2011 Data Breach Investigations Report

A study conducted by the Verizon RISK Team with cooperation from the U.S. Secret Service and the Dutch High Tech Crime Unit.

POLITIE
Korps landelijke politiediensten

verizon

2011 Data Breach Investigations Report

LEAD ANALYSTS/ AUTHORS:

Wade Baker
Alexander Hutton
C. David Hylender
Joseph Pamula, Ph.D.
Christopher Porter
Marc Spitler

AUTHORS

Andy Bonillo
Ben van Erck
Mark Goudie
Jelle Niemantsverdriet
Christopher Novak
Rafael Perelstein
Mike Rosen
Bryan Sartin
Peter Tippett, M.D., Ph.D.
J. Andrew Valentine
Men and women of the U.S. Secret Service
Men and women of the Dutch High Tech Crime Unit

CONTRIBUTORS:

Steve Adams
Thijs Bosschert
Eric Brohm
Calvin Chang
Ron Dormido
Kylee Evans
Jason Fisher
Eric Gentry
John Grim
Clarence Hill
Kenny Lee
Wayne Lee
Kevin Long
David Ostertag
Matthew Speicher
Enrico Telemaque
Yuichi Uzawa
Nicolas Villatte
Paul Wright

SPECIAL THANKS TO:

Christopher Abod
Brianna Boyle
Mike Brubaker
Anita Fortunato

And our continued gratitude to all those we've named before and haven't yet

TABLE OF CONTENTS

For additional updates and commentary, please visit http://securityblog.verizonbusiness.com.

For inquiries directed to the United States Secret Service, contact databreachstudy@usss.dhs.gov.

2011 Data Breach Investigations Report (DBIR)

Executive Summary

361 million >> **144 million** >> **4 million**. Thus goes the tally of total records compromised across the combined caseload of Verizon and the United States Secret Service (USSS) over the last three years. After four years of increasing losses culminating in 2008's record-setting 361 million, we speculated whether 2009's drop to 144 million was a fluke or a sign of things to come. 2010's total of less than four million compromised records seems to suggest it was a sign. But of what? And is it a permanent change in direction or a temporary detour?

To help us answer that, we are very glad to have the United States Secret Service (USSS) back with us for the 2011 DBIR. Additionally, we have the pleasure of welcoming the Dutch National High Tech Crime Unit (NHTCU) to the team. Through this cooperative effort, we had the privilege—and challenge—of examining **about 800 new data compromise incidents since our last report** (with 761 of those for 2010). To put that in perspective, the entire Verizon-USSS dataset from 2004 to 2009 numbered just over 900 breaches. We very nearly doubled the size of our dataset in 2010 alone!

It is fascinating from a research standpoint that the all-time lowest amount of data loss occurred in the same year as the all-time highest amount of incidents investigated. In addition to being the largest caseload ever, it was also extremely diverse in the threat agents, threat actions, affected assets, and security attributes involved. We witnessed highly automated and prolific external attacks, low and slow attacks, intricate internal fraud rings, country-wide device tampering schemes, cunning social engineering plots, and much more. Some of the raw statistics may seem to contradict this claim of diversity (e.g., the percent of breaches attributed to external agents is more lopsided than ever), but one must consider the change in scale. Whereas "10%" used to mean approximately 10-15 breaches across an annual caseload averaging 100-150, it now means 75 breaches in the context of the 2010 caseload. Consider that fact as you digest and ponder results from this year's report.

With the addition of Verizon's 2010 caseload and data contributed from the USSS and NHTCU, the DBIR series now spans 7 years, 1700+ breaches, and over 900 million compromised records. We continue to learn a great deal from this ongoing study and we're glad to have the opportunity once again to share these findings with you. As always, our goal is that the data and analysis presented in this report prove helpful to the planning and security efforts of our readers. As usual, we begin with a few highlights below.

Who is behind data breaches?

92%	stemmed from external agents (**+22%**)
17%	implicated insiders (**-31%**)
<1%	resulted from business partners (**-10%**)
9%	involved multiple parties (**-18%**)

If you've followed these numbers over the years, you may be thinking we change our position more than a professional contortionist. We'll admit to a fair share of head scratching among the RISK team as we tried to interpret what they were telling us. In 2009, breaches involving insiders shot up due to incorporating the USSS data, but returned again to pre-USSS levels in 2010 (even though they're still with us). Read the report for the full scoop on this, but it basically boils down to a HUGE increase in smaller external attacks rather than a decrease in insider activity. Oh, and partner-caused breaches continued their steady decline.

How do breaches occur?

Due to the lower proportion of internal threat agents, Misuse lost its pole position among the list of threat action categories. Hacking and Malware have retaken the lead and are playing dirtier than ever. Absent, weak, and stolen credentials are careening out of control. Gaining quickly, however, is a newcomer to the top three—Physical. After doubling as a percentage of all breaches in 2009, it managed to double again in 2010. Maybe cybercrime is getting less "cyber"? Misuse and Social, though lower in percentage, were still high in number and provided some amazing examples of misbehavior, deception, and plotting for the highlight reel.

- **50%** utilized some form of hacking (**+10%**)
- **49%** incorporated malware (**+11%**)
- **29%** involved physical attacks (**+14%**)
- **17%** resulted from privilege misuse (**-31%**)
- **11%** employed social tactics (**-17%**)

What commonalities exist?

- **83%** of victims were targets of opportunity (<>)
- **92%** of attacks were not highly difficult (**+7%**)
- **76%** of all data was compromised from servers (**-22%**)
- **86%** were discovered by a third party (**+25%**)
- **96%** of breaches were avoidable through simple or intermediate controls (<>)
- **89%** of victims subject to PCI-DSS had not achieved compliance (**+10%**)

Unfortunately, breaching organizations still doesn't typically require highly sophisticated attacks, most victims are a target of opportunity rather than choice, the majority of data is stolen from servers, victims usually don't know about their breach until a third party notifies them, and almost all breaches are avoidable (at least in hindsight) without difficult or expensive corrective action. We would really, really like to report some major change here (negative numbers), but our results won't let us.

Though not applicable to all organizations in our sample, post-breach assessments of those subject to the PCI-DSS revealed compliance levels that were quite low.

Where should mitigation efforts be focused?

We put our collective minds together and honestly tried to come up with something new to say here, but we just couldn't do it. Wait—that's actually not quite true. We would like to remind organizations that have or manage payment card input devices (like ATMs, gas pumps, POS terminals, and other kiosks) to check them regularly for signs of tampering and skimmers. Related attacks have been increasing over the last few years.

We're willing to cook up something new if needed, but the items to the right (and in the Conclusions and Recommendations section) are a healthy part of a balanced diet. Plus, our 2010 caseload suggests that there are many out there who have not yet tried these dishes and it would be impolite to clear the table before they're done. If you're mainly looking for junk food, plenty of other places serve that.

Bon appetit!

- ✔ Eliminate unnecessary data; keep tabs on what's left
- ✔ Ensure essential controls are met
- ✔ Check the above again
- ✔ Assess remote access services
- ✔ Test and review web applications
- ✔ Audit user accounts and monitor privileged activity
- ✔ Monitor and mine event logs
- ✔ Examine ATMs and other payment card input devices for tampering

Year in Review, 2010

Cloud, Aurora, Mobility, Zeus, APT, Wikileaks, Stuxnet, Anonymous. If a word cloud were created using infosec headlines from 2010, these would certainly be rendered big and bold. It's an interesting juxtaposition of themes. While the Cloud and mobile devices increasingly allow us to do anything from anywhere with anyone at any time, Aurora, Zeus, Advanced Persistent Threats (APTs), Wikileaks, and Stuxnet remind us of the difficulty of protecting our information assets in a usability-driven world. Because our caseload (and that of the USSS and NHTCU) is a window into that world, one would expect to glimpse aspects of it in this annual report on breach trends. And this year's DBIR meets that expectation.

We are often asked whether "the Cloud" factors into many of the breaches we investigate. The easy answer is "No—not really." It's more about giving up control of our assets and data (and not controlling the associated risk) than any technology specific to the Cloud.

Apart from the word "Security," "Cloud" was the next most-common word among presentation titles at the 2011 RSA Conference. It's definitely in our collective hearts and minds. As such, we are often asked whether "the Cloud" factors into many of the breaches we investigate. The question is both easy and difficult to answer. The easy answer is "No—not really." We have yet to see a breach involving a successful exploit of a hypervisor allowing an attacker to jump across virtual machines (VMs), for instance. On the other hand, we constantly see breaches involving hosted systems, outsourced management, rogue vendors, and even VMs (though the attack vectors have nothing to do with it being a VM or not). In other words, it's more about giving up control of our assets and data (and not controlling the associated risk) than any technology specific to the Cloud.

While we're on the topic of giving up control of our assets and data, we might as well touch on mobile devices. This is another oft-asked topic during our breach-related presentations and discussions. The fact of the matter is that mobile computing devices (tablets, smartphones, mobile phones, etc.) are rarely the source of data loss across our caseload. That has a lot to do with the kind of cases we investigate (which tend to involve deliberate breach and compromise situations rather than accidental loss of devices). Plus, this report includes only confirmed incidents of data compromise. The threats to mobile devices are real and we fully expect them to increase and diversify along with the use, uses, and users of such devices. Just consider the effect of the iPad since its debut one year ago; many CxOs who were once technology-indifferent now demand to use their iPads at work. The convenience and functionality of these and other similar devices will drive widespread corporate adoption and security will once again find itself rushing to catch up.

Zeus sprouted up within our 2009 caseload, but came to full bloom in 2010. Between the USSS and ourselves, Zeus and its evil business partners, account takeover and transfer fraud, were rampant among consumers and businesses alike. All of these receive further treatment in this report, so we will simply mention it here and move on.

If Zeus shows us that criminals have their minds on our money, Aurora, APTs, Stuxnet, and Anonymous remind us that some threat agents have more than money on their minds. These gave information risk a more sinister, targeted, and personal feel for us all in 2010 (some might add hopeless). Whether these feelings are justified by a significant increase in risk is difficult to discern. Perhaps these feelings are, in fact, justified. Perhaps they are justified only for a subset of us. Maybe risk did not change at all, but our awareness of it changed dramatically. Maybe it's a nugget of truth surrounded by multiple layers of fear, uncertainty, and doubt. What we do know with certainty is that our 2010 caseload revealed certain characteristics that one might associate with these events. For instance, numbers of public sector victims hit an all-time high. We studied more incidents involving theft of classified information, intellectual property, and other sensitive organizational data than ever before. Simply an artifact of a much larger and more diverse sample caseload rather than a real change? Maybe...or maybe not.

APTs deserve some special treatment here. Some will remember that we voiced concern in the 2010 DBIR and subsequent blog posts over the APT hysteria sweeping the security community. We still believe that a "scope creep" exists in the definition of APT. The term's originators use it primarily in reference to state-sponsored attacks from the People's Republic of China. Others use it to describe any threat possessing above average skill and determination. The logical outcome of the former is to seriously assess and seriously address security posture within government agencies and the defense industrial base (which is right and good). The logical outcome of the latter is to conclude that "everyone is a target" of APT (which is an oxymoron and leads to irrational fears about the boogeyman while common thieves clean you out of house and home). It is simply not possible for everyone to be a target. It is undoubtedly true (based on investigative experience) that *some* are the target of state-sponsored attacks (originating from China and/or elsewhere). It is also undoubtedly true (also based on experience) that *some* who think they are victims of APTs are really the victims of organized criminals, hacktivists, glorified script kiddies, and their own mistakes. Because "APTs" (any definition) are real, it's time we get real about defining and defending against them.

Outside the spotlight of these headlines, however, a very different story played out in 2010. The amount of compromised data hit an all-time low across the combined Verizon and USSS caseload. DataLossDB, the Identity Theft Resource Center, and other sources also show a marked decline in total records lost and exposed. What's going on? The headlines seem more hopeless than ever yet the numbers (some of them at least) seem almost hopeful. Why the contrast? What's the "real" 2010? We believe threads of truth exist in both stories. As discussed above, there is some truth behind the headlines. Similarly, data loss figures point to a possible and real change in the motives and tactics used by criminals to steal information. We've done our best to relay these stories and statistics within these pages and unpack their core messages and meaning. We hope this effort will play some small part in leading us all to a happier ending in 2011 and beyond.

If Zeus shows us that criminals have their minds on our money, Aurora, APTs, Stuxnet, and Anonymous remind us that some threat agents have more than money on their minds. These gave information risk a more sinister, targeted, and personal feel for us all in 2010.

2010: The U.S. Secret Service Perspective

The U.S. Secret Service is one of the nation's oldest federal law enforcement agencies. Established in 1865, the Secret Service was founded to combat the widespread counterfeiting of U.S. currency. Today, the agency's primary investigative mission continues to be safeguarding the payment and financial systems of the United States. However, the mission has evolved to include combating worldwide financial and computer cybercrimes.

In 2010, the Secret Service arrested more than 1,200 suspects for cybercrime violations. These investigations involved over $500 million in actual fraud loss and prevented approximately $7 billion in additional losses.

Using advanced technologies and task force partnerships, the Secret Service computer experts, forensic specialists, investigative experts and intelligence analysts provide rapid response and criminal information in support of financial analysis, infrastructure protection and criminal investigations.

The agency has 118 domestic field offices and 23 foreign offices. The Secret Service's 31 Electronic Crimes Task Forces (ECTFs) bring together federal, state and local law enforcement agencies, private industry and academic institutions in a collaborative effort to respond, confront and suppress cybercrimes. In addition to the ECTFs, the agency continues to build strong partnerships with foreign law enforcement agencies worldwide.

Over the past several years the Secret Service has successfully investigated several of the largest cybercriminal cases in the U.S. In 2010, the Secret Service arrested more than 1,200 suspects for cybercrime violations. These investigations involved over $500 million in actual fraud loss and prevented approximately $7 billion in additional losses.

For example in 2010, Albert Gonzalez received a 20 year prison sentence for his role in the TJX and Heartland Payment System breaches. Maksym Yastremskiy was given a 30 year prison sentence in Turkey as the seller of payment card data for Gonzalez and other cybercriminals.

Additionally, Vladislov Horohorin, aka BadB, was arrested in Nice, France on a Secret Service warrant and is currently being extradited to the U.S. BadB was an original founder of the CarderPlanet criminal forum and he had been the largest and well-known trafficker of stolen payment card data for nearly a decade. In a joint investigation with the Netherlands High Tech Crime Unit, the Secret Service provided investigative assistance that led to the take down of the Bredolab Botnet and the arrest of the Botherder nicknamed "Atata" by Armenian authorities.

The Secret Service has focused attention on numerous "bullet proof hosters," who provide web hosting services that allow their customer's considerable leniency in the types of materials their customers may upload and distribute. Seizures in excess of 200TB of data, belonging to bullet proof hosters, have made the proliferation of malware more challenging for cybercriminals and provided a substantial number of investigative leads.

With all these factors taken into account, it is not surprising that the number of compromised records significantly decreased during 2010. After any major investigation and arrest, the cybercriminal underground evaluates what happened and evolves from the lessons learned during the prosecution of their peers.

It appears that cybercriminals are currently satisfied with compromising Point of Sale (POS) systems and performing account takeovers and Automated Clearing House (ACH) transaction fraud. There has been an increase in these areas in 2010. In relation to prior years, it appeared that there were more data breaches in 2010, but the compromised data decreased due to the size of the compromised company's databases. This shows willingness in the cybercriminal underground to go after the smaller, easier targets that provide them with a smaller yet steady stream of compromised data.

There has also been noticeable increase in account takeovers. This can be directly related to the continued rise of the Zeus Trojan and other malware variants created to capture login credentials to financial websites. These account takeovers result in fraudulent transfers from the victim's account to an account under the control of the perpetrator. The Secret Service and the financial services community are working together to combat this growing trend.

The Financial Services Information Sharing and Analysis Center (FS-ISAC) has teamed up with the Secret Service, U.S. Treasury, Department of Justice and many other agencies to create the Account Takeover Task Force (ATOTF). The ATOTF focuses on prevention, detection and response to account takeovers.

As cybercriminals continue to adapt and evolve, so will the Secret Service. As seen in the arrests of Yastremskiy, Horohorin, Atata, and others, there is no safe haven for these criminals.

2011 DBIR: Methodology

Here we are again—our fourth installment of the DBIR series (sixth if you count the '08 and '09 mid-year supplementals). To our readers, it may seem like the 2010 DBIR published ages ago. To us, it feels more like yesterday. The expanding scope and increasing depth of the report makes it almost one continuous effort throughout the year. It is, however, a labor of love and we're very glad to be sharing our research into the world of data breaches with you once again.

We are also very glad to have the USSS back with us for the 2011 DBIR. Additionally, we have the pleasure of welcoming the NHTCU to the team. Through this cooperative effort, we had the privilege—and challenge—of examining about 800 new data compromise incidents since our last report. To put that in perspective, the entire Verizon-USSS dataset from 2004 to 2009 numbered just over 900 breaches. We very nearly doubled the size of our dataset in 2010 alone!

But anyone can put together a large dataset, right? What matters is what that dataset is comprised of, how it was put together, and what conclusions we can draw from it. That is precisely what the rest of this section attempts to do.

We are also very glad to have the USSS back with us for the 2011 DBIR. Additionally, we have the pleasure of welcoming the NHTCU to the team. Through this cooperative effort, we had the privilege—and challenge—of examining about 800 new data compromise incidents since our last report.

Verizon Data Collection Methodology

The underlying methodology used by Verizon remains unchanged from that of previous years. All results are based on firsthand evidence collected during paid external forensic investigations conducted by Verizon from 2004 to 2010. The 2010 caseload is the primary analytical focus of the report, but the entire range of data is referenced extensively throughout. Though the Investigative Response (IR) team works a variety of engagements, only those involving a confirmed data compromise are represented in this report. To help ensure reliable and consistent input, all investigators use the Verizon Enterprise Risk and Incident Sharing (VERIS) framework to record case data and other relevant details (fuller explanation of this to follow). The information collected using VERIS is then submitted to members of the RISK Intelligence team for further validation and analysis. During the aggregation process, information regarding the identity of breach victims is removed from the repository of case data.

USSS Data Collection Methodology

In terms of data collection, the USSS methodology differs little from that of Verizon. Agents of the USSS use an internal application based on the VERIS framework to record pertinent case details for inclusion in the DBIR.. To accomplish this, they utilized investigative notes, reports provided by the victim or other forensic firms, and their own experience gained in handling the case.

From the numerous cases worked by the USSS during 2010, the scope was narrowed to only those involving confirmed organizational data breaches[1] in alignment with the focus of the DBIR. The scope was further narrowed to include only cases for which Verizon did not conduct the forensic investigation[2]. For the 2010 DBIR, a sample of qualifying USSS cases was included since the scope of data collection spanned multiple years. This year information was collected on a much larger proportion of relevant 2010 cases (those not included mainly consist of ongoing cases and some currently in trial). Thus, this 2011 DBIR covers most of the organizational data breaches investigated by the USSS in 2010. This yielded 667 confirmed data breaches for which information was collected within the timeframe set for this report. As you will see, this larger sample greatly increased the variety of breaches we were able to study, and this, in turn, affects the stats we discuss in this report. The resulting dataset was purged of any information that might identify organizations or individuals involved in the case and then provided to Verizon's RISK Intelligence team for analysis.

NHTCU Data Collection Methodology

Like Verizon and the USSS, the NHTCU leveraged VERIS to collect data presented in Appendix A of this report. Verizon RISK team members spent time onsite with the NHTCU to identify cases meeting the criteria for inclusion in the DBIR and to classify those incidents using VERIS. The caseload of the NHTCU is dynamic and varies substantially year by year depending upon various factors. Much of their efforts in 2010 were dedicated to busting up a large child pornography underground and criminal botnet research, investigations, and takedowns. Thus, the number of qualifying corporate breach cases worked in 2010 was not sufficient to use as a standalone dataset[3]. Therefore, a sample of over 30 qualifying breaches was taken from cases worked over the last several years to enable comparative analysis. For these reasons, NHTCU caseload statistics are not included alongside those of Verizon and USSS in the main body of this report. Appendix A presents these findings and are definitely worth a look.

A BRIEF PRIMER ON VERIS

VERIS is a framework designed to provide a common language for describing security incidents in a structured and repeatable manner. It takes the narrative of "who did what to what or whom with what result" and translates it into the kind of data you see presented in this report. Because many readers asked about the methodology behind the DBIR and because we hope to facilitate more information sharing on security incidents, we released VERIS earlier this year for free public use. A brief overview of VERIS is available on our website[4] and the complete framework can be obtained from the VERIS community wiki[5]. Both are good companion references to this report for understanding terminology and context.

1 The USSS works many cases related to theft and fraud that are not included in this report. For instance, crimes committed against consumers that do not involve an organization or its assets are not included. Criminal activities that occur after data are stolen (i.e., "white plastic fraud" and identity theft) are also not within the scope of this study.

2 The USSS is often involved in one manner or another with cases worked by Verizon (especially the larger ones). To eliminate redundancy, these cases were removed from the USSS sample. Where both Verizon and the USSS worked a case, Verizon-contributed data were used.

3 Though it should be noted that the NHTCU has hard drives from over one hundred organizations affected by these botnets that almost certainly contain evidence of data compromise. Time did not permit us to examine those drives for this report.

4 http://www.verizonbusiness.com/resources/whitepapers/wp_verizon-incident-sharing-metrics-framework_en_xg.pdf

5 https://verisframework.wiki.zoho.com/

Classifying Incidents Using VERIS

The Incident Classification section of the VERIS Framework translates the incident narrative of "who did what to what (or whom) with what result" into a form more suitable for trending and analysis. To accomplish this, VERIS employs the A⁴ Threat Model developed by Verizon's RISK team. In the A⁴ model, a security INCIDENT is viewed as a series of EVENTS that adversely affects the information assets of an organization. Every event is comprised of the following ELEMENTS (the 4 A's):

- **Agent:** Whose actions affected the asset
- **Action:** What actions affected the asset
- **Asset:** Which assets were affected
- **Attribute:** How the asset was affected

It is our position that the 4 A's represent the minimum information necessary to adequately describe any incident or threat scenario. Furthermore, this structure provides an optimal framework within which to measure frequency, associate controls, link impact, and many other concepts required for risk management.

If we calculate all the combinations of the A⁴ model's highest-level elements, (3 Agents, 7 Actions, 5 Assets, and 6 Attributes), 630 distinct Threat Events emerge. The grid below graphically represents these and designates a Threat Event Number (hereafter referenced by TE#) to each. TE1, for instance, coincides with External Malware that affects the Confidentiality of a Server.

Figure 1. A⁴ Grid depicting the 630 high-level VERIS Threat Events

		Malware			Hacking			Social			Misuse			Error			Physical			Environmental		
		Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt
Servers	Conf	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Poss	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
	Integ	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
	Auth	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
	Avail	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
	Util	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
Networks	Conf	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147
	Poss	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
	Integ	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189
	Auth	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210
	Avail	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231
	Util	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252
User Devices	Conf	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273
	Poss	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
	Integ	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315
	Auth	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336
	Avail	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357
	Util	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378
Offline Data	Conf	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399
	Poss	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
	Integ	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441
	Auth	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462
	Avail	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483
	Util	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504
People	Conf	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525
	Poss	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546
	Integ	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567
	Auth	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588
	Avail	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609
	Util	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630

Turning the Incident Narrative into Metrics

As stated above, incidents often involve multiple threat events. Identifying which ones are in play and using them to reconstruct the chain of events is how we model an incident to generate the statistics in this report. By way of example, we describe below a simplified hypothetical incident where a targeted phishing attack is used to exfiltrate sensitive data and intellectual property (IP) from an organization.

Figure 2. Example VERIS incident scenario

External agent sends a phishing e-mail that successfully lures an executive to open the attachment.	Malware infects the exec's laptop, creating a backdoor and installing a keylogger.	External agent accesses the exec's laptop via the backdoor, viewing e-mail and other sensitive data.	System administrator failed to enable proper authentication when building a new file server.	External agent accesses a mapped file server from the exec's laptop and steals intellectual property.
TE#553 External Social People Integrity	**TE#295** External Malware User Devices Integrity	**TE#256** External Hacking User Devices Confidentiality	**TE# 56** Internal Error Servers Integrity	**TE#4** External Hacking Servers Confidentiality

The flowchart-like figure representing the incident includes four primary threat events and one conditional event (the diamond)[6]. A brief description of each event is given along with the corresponding TE#s and A^4 categories from the matrix exhibited earlier. Once the construction of the main event chain is complete, additional classification can add more specificity around the elements comprising each event (i.e., the particular type of External agent or exact Social tactics used, etc). The incident is now "VERIS-ized" and useful metrics are available for reporting and further analysis.

