (58%)	331 (13%)	442 (17%)	322 (12%)	42%
Intrusion detection	2687	1467 (55%)	487 (18%)	471 (18%)	262 (10%)	45%
IT asset management	2655	1667 (63%)	389 (15%)	411 (16%)	188 (7%)	37%
IT procurement	2645	1665 (63%)	399 (15%)	378 (14%)	203 (8%)	37%
IT project portfolio management	2682	1644 (61%)	394 (15%)	418 (16%)	226 (8%)	39%

Table E6. Skill by skill training demand (listed in alphabetical order), page 3

**Note: Row totals may not equal 100% due to rounding.**

## Appendix E: Data Tables

Skill	N	None	Basic	Intermediate	Advanced	Percent who need training at any level
IT risk assessment & management	2684	1608 (60%)	405 (15%)	434 (16%)	237 (9%)	40%
IT strategic planning	2675	1608 (60%)	403 (15%)	421 (16%)	243 (9%)	40%
Java	2593	1471 (57%)	473 (18%)	409 (16%)	240 (9%)	43%
JavaScript	2532	1488 (59%)	466 (18%)	366 (15%)	212 (8%)	41%
Java studio	2583	1719 (67%)	501 (19%)	246 (10%)	117 (5%)	33%
Joint Application Development (JAD)	2582	1715 (66%)	361 (14%)	303 (12%)	203 (8%)	34%
Knowledge Management (KM)	2682	1685 (63%)	391 (15%)	418 (16%)	188 (7%)	37%
Leadership	2666	1378 (52%)	186 (7%)	493 (19%)	609 (23%)	48%
Linux operating systems	2606	1747 (67%)	396 (15%)	287 (11%)	176 (7%)	33%
MacOS/ OS X operating systems	2480	1992 (80%)	291 (12%)	132 (5%)	65 (3%)	20%
Mainframe operations	2642	2004 (76%)	272 (10%)	216 (8%)	150 (6%)	24%
Managing agency staff	2646	1457 (55%)	229 (9%)	509 (19%)	451 (17%)	45%
Managing consultant staff	2636	1491 (57%)	268 (10%)	469 (18%)	408 (16%)	43%
Metadata management	2633	1827 (69%)	414 (16%)	266 (10%)	126 (5%)	31%
Microsoft Access	2578	1626 (63%)	232 (9%)	398 (15%)	322 (13%)	37%
Microsoft SQL	2591	1652 (64%)	356 (14%)	339 (13%)	244 (9%)	36%
Mobile computing	2612	1639 (63%)	400 (15%)	380 (15%)	193 (7%)	37%
Modeling & simulation	2633	1810 (69%)	404 (15%)	284 (11%)	135 (5%)	31%
MySQL	2483	1818 (73%)	327 (13%)	216 (9%)	122 (5%)	27%
Negotiation & conflict resolution	2669	1391 (52%)	243 (9%)	500 (19%)	535 (20%)	48%

## Appendix E: Data Tables

Network architecture & design principles	2624	1539 (59%)	349 (13%)	460 (18%)	276 (11%)	41%
Network configuration	2665	1532 (58%)	345 (13%)	478 (18%)	310 (12%)	43%
Novell operating systems	2568	1776 (69%)	354 (14%)	265 (10%)	173 (7%)	31%
Object-oriented analysis & design principles	2640	1604 (61%)	323 (12%)	392 (15%)	321 (12%)	39%
Open systems server administration	2685	1871 (70%)	282 (11%)	285 (11%)	247 (9%)	30%
Oracle	2649	1602 (61%)	373 (14%)	350 (13%)	324 (12%)	40%
Oracle Development studio	2562	1791 (70%)	470 (18%)	186 (7%)	115 (5%)	30%

Table E6. Skill by skill training demand (listed in alphabetical order), page 4

**Note:** Row totals may not equal 100% due to rounding.

## Appendix E: Data Tables

Skill	N	None	Basic	Intermediate	Advanced	Percent who need training at any level
Oral communication	2639	1443 (55%)	150 (6%)	481 (18%)	565 (21%)	45%
Organizational awareness & business knowledge	2614	1442 (55%)	261 (10%)	482 (18%)	429 (16%)	45%
Perl/CGI	2396	1794 (75%)	331 (14%)	176 (7%)	95 (4%)	25%
PHP	2354	1887 (80%)	287 (12%)	115 (5%)	65 (3%)	20%
Public Key Infrastructure (PKI)	2619	1627 (62%)	483 (18%)	329 (13%)	180 (7%)	38%
Planning & evaluation	2636	1408 (53%)	236 (9%)	527 (20%)	465 (18%)	47%
PowerBuilder	2366	1870 (79%)	328 (14%)	93 (4%)	75 (3%)	21%
Principles of operating systems	2523	1673 (66%)	135 (5%)	340 (14%)	375 (15%)	34%
Principles of programming	2336	1654 (71%)	178 (8%)	286 (12%)	218 (9%)	29%
Project management	2689	1391 (52%)	240 (9%)	533 (20%)	525 (20%)	48%
Quality assurance	2590	1601 (62%)	334 (13%)	377 (15%)	278 (11%)	38%
Rapid Application Development (RAD)/ prototyping	2586	1718 (66%)	386 (15%)	279 (11%)	203 (8%)	34%
Records management	2659	1735 (65%)	383 (14%)	367 (14%)	174 (7%)	35%
Requirements analysis	2614	1570 (60%)	296 (11%)	406 (16%)	342 (13%)	40%
Satellite technologies	2566	1786 (70%)	442 (17%)	233 (9%)	105 (4%)	30%
SQL	2481	1626 (66%)	292 (12%)	279 (11%)	284 (11%)	34%
Structured system analysis & design principles	2614	1595 (61%)	283 (11%)	404 (16%)	332 (13%)	39%
Supervisory skills	2661	1380 (52%)	169 (6%)	507 (19%)	605 (23%)	48%

## Appendix E: Data Tables

Support for desktop applications	2668	1848 (69%)	197 (7%)	282 (11%)	341 (13%)	31%
Systems implementation	2612	1574 (60%)	281 (11%)	420 (16%)	337 (13%)	40%
System security applications	2696	1418 (53%)	445 (17%)	546 (20%)	287 (11%)	47%
Systems architecture	2624	1562 (60%)	357 (14%)	419 (16%)	286 (11%)	40%
Systems integration	2620	1558 (60%)	336 (13%)	423 (16%)	303 (12%)	41%
System life cycle planning principles	2609	1620 (62%)	273 (11%)	398 (15%)	318 (12%)	38%
Technical documentation	2618	1588 (61%)	278 (11%)	425 (16%)	327 (13%)	39%
Technology training activities	2668	1850 (69%)	235 (9%)	327 (12%)	256 (10%)	31%
Telephone /PBX	2547	1807 (71%)	375 (15%)	234 (9%)	131 (5%)	29%
Testing & evaluation	2616	1572 (60%)	261 (10%)	431 (17%)	352 (14%)	40%
Unified messaging services	2576	1656 (64%)	338 (13%)	372 (14%)	210 (8%)	36%
Unified Modeling Language (UML)	2576	1772 (69%)	386 (15%)	246 (10%)	172 (7%)	31%