One final note before we conclude this sub-section. The process described above has value beyond just describing the incident itself; it also helps identify what might have been done (or not done) to prevent it. The goal is straightforward: break the chain of events and you stop the incident from proceeding. For instance, security awareness training and e-mail filtering could help keep E1 from occurring. If not, anti-virus and a least privilege implementation on the laptop might prevent E2. Stopping progression between E2 and E3 may be accomplished through egress filtering or netflow analysis to detect and prevent backdoor access. Training and change control procedures could help avoid the administrator's misconfiguration described in the conditional event and preclude the compromise of intellectual property in E4. These are just a few examples of potential controls for each event, but the ability to visualize a layered approach to deterring, preventing, and detecting the incident should be apparent.

The process described above has value beyond just describing the incident itself; it also helps identify what might have been done (or not done) to prevent it. The goal is straightforward: break the chain of events and you stop the incident from proceeding.

6 See the Error section under Threat Actions for an explanation of conditional events.

A Word on Sample Bias

We would like to reiterate that we make no claim that the findings of this report are representative of all data breaches in all organizations at all times. Even though the merged Verizon-USSS and NHTCU datasets (presumably) more closely reflects reality than either in isolation, it is still a sample. Although we believe many of the findings presented in this report to be appropriate for generalization (and our confidence in this grows as we gather more data and compare it to that of others), bias undoubtedly exists. Unfortunately, we cannot measure exactly how much bias exists (i.e., in order to give a precise margin of error). We have no way of knowing what proportion of all data breaches are represented because we have no way of knowing the total number of data breaches across all organizations in 2010. Many breaches go unreported (though our sample does contain many of those). Many more are as yet unknown by the victim (and thereby unknown to us). What we do know is that our knowledge grows along with what we are able to study and that grew more than ever in 2010. At the end of the day, all we as researchers can do is pass our findings on to you to evaluate and use as you see fit.

Results and Analysis

The 2010 combined dataset represents the largest we have ever reported in any single year. Verizon investigated 94 incidents in which data compromise was confirmed. The USSS worked and submitted a whopping 667. Thus, the results and analysis in this section examine a grand total of 761 breaches. The total number of known compromised data records across those incidents was 3.8 million.

In several places throughout the text, we show and discuss the entire range of data for both organizations (2004-2010 for Verizon, 2007-2010 for the USSS, and 2006-2009 for the NHTCU presented in Appendix A). As with last year, the chosen approach is to present the combined dataset intact and highlight interesting differences (or similarities) within the text where appropriate. There are, however, certain data points that were collected by Verizon but not the USSS; these are identified in the text/figures.

The figures in this report utilize a consistent format. Values shown in **dark gray** pertain to breaches while values in **red** pertain to data records. The "breach" is the incident under investigation in a case and "records" refer to the amount of data units (files, card numbers, etc.) compromised in the breach. If one of these values represents a substantial change from prior years, this is marked with a "**(!)**" symbol. Many figures and tables in this report add up to over 100%; this is not an error. Because the number of breaches in this report is so high, the use of percentages is a bit deceiving in some places. Where appropriate, we show the raw numbers of breaches instead of or in addition to the percentages. A handy percent to number conversion table is shown in Table 1. Not all figures and tables contain all possible options but only those having a value greater than 0. If you are interested in seeing all options for any particular figure, these can be found in the VERIS framework.

Let's dig in, shall we?

Values shown in **dark gray** pertain to breaches while values in **red** pertain to data records. The "breach" is the incident under investigation in a case and "records" refer to the amount of data units (files, card numbers, etc.) compromised in the breach. If one of these values represents a substantial change from prior years, this is marked with a "(!)" symbol.

Table 1. Key for translating percents and numbers for 2009 and 2010 datasets

	2009 141 breaches	2010 761 breaches
3%	4	23
10%	14	76
25%	35	190
33%	47	251
50%	71	381
75%	106	571
100%	141	761

Demographics

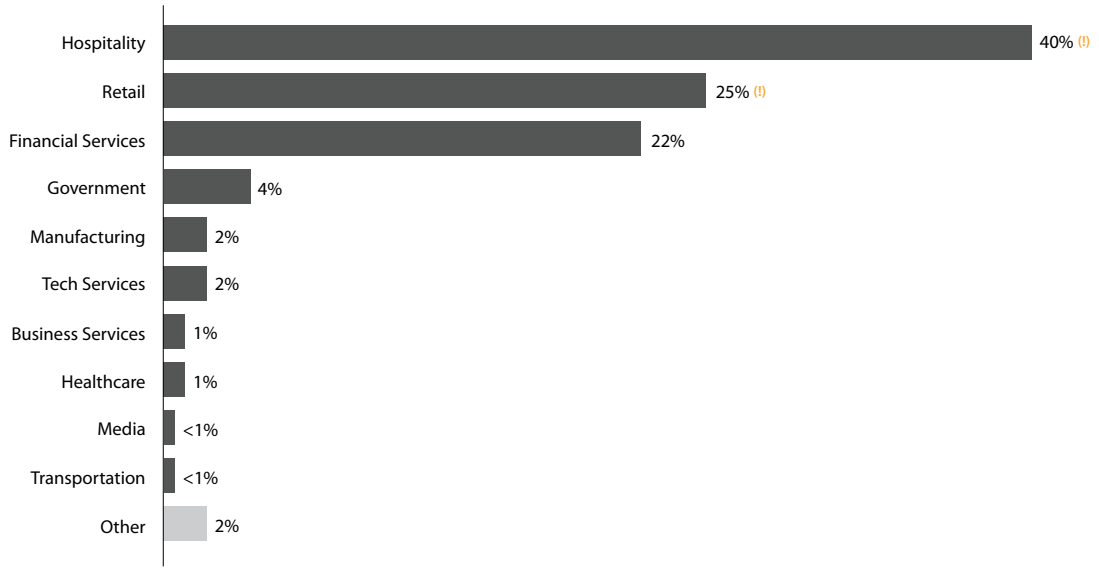
Demographics, as we have pointed out in the past, typically proves to be one of the more difficult sections of this report to compose. The challenge lies in the process of attempting to attribute broader meaning to the statistics generated each year. Clearly, all results are dependent upon our annual investigative casework, but one always wonders if the demographic data has greater secrets to tell us if we could only decipher them. For instance, it may or may not be relevant or indicative of a growing trend if one industry vertical shows a higher rate of attack than another, or if organizations in a certain geographical area appear to be targeted more frequently. Ultimately, we may not be able to discern micro-trend from macro-trend, but demographic data undoubtedly helps set the stage for interpreting breach statistics from 2010 (and we suspect, as you will see throughout this report, perhaps even beyond).

Criminals may be making a classic risk vs. reward decision and opting to "play it safe" in light of recent arrests and prosecutions following large-scale intrusions into Financial Services firms. Numerous smaller strikes on hotels, restaurants, and retailers represent a lower-risk alternative, and cybercriminals may be taking greater advantage of that option.

We live in a world absolutely saturated with information, so it is hardly surprising that breaches continue to happen in a widely diverse group of organizations scattered over a geographically disparate area. However, this year, as we have seen in the past, some types of organizations appear to be singled out more so than others. As you can see in Figure 3, the top three victim verticals remain the same year in and year out. They just switch places occasionally, as they did this year with Hospitality (mostly hotels and restaurants) regaining the number one spot, followed by Retail, which was itself followed very closely by Financial Services. Our readers might think they are looking at the 2008 DBIR since the results closely resemble those found in that report (it's okay, folks; this is the 2011 DBIR—though at least one of us did wear a circa 2008 Three Wolf Moon shirt during the drafting of this report).

This rise of breaches in the Hospitality and Retail sectors is one of those areas where we do suspect the numbers reflect trends broader than this immediate caseload. Typically, such organizations represent smaller, softer, and less reactive targets than, for instance, financial institutions. Criminals may be making a classic risk vs. reward decision and opting to "play it safe" in light of recent arrests and prosecutions following large-scale intrusions into Financial Services firms. Numerous smaller strikes on hotels, restaurants, and retailers represent a lower-risk alternative, and cybercriminals may be taking greater advantage of that option. Supporting evidence for this theory will be presented throughout this report.

Figure 3. Industry groups represented by percent of breaches



As is usually the case, there was quite a chasm between the top three industries and the rest of the pack. Leading that second tier was Government, credited with 4% of breaches. This is on par with past reports from a percentage standpoint, but it is important to note the scaling factor that comes in to play here. In 2009, that was 4% of 141 total or 6 breaches. 2010's equal-sounding 4% (3.5%, actually) corresponds to a much-higher 27 breaches since the total caseload expanded to 761. So, while percentage points suggest "no change," we actually investigated four-fold more government breaches than before. Keep this in mind, because that same math applies to all "smaller" percentages in the report.

Certainly, an interesting change this go around is that unlike previous years in which 90% or more of records lost were derived from financial services targets, 2010 exhibited a much more even distribution. The main factor in this shift is the lack of "mega-breaches" in our combined caseload. Many incidents involving the compromise of multi-millions of records (or more) in the last few years occurred in financial institutions. Without one or two of these skewing the results, things naturally balance out a bit more. Another factor to consider is that criminals seemed to gain interest in stealing data other than payment cards. Account takeovers, theft of IP and other sensitive data, stolen authentication credentials, botnet activity, etc. (which are typically less mega-breach-able) affected firms at increased rates in 2010.

With regard to organizational size, this caseload shows a substantially higher concentration of smaller organizations and franchises. However, we once again remind readers to consider differences of scale. Though the percentages obscure this fact, we investigated almost twice as many breaches affecting organizations in the 1,000-10,000 employee range than in 2009 (26% in '09 and 8% in '10…you can do the math).

Figure 4. Compromised records by industry group (!)

Table 2. Organizational size by number of breaches (number of employees)

1 to 10	46
11 to 100	436 (1)
101 to 1,000	74
1,001 to 10,000	49
10,001 to 100,000	59
Over 100,000	55
Unknown	40

Therefore, one should not conclude that larger organizations were breached less often in 2010, but rather we saw a virtual explosion of breaches involving smaller organizations (which were often small independent franchise locations of large organizations). Plus, our greatly expanded window into the world of data breaches (courtesy of the USSS) allowed us to see a bigger sample of organizations that would not normally contract a third party forensic firm. Law enforcement, thank goodness, is no respecter of size and works all reported breaches. One final observation before we conclude this paragraph is that Table 2 is actually closer than our previous reports to a realistic size distribution for organizations (not just breach victims). Small to medium businesses typically comprise the vast majority of firms in most economies. With our continuing inclusion of data from organizations such as the USSS and the NHTCU we will probably continue to see more representative numbers with regard to organizational size.

Obviously, data breaches are not a country or region-specific phenomenon; they can occur anywhere that information traverses or resides. That's not to say that no regional differences and trends exist, because they most certainly do (though they are often not as amplified as we tend to think). As Figure 5 shows, Verizon and the USSS investigated breaches occurring in many places around the world in 2010. For those keeping track, the map shows more countries highlighted than ever before.

Roughly one-third of Verizon's cases were worked across the greater European and Asia-Pacific regions (split fairly evenly, but with a slight tilt toward APAC). Appendix A, which isolates breaches worked by the NHTCU, is a must-see for those interested in European breach statistics. In North and South America, most breaches occurred in the United States, but other countries in those regions are represented in Figure 5 as well. The USSS' casework was, of course, primarily focused within the continental United States though investigating and prosecuting the criminals behind them takes them all over the world. While these case statistics are certainly dependent upon the firm working them, they also have much to do with the differences in international laws governing disclosure. Higher numbers of known breaches in one area of the world does not mean it is any more a hotbed of crime than other parts of the globe. In many cases, it is simply the result of mandatory breach notification and subsequent investigation.

Figure 5. Countries Represented in 2010 Caseload

Countries in which a breach was confirmed

Australia
Belgium
Canada
China
Czech Republic
Dominican Republic
Ecuador
France
Germany
Greece
Japan
Mexico
Netherlands
New Zealand
Phillipines
Poland
Russia
Spain
Sweden
Taiwan
United Kingdom
United States

Countries in which a breach was investigated but not confirmed

Ghana
Ireland
Italy
Luxembourg
Switzerland
United Arab Emirates

2010 Threat Event Overview

We typically present statistics for Agents, Actions, Assets, and Attributes (though we focus on Confidentiality because this report is about data breaches) in separate sections of the DBIR. That structure remains in this report, but we wanted to show a different representation to tie it all together and give readers a view of the big picture. Plus, it is good to remember that agents are not disassociated from their actions or the assets and attributes they affect. Figure 6 is a modified version of Figure 1 presented in an earlier section, but rather than TE#s, it tallies the total number of breaches in which each Threat Event was part of the incident scenario. If the 761 breaches contained in the 2010 Verizon-USSS caseload can be boiled down to one single image, this is our best concept of it. Many observations could be made from this, but we'll start by highlighting a few of them.

From a threat management standpoint, it is interesting that only 55 of the 630 possible threat events have a value greater than 0. This means over 90% of the threat-space was not in play at all. Furthermore, even among the 9% that were observed, frequency counts gravitate toward a smaller subset of dominant threat events. Tables 3 through 5 expand on this and list the top 10 events in the combined, Verizon, and USSS datasets.

Figure 6. A^4 Grid depicting the frequency of VERIS Threat Events across 2010 caseload

		Malware			Hacking			Social			Misuse			Error			Physical			Environmental		
		Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt	Ext	Int	Prt
Servers	Conf	319	1		369						10	50	1			1						
	Poss																					
	Integ	323	1		353	2					3	43										
	Auth	2			16	2					3	16										
	Avail	3			4						2	1										
	Util																					
Networks	Conf	1			1												11					
	Poss																					
	Integ	1			1												11					
	Auth																					
	Avail																					
	Util																					
User Devices	Conf	214	1		174						2	4					201					
	Poss																					
	Integ	214	2		173							3					201	4				
	Auth	2			2												2	1				
	Avail				2												1					
	Util																					
Offline Data	Conf	1										87				1	1					
	Poss																					
	Integ	1																				
	Auth																					
	Avail																					
	Util																					
People	Conf							8	1													
	Poss																					
	Integ							72	24													
	Auth																					
	Avail																					
	Util																					

None — Least frequent — Most Frequent

From a threat management standpoint, it is interesting that only 55 of the 630 possible threat events have a value greater than 0. This means over 90% of the threat-space was not in play at all.

It is fascinating that the top four threat events in both caseloads are the same and involve external agents hacking and installing malware to compromise the confidentiality and integrity of servers. Think about it—out of 630 possibilities, what is the likelihood that two completely different datasets "just happen" to share the four most common events? These results may surprise some since internal agents and misuse were so prominent in the 2009 report, but we'll get into that later. Some may also wonder about the presence of integrity, but should consider that the installation of malware and many other actions taken by attackers (configuration changes, adding users, altering logs, etc.) introduce unauthorized modifications to the systems involved.

It is fascinating that the top four threat events in both caseloads are the same and involve external agents hacking and installing malware to compromise the confidentiality and integrity of servers. Think about it—out of 630 possibilities, what is the likelihood that two completely different datasets "just happen" to share the four most common events?

After the top four, the Verizon and USSS caseloads diverge a bit. The USSS investigated a large number of cases involving tampering with and extracting data from ATMs, gas pumps, and POS terminals. This accounts for the prevalence of External.Physical.UserDevices.X events, which will be discussed later in this report. Toward the bottom of the list, the two caseloads come back into agreement around external agents hacking user devices (which is often done to gain an initial foothold as part of the larger attack). We hope you enjoyed this short digression and we now return to our regularly scheduled programming.

Table 3: Top 10 VERIS Threat Events, combined caseload

	Threat Event	Threat Event	Counts
1	External.Hacking.Servers.Confidentiality	TE #4	369
2	External.Hacking.Servers.Integrity	TE #46	353
3	External.Malware.Servers.Integrity	TE #43	323
4	External.Malware.Servers.Confidentiality	TE #1	319
5	External.Malware.UserDevices.Confidentiality	TE #253	214
6	External.Malware.UserDevices.Integrity	TE #295	214
7	External.Physical.UserDevices.Confidentiality	TE #268	201
8	External.Physical.UserDevices.Integrity	TE #310	201
9	External.Hacking.UserDevices.Confidentiality	TE #256	174
10	External.Hacking.UserDevices.Integrity	TE #298	173

Table 4. Top 10 VERIS Threat Events, Verizon caseload

	Threat Event	Threat Event	Counts
1	External.Hacking.Servers.Confidentiality	TE #4	63
2	External.Hacking.Servers.Integrity	TE #46	56
3	External.Malware.Servers.Integrity	TE #43	42
4	External.Malware.Servers.Confidentiality	TE #1	37
5	External.Malware.UserDevices.Integrity	TE #295	22
6	External.Malware.UserDevices.Confidentiality	TE #253	21
7	External.Hacking.UserDevices.Confidentiality	TE #256	13
8	External.Hacking.UserDevices.Integrity	TE #298	12
9	Internal.Misuse.Servers.Confidentiality	TE #389	7
10	External.Social.People.Integrity	TE#553	5

Table 5. Top 10 VERIS Threat Events, USSS caseload

	Threat Event	Threat Event	Counts
1	External.Hacking.Servers.Confidentiality	TE #4	306
2	External.Hacking.Servers.Integrity	TE #46	297
3	External.Malware.Servers.Confidentiality	TE #1	282
4	External.Malware.Servers.Integrity	TE #43	281
5	External.Physical.UserDevices.Confidentiality	TE #268	200
6	External.Physical.UserDevices.Integrity	TE #310	200
7	External.Malware.UserDevices.Confidentiality	TE #253	193
8	External.Malware.UserDevices.Integrity	TE #295	192
9	External.Hacking.UserDevices.Confidentiality	TE #256	161
10	External.Hacking.UserDevices.Integrity	TE #298	161

Threat Agents

Threat agents refer to entities that cause or contribute to an incident. There can be more than one agent involved in any incident and their involvement can be malicious or non-malicious, intentional or accidental, direct or indirect. Critical to any forensic investigation is to identify the source of the breach, not only for purposes of response and containment, but also for implementing current and future defensive strategies. Verizon recognizes three primary categories of threat agents—External, Internal, and Partner.

VERIS Classification Note: If the agent's role in the breach is limited to a contributory error (see explanation in the Error sub-section under Threat Actions), the agent would not be included here. For example, if an insider's unintentional misconfiguration of an application left it vulnerable to attack, the insider would not be considered an agent if the application were successfully breached by another agent. An insider who deliberately steals data or whose inappropriate behavior (i.e., policy violations) facilitated the breach would be considered an agent in the breach.

External: External threats originate from sources outside the organization and its network of partners. Examples include lone hackers, organized crime groups, and government entities, as well as environmental events such as weather and earthquakes. Typically, no trust or privilege is implied for external entities.

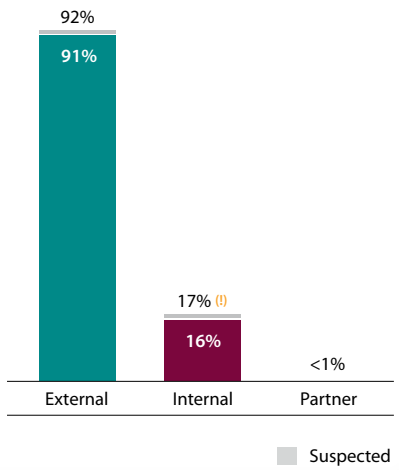
Internal: Internal threats are those originating from within the organization. This encompasses company executives, employees, independent contractors (i.e., 1099 staff), interns, etc., as well as internal infrastructure. Insiders are trusted and privileged (some more than others).

Partners: Partners include any third party sharing a business relationship with the organization. This includes suppliers, vendors, hosting providers, outsourced IT support, etc. Some level of trust and privilege is usually implied between business partners.

Figure 7 displays the distribution of threat agents among breach cases worked by Verizon and the USSS in 2010. Veteran DBIR readers will almost certainly recognize the much lower percentage of internal breaches compared to what was presented in our last report. Except for partner, these results more closely resemble those from two years ago (and prior) than 2009. Why the roller coaster time machine?

First of all, readers should remember to be careful when drawing conclusions from statistics without exploring the root issues and trends behind them. Many interpreted the more than doubling of internal breaches reported in last year's DBIR as proof that insider threat was rocketing upward. This was probably stoked somewhat by rumors and reports at the time of a poor economy driving employees to desperate acts of crime. In point of fact, the apparent "increase" was due to incorporating the USSS dataset, which had a higher proportion—but actually a decreasing trend—of insider breaches. The Verizon trend line for internal incidents was flat.

Figure 7. Threat agents (inclusive) by percent of breaches



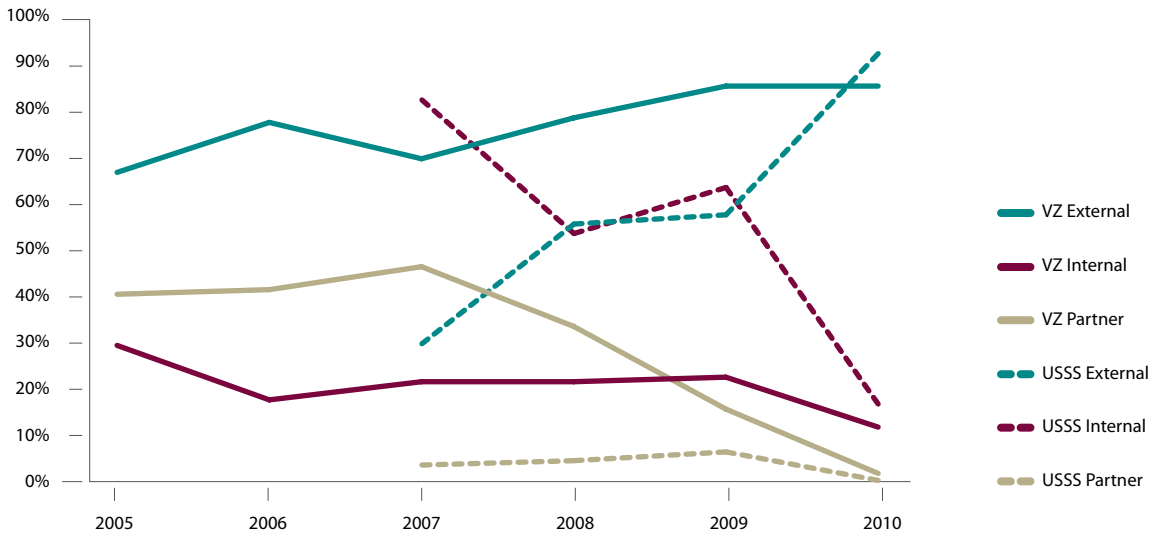
*These results are not so much a **decrease** in internal agents as much as they are a comparatively huge **increase** in external agents.*

Figure 7 has similar potential for interpretive pitfalls. At 17% of all breaches, illicit insider activity is near an all-time low. Does this mean that insiders are a concern of yesteryear? Not likely. These results are not so much a *decrease* in internal agents as much as they are a comparatively huge *increase* in external agents. Or, perhaps, it is simply that our window into the world of external threats is simply much larger than it was a year before. Either way, the raw number of breaches attributed to outsiders exploded within the USSS' 2010 caseload, and skewed slightly more in that direction in Verizon's as well.

We hypothesize this rise in the past year reflects an ongoing industrialization process of sorts in attack methods used by certain groups of external agents, most notably financially motivated organized criminals. They have created economies of scale by refining standardized, automated, and highly repeatable attacks directed at smaller, vulnerable, and largely homogenous targets. That's not to say all external attacks fall into this category, but this was where much of the growth occurred between our 2009 and 2010 caseloads. Several cases worked by the USSS spanned numerous organizations victimized by the same attacker or group. For instance, at least 140 breaches from 2010 were tied to a single individual using the exact same methods. Even more astounding is that several hundred more have been discovered and linked to him already in 2011 (not included in this report).

External agents have created economies of scale by refining standardized, automated, and highly repeatable attacks directed at smaller, vulnerable, and largely homogenous targets.