Table E6. Skill by skill training demand (listed in alphabetical order), page 5

**Note:** Row totals may not equal 100% due to rounding.

## Appendix E: Data Tables

Skill	N	None	Basic	Intermediate	Advanced	Percent who need training at any level
Unisys mainframe	2516	1973 (78%)	296 (12%)	155 (6%)	92 (4%)	22%
Unix	2628	1676 (64%)	347 (13%)	387 (15%)	218 (8%)	36%
Visual Basic	2521	1575 (63%)	324 (13%)	386 (15%)	236 (9%)	38%
Visual Basic Script	2474	1592 (64%)	413 (17%)	307 (12%)	162 (7%)	36%
Video imaging	2559	1738 (68%)	420 (16%)	265 (10%)	136 (5%)	32%
Visual Studio .NET	2603	1695 (65%)	465 (18%)	274 (11%)	169 (7%)	35%
Voice over IP	2594	1690 (65%)	441 (17%)	309 (12%)	154 (6%)	35%
Web servers	2643	1506 (57%)	501 (19%)	389 (15%)	247 (9%)	43%
Web/IP	2665	1514 (57%)	370 (14%)	480 (18%)	301 (11%)	43%
Web-based graphics & multimedia	2557	1667 (65%)	476 (19%)	248 (10%)	166 (7%)	35%
Website accessibility	2636	1510 (57%)	476 (18%)	404 (15%)	246 (9%)	43%
Website design & development	2708	1435 (53%)	440 (16%)	503 (19%)	330 (12%)	47%
Website management	2678	1469 (55%)	468 (18%)	447 (17%)	294 (11%)	45%
Website privacy	2636	1507 (57%)	502 (19%)	388 (15%)	239 (9%)	43%
Website search & administration	2635	1535 (58%)	494 (19%)	376 (14%)	230 (9%)	42%
Wide Area Networks (WAN)	2621	1591 (61%)	350 (13%)	398 (15%)	282 (11%)	39%
Windows operating systems	2639	1619 (61%)	103 (4%)	311 (12%)	606 (23%)	39%
Windows network operating systems	2645	1530 (58%)	282 (11%)	445 (17%)	388 (15%)	42%
Wireless technologies	2659	1574 (60%)	418 (16%)	447 (17%)	220 (8%)	41%
Workflow management	2700	1671 (62%)	390 (14%)	443 (16%)	196 (7%)	38%

Written communication	2627	1436 (55%)	139 (5%)	467 (18%)	585 (22%)	45%
XML/XSL	2510	1582 (63%)	408 (16%)	313 (13%)	207 (8%)	37%

**Table E7. Top ten skills with none expected and in use, but declining forecast over the next three years**

Skill (percent of CIOs choosing forecast)	Competency Area
<ul style="list-style-type: none"> <li>Fortran (98%)</li> </ul>	<ul style="list-style-type: none"> <li>Legacy technologies</li> </ul>
<ul style="list-style-type: none"> <li>Unisys mainframe (95%)</li> </ul>	<ul style="list-style-type: none"> <li>Legacy technologies</li> </ul>
<ul style="list-style-type: none"> <li>COBOL (88%)</li> </ul>	<ul style="list-style-type: none"> <li>Legacy technologies</li> </ul>
<ul style="list-style-type: none"> <li>Mac OS/OS X operating systems (87%)</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure</li> </ul>
<ul style="list-style-type: none"> <li>Mainframe operations (84%)</li> </ul>	<ul style="list-style-type: none"> <li>Legacy technologies</li> </ul>
<ul style="list-style-type: none"> <li>IBM mainframe (82%)</li> </ul>	<ul style="list-style-type: none"> <li>Legacy technologies</li> </ul>
<ul style="list-style-type: none"> <li>Borland JBuilder (80%)</li> </ul>	<ul style="list-style-type: none"> <li>Web computing</li> </ul>
<ul style="list-style-type: none"> <li>Novell operating systems (75%)</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure</li> </ul>
<ul style="list-style-type: none"> <li>C (75%)</li> </ul>	<ul style="list-style-type: none"> <li>Web computing</li> </ul>
<ul style="list-style-type: none"> <li>PowerBuilder (73%)</li> </ul>	<ul style="list-style-type: none"> <li>Legacy technologies</li> </ul>

**Table E8. Top ten skills with in use, but declining forecast over the next three years**

<b>Skill</b> (percent of CIOs choosing forecast)	<b>Competency Area</b>
• COBOL (39%)	• Legacy technologies
• Microsoft Access (35%)	• Web computing
• Mainframe operations (26%)	• Legacy technologies
• PowerBuilder (22%)	• Legacy technologies
• Visual Basic (22%)	• Web computing
• IBM mainframe (18%)	• Legacy technologies
• Visual Basic Script (17%)	• Web computing
• Novell operating systems (16%)	• Infrastructure
• Unisys mainframe (15%)	• Legacy technologies
• C ++ (14%)	• Web computing

**Table E9. Top ten skills with possible adoption forecast over the next three years**



Skill (percent of CIOs choosing forecast)	Competency Area
• Biometrics (61%)	• Infrastructure
• Voice over IP (56%)	• Infrastructure
• Public Key Infrastructure (PKI) (53%)	• Infrastructure
• Video imaging (38%)	• Infrastructure
• Linux operating systems (38%)	• Infrastructure
• Wireless technologies (35%)	• Infrastructure
• Decision support systems (35%)	• Management and use of information as an asset
• Modeling & simulation (32%)	• Management and use of information as an asset
• Cryptology (32%)	• Infrastructure
• IT project portfolio management (30%)	• Management

**Table E10. Top ten skills with steady state forecast over the next three years**

Skill (percent of CIOs choosing forecast)	Competency Area
• Hardware maintenance & support (71%)	• Infrastructure
• Support for desktop applications (64%)	• Technical support services
• Principles of operating systems (63%)	• Infrastructure
• Internal controls (57%)	• Management
• Managing agency staff (55%)	• Management
• Principles of programming (55%)	• Systems & databases
• Financial management (54%)	• Management
• IT procurement (54%)	• Management
• Oral communication (52%)	• Management
• Backup & recovery (52%)	• Infrastructure

**Table E11. Top ten skills with in use and growing forecast over the next three years**

<b>Skill</b> (percent of CIOs choosing forecast)	<b>Competency Area</b>
<ul style="list-style-type: none"> <li>System security applications (82%)</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure</li> </ul>
<ul style="list-style-type: none"> <li>Website design &amp; development (82%)</li> </ul>	<ul style="list-style-type: none"> <li>Web computing</li> </ul>
<ul style="list-style-type: none"> <li>Website management (72%)</li> </ul>	<ul style="list-style-type: none"> <li>Web computing</li> </ul>
<ul style="list-style-type: none"> <li>Identity management &amp; directory services (70%)</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure</li> </ul>
<ul style="list-style-type: none"> <li>Encryption (68%)</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure</li> </ul>
<ul style="list-style-type: none"> <li>Disaster recovery &amp; planning (67%)</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure</li> </ul>
<ul style="list-style-type: none"> <li>Web/ IP (66%)</li> </ul>	<ul style="list-style-type: none"> <li>Web computing</li> </ul>
<ul style="list-style-type: none"> <li>Project management (66%)</li> </ul>	<ul style="list-style-type: none"> <li>Management</li> </ul>
<ul style="list-style-type: none"> <li>DHTML/ HTML/ XHTML (63%)</li> </ul>	<ul style="list-style-type: none"> <li>Web computing</li> </ul>
<ul style="list-style-type: none"> <li>Intrusion detection (63%)</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure</li> </ul>

**Table E12. Similarities and differences in the in use and declining forecast across agency size groups**

<b>Competency Area</b>	<b>At least 50 percent of CIOs in all</b>	<b>Small(at least 50 percent of CIOs)</b>	<b>Medium(at least 50 percent of CIOs)</b>	<b>Large(at least 50 percent of CIOs)</b>
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	agency size groups chose forecast for these skills			
Management				
Infrastructure				
Web computing				
Systems and databases				
Technical support services				
Management and use of information as an asset				
Legacy technologies			<ul style="list-style-type: none"> <li>• COBOL</li> <li>• Mainframe operating systems</li> <li>• IBM mainframe operating systems</li> </ul>	<ul style="list-style-type: none"> <li>• COBOL</li> </ul>