Figure 8. Threat agents over time by percent of breaches

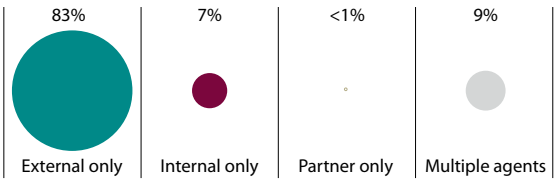


Insider attacks, fortunately, are not so scalable. They can target their employer and perhaps some of its partners or customers, but not typically in the manner or to the extent described above. Thus, in a 2010 caseload expanded by these mass external operations, breaches involving internal agents declined as a percentage of total cases. One should keep in mind, however, that the actual number of insider incidents was almost twice as large. This information would suggest that the insider threat is still present and not declining; it just didn't increase as much as external threats. We hope these results will be viewed with the above in mind. With that horse sufficiently flogged, let's move on to partners.

Although the previous discussion can also explain the drop in percentage of breaches attributed to business partners, 2010 seems to continue a legitimate downward trend that began in 2008. We hypothesized in previous years that this may be due to increased regulation, heightened awareness, more assessments, better technology, or combinations of these (maybe even something else entirely). What has not declined are the number of incidents in which partners were "in the picture" for circumstances surrounding the breach. By this we mean that the partner was not an active (or causal) threat agent, but they were responsible for hosting, managing, securing, etc. the systems involved. More discussion on these scenarios can be found in the Partner and Error sections of this report.

Reviewing Figure 9, which contrasts single and multi-agent breaches, we can make a few observations about these results. The 9% of cases involving more than one agent is well below that of 2008 and 2009. In prior years, the multi-agent breaches worked by Verizon exhibited an External-Partner combination. Verizon's 2010 data mirrors that most often shown in the USSS data, which is an External-Internal pairing. This often involves an outsider colluding with an insider to embezzle or skim data and/or funds, but also includes scenarios such as an insider breaking web use policy, picking up malware, and then having their machine used as a base camp by external attackers.

Figure 9. Threat agents (exclusive) by percent of breaches



Breach Size by Threat Agents

The amount of data compromised certainly does not capture the full impact of a breach, but it is, at least, an indicator of it. It is also something that can (ordinarily) be measured by investigators during the normal scope of an engagement. We would love to collect more information on the financial impact of breaches we investigate, but such is not our primary objective (though it is one of the most requested additions to this report). Additionally, by the time the full consequences are known to the client (if they ever are), we're long gone.

Figure 10. Compromised records by threat agent, 2010

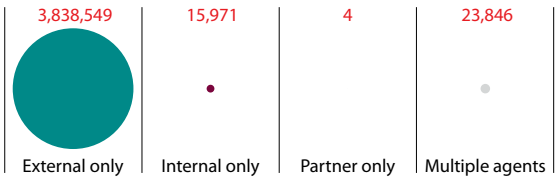


Figure 11. Compromised records by threat agent, 2004-2010

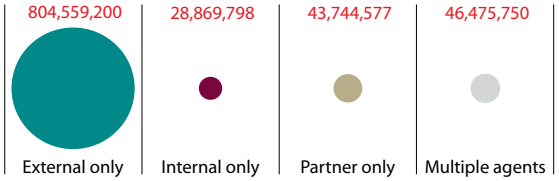


Figure 10 records the distribution of the 3.8 million records compromised across the merged 2010 dataset among threat agents. The effect reveals even larger disparity than we typically see; the data loss inflicted by External agents continues to far outweigh that done by insiders and partners. It's interesting to note that while a few mega-breaches always helped tip the scales toward outsiders in years past, 2010 is different. Instead, the same result was achieved in a caseload lacking huge breaches but rife with many smaller external breaches. Still, the total number of records depicted in Figure 10 pales in comparison to those in previous years, which is why Figure 11 (showing the overall tally since we began collecting data in 2004) hasn't changed much since our last report.

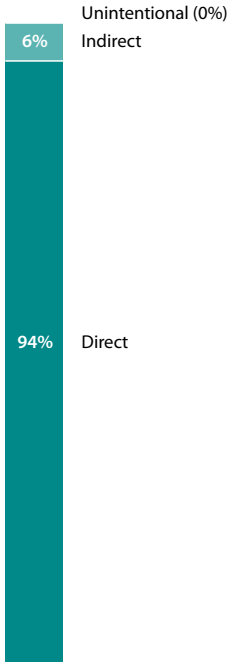
Another important facet of this metric to consider is the various types of data compromised. Some, like payment card numbers and personal information are often stolen in bulk, whereas criminals may only target a few documents comprising intellectual property and classified data. Data types quantify differently as well as have varying levels of value to the breached organization. IP for instance may be low in the number of records, but have a much higher financial impact. Based on data from this past year, insiders were at least three times more likely to steal IP than outsiders. Is that enough to make insiders the most impactful category of agent in 2010? We honestly cannot answer that, but it is possible.

External Agents (92% of breaches, 99+% of records)

As discussed in the previous section, external threat agents are the dominant force in both percentage of breaches and percentage of compromised records. Almost all of them acted against the victim organizations deliberately and maliciously. While external agents can unintentionally cause harm, the subject of this report is such that those we observe usually have sinister motives.

Zooming in to review the various types of external threat agents observed in 2010, we see in Table 6 that the primary offenders remain unchanged from the previous year. Organized criminal groups (58%) led the list, followed by unaffiliated person(s) (40%), with all others trailing a good distance behind. Both of the former increased rather dramatically, from 24% and 21% respectively in 2009. This effect has much to do with the aforementioned "industrialization" and scaling tactics observed among external breaches. The USSS dataset in particular shows quite a few remarkable examples of attacks replicated by the same group or individual across dozens of victims.

Figure 12. Role of external agents by percent of breaches within External



*Should we conclude that organized criminals tried harder (hit more victims) but were less successful (stole less data)? This may or may not be true, and there's a chance they might actually be **more** successful overall if measures other than record counts are considered.*

When examining compromised records for organized criminals, we see a different picture than the one we have come to know (and dis-love). Prior reports pinned upwards of 80-90+% of all stolen data on the activity of these groups; here they declined to a little over 50%. Should we conclude that organized criminals tried harder (hit more victims) but were less successful (stole less data)? This may or may not be true, and there's a chance they might actually be *more* successful overall if measures other than record counts are considered. For instance, many of the perpetrators of the largest known breaches are living behind bars now (not considered by most to be a high quality of life). An approach using a standardized methodology to take a little data from a lot of organizations may help achieve a decent (or indecent, rather) living while avoiding incarceration (at least for a time).

Table 6. Types of external agents by percent of breaches within External

Organized criminal group	58% (!)
Unaffiliated person(s)	40% (!)
Former employee (no longer had access)	2%
Competitor	1%
Unknown	14%
Other	<1%

The "unaffiliated person(s)" label is used when the perpetrator is identified, but there are no known associations between that individual and larger organized criminal groups, governments, activist groups, etc. They are, apparently at least, acting alone. Growth in activity from this type of external agent may signal a growing entrepreneurial spirit and/or lessening co-dependency amongst criminals. It could be that the canned tools used to attack POS systems, for instance, may be maturing to the point that even "script-kiddies" can use them. Another take is that they are not, in fact, acting alone, but are rather "guns for hire" for some other entity lurking behind the shadows. If true, this has its own set of implications. We will surely be watching to see if this trend continues over the next few years.

The number of external agents categorized as "unknowns" dropped this year compared to last year, which can mainly be attributed to the USSS, as they were able to successfully identify (and in many cases arrest and prosecute) the criminals. A greater percentage of the unknown agents were found in the Verizon incidents. There are two main reasons for this. First, a considerable number of clients kept insufficient log information to successfully identify the attacker; it simply can't be determined by forensics alone. This is in part due to the demographics of the 2010 caseload; smaller organizations are less likely to have the resources or the expertise to manage their IT infrastructure. The second reason is that many victim organizations do not wish to expand the investigation to include this line of inquiry when the attack has already been successfully mitigated. Similar to "unaffiliated person(s)," one wonders about their true agenda and alliegances.

Lastly, we wanted to mention another group of external agents that are sometimes lumped in with insiders—that is, former employees. There is some grey area around exactly when an employee (internal agent) becomes a former employee (external agent) and the classification depends on the individual's employment status with the organization *when the breach occurred* as opposed to when it was discovered or investigated. In our recent casework, we observed several examples involving former employees stealing data from their ex-employer. One of them sold their shared administrative credentials on the black market, which resulted in authorized access soon after. Since these credentials were still shared among active employees, they weren't disabled as this individual left. Another stole data while employed, nabbed more after leaving, and then extorted their former organization. Yet another sold their knowledge about the inner workings of a system to a competitor. Several others were nice enough to continue visiting the internal network occasionally to catch up on the latest developments and gossip. Deprovisioning of user accounts, anyone?

Origin of external agents

Ascertaining the geographic origin of external agents generally suffers from problems with making this determination based upon IP addresses. Even when the country of the source IP(s) can be accurately pinpointed, it is often not the country where the actual attacker resides, but rather a host in a botnet or just another "hop" used by the real culprit. In some cases, however, various types of additional information help refine or corroborate IP-based geolocation. All these issues aside, knowing the origin of attacks (whether immediate or ultimate) is still very useful for many reasons.

For 2010, Figure 13 shows a similar order of regions as in years past, except there is a striking jump in the percentage of incidents originating from Eastern Europe. North America is the runner-up, but it was by a much wider margin than before. The disparity was largely due to the widespread and prolific attacks from organized criminal groups typically hailing from Eastern Europe. Conversely, many of the unaffiliated and unidentified agents originate from Asia, which is in the three spot. In the individual Verizon dataset, North America is the main source followed by East Asia and Eastern Europe. This leaves little doubt as to the origin of the majority of breaches worked by the USSS.

Figure 13. Origin of external agents by percent of breaches within External

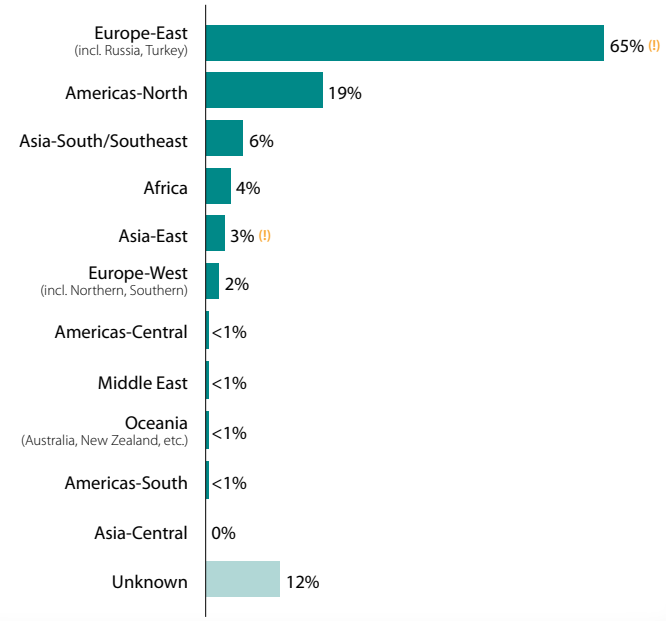
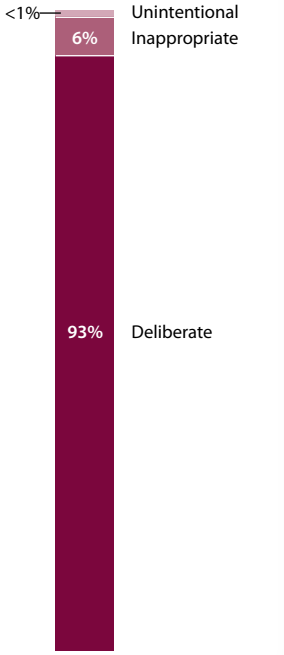


Figure 14. Role of internal agents by percent of breaches within Internal



Internal Agents (17% of breaches, 1% of records)

Mentioned already in the overview to the Threat Agents section, the reduction of insider breaches from 48% to 17% is more of a function of the greater number of outsiders represented in this year's cases. Last year we discussed that many hypothesized we would begin to see an uptick in the number of insider attacks due to the financial strain created by the global economic conditions. In reviewing the trends in both the Verizon and USSS caseloads, if it is happening, we are not seeing the consequences of it quite yet. A counter argument can be made that because of the global economic conditions and the competitive job market, insiders have placed more value on their trusted employment and benefits. Fear of losing your job changes the risk versus reward model for committing or conspiring to commit a crime in the workplace.

Insiders can cause or contribute to breaches in all sorts of ways. For classification purposes, we group these into three major buckets. They either acted deliberately and maliciously, inappropriately but not maliciously, or unintentionally without malice. Much like last year, investigators determined that nearly all internal breaches (93%) were the result of deliberate malicious activity. This may seem odd, but one should remember that we're specifically discussing data loss cases investigated by either a third party forensics group (Verizon) or a law enforcement agency (USSS). Also keep in mind that if the insider's only involvement was related to a conditional event[7], they are not considered a primary threat agent and thus not depicted in the statistics above.

For the second year in a row, it is regular employees and end-users—not highly trusted ones—who are behind the majority of data compromises. That ratio was roughly even in our first two reports, but since the addition of the USSS cases, lesser-privileged insiders are increasingly dominant. Examples of regular employees represented by the 88% shown in Table 7 spanned corporate end-users, bank tellers, cashiers, waiters, and others among the rank and file. These employees aren't normally escalating their privileges in order to steal data because they don't need to. They simply take advantage of whatever standard user privileges were granted to them by their organizations . This is a good time to remember that users need not be superusers to make off with sensitive and/or valuable data. Case findings suggest that regular employees typically seek "cashable" forms of information like payment card data, bank account numbers, and personal information.

For the second year in a row, it is regular employees and end-users—not highly trusted ones—who are behind the majority of data compromises. This is a good time to remember that users need not be super users to make off with sensitive and/or valuable data.

The proportion of internal breaches tied to more privileged and trusted employees like executives, system administrators, and developers totals about 12% (less than half of what it was in 2009). When those in such positions are involved with breaches, case history shows they usually steal larger quantities and more valuable forms of information. This makes a lot of sense in that highly privileged and senior employees have the "keys to the kingdom" as they say. 2010, however, did not follow the pattern of history (maybe someone changed the locks?).

7 See the Error section under Threat Actions for an explanation of conditional events.

System and network administrators stole far less information than regular employees. Executives, usually linked to the theft of IP and other sensitive organizational information, did not take significantly more of such data than other types of employees. Why? To be honest, we're not sure. It may have to do with a higher-than-normal percentage of cases for which we were not able to ascertain the total amount of data loss. We do think the principle still holds and this is likely just an odd characteristic of this year's caseload.

Finance and accounting staff represent a kind of in-between group in relation to those above with respect to privilege and trust. They were tied to nearly twice the percentage of breaches in 2010 as in 2009. Their position involves the oversight and management of accounts, records, and finances, which gives them greater opportunity to engage in illicit activity of various sorts.

Table 7. Types of internal agents by percent of breaches within Internal

Regular employee/end-user	85% (1)
Finance/accounting staff	22%
Executive/upper management	11%
Helpdesk staff	4%
System/network administrator	3%
Software developer	2%
Unknown	1%
Other(s)	1%

It's worth the time to make a quick point on the types of assets targeted by insiders. Our data shows that external agents target servers and applications and end-user systems most of time. The assets targeted by insiders vary between all types of assets. We believe this is one the (many) reasons that insider threat is difficult to control. They have access to a plethora of assets and know where and how to obtain data from them.

Partner Agents (<1% of breaches, <1% of records)

In comparison to previous years, breaches stemming from business partners declined sharply (based on partners identified as a primary threat agent). There were only three (yes, 3) of them in the entire combined 2010 caseload. How does one write a section about three events? Answer: One doesn't. Instead, we'll simply mention what they were and then briefly clarify other ways in which partners factored into breaches but did not cause them.

There were two instances of partner error and one of misuse resulting in data compromise in 2010. One acted deliberately and maliciously (Misuse) and the other two acted unintentionally (these are touched on in the Error section).

Extending the conversation from partners as threat agents to partners that factor into or relate to the breach in other ways gives us something more to talk about. First, partners can contribute to a conditional event within the broader incident scenario. Conditional events create circumstances or conditions that—if/when acted upon by another agent—allow the primary chain of threat events to progress. In this respect, they are more akin to vulnerability than threat (which is why partners involved in them are not considered primary threat agents). In 2010, partners contributed to conditional events in a sizeable 22% of incidents. A common example of this is in the retail and hospitality industries where a remote vendor responsible for managing a POS system neglects to change the default credentials, leaving it vulnerable to attack.

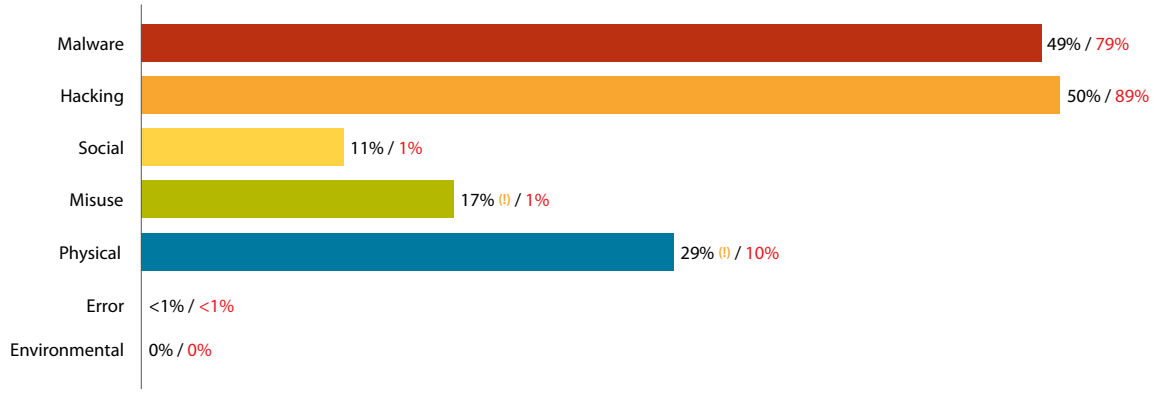
Something else to consider, a good number of assets involved in 2010 breaches were either hosted or managed by a partner. This fact may have had absolutely nothing at all to do with the incident, but it is a partner-related datapoint and worth tracking and monitoring over time.

All in all, what was said last year remains true; organizations that outsource their IT infrastructure and support also outsource a great deal of trust. A partner's security practices—often outside the victim's control or expertise—can factor into breaches in various ways. Third party policies, contracts, controls, and assessments should account for this.

Threat Actions

Threat actions describe what the threat agent did to cause or to contribute to the breach. The majority of incidents involve multiple threat actions in one or more categories (this is why the items in Figure 15 sum to more than 100%). VERIS defines seven primary categories of threat actions, which are shown below along with the percent of breaches and compromised records associated with each.

Figure 15. Threat action categories by percent of breaches and percent of records

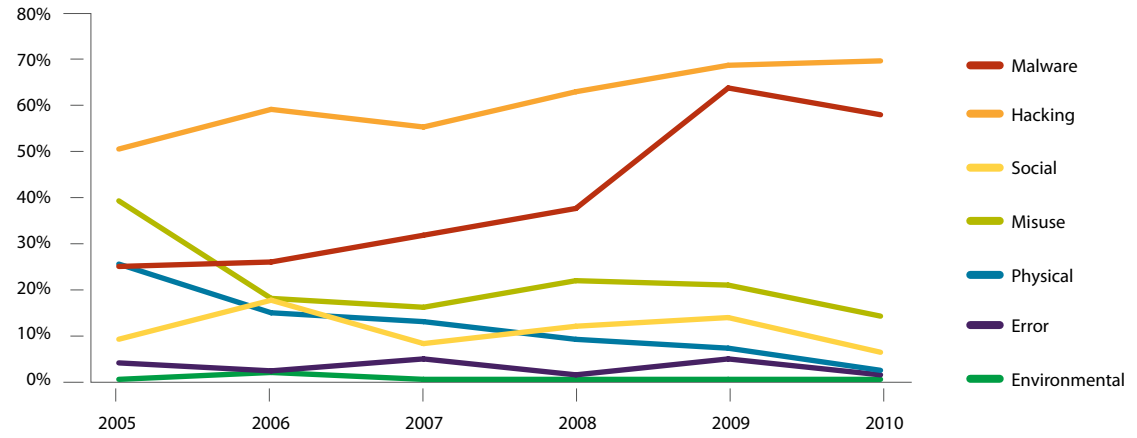


2010 witnessed a fair degree of shuffling among the threat categories. Misuse had a three-fold decrease and dropped from the top spot down to 4th place. Hacking and malware (#2 and #3 in 2009) each bumped up one notch to #1 and #2. Physical doubled as a percentage of all breaches and sits in the #3 position. Social is no longer in the top three, falling from 28% to 11%. The "also rans" of Error and Environmental are still bringing up the rear. Now let's see if we can figure out what all the shuffling is about.

That Hacking and Malware are once again the most common threat actions may come as no surprise to our long-term readers. After all, they've simply regained what has been theirs all along before the usurper, Misuse, dethroned them in last year's report.

That Hacking and Malware are once again the most common threat actions may come as no surprise to our long-term readers. After all, they've simply regained what has been theirs all along before the usurper, Misuse, dethroned them in last year's report. When one considers the circumstances surrounding this dethronement, however, it is actually quite a surprising result. The rise of Misuse in the 2010 DBIR corresponded to the addition of the USSS caseload, which was very heavy in insider misuse. The caseload examined in that report represented a semi-even ratio between Verizon and the USSS (57 cases from Verizon, 84 from the USSS). Since the caseload for the 2011 report is nowhere near an even ratio (94 cases from Verizon, 667 from the USSS), logic would hold that the percentage of Misuse would be astronomically higher than anything else. Viewed in this light, one can see why the fall of Misuse is a very interesting development indeed.

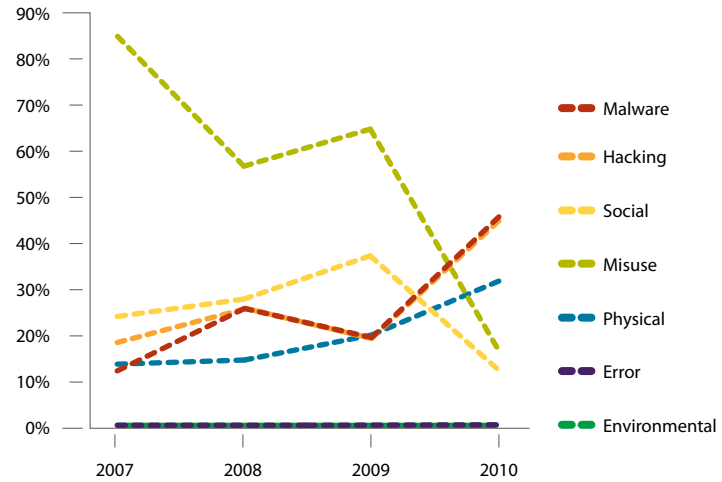
Figure 16. Threat action categories over time by percent of breaches (Verizon cases)



The reasons behind the rise of Hacking and Malware are one and the same as those behind the rise of External threat agents, so we won't go over it again in full here. Suffice it to say that the "industrialization" trend we discussed in which standardized, scalable, and automated attacks—which incorporated actions falling under the Hacking and Malware categories—are iterated across numerous victims drove up the numbers in these categories. The effect of this shift is very apparent in Figure 17 showing trends for the USSS over time.

Though very different in the nature of attack, the doubled percentage of breaches in the Physical category has roots in a similar trend. Rather than remote automated attacks, efficient techniques for locally installing skimming devices on hundreds of credit card input devices (ATMs, gas pumps, POS systems) were used against many organizations. The USSS investigated quite a few cases of this sort, some of which covered many victims in wide geographic regions across the U.S. and Europe. A methodology disclaimer is important to mention here. In 2009, the physical tampering/skimming cases we received from the USSS were not of the large multi-victim variety. Some involved a large number of affected devices, but they all belonged to one victim (or we were unable to determine how many unique victims or incidents were involved). Therefore, we believe that at least some of the rise in physical attacks in this 2010 caseload is due to increased sample size, higher visibility into each case, and improved ability to recognize and split out cases affecting multiple victims into distinct incidents.