**Table E13. Similarities and differences in possible adoption forecast across agency size groups**

Competency Area	At least 50 percent of CIOs in all agency size groups chose forecast for these skills	Small(at least 50 percent of CIOs)	Medium(at least 50 percent of CIOs)	Large(at least 50 percent of CIOs)
Management				
Infrastructure	<ul style="list-style-type: none"> <li>Biometrics</li> </ul>	<ul style="list-style-type: none"> <li>Public Key Infrastructure (PKI)</li> <li>Voice over IP</li> </ul>		<ul style="list-style-type: none"> <li>Public Key Infrastructure (PKI)</li> <li>Voice over IP</li> </ul>
Web computing				
Systems and databases			<ul style="list-style-type: none"> <li>CASE tools</li> </ul>	
Technical support services				
Management and use of information as an asset				
Legacy technologies				

**Table E14. Similarities and differences in steady state forecast across agency size groups**

## Appendix E: Data Tables

Competency Area	At least 50 percent of CIOs in all agency size groups chose forecast for these skills	Small(at least 50 percent of CIOs)	Medium(at least 50 percent of CIOs)	Large(at least 50 percent of CIOs)
<b>Management</b>	<ul style="list-style-type: none"> <li>Internal controls</li> <li>Managing agency staff</li> </ul>	<ul style="list-style-type: none"> <li>IT asset management</li> <li>Financial management</li> <li>IT procurement</li> </ul>	<ul style="list-style-type: none"> <li>IT procurement</li> <li>Customer Relationship Management (CRM)</li> <li>IT strategic planning</li> <li>Planning &amp; evaluation</li> <li>Leadership</li> <li>Negotiation &amp; conflict resolution</li> <li>Supervisory skills</li> <li>Customer service</li> </ul>	<ul style="list-style-type: none"> <li>Financial management</li> <li>Negotiation &amp; conflict resolution</li> <li>Supervisory skills</li> <li>Customer service</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>Hardware &amp; maintenance support</li> </ul>	<ul style="list-style-type: none"> <li>Principles of operating systems</li> <li>Backup &amp; recovery</li> </ul>	<ul style="list-style-type: none"> <li>Principles of operating systems</li> <li>Backup &amp; recovery</li> <li>Wide Area Networks (WAN)</li> </ul>	<ul style="list-style-type: none"> <li>Telephone/ PBX</li> <li>Windows network operating systems</li> <li>Windows operating systems</li> <li>Open system server administration</li> <li>Technology training activities</li> </ul>
<b>Web computing</b>			<ul style="list-style-type: none"> <li>Microsoft Access</li> </ul>	<ul style="list-style-type: none"> <li>Microsoft Access</li> <li>Java</li> <li>Microsoft SQL</li> </ul>
<b>Systems and databases</b>		<ul style="list-style-type: none"> <li>Database design &amp; development principles</li> <li>Quality assurance</li> <li>Testing &amp; evaluation</li> <li>Principles of programming</li> </ul>		<ul style="list-style-type: none"> <li>Principles of programming</li> <li>Structured system analysis &amp; design principles</li> </ul>
<b>Technical support services</b>	<ul style="list-style-type: none"> <li>Help desk activities</li> </ul>	<ul style="list-style-type: none"> <li>Support for desktop applications</li> </ul>	<ul style="list-style-type: none"> <li>Call center activities</li> </ul>	<ul style="list-style-type: none"> <li>Support for desktop applications</li> </ul>

Management and use of information as an asset				
Legacy technologies				

**Table E15. High impact skill investments by job specialty, page 1**

## Appendix E: Data Tables

Competency Area	IT managers	Operations specialists	Database specialists	Systems specialists
<b>Management</b>		<ul style="list-style-type: none"> <li>Project management</li> </ul>	<ul style="list-style-type: none"> <li>Business continuity planning</li> <li>Change management</li> <li>IT strategic planning</li> <li>IT risk assessment &amp; management</li> </ul>	<ul style="list-style-type: none"> <li>Business continuity planning</li> <li>Change management</li> <li>IT risk assessment &amp; management</li> <li>IT strategic planning</li> <li>IT asset management</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>Encryption</li> <li>Firewalls</li> <li>Intrusion detection</li> <li>Wireless technologies</li> <li>Web/ IP</li> </ul>	<ul style="list-style-type: none"> <li>Firewalls</li> <li>Encryption</li> <li>Intrusion detection</li> <li>System security applications</li> <li>Disaster recovery &amp; planning</li> </ul>	<ul style="list-style-type: none"> <li>Identity management &amp; directory services</li> <li>Network architecture &amp; design principles</li> <li>System security applications</li> <li>Firewalls</li> <li>Intrusion detection</li> <li>Encryption</li> <li>Web/ IP</li> <li>Network configuration</li> </ul>	<ul style="list-style-type: none"> <li>Identity management &amp; directory services</li> <li>Firewalls</li> <li>Wireless technologies</li> <li>Mobile computing</li> <li>Intrusion detection</li> <li>Encryption</li> <li>Unified messaging services</li> <li>Wide Area Networks (WAN)</li> </ul>
<b>Web computing</b>	<ul style="list-style-type: none"> <li>Website design &amp; development</li> <li>Website management</li> <li>Website privacy</li> <li>Web accessibility</li> <li>Website search &amp; administration</li> </ul>		<ul style="list-style-type: none"> <li>Website search &amp; administration</li> <li>XML/XSL</li> <li>JavaScript</li> <li>Java</li> <li>Website accessibility</li> <li>Web servers</li> <li>Website management</li> <li>DHTML/ HTML/ XHTML</li> <li>Website privacy</li> </ul>	<ul style="list-style-type: none"> <li>XML/XSL</li> <li>Website search &amp; administration</li> <li>Website accessibility</li> <li>Web servers</li> <li>Java</li> <li>JavaScript</li> <li>Website management</li> <li>Website privacy</li> </ul>
<b>Systems and databases</b>				<ul style="list-style-type: none"> <li>Oracle</li> <li>Business process analysis</li> </ul>
<b>Technical support services</b>				



<b>Management and use of information as an asset</b>	<ul style="list-style-type: none"> <li>• Content management</li> </ul>		<ul style="list-style-type: none"> <li>• Content management</li> <li>• Records management</li> <li>• Workflow management</li> <li>• Artificial Intelligence (AI)</li> </ul>	<ul style="list-style-type: none"> <li>• Content management</li> <li>• Workflow management</li> <li>• Data warehousing</li> </ul>
<b>Legacy technologies</b>				