Figure 17. Threat action categories over time by percent of breaches (USSS cases)



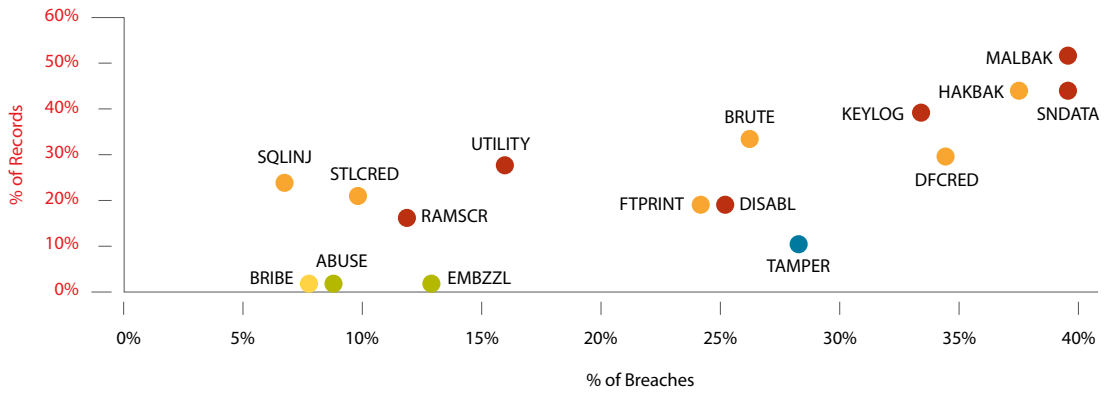
Figures relating to compromised records were comparatively more stable across all threat categories in 2010. Hacking and Malware were still the dominant duo of data loss, though slightly less so than in previous years. The only other category responsible for a significant amount of loss was Physical.

In the spirit of the 2009 Supplemental DBIR, Table 8 lists the top 15 most prevalent threat action types (not categories) in 2010 along with their frequency (percent of breaches) and impact (percent of records). The information recorded in Table 8 is also represented in Figure 18 with the percentage of breaches (frequency) along the x-axis and percentage of compromised records (impact) along the y-axis. We will leave you to mull over these at your convenience and move on to a more in-depth analysis of each threat action category.

Table 8. Top 15 Threat Action Types by number of breaches and number of records

	Category	Threat Action Type	Short Name	Breaches	Records
1	Malware	Send data to external site/entity	SNDATA	297	1,729,719
2	Malware	Backdoor (allows remote access / control)	MALBAK	294	2,065,001
3	Hacking	Exploitation of backdoor or command and control channel	HAKBAK	279	1,751,530
4	Hacking	Exploitation of default or guessable credentials	DFCRED	257	1,169,300
5	Malware	Keylogger/Form-grabber/Spyware (capture data from user activity)	KEYLOG	250	1,538,680
6	Physical	Tampering	TAMPER	216	371,470
7	Hacking	Brute force and dictionary attacks	BRUTE	200	1,316,588
8	Malware	Disable or interfere with security controls	DISABL	189	736,884
9	Hacking	Footprinting and Fingerprinting	FTPRNT	185	720,129
10	Malware	System/network utilities (PsTools, Netcat)	UTILITY	121	1,098,643
11	Misuse	Embezzlement, skimming, and related fraud	EMBZZL	100	37,229
12	Malware	RAM scraper (captures data from volatile memory)	RAMSCR	95	606,354
13	Hacking	Use of stolen login credentials	STLCRED	79	817,159
14	Misuse	Abuse of system access/privileges	ABUSE	65	22,364
15	Social	Solicitation/Bribery	BRIBE	59	23,361
		Honorable Mention at #16			
16	Hacking	SQL Injection	SQLINJ	54	933,157

Figure 18. Top 15 Threat Action Types plotted by percent of breaches (x) and percent of records (y)



Malware (49% of breaches, 79% of records)

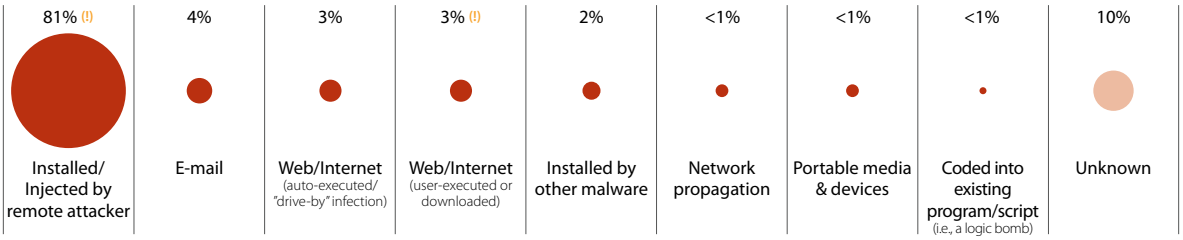
Malware is any software or code developed or used for the purpose of compromising or harming information assets without the owner's informed consent. Malware factored into about half of the 2010 caseload and nearly 80% of all data lost. A majority of breaches involving malware were against organizations in the Hospitality industry, with Financial Services being the second most affected group.

Upon identification of malware during a data breach investigation, the IR team conducts an independent analysis to classify and ascertain the capabilities of the malware with regards to the compromise at hand. Investigators often collaborate with ICSA Labs, an independent division of Verizon, and use the resultant analysis to better assist the victim with containment, removal, and recovery. Malware can be classified in many ways but we utilize a two-dimensional approach that identifies the infection vector and the functionality used to breach data. These two dimensions are directly relevant to identifying appropriate detective and preventive measures for malware.

Infection Vectors

As always (at least in our caseload), the most common malware infection pathway is installation or injection by a remote attacker. This covers scenarios where an attacker breaches a system and then deploys malware or injects code via SQL injection or other web application input functionality. It also accounts for four-fifths of the malware infections in our 2010 caseload, up from around half in last year's study. It's popularity as an infection vector stems from the attacker's desire to "set up shop" after gaining access to the system. Installing malware is simply part of the moving in process.

Figure 19. Malware infection vectors by percent of breaches within Malware



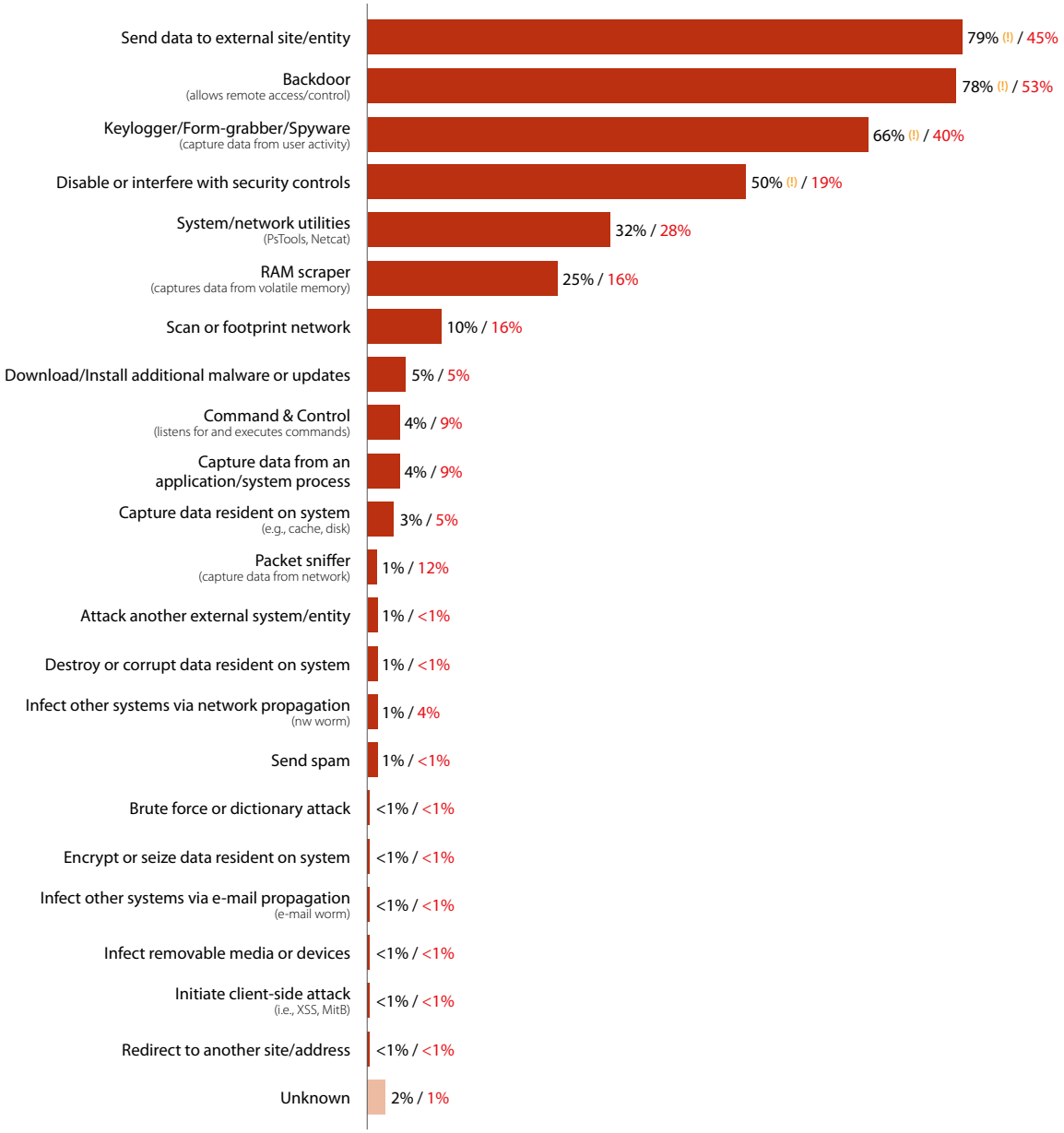
The web, while still the second most common infection vector, decreased from last year. Web-based malware is divided into two subcategories, code that is auto-executed (aka drive-by downloads), and code that requires additional user interaction beyond the page visit; fake AV scaring users to "click here to scan and clean your infected system" is a common example of this tactic. The main reason for the "drop" in web-based malware (which wasn't really a drop at all since the number of incidents involving them is similar to before) is that the highly-automated and scalable attack scenarios described throughout this document do not use this pathway. Improvements in browser security could also be contributing to this shift, but we haven't seen any direct evidence to support this finding.

E-mail based malware doesn't show significant changes from previous studies, while other infection vectors decreased. Occasionally, we still see infection vectors such as network propagation and portable media devices, but there appears to be a consistent shift towards attackers "owning the box" to get specific malware on the system. The somewhat high percentage of "unknown" is attributable to many different factors. Most often it is due to a lack of evidence (no log data, software removal, and premature cleanup) on the system. In these cases, we know malware was present, but the infection vector cannot be conclusively determined.

Malware Functionality

Equally important to the pathway of malware infection is the function it exhibits once it is within the victim's environment. Verizon's IR team mostly focuses on how malware causes and contributes to the data breach. However, we often find all sorts of other unrelated malware during the course of our investigation. This serves as an additional indication of inadequately managed systems. Although malware frequently utilizes several methods to harm a system, it still serves one or more of three basic purposes in data breach scenarios: enable or prolong access, capture data, or further the attack in some other manner.

Figure 20. Malware functionality by percent of breaches within Malware and percent of records



Per Figure 20, sending data to an external entity, backdoor, and keylogger functionalities continue to be the three most common functions found in breach-related malware and all increased this year. It is important to note that none of these are mutually exclusive and it's common for a single piece of malicious code to feature several components. Backdoors, which allow attackers unauthorized access to infected devices, are again atop the list with a two-fold increase. Once they have gained that foothold they can install additional malware, use the device as a launch point for further attacks, retrieve captured data, and so on. Over half of data loss in cases featuring malicious code involved a backdoor component.

Keyloggers and form grabbers were seen in two-thirds of cases, nearly doubling from the previous year. Commercially available keylogging software, such as Perfect Keylogger and Ardamax Keylogger, are freely available on the web with fully functioned pirated versions distributed on P2P networks and torrent sites. These utilities also allow the attacker to build a pre-configured remote installation package that will be deployed on a target system. They exhibit many types of anti-forensic capabilities, such as hiding itself from a list or running processes, and manipulation of timestamps of its components and output files. Attackers can customize the software to create output files with user-defined filenames, which enable the use of legitimate Windows filenames. Other features, such as encryption of output files and automated exfiltration methods via e-mail or FTP also exist. Historically, criminals use these types of keyloggers because of these features and ease of configuration.

Sending data to an external entity, backdoor, and keylogger functionalities continue to be the three most common functions found in breach-related malware and all increased this year.

Keyloggers are also common in Zeus family of malware used to target consumer or merchant credentials to online banking applications. An interesting two-victim dynamic develops where a customer victim (consumer or business) suffers the loss of valid banking credentials, and a bank is victimized when the attacker uses the stolen credentials to conduct a fraudulent transaction. Many times this entails a wire transfer to an account outside of the United States where the funds disappear quickly into the hands of money-mules.

In addition to keyloggers, the use of RAM scrapers in POS-directed attacks has also increased. RAM scrapers are designed to capture payment card data from a system's volatile memory, and the increase of its use is consistent with the decrease in packet sniffers. Increased encryption of network traffic across both public and private networks has driven some of this transition. The payment card data residing in RAM is not encrypted and is most likely "fresh" with a current expiration date. Another potential factor in the reduction of packet sniffers may be that several of the groups tied to large cases involving packet sniffers are in jail (e.g., Albert Gonzalez). That's not at all to say sniffers are a lost art, but there does seem to be a connection.

Backdoors initiate outbound reverse connections from the infected system to circumvent firewalls and other security controls. We've seen several types of backdoors throughout our investigations, some of which facilitate interactive remote access employing SSH tunneling to forward RDP port 3389 to an IP address configured by the attacker, and others that communicate to a "client" application accepting communication from the infected system. Attackers deploy the latter type of backdoor using a "server" executable on a target system, which will communicate with a "client" application on the attacker's system. These backdoors are often configured to communicate on commonly used ports such as 80, 443, or 22 to conceal the suspicious traffic from system administrators. Such backdoors are described in the hacker community as a Remote Administration Tool (RAT) and are readily available on the web and across hacking forums. Generally, AV classifies RATs as remote access Trojans, however commercial non-free versions of these tools exist and are advertised by the developers to circumvent AV. These standalone "server" executables are usually configured and built using a GUI based "client" application with all attacker specified options embedded within the executable. These types of backdoors commonly contain file transfer and keylogging functionality as well as other anti-forensic techniques such as encrypting its traffic, password protection, and secure deletion capabilities. The keylogging components of these backdoors allow criminals to capture authentication credentials and use them for subsequent and/or expanded attacks against corporate networks. One particular organized crime group used the same backdoor/keylogger on over 100 different organizations.

Network utilities, such as PSTools are commonly used to deploy malware on systems and to harvest the output. Though these tools are not inherently malicious, criminals are deploying them and using them in a malicious manner. If such utilities were added to a system by an attacker, we categorized them under malware.

While any amount of data leaving the owner's possession is never a good thing, the act does (or at least can) provide evidence of foul play. It's a matter of looking for the right indicators in the correct places.

When malware captures sensitive information, it must then be exfiltrated from (taken out of) the victim's environment. There are two basic ways this happens: either the malware sends it out of the organization (found in nearly eight out of ten of incidents involving malware) or the attacker re-enters the network to retrieve it (see backdoor). The general rule of thumb is that smaller packets are sent out (i.e., credentials captured by keyloggers) while larger hauls of data are retrieved (i.e., the contents of a network file share transmitted through a backdoor's file transfer capabilities). While any amount of data leaving the owner's possession is never a good thing, the act does (or at least can) provide evidence of foul play. It's a matter of looking for the right indicators in the correct places.

For this reason (and others) we advocate paying attention to what goes out of your network and what changes take place within your systems. Don't have any customers or partners in East Asia, yet network and firewall logs show periodic bursts of traffic sent there from your networks? What about those ZIP or RAR files with hidden and read-only attributes that showed up in your root directory last week and have been growing steadily ever since? Maybe there's a perfectly good explanation for these things… but you will never know for certain unless you take steps to identify and verify them. It highlights the importance of detecting and responding to malware quickly. In some incidents the affected company missed an opportunity to lessen the aftermath of infection by ignoring or not adequately investigating initial anti-virus alerts. Regrettably, those alerts sound less often these days, and AV alone is not always enough.

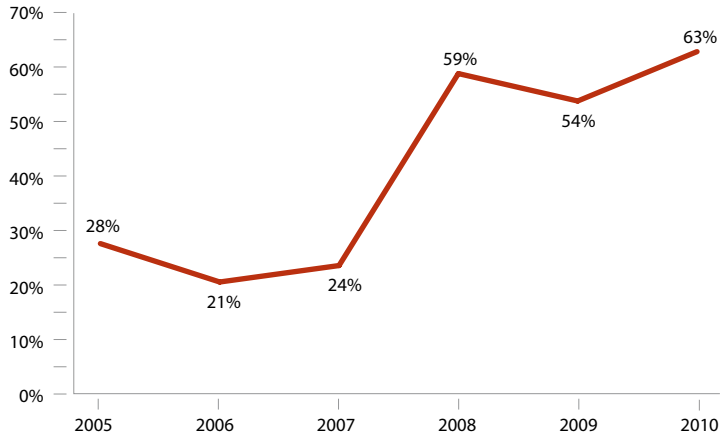
Malware Customization

This year nearly two-thirds of malware investigated in the Verizon caseload was customized—the highest we have ever seen (see Figure 21). Additionally, most of the records stolen by malware were taken in breaches where customized forms were observed. The extent of customization found in a piece of malware can range from a simple repack of existing malware to avoid AV detection to code written from the ground up for a specific attack. In 2010 we have seen the majority of customized code shifting to a level of effort that falls in between these two extremes.

Code modification to existing malware was present in a little less than half of Verizon cases involving malware. This is often something like a "kit" in which you start with certain known base code that provides low-level functionality, but can add to it or modify it to fit a specific purpose. Hackers can then collaborate on more advanced functionality to build a bigger and better monster. Additionally, the modification and customization of such malware not only allows attackers to add or change capabilities, but also hinders the detection of such malware. The infamous Zeus malware falls into this category. Attackers commonly started off with a base version of Zeus, but a large community of individuals modified or recoded its elements to enhance or change its functionality and detectability over time.

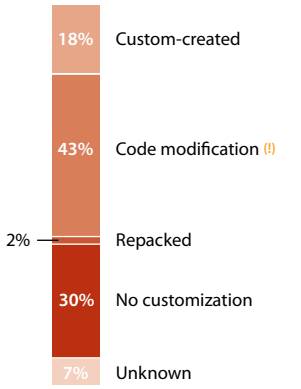
When code modification is present, over two-thirds would fall into this level of customization. Many of the freely available backdoors and keyloggers also allow for low-difficulty customization and modification. For example, attackers no longer have to modify code to alter the exfiltration strategy of a particular piece of malware, they can just type an IP address in a form, check (or uncheck) some boxes, hit "Apply" and then "OK."

Figure 21. Malware customization over time
by percent of breaches within Malware*



* Verzon caseload only

Level of malware customization by
percent of breaches within Malware*



* Verzon caseload only

This year nearly two-thirds of malware investigated in the Verizon caseload was customized—the highest we have ever seen. The extent of customization found in a piece of malware can range from a simple repack of existing malware to avoid AV detection to code written from the ground up for a specific attack.

In a year that includes more breaches than ever, the increased proportion of customized is not a good sign. This is especially true when mixed with other findings of this report. It means that even the majority of highly-automated and non-targeted attacks against small organizations utlize customized malware. This, in turn, means that the cost and difficulty of customization is relatively low. This commoditized customization is made ever more accessible to an ever-increasing pool of criminals by an extensive "malware-as-a-service" market. We find it hard to foresee anything but trouble here for the good guys.

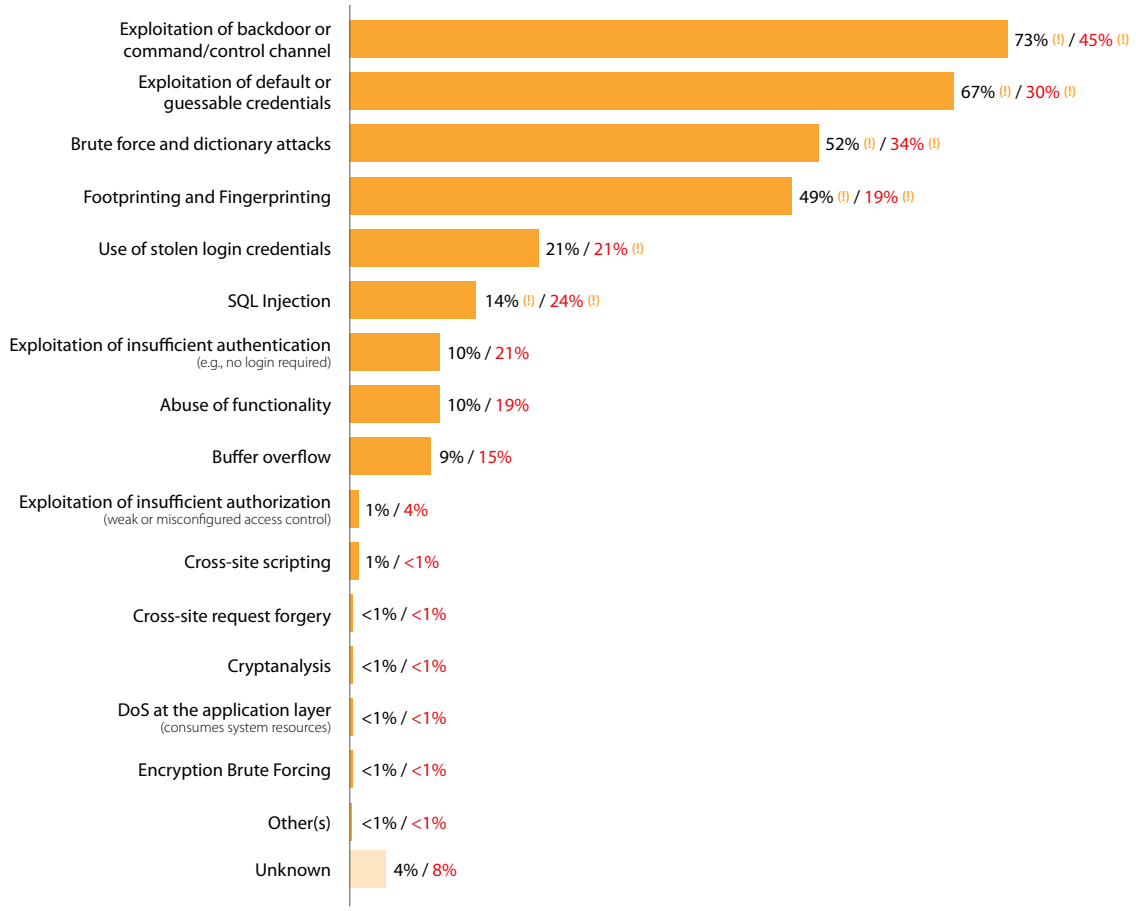
Hacking (50% of breaches, 89% of records)

The term "hacking," although ambiguous (and ubiquitous), essentially categorizes all attempts to intentionally access or harm information assets without (or in excess of) authorization by thwarting logical security mechanisms. Hacking affords the criminal many advantages over alternate modes of attack. Namely, it can be accomplished remotely and anonymously, it doesn't require direct interaction or physical proximity, and there are many tools available to automate and accelerate attacks. The use of automated tools, typically written and developed by someone other than the attacker, lowers the learning curve and allows even less-skilled threat agents to successfully pull off an intrusion. In this section, we examine the types of hacking observed by Verizon and the USSS in 2010, the paths through which these attacks were conducted, and other details about this important category.

Hacking Methods

As shown in Figure 22, there are a handful of hacking methods that dwarf all others with regard to frequency and data loss in 2010. By contrast, 2009 results showed a more gradual tapering off from most to least common (though there were still some definite frontrunners). Furthermore, none of the techniques in 2009 represented more than 40% of all hacking-related breaches. All of the top four exceeded that percentage in 2010, suggesting a great many attacks leveraging the same (or similar) combination of methods.

Figure 22. Types of hacking by percent of breaches within Hacking and percent of records



The method utilized in the highest percentage of breaches and stolen records was exploitation of backdoors or command/control functionality. This isn't the backdoor itself (which is considered malware), but is inextricably linked to it. With a backdoor installed, attackers can bypass security mechanisms to gain access without relying on legitimate channels. This offers the added advantage of greater stealth and evasion of host-level logging. Legitimate remote access applications do not log an intruder's actions if he or she is not using them.