Table E15. High impact skill investments by job specialty, page 2

## Appendix E: Data Tables

Competency Area	Datacomm/telecomm specialists	Programmers	Other technical specialists	Program/business specialists
<b>Management</b>	<ul style="list-style-type: none"> <li>Change management</li> <li>Business continuity Planning</li> <li>IT risk assessment &amp; management</li> </ul>	<ul style="list-style-type: none"> <li>Business continuity planning</li> <li>Change management</li> <li>IT strategic planning</li> <li>IT risk assessment &amp; management</li> <li>IT asset management</li> </ul>	<ul style="list-style-type: none"> <li>IT asset management</li> <li>IT risk assessment and mgmt</li> <li>IT strategic planning</li> </ul>	<ul style="list-style-type: none"> <li>Business continuity planning</li> <li>Change management</li> <li>IT risk assessment &amp; management</li> <li>IT strategic planning</li> <li>IT asset management</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>Encryption</li> <li>Firewalls</li> </ul>	<ul style="list-style-type: none"> <li>Identity management &amp; directory services</li> <li>Disaster recovery planning</li> <li>System security applications</li> <li>Network architecture &amp; design principles</li> <li>Firewalls</li> <li>Encryption</li> <li>Mobile computing</li> <li>Wireless technologies</li> <li>Intrusion detection</li> <li>Web/ IP</li> <li>Wide Area Networks (WAN)</li> <li>Unified messaging services</li> <li>Network configuration</li> </ul>	<ul style="list-style-type: none"> <li>System security applications</li> <li>Identity management &amp; directory services</li> <li>Disaster recovery &amp; planning</li> <li>Encryption</li> <li>Intrusion detection</li> <li>Firewalls</li> </ul>	<ul style="list-style-type: none"> <li>Disaster recovery planning</li> <li>Identity management &amp; directory services</li> <li>Network architecture &amp; design principles</li> <li>System security applications</li> <li>Encryption</li> <li>Intrusion detection</li> <li>Mobile computing</li> <li>Web/ IP</li> <li>Wireless technologies</li> <li>Network configuration</li> <li>Wide Area Networks (WAN)</li> </ul>
<b>Web computing</b>	<ul style="list-style-type: none"> <li>Website design &amp; development</li> </ul>	<ul style="list-style-type: none"> <li>XML/XSL</li> <li>Website search &amp; administration</li> <li>Web servers</li> <li>Java</li> <li>JavaScript</li> <li>Website accessibility</li> <li>Website management</li> <li>Website privacy</li> </ul>	<ul style="list-style-type: none"> <li>Website design &amp; development</li> <li>Website management</li> <li>DHTML/ HTML/ XHTML</li> <li>Java</li> <li>JavaScript</li> <li>Web servers</li> <li>Website accessibility</li> <li>Website search &amp; administration</li> <li>Website privacy</li> </ul>	<ul style="list-style-type: none"> <li>DHTML/ HTML/ XHTML</li> <li>Java</li> <li>JavaScript</li> <li>Web servers</li> <li>Website accessibility</li> <li>Website design &amp; development</li> <li>Website management</li> <li>Website search &amp; administration</li> <li>XML/XSL</li> <li>Website privacy</li> </ul>

<b>Systems and databases</b>		<ul style="list-style-type: none"> <li>• Oracle</li> </ul>	<ul style="list-style-type: none"> <li>• Database design &amp; development standards</li> <li>• Systems integration</li> <li>• Systems architecture</li> <li>• Oracle</li> <li>• System life cycle planning principles</li> <li>• Object-oriented analysis &amp; design principles</li> <li>• Database applications development techniques</li> <li>• Business process analysis</li> <li>• Systems implementation</li> <li>• Requirements analysis</li> <li>• Structured system analysis &amp; design principles</li> <li>• Quality assurance</li> </ul>	<ul style="list-style-type: none"> <li>• System architecture</li> <li>• Systems integration</li> <li>• Database applications &amp; development techniques</li> <li>• Object-oriented analysis &amp; design principles</li> <li>• Quality assurance</li> <li>• Structured system analysis &amp; design principles</li> </ul>
<b>Technical support services</b>				
<b>Management and Use of Information as an Asset</b>		<ul style="list-style-type: none"> <li>• Content management</li> <li>• Records management</li> <li>• Workflow management</li> <li>• Data warehousing</li> </ul>	<ul style="list-style-type: none"> <li>• Records management</li> <li>• Workflow management</li> <li>• Content management</li> <li>• Data warehousing</li> </ul>	<ul style="list-style-type: none"> <li>• Content management</li> <li>• Data warehousing</li> <li>• Records management</li> </ul>

**Table E16. Reasons training is worthwhile to employees**

Rank	Skill Item	N*	% of respondents
1	To improve my ability to do existing work	2,609	92 %
2	To prepare me for more demanding assignments	2,351	83 %
3	To prepare me for a greater variety of assignments	2,344	83 %
4	To prepare me for management opportunities	1,906	67 %
5	To help me score better on Civil Service exams	1,185	42 %
6	To give me more opportunity to transfer to jobs in other agencies	1,041	37 %