The next few techniques listed in Figure 22 are basically a blueprint for standardized and highly scalable attacks against soft targets. That is to say, the perpetrator(s)—largely organized crime groups—set up automated systems to scan for certain open ports and services (footprinting and fingerprinting), try a few well-known combinations of default credentials used on various types of systems, and then—if still necessary (it's often not)—run a brute-force attack to crack the system. These scans run at all hours of the day and night, trying to gain access, and recording successes. The would-be assailant wakes up, has some coffee (or tea, or maybe even vodka), and begins the workday with a nice compiled list of IPs for vulnerable devices along with the exact usernames and passwords needed to access them. After that, put in a few hours cramming malware onto selected systems, revisit last week's victims to collect some captured data, and then head home early to the wife and kids. This continues until they get caught, grow bored with it, die, or get hired by a security company (yes, the latter is a jibe, but, unfortunately, it's often true).

The would-be assailant wakes up, has some coffee (or tea, or maybe even vodka), and begins the workday with a nice compiled list of IPs for vulnerable devices along with the exact usernames and passwords needed to access them. After that, put in a few hours cramming malware onto selected systems, revisit last week's victims to collect some captured data, and then head home early to the wife and kids.

After the triad above was the use of stolen login credentials. This common technique is particularly vexing to victims because it shrouds the attacker in a disguise of legitimacy. Rather than sounding alarms because an unrecognized or unauthorized user is accessing sensitive assets (yes, we realize the data suggests that no alarm would be sounded anyway, but we're trying to be optimistic), it looks like Bob doing his job. Nothing out of the ordinary with that, right? Authenticated activity is much less likely to trigger IDS alerts or be noticed by other detection mechanisms. It also makes it easier for the attacker to cover his tracks as he makes off with the victim's data.

That the use of stolen login credentials fell in 2010 from its top position is rather misleading. The distinction of what is a single incident vs. multiple incidents can be difficult to make with this technique. For instance, if a bank notices that 100 accounts showed signs of unauthorized access, they would likely consider these to be 100 different "incidents." However, if an investigation was conducted and all of those were traced to a single perpetrator, it might be viewed as one large incident affecting multiple accounts. It comes down to perspective and knowledge of the details behind the attack. We mention this simply because such scenarios were quite common in both Verizon's and the USSS' caseloads. We treated them as single incidents, which has an effect on the stats associated with stolen credentials. One can rightly say that the actual frequency of criminals using of stolen credentials (each instance of gaining access to a compromised account) was much higher than a glance at Figure 22 (which is based on per incident stats) indicates.

As with last year, we found that credentials are stolen more often by malware than, say, phishing or snooping them off sticky pads (though those things do happen). Bank credential stealing malware such as Zeus or Spyeye will grant an intruder possession of legitimate access credentials that often drive the remainder of the data breach. This occurs when an end-user downloads a piece of malware, either via drive-by-download or through user interaction with some e-mail or other message tailored to the user. The credentials are then distributed through botnets, compiled, and organized for each institution. The attacker will then use these credentials to either make fraudulent financial transactions from business accounts, personal accounts (consumer fraud), or steal some type of sensitive PII data for identity theft.

During one of Verizon's cases in mid 2010, Romanian hackers were able to use this exact method to relieve a U.S. bank of about several million dollars. The intruders started by stealing legitimate credentials to the bank's ACH wire transfer portal belonging to three separate internal employees, who all received an e-mail from the "FDIC" on a Friday afternoon. The employees noted that the attached PDF file wouldn't open correctly. The following Monday, several million dollars were wired out of the bank using the three employees' access credentials.

After we wished it a happy 10th birthday last year, SQL injection has returned for another party, but with less fanfare this time. From 25% of hacking-related breaches and 89% of all data stolen, those numbers declined in 2010 to 14% and 24% respectively. Of course, there's that whole caseload-scaling thing to consider, so it's not as though SQL injection is disappearing. It simply hasn't been as widely incorporated into the kind of canned attacks described above for other techniques. Something interesting to note about SQL injection is that it factored into a disproportionately higher percentage of breaches in Asia.

It's difficult to tell if this trend (of few vulnerability exploits) exists because hackers prefer other vectors or if they've been forced in that direction because organizations are patching well. Most likely, it's a little of both.

Vulnerabilities and Patch Management

In previous DBIRs, we've shown the relatively few numbers of attacks leading to data compromise that exploit patchable[9] software or system vulnerabilities. Nearly all exploit configuration weaknesses or inherent functionality of the system or application. This trend continued in 2010 as only five vulnerabilities were exploited across the 381 breaches attributed to hacking. These are as follows: CVE-2009-3547, CVE-2007-5156, CVE-2009-2629, CVE-2010-0738, and CVE-2007-1036. Though surprising, this makes sense if one considers the prevalence of techniques discussed earlier in this section, few of which are vulnerabilities in code that can be "patched."

It's difficult to tell if this trend (of few vulnerability exploits) exists because hackers prefer other vectors or if they've been forced in that direction because organizations are patching well. Most likely, it's a little of both. Patching is definitely a security practice that is well-known and receives a lot of attention (it's often the core statistic of a security metrics program). For the most part, organizations do seem to be keeping patch levels current, at least on Internet-facing systems. As you can see from those CVE dates, most attacks exploit older vulnerabilities, ones that should have been eliminated by any reasonable patch deployment cycle. Therefore, we continue to maintain that patching strategies should focus on coverage and consistency rather than raw speed. The resources saved from doing that could then be put toward something more useful like code review and configuration management.

9 The word "patchable" here is chosen carefully since we find that "vulnerability" does not have the same meaning for everyone within the security community. While programming errors and misconfigurations are vulnerabilities in the broader sense, lousy code can't always be fixed through patching and the careless administration patch has yet to be released. Furthermore, many custom-developed or proprietary applications simply do not have routine patch creation or deployment schedules.

Attack Pathways

Having lost ground to web applications over the last few years, remote access and desktop services are once again at the number one spot in the list of attack pathways in Figure 23. A whopping 71% of all attacks in the Hacking category were conducted through this vector. Because there are so many types of remote access services in use by organizations, we give a more detailed account of them in Table 9.

Figure 23. Attack pathways by percent of breaches within Hacking and percent of records

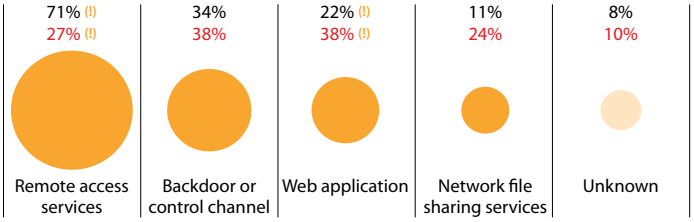


Table 9. Types of remote access by percent of breaches within Hacking and percent of records

Local remote screen sharing (e.g., RDP, PCAnywhere)	64%	24%
Online session screen sharing (e.g., Go2Assist, LogMeIn, NetViewer)	5%	13%
Remote Shell (e.g., ssh, telnet, rsh)	2%	1%
Web-based terminal services (e.g., Citrix, MS Terminal Services)	2%	12%
VPN	1%	<1%

Remote access and desktop services, in combination with the exploitation of default and/or stolen credentials, is a huge problem in the retail and hospitality industries. Opportunistic attacks are carried out across many victims who often share the same support and/or software vendor. As soon as an intruder discovers a particular vendor's authentication method and schema (be it for TCP port 3389 for RDP; or TCP port 5631 and UDP port 5632 for pcAnywhere), he will be able to exploit it across a multitude of that vendor's partners and customers. Oftentimes, in lieu of conducting a full port scan for these remote service applications, attackers will customize their scripts to exclusively look for these ports and search a broad swath of the Internet. This speeds up their capability of searching for and finding services unprotected by router/firewall ACLs and allows them to quickly check for default credentials as well. This of course relies on remote access authentication schema being uniform across all of that particular vendor's customers—but hey, who are we kidding? They always are.

The installation and exploitation of backdoors has already been covered in this report. They do, however, warrant another mention here as we discuss common paths of attack. Along the typical chain of events, the backdoor is often placed on a victim system after gaining access via default or stolen credentials. The agent then has control of or can access the system at will without leaving traces in logs (if they exist in the victim environment). It accomplishes the goals of concealment and persistence that cybercriminals crave. As in years past, backdoors are frequently utilized to exfiltrate data from compromised systems.

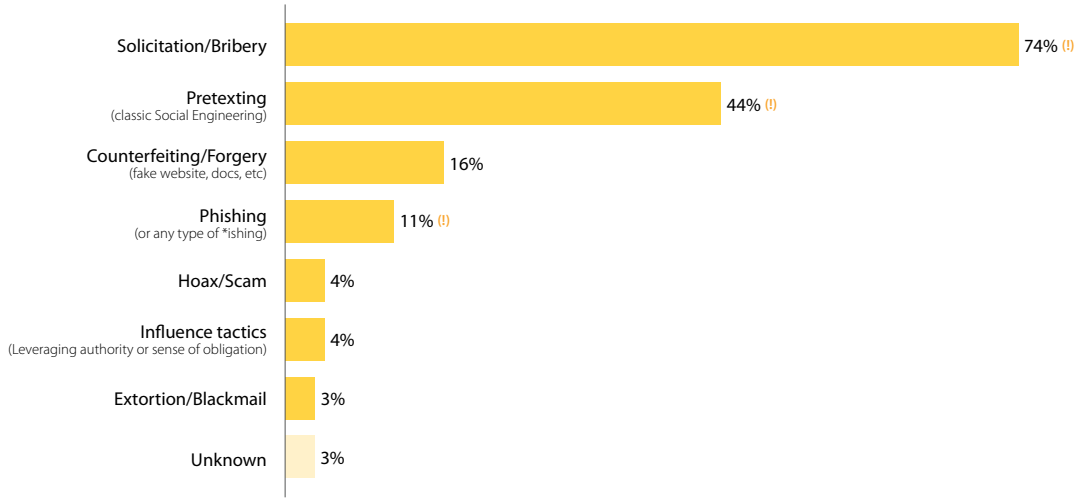
Just because web applications dropped as an overall percentage of attacks, don't believe for an instant that they are any less critical a vector than they were a year ago. If you remove hospitality and retail victims from this dataset, web applications are right back on top and are more numerous than ever. Please don't let the bad guys catch your development and application assessment teams napping.

Just because web applications dropped as an overall percentage of attacks, don't believe for an instant that they are any less critical a vector than they were a year ago. If you remove hospitality and retail victims from this dataset, web applications are right back on top and are more numerous than ever.

Social (11% of breaches, <1% of records)

Social tactics employ deception, manipulation, intimidation, etc. to exploit the human element, or users, of information assets. Typically, these actions are used in concert with various other threat categories and can be conducted through both technical and non-technical means. Social attacks are down from 28% in 2009 to 11% in 2010. The amount of data stolen as a result of social attacks, while previously low, is down from last year as well (3% to less than 1%).

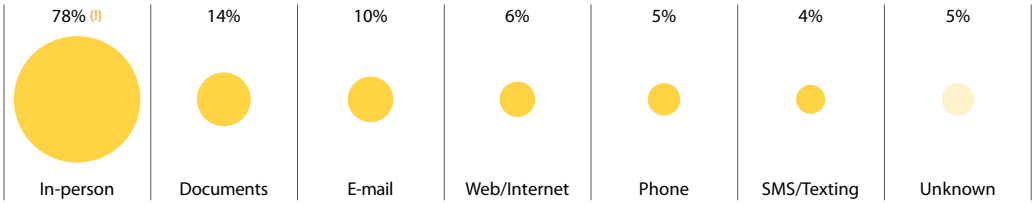
Figure 24. Types of social tactics by percent of breaches within Social



Per Figure 24, solicitation and bribery remains the most common type of social tactic in 2010, but by a much wider margin than before. This frequently entails collusion between an external agent and an insider, though other combinations occur as well. Whoever is involved, one party uses petitions, promises, and payments to get another to participate in the crime, usually because it would have been difficult or impossible without their aid. Widespread solicitation scenarios target waitstaff and cashiers to skim payment cards and bank employees to perform all manner of illicit activities. Less common examples involve recruiting system administrators and other privileged parties to steal data, open holes, disable security systems, etc.

Pretexting numbers are also quite high, and have more than doubled from the previous year. There are a myriad of ways in which imaginative and resourceful criminals can utilize pretexting in an attack scenario. We observed convincingly-attired repairmen walk brazenly into victim locations to steal, tamper with, and replace devices. We saw organized foreign criminals use elaborate yarns to weasel their way into positions of influence in numerous organizations (or gain the trust of those that did). We studied records of human resources staff hoodwinked into providing (and changing) personal and employment information to would-be fraudsters. We witnessed Jedi masters convince Stormtroopers that these were not the droids they were looking for… oh wait…no; that was Star Wars. Nevermind. But the others were definitely examples from 2010 cases.

Figure 25. Paths of social tactics by percent of breaches within Social



While counterfeiting and forgery can involve everything from websites to documents (and more), the use of fake credentials (drivers' licenses, birth certificates, etc.) was 2010's most prevalent example. Many of these had to do with identify theft and account takeover schemes targeting financial institutions.

In last year's report, e-mail was the path du jour in most cases. Over the last year, however, criminals increasingly relied on the personal touch with a whopping 78% of cases involving in-person contact.

Phishing is not new by any means, but it does seem to be finding some renewed attention in the criminal community. Rather than the typical e-mail lure to change your bank password, external sources along with our own caseload hint that phishing is being used more often to gain a toehold in the victim's environment through attached malware. This tactic, of course, is not new either; it simply seems to be hitting a (who know's how temporary) growth spurt.

The vectors through which social tactics were conducted changed significantly in 2010 (see Figure 25). In last year's report, e-mail was the path du jour in most cases. Over the last year, however, criminals increasingly relied on the personal touch with a whopping 78% of cases involving in-person contact. This was the clear vector of choice for solicitation and pretexting—and understandably so. Even in our high-tech business world, many deals won't get done without an in-person "meet and greet." A good number of large multi-victim cases worked by the USSS involving in-person solicitation and pretexting helped to drive this up substantially. That some of them employed counterfeiting of identification credentials also drove documents up as vector as well.

Not much has changed this year with regard to the targets of social tactics listed in Table 10. Regular employees continue to be singled out for mischief of this sort (see paragraphs above for examples). This reinforces the need for greater and more comprehensive training and awareness campaigns with regard to social attacks. These should include information and tips on how to recognize and avoid falling for common ploys.

Table 10. Targets of social tactics by percent of breaches within Social

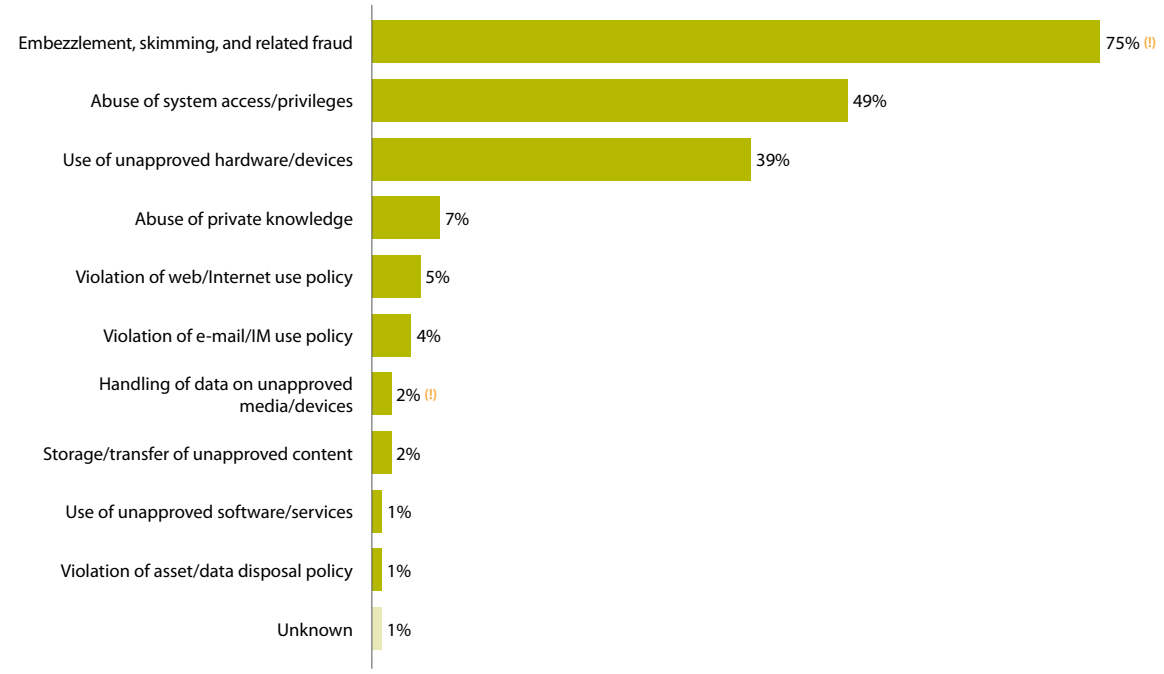
Regular employee/end-user	80% (!)
Finance/accounting staff	33% (!)
Human resources staff	30% (!)
Customer (B2C)	8%
Executive/upper management	5%
Helpdesk staff	3%
System/network administrator	1%
Unknown	1%

Misuse (17% of breaches, 1% of records)

We define Misuse as using entrusted organizational resources or privileges for any purpose or in a manner contrary to that which was intended. These actions can be malicious or non-malicious in nature. The category is exclusive to parties that enjoy a degree of trust from the organization such as insiders and partners. In 2009, Misuse was the most common of all threat actions, but dropped substantially in 2010. In no way does this mean Misuse is rare; 17% corresponds to almost 130 breaches that involved some form of Misuse.

The three most common types of Misuse observed in 2010 are a repeat of those identified in 2009, with embezzlement, skimming, and related fraud once again on top. Several large internal fraud cases worked by the USSS helped make this type of misuse even more predominant over the past year. In one, certain members of a Nigerian fraud ring were indicted for their involvement in a long-running and extensive identity theft operation within some of America's largest banks. The fraudsters gained key positions within these institutions which allowed them to steal personally identifiable information, access and/or create bank accounts, apply for fraudulent loans, sell information on the black market, and other nefarious activities.

Figure 26. Types of misuse by percent of breaches within Misuse



The three most common types of Misuse observed in 2010 are a repeat of those identified in 2009, with embezzlement, skimming, and related fraud once again on top. Several large internal fraud cases worked by the USSS helped make this type of misuse even more predominant over the past year.

Other, less complex, instances of embezzlement, skimming, and related fraud were seen as well. These were commonly perpetrated by bank tellers, restaurant waitstaff, retail clerks, or others in similar positions in which the "simple" handling of financial transactions is inherent to the job. Oftentimes these employees used handheld skimmers and other devices to facilitate the theft, which is why "use of unapproved hardware/devices" is rather high in Figure 26. While such activity may seem out of sorts with some of the more technical attacks described in this report, it is nevertheless a real (and common) method of stealing data—especially payment cards. As discussed in the section describing Social tactics, these scenarios very often involve an external party that solicits and/or bribes the insider to commit the crime and provides them with the requisite devices to pull it off.

Abuse of system access/privileges, at the #2 spot in Figure 26, is similar in nature to embezzlement, but specifically involves the misuse of logical access to information systems. As suspected, many breaches involve both non-technical forms of embezzlement along with abuse of system access (and any other type of Misuse listed in Figure 26, for that matter). The actions leading to the court martial of U.S. Army Private Manning provide a now infamous real-world example of this type of Misuse. He abused his (overly) privileged access to SIPRNET to browse and copy classified State Department cables without authorization to an external hard-drive (unapproved device). While this event stole the spotlight in 2010, it is by no means the only or most spectacular example of system abuse from 2010. The combined Verizon-USSS dataset contains scores of them, but the worst aspect of such cases is that countless others will likely never be discovered.

The 2010 caseload once again reminds us that "major" acts of misuse like data theft are often precipitated by "minor" acts of misconduct. This doesn't mean that everyone who veers slightly from the straight and narrow will inevitably careen headlong into a life crime, but it does mean that questionable behavior should be seen for what it is—a potential warning sign—and treated appropriately.

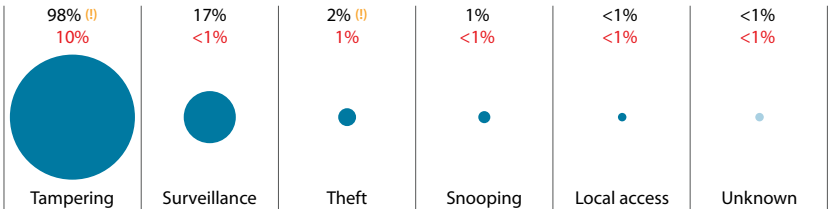
As evidenced by the examples above, privileged users typically need a means of moving or exfiltrating data once they have misappropriated it. Figure 26 is essentially a laundry list of how this can be accomplished. Some use corporate or personal e-mail to send it to external parties or accounts. Some smuggle it out on various types of personal devices or media. Others use approved devices, but for unapproved purposes or in an unsanctioned manner. We continue to find that the success of a breach does not hinge on the perpetrator being able to use a certain portable device (i.e., plugging up USB slots doesn't eliminate the problem). Unfortunately, users have a plethora of choices when it comes to media and devices fit for secreting data and removing it from their employer. For this reason, it is generally easier to control data at the source than it is to block a virtually limitless array of potential destinations. Certain technologies, however, like DLP and behavioral monitoring may add some additional levels of protection between those end points.

The 2010 caseload once again reminds us that "major" acts of misuse like data theft are often precipitated by "minor" acts of misconduct. This doesn't mean that everyone who veers slightly from the straight and narrow will inevitably careen headlong into a life of crime, but it does mean that questionable behavior should be seen for what it is—a potential warning sign—and treated appropriately. Another lesson reinforced during this round of analysis is the importance of quickly deprovisioning user access and privileges when they are no longer needed. Year after year we investigate breaches involving former employees or business partners. A simple yet good rule of thumb is that if you no longer want them on your payroll, then don't leave them in your systems.

Physical (29% of breaches, 10% of records)

This category encompasses human-driven threats that employ physical actions and/or require physical proximity. In previous years physical attacks were consistently one of the least prevalent threat actions in terms of both percentage of breaches and percentage of records lost. This was partially due to the nature of common physical actions; for instance, it is unlikely that a stolen mobile device will precipitate a full-blown forensics investigation and would therefore not be in our caseload. Another factor is that many of the action types we classify as Physical are less likely to be associated with confirmed data loss. Moreover, if physical access to a device is available as part of normal job duties for insiders, then that local access is not classified as a physical action but rather falls under the category of misuse.

Figure 27: Types of physical actions by percent of breaches within Physical and percent of records



The analysis of the 2010 case dataset has resulted in three noteworthy shifts in physical actions from data represented in previous reports. The first of these is that Physical actions are twice as prevalent in our current caseload, with one or more action types found in 29% of the combined caseload of Verizon and USSS. Incidents involving ATM and gas pump credit card skimmers represent the majority of physical actions. These cases would not typically be pursued by Verizon investigators, but certainly fall under the jurisdiction of USSS. ATM and gas pump skimming is conducted largely by organized criminal groups and one "spree" can target 50 to 100 different business locations. These attacks have been occurring for years, but are on rise in many areas according to both public reports and the caseload of the USSS.

The second change from last year is that we have witnessed a discernible increase in the proportion of record loss associated with physical actions from prior years. Again, this is attributable to the increase in physical skimmer cases. Record loss for these cases is an aggregate of the credit card numbers and/or PINs compromised and is therefore much different than cases of theft that may involve a single document or device. Ten percent of all compromised records were linked to cases involving a physical action in 2010. By way of comparison, physical actions were only associated with 1% of data loss in 2009's combined caseload.

The third change in Physical is represented in Figure 27 by the increase in tampering (98%), and surveillance (17%), and the decrease of theft (2%) as physical action types from previous years. Yet again, this was directly influenced by the amount of ATM and gas pump skimming cases in our data set. According to USSS data, ATM skimming is increasing and is becoming more organized.

Skimmers can vary greatly in sophistication both in inconspicuousness and feature sets. A standard ATM skimmer is a reader device designed to fit on top of a legitimate card slot. Both readers are able to read the data on the magnetic strip, and the credit card number is stored on the skimmer device to be retrieved at a later date. Hidden cameras are often used in conjunction with the capture device to collect PINs upon user entry. These cameras are affixed above the keypad and are concealed by the use of incredibly clever camouflage. In many instances, they fit almost perfectly over the existing ATM shell, and are disguised by means of using the same material and color as the original. In other cases, this is achieved by disguising the camera as a sign on the ATM that features the bank logo, or the logos of the cards accepted by the ATM. Fake PIN pad covers are another method of PIN capture, and have the advantage of not relying on a line of sight to the key pad. However, these are potentially riskier for the criminals as they are larger, more expensive, and because they are touched by customers, potentially more vulnerable to discovery. These fraudulent devices are attached by junior members of organizations in a matter of seconds using strong adhesives.

As stated above, ATM skimmers are found with varied levels in sophistication. This type of crime is carried out by gangs which possess a considerable amount of organization. The techniques used to reduce the chances of discovering the fact that they have tampered with the machines begins with molds and overlays that mimic the existing card reader in shape, and perhaps more importantly, color and material. Even the most basic skimmers are not generic, but designed for specific ATM models in the same manner that mobile phone cases are manufactured for specific models. Better fit equates to less deviation from a non-altered device, and, therefore, less potential for scrutiny.

The technology behind the skimmer is also becoming increasingly sophisticated. The more basic devices feature a built-in storage component for the magnetic stripe and PIN data. The payment card data resides on the skimmers until retrieved by a second visit from the criminal to detach the skimmer device. Advances in data exfiltration techniques have included the use of Bluetooth technology within the skimmer to allow for wireless retrieval within a finite proximity. This, of course, reduces the risk of apprehension when attempting to retrieve the device, which may occur if the skimmer is discovered. Additionally, it allows the possibility of collecting data at various intervals, so if a device is removed by a bank employee or law enforcement not all of the captured data is lost. The latest evolution in data retrieval is the use of technology, again embedded in the skimmer, that utilizes GSM standards and will text captured data in real-time to the criminal's cell phone. The correlation between data capture and criminal possession is streamlined from a one-time retrieval, to scheduled collections at the criminal's convenience, to an instantaneous event. The required proximity of the criminal collecting captured data increases exponentially from required local physical access, to close proximity, to virtually anywhere.

ATM and gas pump skimming is conducted largely by organized criminal groups and one "spree" can target 50 to 100 different business locations. These attacks have been occurring for years, but are on rise in many areas according to both public reports and the caseload of the USSS.

The cases involving payment card capture at "Pay at the Pump" terminals have featured different attributes than ATM skimming. Access to the inside of the gas pump and the card reader hardware is achieved by using a master key to unlock the front of the device. Devices are placed inline between the card reader and the remaining hardware. The data is not captured by a magnetic strip read, but from the communication of payment card data from the reader to the embedded POS terminal. There is no trace of tampering from the outside of the gas pump and Bluetooth transmission is typically utilized for retrieval of data. Gas pump skimming was more common in our caseload than cases involving ATM assets; however the number of records lost is considerably lower.

Our caseload shows that ATMs and gas pumps are the most common assets targeted in skimming attacks, but they are not the only ones. The USSS has investigated cases in which card readers, designed as physical access control mechanisms to enclosed ATM locations (typically attached to banks and utilized for after-hours customers), have been tampered with for the same intent as the ATM card readers. Point-of-Sale (POS) terminals have been targeted in sophisticated tampering cases in which the devices are replaced with "new" devices redesigned to capture and store payment card data as it is passed from the swipe reader to the terminal for legitimate processing. The capture and exfiltration methods are similar to the gas pump skimmers, completely hidden inside the PED device and remote data collection. Criminals have even incorporated social engineering methods, such as dressing in uniforms and identifying themselves as technicians employed by the POS manufacturer. Upon arrival at the location, they inform staff that they are replacing devices for scheduled maintenance and switch the legitimate devices for devices they control. The majority of physical actions took place at the victim location in an outdoor area where, as one would expect, all gas pumps and most ATMs are located.

Error (<1% of breaches, <1% of records)

In VERIS, we define error as anything done (or left undone) incorrectly or inadvertently. This includes omissions, misconfigurations, programming errors, trips and spills, malfunctions, etc. It is not hard to imagine that something befitting this broad definition could be identified in nearly every incident scenario. When examining and classifying an incident, we are primarily concerned with identifying critical errors that were either the primary cause of the incident or a significant contributing factor.

Making the determination of whether an error is "significant enough" to be included in the event chain isn't always easy. Because of this, last year we focused solely on presenting error when it was the primary cause of the breach, which is usually easily discernible. An example of error as a primary cause would be if a company accidentally left confidential information on an asset that was then donated to a charitable organization. If it were never known whether or not the information was accessed, this would be a "possession" loss. If that organization accessed the information or gave it to another one that did (let's assume they did so innocently), it would be a "confidentiality" loss. In either case, the error was the primary cause of exposure.

Table 11. Types of causal and contributory errors by number of breaches

	Causal	Contributory
Disposal error	1	0
Publishing error	1	0
Omission	0	192
Programming error	0	16
Misconfiguration	0	10
General user error	0	1

Error as a primary cause has historically been rare among our data compromise cases, and 2010 is no exception (but this would undoubtedly be different if this report focused on availability losses). Error was identified as the primary cause of only two incidents out of the total population of 761 breaches investigated. These are shown in Table 11 and included one disposal error involving a device that was repurposed, supposedly wiped, and then given to another company. However, the receiving company (very nicely) reported that it still contained sensitive information. The publishing error occurred when non-public information was accidentally posted to a public website.

This year, we include errors identified as a contributing factor to give a broader view of their role in data breaches. An error is a contributing factor if it creates a condition that—if/when acted upon by another agent—allows the primary chain of events to progress. Such errors occurred quite often in breaches in 2010 and are listed in the second column of Table 11. In reviewing contributing errors, it is difficult not to notice the overwhelming representation of omission in the data set. Omission refers to something not done that, according to policy and/or standard operating procedures, should have been done. Within the Verizon and USSS caseload, a frequent example of this (especially in the retail and hospitality industry) is the failure to change default credentials. This was most commonly linked to inadequate processes on the part of the victim to validate that things get done properly and consistently. A dash of misconfigurations (an active mistake rather than a passive one like omissions) and programming errors (often linked to flaws in custom web apps) populate Table 11 as well.

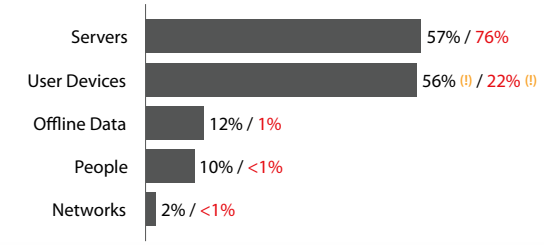
Environmental (0% of breaches, 0% of records)

This category not only includes natural events like earthquakes and floods but also hazards associated with the immediate environment (or infrastructure) in which assets are located. The latter encompasses power failures, electrical interference, pipe leaks, and atmospheric conditions. Nothing in this category contributed to data breaches in either the Verizon or USSS caseloads in 2010. Although environmental hazards most often affect the attribute of availability, they can occasionally factor into scenarios resulting in the loss of confidentiality as well. We have, for instance, investigated incidents in the past in which a power outage led to a device rebooting without any of the previously-configured security settings in place. An intruder took advantage of this window of opportunity, infiltrated the network, and compromised sensitive data. Such events are not common but are worth some consideration.

Assets and Attributes

In prior versions of this report, we focused primarily on assets from which data was stolen during a breach scenario. There is nothing wrong with this approach, but it does exclude certain assets that serve various initial and intermediate purposes prior to the point of compromise. We have elected to include all assets identified in the event chain for this 2011 DBIR. Also, past DBIRs have not broken out the security attributes of those assets that are negatively impacted other than the obvious, confidentiality, which is in scope for them all (it's a report on data breaches). This year, we've added a brief tally of results pertaining to all six attributes.

Figure 28. Categories of affected assets by percent of breaches and percent of records



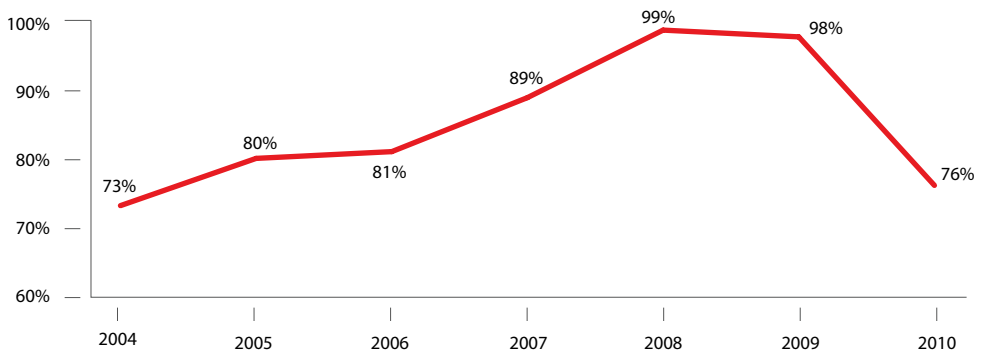
Asset types

In the combined Verizon/USSS data set for 2010, servers edged out user devices to maintain the top spot as the class of assets most often involved in a data breach. They are still associated with the majority of data loss, though it's now more of a true majority in Figure 28 than a super landslide majority like in previous years. Within the servers category, POS, database, and web servers were observed most often. If we focus solely on Verizon's caseload, a feeling of nostalgia sets in and we once again see ratios more in line with previous DBIRs. Drilling down further in the Verizon data, we see that servers accounted for 80% of breaches and 95% of compromised records, with POS and web servers leading both metrics.

The margin between servers and end-user devices has been shrinking over the last few years (at least with respect to percentage of breaches). Though workstations, laptops, and mobile devices fall within this category, they are not responsible for these gains. That credit goes to devices like POS terminals (not back-of-store servers), "pay at the pump" terminals, and ATMs (detailed breakdown in Table 12). This is an interesting trend, one driven by both functionality—the ability to accept financial transactions—and convenience—openness to public use. That combination makes them both attractive and accessible to a wide array of criminals, who tend to "follow the easy money." An interesting outcome of this trend is the relative size of breaches. In the 2010 caseload, for the first time, we saw no breaches involving a million or more records.

The offline data category was off its record mark of 25% set in 2009, showing a rather steep 13% drop. Last year, we associated the large increase in offline data with the larger proportion of insider theft in the USSS dataset (insiders take data from documents, media, or whatever else is within reach). Therefore, it is not a stretch to do the reverse and attribute the drop in this category to the lower proportion of internal agents observed in 2010.

Figure 29. Percent of records compromised from online assets



The risk of mobile computing is a topic that Verizon's RISK team continues to receive questions about. Both smartphones and tablets have experienced phenomenal growth and equally phenomenal mind share in the past few years, and our clients frequently ask us for recommendations around policies, processes, and controls for this class of assets. While we acknowledge the growth of mobile computing and the increasing attractiveness of the platform to potential threats, we also must acknowledge that again this year we have no representation of smartphones or tablets as the source of a data breach.

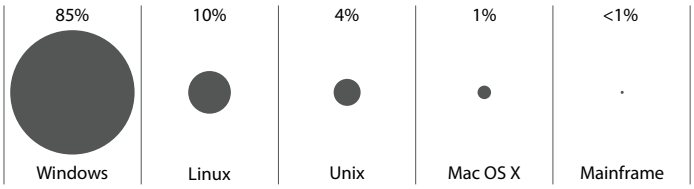
While we acknowledge the growth of mobile computing and the increasing attractiveness of the platform to potential threats, we also must acknowledge that again this year we have no representation of smartphones or tablets as the source of a data breach.

Table 12. Types of compromised assets by percent of breaches and percent of records*

Type	Category	% of Breaches	% of Records
POS server (store controller)	Servers	36% (!)	28% (!)
POS terminal	User Devices	21% (!)	13% (!)
Pay at the pump terminal	User Devices	18% (!)	<1%
Database server	Servers	14%	15% (!)
Web app/server	Servers	9%	24%
Regular employee/end-user	People	8%	0%
Automated teller machine (ATM)	User Devices	8%	9%
Desktop/workstation	User Devices	8%	0%
Payment card (credit, debit, etc)	Offline Data	7%	1%
File server	Servers	4%	<1%
Documents	Offline Data	4%	<1%
Finance/accounting staff	People	4%	0%
Human resources staff	People	3%	0%
Directory server (LDAP, AD)	Servers	1%	0%
Physical security system (e.g., badge reader)	Networks	1%	0%
Mail server	Servers	1%	0%
Payment switch/gateway	Servers	1%	10%
Remote access server	Servers	1%	0%
Customer (B2C)	People	1%	<1%
Executive/upper management	People	1%	0%
Unknown	Unknown	1%	1%

*Only assets involved in greater than 1% of breaches or greater than 1% of records shown

Figure 30. Distribution of operating systems by percent of affected assets*



* Verizon caseload only

Operating Systems

One of the most frequent requests we've heard over the past few years is for data on the operating systems of compromised assets. We've included that information in Figure 30 this year, trusting our readers will refrain from using it in "OS holy wars."

We broke out OS categories into Linux, UNIX, Mac OS X (yes, we know this is UNIX, but it's worth treating as a special case), Windows, and Mainframe. It might be tempting to focus on the fact that 85% of breached assets run Microsoft Windows, but it is important to note that the attacks used against these systems have little to do with OS vulnerabilities; it's not exactly rocket science to breach a system using default or easily guessable credentials. Also, the Verizon/USSS data generally mimics the market share representation we see from various industry analysts and publications, leading us to believe that as far as OS preference is concerned, threat agents are generally agnostic.

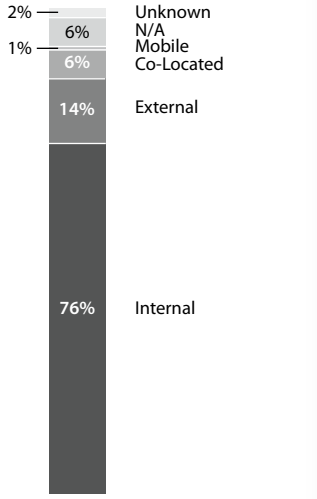
One of the most frequent requests we've heard over the past few years is for data on the operating systems of compromised assets. We've included that information this year, trusting our readers will refrain from using it in "OS holy wars."

Hosting and Management

Given the industry's hyper-focus on cloud computing, we do our best to track relevant details during breach investigations and subsequent analysis. As stated earlier in this report, we have yet to see a breach involving a successful attack against the hypervisor. On the other hand, we constantly see breaches involving hosted systems, outsourced management, rogue vendors, and even VMs (though the attack vectors have nothing to do with it being a VM or not). In other words, it's more about giving up control of our assets and data (and not controlling the associated risk) than any technology specific to The Cloud.

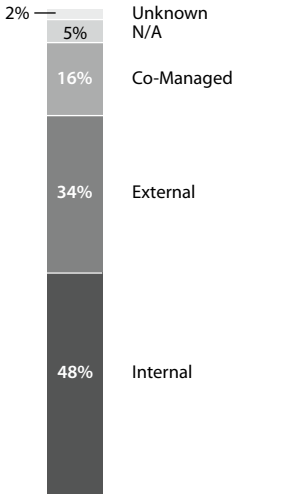
With that in mind, Figures 31 and 32 depict the location and management of the assets discussed in this section. Most assets encountered during Verizon's investigations were hosted internally, but half were fully or partly managed by a third party. Overall, both hosting and management were a little more likely to be handled by external parties in 2010 compared to prior years. The question of whether these variables contributes to the susceptibility of assets to compromise is difficult to answer from these results, but worth pondering nevertheless. The combination of outsourcing plus indifference and/or negligence with respect to vendor management—which is seen more often than you might think—is almost certainly a contributor.

Figure 31. Location/Hosting of assets by percent of breaches*



* Verizon caseload only

Figure 32. Management of assets by percent of breaches*



* Verizon caseload only

In other words, it's more about giving up control of our assets and data (and not controlling the associated risk) than any technology specific to The Cloud.

Security Attributes

Security attributes are exactly what they sound like they are: attributes that describe or pertain to the security of an information asset. A security incident negatively affects one or more of these attributes. VERIS uses six primary security attributes: Confidentiality, Possession or Control, Integrity, Authenticity, Availability, and Utility (also known as the Parkerian Hexad). Table 13 shows how often each of these attributes was affected during breaches investigated in 2010.

Table 13. Security attributes affected by percent of breaches

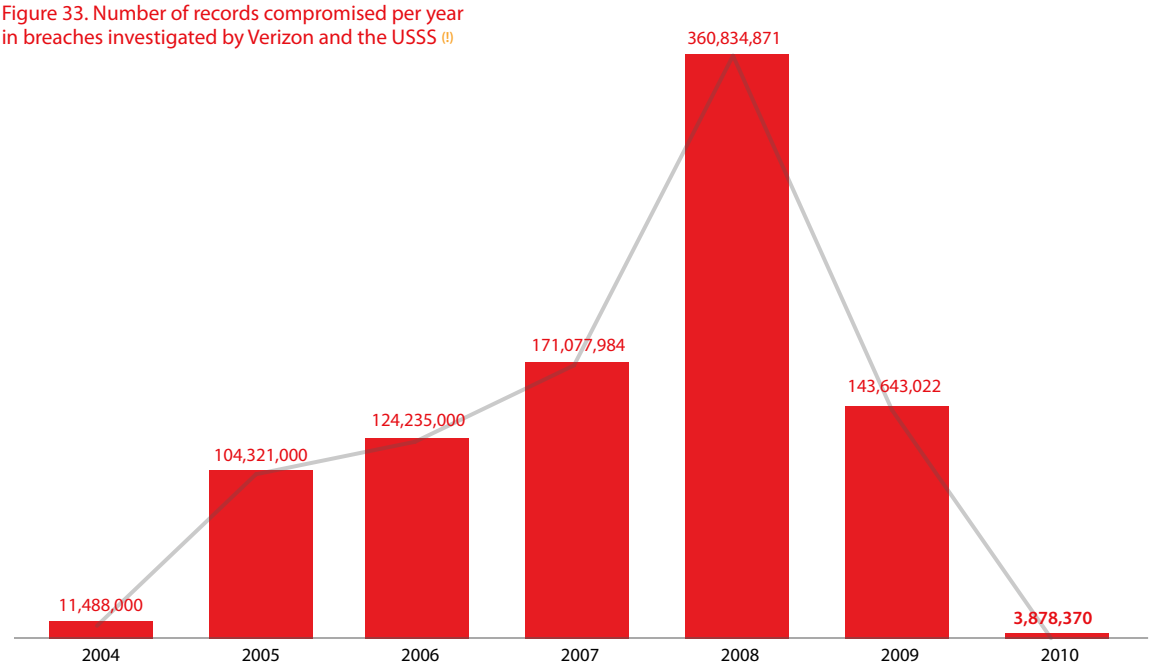
Attributes affected	Definition	Breaches
Confidentiality	Limited access, observation, and disclosure	100%
Possession	Exclusive (or intended) possession and control (and ability to prove it)	0%
Integrity	Complete and unchanged from original state	90%
Authenticity	Validity, conformance, and genuineness	5%
Availability	Present and ready for use when needed	1%
Utility	Usefulness or fitness for a purpose	0%

News flash: 100% of all data breaches compromise the confidentiality of information assets. Q.E.D. Moving on. The fact that integrity is involved in 90% of breaches may come as a surprise to some, but consider how many events occur during a breach that can introduce unauthorized changes to a system. The installation of malware alone explains over half of that number (all malware changes the original state of the system), and we haven't even scratched the surface of what intruders typically do once they own a system. Values drop way off after integrity. Examples of events affecting the authenticity of assets are swapping a legit device for a phony one and initiating fraudulent transactions. The latter could drive this attribute much higher, but our focus in the investigation is on how data was compromised rather than, for instance, what criminals did with it afterwards (which often involves fraud of various kinds). Availability isn't the main goal for attackers interested in breaching data, but it is occasionally a casualty of war. For example, malware can bog down a system even if doing so wasn't its primary function. We did investigate an incident affecting the utility of information in 2010, but it was not a breach and thus not represented here (a terminated admin encrypted some data and tried to extort his former employer). Possession losses aren't represented because if we could not confirm actual compromise of data, the case would not be included in this report.

Compromised Data

3.8 million records confirmed stolen in 2010. Compared to totals for the past few years, that's basically a rounding error. That is in no way intended to make light of the situation; as those affected by breaches discussed in this report know all too well, it's still 3.8 million too many. The fact of the matter remains, however, that 3.8 million is a lot less than 360.8 million or 143.6 million, and one is left wondering what in the world is going on.

Figure 33. Number of records compromised per year in breaches investigated by Verizon and the USSS (1)



3.8 million records confirmed stolen in 2010. Compared to totals for the past few years, that's basically a rounding error, and one is left wondering what in the world is going on.

We've touched on various potential explanations for this trend throughout this report, but we'd like to explore these again and offer some others in this section. Before engaging in speculation, though, let's make sure we have our facts straight concerning compromised data in the combined Verizon-USSS 2010 caseload. Table 14 is a good place to start.

Perhaps more so than anything else we could provide, Table 14 demonstrates the unique character of 2010 in terms of data loss. Not only is there a huge disparity in the annual totals, but the mean, median, and percentiles are profoundly different. The mean is down from 2 million records per breach to below 7,000. Before you attribute this to the "flaw of averages," note that the median is also a fraction of its former value. From 2004 through 2009, 13% of all breaches featured losses of over 1 million records. By contrast, there was not a single incident in 2010 that broke that threshold; over 93% of them were smaller than 10,000 records.

Table 14. Descriptive statistics on records compromised, 2004-2010 (!)

	2004-2009	2010	All-Time ('04-'10)
Total records	915,599,877	3,878,370	919,478,247
Mean	1,963,230	6,687	878,850
Median	20,000	221	775
Standard deviation	13,141,644	32,854	8,868,990
Percentiles			
10th	12	8	10
25th	360	10	40
50th	20,000	221	775
75th	200,000	2,401	19,221
90th	1,200,001	4,826	250,000
99th	60,720,000	157,695	10,000,001

With the descriptive statistics out of the way, let's switch modes and talk about what they mean (sorry, lame statistician's joke). And while we're at it, let's also talk about what they probably don't mean. We'll do that first, in fact.

Why the drop in records?

The most obvious hypothesis we can easily disprove is that the drop in data loss corresponds to a drop in breaches. The opposite is true. The 2010 dataset has more breaches than ever before, but fewer compromised records.

Another explanation that doesn't seem to hold water is that we (Verizon or the USSS) simply didn't work the big cases like we have in the past. As mentioned in the *Year in Review* section, other public sources of breach statistics also show dramatic declines in the number of compromised and exposed records in 2010. The year also lacked (as far as we know, at least) the headline-grabbing mega breaches that tend to drive up data loss so quickly. These external data points suggest that something other than sheer caseload bias is at work.

It is worth mentioning that 3.8 million is actually a low-end estimate; we were unable to quantify data losses in almost a quarter of all cases and other times could confirm only a portion of the total amount[10]. Still, increasing 3.8 million by 25% doesn't change matters in the least. It is possible that one of those unknown quantities was actually a mega breach, but we think not. None exhibited the typical signs that accompany large data compromises we have worked in the past.

Our leading hypothesis is that the successful identification, prosecution, and incarceration of the perpetrators of many of the largest breaches in recent history is having a positive effect.

Cynics might argue that cybercriminals were just as active and successful in 2010, yet the breaches were never discovered. This isn't a stretch if you are familiar with the poor discovery-related findings we typically share in this report. However, this would stipulate that criminals are either not using the stolen data or have found a means of bypassing Common Point of Purchase (CPP) and other fraud detection mechanisms. CPP, however, remains the most frequent discovery method.

An optimist may interpret these results as a sign that the security industry is WINNING! Sorry, Charlie; while we'd really like that to be the case, one year just isn't enough time for such a wholesale improvement in security practices necessary cut data loss so drastically. Plus, keep in mind that the number of incidents increased substantially (both in our caseload and those publicly reported).

10 There are many reasons why ascertaining the full and exact amount of data stolen can be difficult. Some victims lack sufficient logs. Some destroy this information in trying to respond to or contain the breach. Many attackers disguise, encrypt, erase, or otherwise make it difficult to access data in order to "count records."

Now let's turn to some explanations that do seem plausible. Our leading hypothesis is that the successful identification, prosecution, and incarceration of the perpetrators of many of the largest breaches in recent history is having a positive effect. If you consider that a rather small number individuals were tied to a disproportionately large number of breaches and/or breached records, then you begin to get the sense that taking a few of them out could make a huge difference.