\* Respondents were allowed to select all that apply

**Table E17. Employee preferences for training methods**

## Appendix E: Data Tables

		Training Focus														
		Technical tools					Specific IT skills				Management skills					
Training Method	Description	1st Pref.	%	2nd Pref.	%	1st Pref.	%	2nd Pref.	%	1st Pref.	%	2nd Pref.	%	Total count	As 1st Pref.	As 2nd Pref.
Off-site classroom instruction	Traditional instructor-led.	300	47%	700	25%	1,157	41%	655	24%	1,032	37%	614	22%	5,458	3,489	1,969
On-site classroom instruction	Traditional instructor-led.	651	38%	962	35%	995	36%	864	31%	943	34%	809	29%	5,624	2,989	2,635
Virtual classroom	Real-time instructor-led, delivered via Internet at your desktop.	166	3%	257	9%	151	5%	301	11%	172	6%	222	8%	1,186	406	780
Self-taught	With instructor, use of books, reference guides, or user manuals available at your facility.	81	3%	154	6%	99	4%	167	6%	80	3%	177	6%	758	260	498
Self-paced eLearning	With instructor, self-study tutorials, delivered via the Internet at your desktop.	123	4%	292	11%	216	8%	376	14%	180	6%	333	12%	1,520	519	1,001
Coaching or mentoring		135	5%	235	9%	120	4%	222	8%	275	10%	309	11%	1,296	530	766
Video conferencing	Instructional session, bringing together people at different locations.	4	0%	27	1%	11	0%	39	1%	34	1%	78	3%	193	49	144

## Appendix E: Data Tables

Workshops provided at trade or other professional conferences	1%	151	5%	48	2%	153	6%	94	3%	243	9%	709	162	547
<b>Number of Responses</b>		<b>2778</b>		<b>2,797</b>		<b>2777</b>		<b>2,810</b>		<b>2785</b>				
<b>Missing</b>		<b>55</b>		<b>36</b>		<b>56</b>		<b>36</b>		<b>48</b>				
<b>Total Responses</b>		<b>2,833</b>		<b>2,833</b>		<b>2,833</b>		<b>2,833</b>		<b>2,833</b>				

\* Respondents were asked for their first and second preference

### Table E18. Employee preferences for being informed about training

Rank	Skill Item	N*	% of respondents
1	Email	2,676	95 %
2	Posting on your agency's Intranet	1,506	53 %
3	Posting on a Website outside of your agency	630	22 %
4	Printed flyers posted at your facility	570	20 %

\* Respondents were allowed to select all that apply

### Table E19. Employee certifications

Rank	Skill Item	N*	% of respondents
1	Operating systems	146	5 %
2	Computing	139	5 %
3	Network support	134	5 %
4	Information systems	106	4 %
5	Database	58	2 %
6	Business applications	55	2 %
7	Project management	54	2 %
8	Software development	52	2 %
9	Website design & management	36	1 %
10	Network security	33	1 %
11	Training	31	1 %
12	Information systems security	29	1 %
13	Healthcare	7	< 1 %
14	Quality assurance	4	< 1 %
15	Chief information officer (CIO)	2	< 1 %
	Total number of employees with any certification	439	16 %

\* Respondents were allowed to select all that apply

**Table E20. CIO preferences for employee certifications**

## Appendix E: Data Tables

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Rank	Skill Item	N	% of CIOs
1	Project management	39	68 %
2	Information systems security	39	68 %
3	Network security	38	67 %
4	Database	34	60 %
5	Network support	28	49 %
6	Operating systems	25	44 %
7	Web	24	42 %
8	Software development	22	39 %
9	Chief information officer (CIO)	20	35 %
10	Information systems	18	32 %
11	Business applications	16	28 %
12	Quality assurance	13	23 %
13	Computing	12	21 %
14	Training	7	12 %
15	Healthcare	3	5 %

**\* Respondents were allowed to select all that apply**

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