A corollary of the above is that the "second tier" of the criminal community has effectively been deterred from engaging in high-profile activity. Pulling off a huge heist might achieve fame and fortune, but it also attracts a lot of unwanted attention. Those that wish to stay out of jail may have changed their goals and tactics to stay under the radar. This could be one of the chief reasons behind the rash of "mini breaches" involving smaller organizations.

It is also possible that the talent pool is shallower than expected. Knocking off the kingpins could have precipitated a brain drain of sorts in certain skillsets. We have circumstantial evidence of this, but nothing concrete. For instance, a drop in certain techniques used by certain criminals correlates with their arrest. But correlation, of course, is not causation. It is also interesting that we consistently have a significant portion of our caseload that ties back to the same individuals or groups. If the attacker population were enormous, we wouldn't expect to see that in our sample year after year.

The focus may continue to shift in the future from payment card numbers to other data types, such as bank account data, personal information, and even intellectual property (more on this below). These are not as flashy in the sheer number of records lost, but can still be lucrative to the criminal.

In addition to arrests, law enforcement has been busy infiltrating black markets and other dark corners of the Internet where criminals congregate, cogitate, and negotiate. Their presence is known and stresses the tentative trust among thieves that exists in such communities. This could disrupt the underground economy and account for some of what we're seeing.

In the 2009 DBIR, we speculated that the flooding of the black market with millions and millions of stolen data records could drive the price so low that releasing more would be disadvantageous. Criminals might opt to let the markets clear before stealing more in bulk or selling what they already had. We could be in such a holding pattern now.

Furthermore, we have seen the scenario of large breaches and subsequent selling of card data on black markets replaced with smaller captures and the direct use of the information for profit (recoding cards and making fraudulent ATM withdrawals). In other words, the people behind the breaches are no longer becoming wholesalers after they capture the credit card information.

The focus may continue to shift in the future from payment card numbers to other data types, such as bank account data, personal information, and even intellectual property (more on this below). These are not as flashy in the sheer number of records lost, but can still be lucrative to the criminal. A single business's bank account information, for instance, can result in a sizable loss of money to the victim in the form of fraudulent transfer or withdrawal of funds.

Types of data compromised

When reviewing Table 15 for details regarding types of data compromised during breaches in the past year, results show that payment card data maintains its predominance across the combined caseload. The 24% increase from 2009 is directly attributable the large multi-victim cases worked by the USSS, which all had payment cards as the primary target (POS, gas pumps, ATMs, etc.). Separating out Verizon's 94 cases yields results that look more in line with the previous year's ratios. Payment cards are desirable to certain types of financially-motivated criminals because there are numerous established options for converting them to cash.

Authentication credentials were nabbed in 45% of incidents in 2010, boosting it to the second most compromised data type. Stolen credentials are most often a means to an end but are increasingly an end in and of themselves. They can be used to further an attack by gaining privileged and persistent access into the victim's environment. There is also a growing market for offloading stolen credentials directly by selling or renting access to organizations (especially high profile ones). That authentication credentials represent such a low proportion of records shouldn't be surprising; a lot of damage can be done with just one valid account in the wrong hands.

Table 15. Compromised data types by number and percent of breaches and percent of records

	Number of incidents	Percent of incidents	Percent of records
Payment card numbers/data	593	78%	96%
Authentication credentials (usernames, pwds, etc)	339	45%	3%
Personal Information (Name, SS#, Addr, etc)	111	15%	1%
Sensitive organizational data (reports, plans, etc)	81	11%	0%
Bank account numbers/data	64	8%	<1%
Intellectual property	41	5%	<1%
System information (config, svcs, sw, etc)	41	5%	unknown
Classified information	20	3%	unknown
Medical records	4	1%	unknown
Unknown	7	1%	0%

Other data types associated with fraud-for-profit activities are personal information and bank account data. Only one or two breaches involved a substantial amount of records for either of these. For various reasons, quantifying an exact number was difficult in many instances, contributing to the lower percentage of data loss shown in Table 15. Not captured in the chart are the hundreds of millions of dollars lost through fraudulent access to compromised bank accounts, identity theft, and other downstream crimes committed with this data.

Sensitive organizational data, intellectual property, and classified information still comprise a small proportion of compromised data when compared more cashable forms of data. However, that the ratios remained similar to previous years even in the face of huge gains in the number of smaller payment card breaches implies significant growth among these data types as well. At a glance, this appears to concur with recent speculation that payment cards are passé and that IP is the new goal of cybercriminals. This may well be true, but it's a little too early to dub it a trend based on case evidence alone. Then again, it is noteworthy that the number of breaches involving such data has never been higher in our caseload. It also should be noted that the real rate of theft for IP and classified information is likely higher than any sources (including ours) show. Since fraud detection (e.g., CPP) is the most effective means of discovering a breach and since IP isn't used for financial fraud, then it stands to reason that thieves could pilfer IP freely without being discovered. This is not a comforting thought, but we'll leave you with it anyway.

Authentication credentials were nabbed in 45% of incidents in 2010, boosting it to the second most compromised data type. Stolen credentials are most often a means to an end but are increasingly an end in and of themselves.

Attack Difficulty

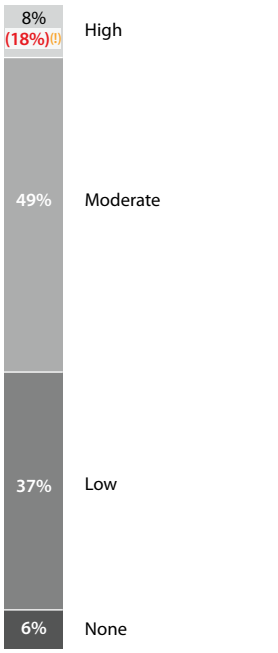
As we have pointed out in previous reports, skilled threat agents—especially well organized groups of them—can breach any single organization they choose given enough time, resources and inclination. They cannot, however, breach all organizations. Therefore, unless the perceived benefit is inordinately high, it is not optimal for him to expend his limited resources on a difficult target while an easier one is available.

Rating the relative difficulty of the attacks we observe during investigations admittedly involves some degree of subjectivity, but it is still a useful indicator of the level of effort and expense required to breach corporate assets. It also provides better understanding of the criminals that are responsible for these crimes and what defensive measures organizations should take to protect themselves.

Our investigators[11] assess the various details around the attack and then classify it according to the following difficulty levels:

- **None:** No special skills or resources required. The average user could have done it.
- **Low:** Basic methods, no customization, and/or low resources required. Automated tools and script kiddies.
- **Moderate:** Skilled techniques, some customization, and/or significant resources required.
- **High:** Advanced skills, significant customization, and/or extensive resources required.

Figure 34. Attack difficulty by percent of breaches and percent of records*



* Verizon caseload only

Over the past few years, the percentage of highly difficult attacks has hovered somewhere in the mid-teens. Per Figure 34, analysis of our 2010 caseload puts that statistic at 8%, which is the lowest figure among prior DBIRs. This is an interesting finding and poses some interpretive difficulties. The fact that this pertains to Verizon's caseload only (94 confirmed breaches), rules out the USSS' huge increase in sample size (which included many smaller and softer targets) as a possible explanation. This seems to be a genuine shift (albeit not a dramatic one) away from highly difficult attacks in the past year.

An important observation is that this shift is more from "High" to "Moderate" than from "High or Moderate" to "Low or None". The sum of the top two difficulty levels in 2010 (57%) is basically the same as 2009 (59%) and higher than 2008 (48%) and years prior (45%). Therefore, we cannot conclude that organizations are increasingly falling prey to simple attacks.

Another point to consider is that investigators noticed a higher proportion of automation with respect to attack methods in 2010. Those that once required some human finesse and guidance became a little more "fire and forget" and thus more accessible to lesser-skilled assailants. Such attacks still have the same degree of effectiveness, but are not as difficult to pull off (which is not a trend we want to see continue).

In our last two reports, the overwhelming majority of records compromised were associated with highly difficult attacks (~90%). In 2010, however, this statistic dropped to a comparably scant 18%. At the risk of sounding like a broken record (get it?), the much fewer records stolen overall and absence of "mega breaches" is the most likely factor. Most of the largest breaches have historically utilized more sophisticated attacks.

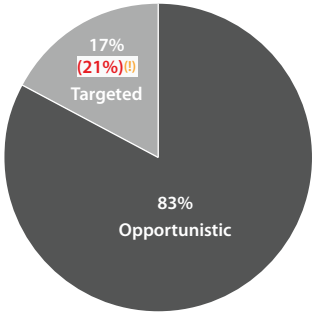
11 Attack difficulty is not a part of the VERIS framework, and therefore, is not a data point collected by organizations partnering with us for this report. As a result, statistics in this section pertain only to Verizon's 2010 caseload.

As has been true in the past, the more difficult parts of the attack sequence typically pertain to malware rather than the method of intrusion (Hacking). Thus, our recommendation for prevention is still to focus on the front end. 90% of attacks are not highly sophisticated, and the method of intrusion is relatively straightforward in most cases. Implement, double, and triple-check the basics so that attackers are not granted a foothold from which to exploit your systems.

Attack Targeting

Standard convention in the security industry classifies attacks into two broad categories: opportunistic and targeted. In past DBIRs, we further separated opportunistic attacks into two subgroups, random and directed. We found it was getting increasingly difficult to reliably distinguish the two subgroups hence we merged them back into a single category (i.e., the contrast between levels of opportunity is less important than the contrast between targeted and opportunistic). The updated definitions are provided below:

Figure 35. Attack targeting by percent of breaches and percent of records*



* Verizon caseload only

Opportunistic Attacks: The victim was identified because they exhibited a weakness or vulnerability that the attacker(s) could exploit. The exact manner by which this flaw was identified is immaterial; the point is that the victim became a target primarily because of an opportunity.

Targeted Attacks: The victim was first chosen as the target and then the attacker(s) determined a way to exploit them. This doesn't necessarily mean that a weakness or vulnerability wasn't exploited to accomplish this; it simply means that opportunity is not the primary reason for the attack.

Based on data collected by Verizon's IR team in 2010, the ratio of targeted to opportunistic attacks shown in Figure 35 remained similar to previous years. The percentage of targeted attacks hovered in the high 20% range for 2008 and 2009 whereas it inched down a few notches to 17% in 2010 (not a significant statistical change). The financial industry continued to experience a higher rate of targeted attacks. The hospitality sectors (followed closely by the retail industry) were the highest victims of opportunistic attacks. This was largely due to widespread knowledge in the criminal community about default credentials used for various types of POS systems. Interestingly, more than half of all opportunistic attacks involved malware infections or hacking, some of which included installation of RAM scrapers, keyloggers and/or backdoors on POS terminals and servers.

One finding that did constitute a significant change in 2010 was a sharp drop in the percentage of total records compromised from targeted attacks. They accounted for 21% of records compromised compared to 89% and 90% for 2009 and 2008, respectively. As with attack difficulty, this is mainly due to an absence of any mega-breaches in 2010, almost all of which have been targeted in nature. Instead, we saw more targeted attacks at specific types of data that aren't typically stolen in bulk, like various types of sensitive organizational data and intellectual property. While this aspect may be in line with much of this year's media buzz around Aurora, APT, Stuxnet, and other highly targeted attacks, the general rule of thumb remains the same: Some organizations will be a target regardless of what they do, but most become a target *because* of what they do (or don't do).

*The general rule of thumb remains the same: Some organizations will be a target regardless of what they do, but most become a target **because** of what they do (or don't do).*

Thus, our previous recommendation remains unchanged in that one of the fundamental self-assessments every organization should undertake is to determine whether they are a Target of Opportunity or a Target of Choice. Those in the former category should consistently seek to identify and remove opportunities to avoid needlessly attracting foes. Those in the latter category should expect sophisticated attacks directed from skilled and determined adversaries. They should also expect the cost of control to be much higher. However, remember that even Targets of Choice can fall to opportunistic attacks. Seasoned criminals are not usually dumb and rarely work harder than necessary. Defend against dragons if you must, but don't watch the skies so much that common rogues slip inside the castle walls from below.

Unknown Unknowns

Evidence from prior DBIRs has established a correlation between data breaches and the victim's level of knowledge of their environment and data flow. When an investigation uncovers such gaps in knowledge, we refer to them as "unknown unknowns". Common scenarios include:

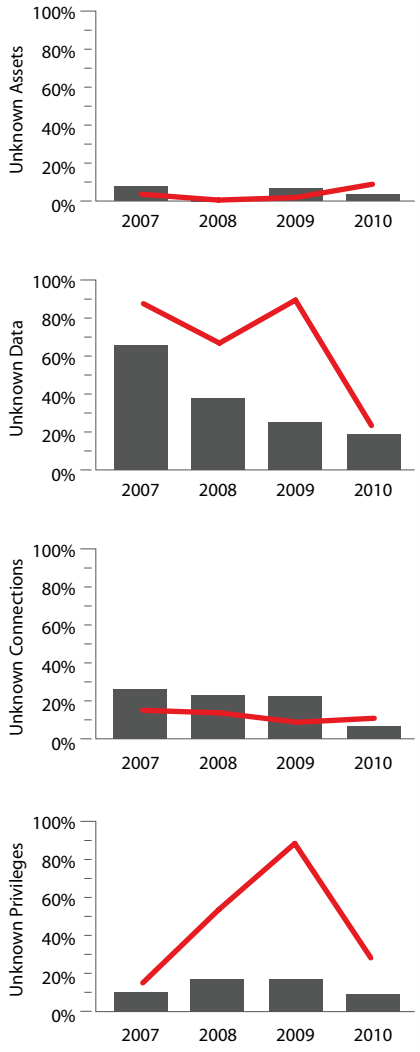
- **Assets** unknown or unclaimed by the organization (or business group affected)
- **Data** the organization did not know existed on a particular asset
- Assets that had unknown network **connections** or accessibility
- Assets that had unknown user accounts or **privileges**

2010 marks the first year in which both the percentage of breaches *and* data loss associated with unknowns declined. Even with this substantial drop, however, over a quarter of cases still involve one or more of the conditions listed above. In addition to an overall downward trend, each of the four types of unknowns individually showed a decline as well in Figure 36. Reductions of unknown privileges and network connections were the most notable changes.

We cited several reasons for these falling numbers in the 2010 DBIR, and those reasons are still relevant this year. While we cannot empirically prove it to be the case, we certainly hope that organizations are becoming more aware of their computing environment and where data resides within it. Another year of compliance regulations under companies' belts may be helping to improve matters somewhat. There is no doubt that we encounter fewer POS systems, for instance, that store unencrypted data locally in violation of PCI DSS. Mandated network scanning—and, more importantly, the increased scrutiny that follows in order to clear flagged anomalies—can uncover all kinds of unexpected devices, configurations, services, ports, etc. before they contribute to your next breach.

While such actions taken by organizations may provide a partial explanation for what we're seeing, our gut tells us that a shift in criminal tactics is the key factor in this decline. Growing utilization of malware to capture data in-transit, in memory, from user activity, and from system processes reduces the reliance on unknowns in order to successfully compromise data. Why search for data accidentally stored in the clear on some chance system when you can capture exactly the data you want from the system of your choosing?

Figure 36. Unknown Unknowns by percent of breaches and percent of records* (1)



* Verizon caseload only

Instead of hunting for a user account with sufficient privileges, why not just use a keylogger or form-grabber to steal credentials for one that you know will suit your needs? Such methods become evermore commonplace and we believe this results in unknown unknowns being less prevalent across our caseload.

Not only were unknowns less prevalent, but the amount of data compromised during breaches in which they were a factor also realized a sizable decline. In 2009, unknowns were found in just under half of all cases, but those cases comprised over 90% of all data stolen. A recurring theme of the 2010 caseload is the lack of "the big one"—a single breach resulting in multi-millions of records lost. In the past, most of these mega-breaches involved one or more unknowns at some point in the event chain. That fact, combined with a lower amount of unknowns observed in 2010, resulted in only 26% of data loss attributed to a case with one or more unknown conditions. The sharpest drop occurred in "unknown privileges" and "unknown data," both of which fell from around 90% of records lost to 26% and 21% respectively in 2010.

*2010 marks the first year in which both the percentage of breaches **and** data loss associated with unknowns declined. While such actions taken by organizations may provide a partial explanation for what we're seeing, our gut tells us that a shift in criminal tactics is the key factor in this decline.*

While we are glad to see the drop in the prevalence and impact of unknown unknowns, we doubt that the underlying problem that allows them to exist has truly been addressed. Organizations should continue to strive to improve asset management, user account management, dataflow analysis, and other practices that improve visibility across information assets. These efforts are essential to a risk management strategy and will almost certainly pay dividends in the long run.

Timespan of Attack

The timeline of an attack must be one of the least understood aspects of a data breach—and yet a good understanding of the breach timeline can be of great importance for properly aligning defense and response mechanisms. We will again describe the timeline of breach scenarios using three major phases. One could distinguish many more if desired, but we think this distinction provides a clear overview and maps well to how incident response processes are typically organized. Figure 37 shows the phases and associated percentages.

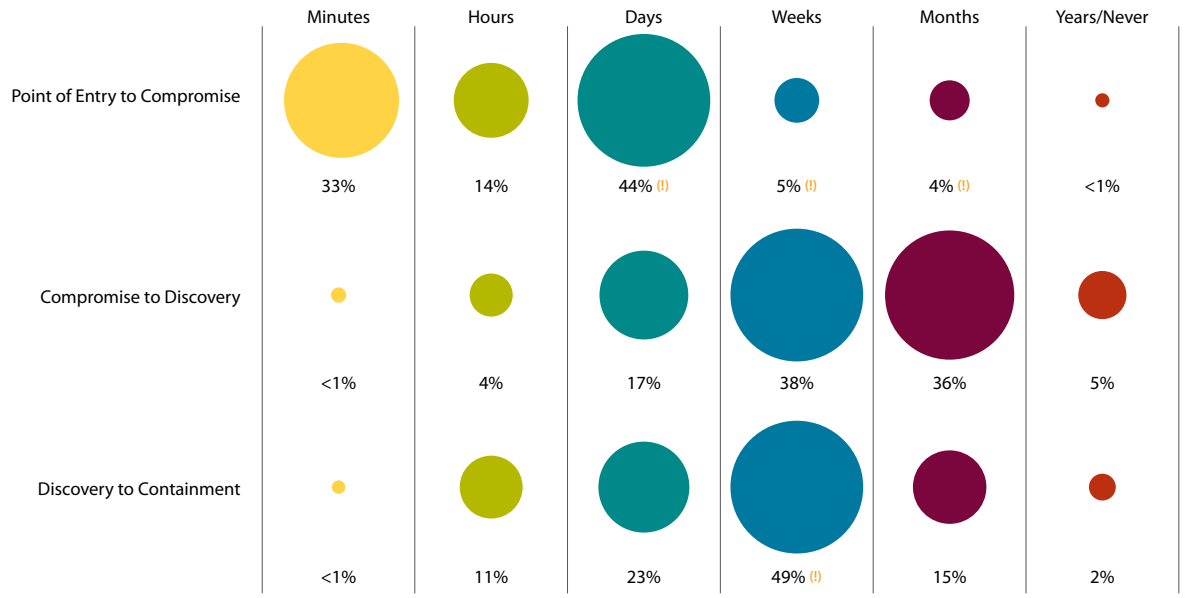
Point of entry to compromise

The first phase depicts the time between the first entry into the victim's environment to the moment when the data is located and compromised. To use a more physical-world analogy, this is the time between the moment when the attacker first has his foot in the door and the moment when he's walking out the door with your belongings. In a substantial number of cases, the desired data is not stored on the system that is the first point of entry. In fact, multiple steps are often required to conduct reconnaissance on the network, locate the correct systems, and setup mechanisms to exfiltrate the data from the network.

Roughly one-third of breaches in 2010 reveal a timespan of mere minutes between entry and compromise (about the same as 2009). To build upon the analogy above, these are cases in which the loot is lying just beyond the front door—i.e., on the same system that was the initial target of the entry.

Similar to previous years, we continue to observe that in over half of cases, an attacker needs a minimum of "days" to successfully complete this stage of the attack. Within that range, however, timeframes shifted noticeably away from "weeks/months/years" end of the spectrum and into the "days" category. This shift was mainly a byproduct of the higher proportion of automated attacks within 2010 caseload.

Figure 37. Timespan of events by percent of breaches



There is an interesting difference here between the Verizon and the USSS caseload. The USSS cases show almost twice the proportion of the "days or less" grouping. This is explained when one considers the fact that in the USSS caseload, we see both a greater share of ATM skimming cases and a larger number of POS attacks against small merchants. The former cases do not require weeks of preparation, in fact, the attacker wants to install the skimmer as discretely and quickly as possible. Also, the latter involves attacks that can be automated in order to share the same successful approach (or password) across a multitude of victims.

Similar to previous years, we continue to observe that in over half of cases, an attacker needs a minimum of "days" to successfully find and compromise data.

As stated last year, a couple of days might not sound like a tremendously long time frame, but we'd like to counter this argument. When someone attacks your network for several days, it allows for a greater opportunity for detection before brains beat boxes and significant data loss occurs. We can and should take better advantage of that reprieve than we are now.

Compromise to discovery

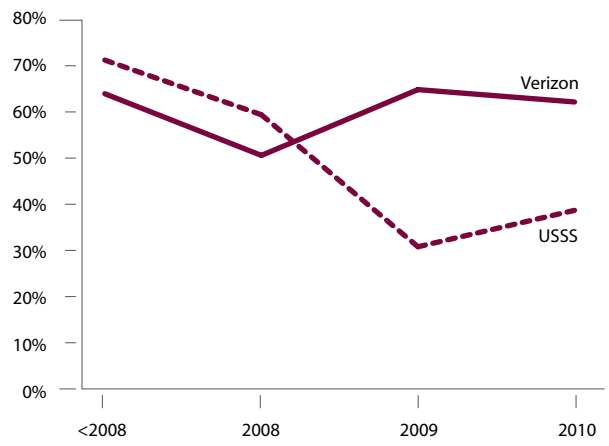
In past years, our reports have shown that victims generally allow a breach to exist for weeks, months, and even years before realizing they've been had. 2010 in this regard looks similar, though there was some minor movement among the timeframes. "Weeks" appears to be the gainer, taking share away slightly from the leftmost categories. We'd much rather see a mass migration from the right, which would indicate an improvement in discovery capabilities.

When contrasting the Verizon and USSS datasets in Figure 38, one striking difference is that the "months or more" range is notably higher for the Verizon cases than for those of the USSS. This is a rather curious result since the USSS investigates a higher percentage of smaller organizations, which presumably would have slower discovery times. Normally, this would be true, but the USSS often promptly notifies victims after discovering information (through various operations) about a successful breach.

Another factor at work is the large number of Pay-at-the-Pump and ATM skimming cases worked by the USSS. Whether by CPP, complaining customers, or observant users, such thefts tend to be discovered relatively quickly.

If there is any cause for hope in these statistics, it's that for the fourth straight year we've seen a decrease in the percentage of breaches extending months or longer before discovery (65% to 50% to 44% to 41%). Verizon's cases are still above 60% and consistent with prior years' data, but at least overall numbers are headed in the right direction. Now if we could just get them to accelerate.

Figure 38. Percent of breaches that remain undiscovered for months or more



Discovery to containment

Regardless of the timespan involved, once an organization realizes that they have been the victim of a breach, quick and effective remediation should be their first objective. We should mention that containment is not defined as the phase in which everything is back to normal, but rather when the data outflow has been stopped. To return to our now somewhat wearied analogy, the door or window is closed and a temporary lock has been installed. However, it's still a long way from a restored operating environment.

Here, the combined dataset again shows a tendency to shift towards the center as compared to last year, with more breaches taking weeks to contain. The higher proportion of smaller organizations that generally don't have any incident response policy or staff in place is an important contributor to this result. For these victims, the level of effort required to ultimately contain the data breach is low, but the process from initial breach discovery to uncovering the breach methods and taking the necessary steps to contain it is often beyond their capabilities. We have also noticed that a tendency exists for displacement of responsibilitiy when small businesses are the victims of a data breach. Because they usually assume little responsibility for their IT functions, they believe that the vendor who sold them the POS software or terminals holds the responsibility to take action. This may or may not be the case, but the resultant confusion and ambiguity reinforces the fact that organizations of all sizes must have some level of preparation around incident handling and response.

To quote last year's report: Proper Planning Prevents Poor Performance. This mantra can expedite the containment of incidents, while ensuring that actions taken preserve evidence for investigative needs.

To quote last year's report: Proper Planning Prevents Poor Performance. This mantra can expedite the containment of incidents, while ensuring that actions taken preserve evidence for investigative needs. This does not mean that organizations have to practice complicated technical forensic procedures, but rather that they should think about responsibilities and chain of command, define a "freeze point" at which they need to engage external consulting, and ensure practical matters like network diagrams and contact details are up to date and available. Moreover, after the incident is contained, reviewing lessons learned and applying those to future planning is essential.

A COLLECTION OF IR GHOST STORIES

Investigating as many breach cases as we do, we encounter a myriad of different situations upon our arrival on scene. Some of these are quite unique, but most are all too familiar variations on a common theme, a theme in which unpreparedness, panic, and the blame game play a major role. While these repetitious occurrences can be frustrating to investigators in the field, they do serve to provide us with opportunities to illustrate to our readers things to avoid during a breach event. We hope these 'ghost stories' will provide the reader with a bit of insight into common problems encountered. For instance, we often see the shade of "DIY" in victim organizations. The scenario plays out like this: a breach has been discovered, the IT and security staff try to solve the problem but lack the required training and procedures to do so. The weekend is fast approaching, and management begins to panic. It's often at this precise moment, typically late Friday afternoon, that we get the call: "We think we have a problem and we have worked on it for the past couple of days—but can you please come and help us out?" Of course, by now precious time is lost and the well-intended actions of the in-house group have complicated the investigation or even spoiled the evidence. While it isn't crucial that every part of an incident response is outsourced, it is vital that the limitations of the internal group's knowledge and skillset be known, and a proper escalation path be in place.

Once we do finally arrive onsite, one of the first things we ask for is a network diagram of the involved systems. Typically, this elicits a response such as: "Well, we have one, but it's a little bit outdated. We have decommissioned a few systems, and added a few new environments. Oh, and I meant to include the merger we did last year." You get the idea. In these situations, we have found that the fastest and most reliable method is to use the "consensus network diagram". This involves getting everyone with knowledge about the involved systems in a room, giving them a whiteboard and a marker, and asking them to start drawing. It takes a little while, but after everyone provides input there is generally a reasonably usable diagram on the board. This sounds like a simple or even a pleasant exercise, but when you remember that meanwhile valuable data is still leaking from the company, and the frantic CEO is demanding updates. In hindsight, it might have been preferable to have done some of this work beforehand.

Another specter that frequently rears its ugly head is that of the disappearing backup. Theoretically, backups are great for investigative purposes. Who wouldn't want to be able to go back in time to see what happened on a system? Unfortunately, many backup systems are built and managed with business continuity solely in mind and, therefore, are only capable of restoring full backups. In such cases, the victim organization often needs to arrange a complete server to restore the backup to. Not impossible to do, but, again, something that takes valuable time which could have otherwise been saved. We recommend our readers avoid this situation by the simple expedients of either changing the backup software used or proactively ensuring that a spare server is available.

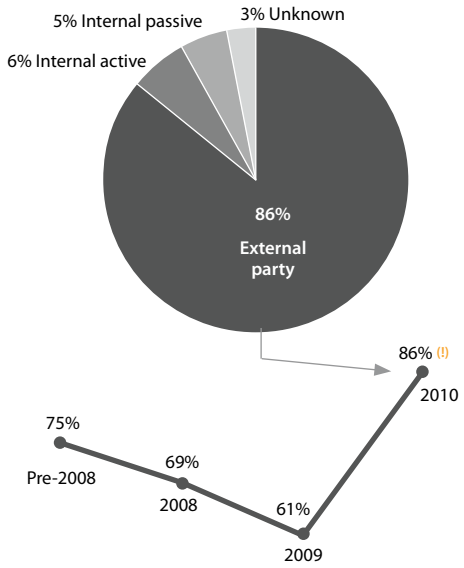
The challenges that arise during a breach are not always of a technical nature. Perhaps the most feared fiend of all is that of the third party contract. The typical Service Level Agreement, of course, has a fast response time for those problems deemed most urgent. Unfortunately, "most urgent" is often defined as "an important or critical system being down." Strange as it may sound, data leakage often doesn't fall into a category that warrants the highest priority and fastest response. Luckily, some outsourcing companies have the correct mindset about such matters, and tend to try to give priority to those situations that are clearly urgent. However, some stick to the contract and respond with "We will provide the requested log file within 24 hours, according to the SLA for a medium priority incident." In one case, the victim took more than three weeks before delivering firewall logs to the investigative team. This was because the outsourcing company that managed the system could not locate the physical system, to which they had to attach the external hard drive, within their own datacenter. When outsourcing data, the wise professional will make certain that the protocols for accessing said data during a crisis are fully understood and are acceptable to the organization.

Breach Discovery Methods

One of the many benefits to studying breaches en masse rather than the myopic view of a single investigator's caseload or even one team's caseload is that it allows one to spot things that would otherwise go unseen or appear unremarkable. A bird's eye view of the ways and means behind breach discovery is one of those areas where this is especially useful. And as veteran readers know, the view hasn't been very pretty.

The Verizon RISK Team uses three main categories to describe discovery methods: External, Internal Passive, and Internal Active. External discovery is fairly self-explanatory; the breach was discovered by an external source and then reported to the victim. For internal discovery we classify incidents as being discovered by Active methods (those that arise from processes specifically designed for detection) or Passive methods (those in which the evidence of breach arises from non-security processes).

Figure 39. Simplified breach discovery methods by percent of breaches



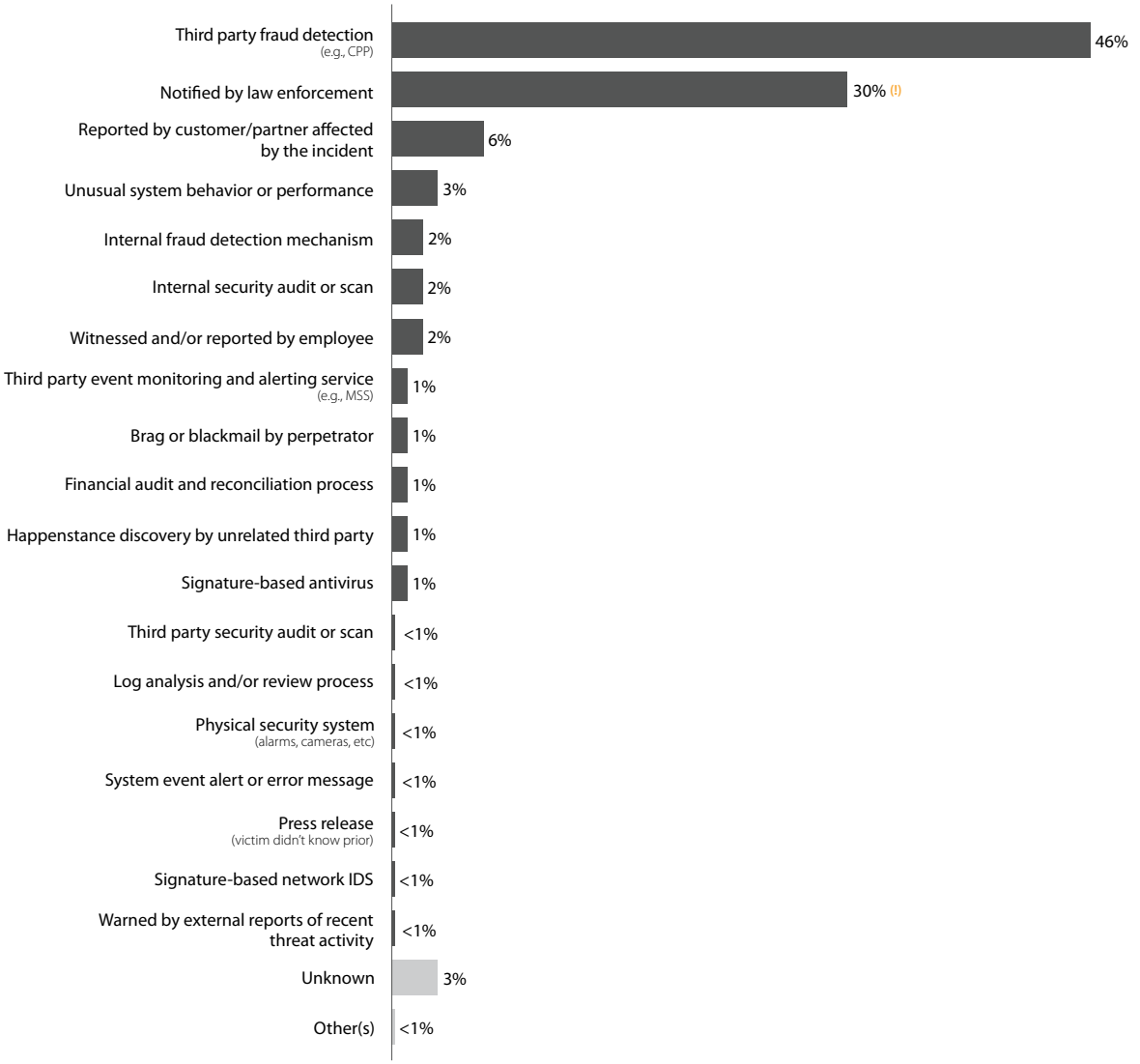
Over the past few years, we have been closely monitoring this data, since one might argue that the method of breach discovery could act as a sort of "canary in the coalmine" for the ability of our victims set to detect and respond to security incidents. Data around how victims discover the breach would be an indicator of how well they know and monitor their own environment. Discovery by Internal Active methods suggests a capable and responsive security program. On the other hand, if the organization is unaware of a breach (as we're seeing is more often the case than not in Compromise to Discovery data above) and must be told about it by a third party, it is likely they aren't as knowledgeable as they should be with regard to their own networks and systems.

With that in mind, we have been watching a particular statistic from this section—breach discovery by External party. Past reports began to show an encouraging steady decline in breach discovery by third parties and we were hopeful that this would continue. Unfortunately, this year Figure 39 shows a significant increase (25%) in third party breach discovery. One might be tempted to attribute this increase to the demographic mix of the victims, arguing that smaller companies have fewer resources to expend on difficult and expensive security functions such as traffic, log, and event monitoring. However, when looking at Verizon's data in isolation we see twice the number of companies with over 1,000 employees (30% vs. 15%) were notified of a breach by a third party. In the USSS data set we saw roughly a 10% reduction in third party discovery (75% vs. 86%). Size just doesn't seem to matter all that much.

A more detailed representation of breach discovery methods for 2010 are shown in Figure 40. The top discovery methods remain relatively unchanged since 2007; third party fraud detection and law enforcement notification continue to be how most victims find out about the data breach. Internal Active and Passive methods show fairly similar ratios at around 5% each, and viewed independently, the Verizon and USSS data show very similar representations for Internal Active discovery methods.

Past reports began to show an encouraging steady decline in breach discovery by third parties and we were hopeful that this would continue. Unfortunately, this year we see a significant increase (25%) in third party breach discovery.

Figure 40. Breach discovery methods by percent of breaches



External Discovery

The most common third party detection method is Common Point of Purchase analysis, or CPP. At a very basic level, CPP identifies probable breach victims based on the purchase histories of stolen payment cards. Banks use it to limit their financial losses due to fraudulent transactions, and it works quite well for that purpose. Unfortunately, for CPP to work, the thief must begin committing fraud with the stolen cards. Notification by law enforcement can happen any number of ways. Very often—especially in this particular caseload—law enforcement personnel learn of and alert numerous victims as they identify, research, and monitor suspects. Sometimes confidential informants provide information on the activities and victims of other criminals. Other third party external methods include notification by customers/business partners and in some small number of cases, braggadocio on the part of the threat agent.

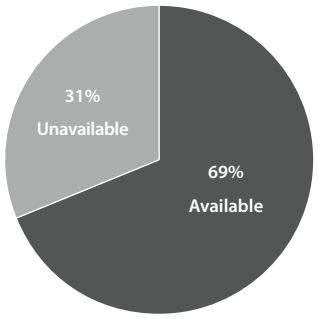
You Down With CPP? CPP is a method that banks employ to limit their financial losses due to fraudulent transactions. Let's say 200 cardholders all experienced fraudulent purchases on their credit cards. CPP analysis would look at the purchasing history of these cardholders and try to find a common point of sale (e.g., stores) which they all shared. This is essentially crunching data in such a way that the algorithm determines that all cards in question were used at StoreX in a given period of time. Timeframing, history, geographic location, and many other data points are then used to determine if a particular common point of purchase could be considered to have a high probability of incident.

CPP has the advantage of seeing through the fog within an organization by highlighting the glaringly obvious issues from without. A scary thought about CPP is that this detection method is so successful because there is a mechanism (fraud) for correlating the data together. Other types of valuable data such as personal information, health records, e-mail addresses, and authentication credentials can often be harvested from many places, but they do not have the same protective mechanisms as payment cards to detect the data breach. Thus, we believe the numbers around non-payment card breaches are far worse than reported since there is no CPP like mechanism to detect their loss.

Internal Active Discovery

Internal active discovery relates to IDS/IPS/HIPS, log monitoring and other like technologies that security departments typically use to prevent, detect, and respond to data breaches. Unfortunately, as referenced above, many smaller organizations do not have the awareness, aptitude, funding, or technical support to perform these tasks on par with the sophistication of the threats they face. That said, past history has shown that even large businesses seem to have a difficult time utilizing their investments for significant return.

Figure 41. Availability of log evidence for forensics by percent of breaches*



* Verizon caseload only

We often joke (though it's really not funny) that criminals seem to have better ownership, insight, and control over the environment than the organization paying the bills. Again this year we see a small representation of Internal Active methods; only ~6% of the time did an organization's designed security efforts detect the breach. In the experience of the investigation team, many of these technology controls are either misconfigured, in the wrong place, or—as is far too often the case—not being utilized at all. For example, one breach victim had recently purchased a SIEM system, but then let the admin go to save cost. We showed up to find it brimming over with alerts pointing to the breach, which was of great use to us, but not so much for them. Again there doesn't appear to be a club big enough for this dead horse; it might be a great idea to leverage existing technology investments to help detect and respond to data breaches.

If there is one positive note that we can squeeze out of these statistics around active measures, it's that discovery through log analysis and review has dwindled down to 0%. So the good news is that things are only looking up from here. Yeah, that's squeezing pretty hard, but what else can we do? Figure 41 continues to show that good evidence of the breach usually exists in the victim's log files waiting to be used. See the "On logs, needles and haystacks" sidebar in the 2010 DBIR for a few tips on smart and cost effective ways to analyze logs.

Internal Passive Discovery

Internal Passive is best described as when someone who is not responsible for security reports the signs of an incident. Having people aware of the signs of a security incident and knowing what to do when the tell tale signs of a compromise appear is a wonderful thing, a bit like free beer. The depressing alternative is when our investigators hear stories from users about how they noticed strange things on a system they were using but did not report it because they did not know how to report it, or did not feel it could be important.

To take advantage of this "free beer" we recommend that every organization should have a good security awareness campaign, and that they test their people frequently to make sure they understand what the signs of compromise might be for their system, and what to do if they see them. As we said last year, evidence of compromise is not always in the form of subtle indicators that appear in log and event histories admins might be encountering, but rather in obvious, noticeable change that should have been investigated.

Anti-Forensics

With all the industry buzz around new and advanced threats, you might have anticipated a radical increase in the use of anti-forensics. After all, if you want to be truly persistent, it will likely require repeated access to the victim's environment and data—each time with the possibility of leaving behind a digital footprint or two. Then again, if you happen to have budgets and resources that most of us only dream about (perhaps the backing of a nation-state?), then wouldn't you take advantage of anti-forensics? And if you did, would there be any trace of your doing so?

The fact of the matter is that for the entire period that we have been studying breaches, we have seen consistent signs of anti-forensics. Based on the most recent evidence, anti-forensics was used in approximately one-third of 2010 breaches worked by Verizon. That represents neither a significant increase nor decrease over the prior year. The important thing to note here is that these numbers are based on evidence. That is, hard facts collected during an investigation. Since the whole purpose of anti-forensics is to remove such evidence, pessimists among us might view that third of breaches as the error rate for anti-forensics rather than the usage rate. A different kind of pessimist might accept one-third as the usage rate and chalk the remaining gap

The fact of the matter is that for the entire period that we have been studying breaches, we have seen consistent signs of anti-forensics. Based on the most recent evidence, anti-forensics was used in approximately one-third of 2010 breaches worked by Verizon. That represents neither a significant increase nor decrease over the prior year.

up to non-existent logging and self-inflicted anti-forensics performed by the victim. Either way, we can only report what we see.

While the overall use of anti-forensics has remained relatively flat, the techniques deployed have an ebb and flow to them. Previously, the most common form of anti-forensics observed in the field was Data Wiping, leading well ahead of all others. The prior pervasiveness of Data Wiping, which includes removal and deletion of evidence, came as no surprise. However, in the last year we have seen Data Hiding (~40%) pull up as a much closer second place to Data Wiping (~57%). With respect to Data Hiding, the use of steganography has remained relatively rare and flat year-over-year. The use of encryption for the purposes of Data Hiding has again contributed most significantly to the rise in Data Hiding. It could be opined that this is potentially a response to the wider usage of DLP or FIM solutions that might otherwise detect clear-text repositories of soon-to-be-exfiltrated data. Where Data Corruption (~4%) was observed, it continued to be mostly manifested as log tampering.

It is also interesting to consider these AF numbers in connection with the total quantity of breaches (up) and the total quantity of records compromised (down) that are covered in this study. The steady anti-forensics usage in the face of a much smaller records-per-breach ratio would tend to support the notion that anti-forensics is a tool for the masses and not limited to the elite criminals or highest-value targets. In many cases, the anti-forensic tools being used are found to be common across multiple cases. This likely ties into the increasing underground marketplace for "malware-as-a-service."

This continues to be a trend of interest to our investigative team as the use of anti-forensics plays a significant role in daily activities. We will continue to monitor and report on the evolution of anti-forensics.

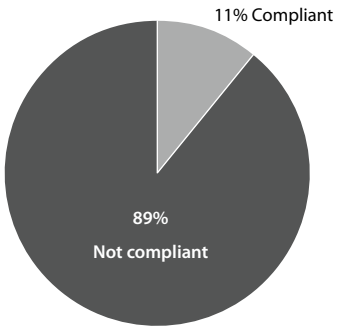
PCI DSS Compliance

The Payment Card Industry Data Security Standard (PCI DSS) is a set of control requirements created to help protect cardholder information. Every year Verizon's caseload contains a number of organizations that are required to adhere to the PCI DSS. Because these are confirmed data breach victims, obvious questions arise with respect to the compliance status of these organizations. This section examines this important topic from several perspectives.

"Compliance is a continuous process of adhering to the regulatory standard," and "Validation . . . is a point-in-time event . . . that attempts to measure and describe the level of adherence to the standard."

In *Verizon's Payment Card Industry Compliance Report (PCIR)* from 2010, we made the distinction between "validation" and "compliance." In that report, we said that, "Compliance is a continuous process of adhering to the regulatory standard," and "Validation . . . is a point-in-time event . . . that attempts to measure and describe the level of adherence to the standard." Understanding this distinction between these two contents is important when we look at the data as collected by the Verizon team.

Figure 42. PCI DSS compliance status based on last official audit (or self-assessment)*



* Verizon caseload only

Similar to past reports, most organizations (89%) suffering payment card breaches had not been validated compliant with PCI DSS at the time of the breach (see Figure 42). That means, of course, that some (11% to be exact) had passed their most recent validation within the last 12 months as required by the PCI council (or at least attested to that fact during the investigation).

In comparison to past reports, this year's compliance/non-compliance ratio leans a bit more toward "non-compliant." This modest change is likely due to more level three and four merchants (smaller retailers, hotels, restaurants, etc.) in the dataset, whereas previous caseloads reflected a higher percentage of level one or two merchants and/or service providers (e.g., larger financial institutions). In reviewing this demographic mix and the associated lack of compliance, we believe that the data reinforces an assertion we've been making for the past three years: to reduce risk, organizations of all sizes need to implement the basic tenets of an information risk management program and maintain this initial investment over time. This includes network and data defense technology basics (firewalls, anti-virus, identity and access management), as well as the non-technical aspects of security and risk management (policy and process development).

While the above refers to the victim's status based upon their last official validation, another important line of inquiry relates to their state when the incident occurred. When our investigators work a case in which the victim organization processes payment cards, a review is conducted of which PCI DSS requirements were and were not in place at the time of the breach. The results of this assessment are recorded, appended to the case report, and then conveyed to the relevant payment card brands. This work is not an official PCI DSS audit, nor does it either uphold or overrule the victim's compliance status. That said, it does provide insight into the condition of the security program of the victim organization at the time.

In the incident report delivered to the card brands, investigators break down compliance by PCI DSS requirement. If the DSS represents the basics of an information security program, then we are able to get a high-level understanding of the state of the security program at the time of investigation. In Table 16 we present the results of these assessments over time. Additionally, we've added a column that presents data from our 2010 Payment Card Industry Compliance Report (PCIR).

This report reflects information from Initial Reports on Compliance (IROCs) conducted by Verizon's team of Qualified Security Assessors (QSAs). The IROC is essentially an initial state (pre-validation) analysis of the client's adherence to the DSS. We've included this data for reference because it allows us to infer which sections of the PCI DSS organizations find most difficult to satisfy.

Table 16. Percent of relevant organizations in compliance with PCI DSS requirements based on post-breach reviews conducted by Verizon IR team

Build and Maintain a Secure Network	2008	2009	2010	PCIR
Requirement 1: Install and maintain a firewall configuration to protect data	30%	35%	18%	46%
Requirement 2: Do not use vendor-supplied defaults for system passwords and other security parameters	49%	30%	33%	48%
Protect Cardholder Data				
Requirement 3: Protect Stored Data	11%	30%	21%	43%
Requirement 4: Encrypt transmission of cardholder data and sensitive information across public networks	68%	90%	89%	63%
Maintain a Vulnerability Management Program				
Requirement 5: Use and regularly update anti-virus software	62%	53%	47%	70%
Requirement 6: Develop and maintain secure systems and applications	5%	21%	19%	48%
Implement Strong Access Control Measures				
Requirement 7: Restrict access to data by bustiness need-to-know	24%	30%	33%	69%
Requirement 8: Assign a unique ID to each person with computer access	19%	35%	26%	44%
Requirement 9: Restrict physical access to cardholder data	43%	58%	65%	59%
Regularly Monitor and Test Networks				
Requirement 10: Track and monitor all access to network resources and cardholder data	5%	30%	11%	39%
Requirement 11: Regularly test security systems and processes	14%	25%	19%	38%
Maintain an Information Security Policy				
Requirement 12: Maintain a policy that addresses information security	14%	40%	16%	44%

The 2010 compliance data simply doesn't provide us with a basis for optimism. Overall, things look better than 2008, but worse than 2009. Before jumping to conclusions about PCI backsliders, however, consider one important fact: this apparent decline may be partially explained by the demographic differences discussed above. 2009 was a smaller caseload (54 breaches) with a higher ratio of larger organizations than 2010 (94 breaches). Granted, that's no excuse since all of the organizations represented process, store, or transmit payment card information and, therefore, should meet all requirements.

Despite the rather poor showing, let's see what we can learn. Eight of the twelve requirements posted lower numbers than the year before, some by a fairly large margin. Requirements 1, 2, 5, and 12 are at or very near their historic lows, hinting at rather immature security programs. Firewalls, Anti-Virus, changing default credentials, and related concepts could all be found in "best practice" documents for information security from 15 years ago (or more). So, either the "security message" isn't reaching smaller businesses or we, as an industry, are not explaining the benefits well enough for them to make the extra effort, or they aren't willing or compelled to do so for various other reasons.

In addition, low marks in other technical aspects of the PCI DSS (Requirements 3, 8, 10, 11) are similar to the areas that our QSA clients struggled to meet. The association here is too strong to ignore; PCI compliance is not easy, and security is not something to be addressed once every twelve months. Installing and maintaining a firewall configuration to protect data, developing and maintaining secure systems and applications, restricting access to data by business need-to-know, tracking and monitoring all access to network resources and cardholder data, and maintaining a policy that addresses information security (Requirements 1, 6, 7, 10, 12) are all aspects of the DSS that need an investment in continuous processes and upkeep to be effective.

What does appear to be working are areas where the security-conscious aspects of our industry can "bake security in." Requirement 4, "Encrypt transmission of cardholder data and sensitive information across public networks," is one that has been increasingly addressed by hardware and software vendors, as well as the vendor management programs of banks and card processing vendors. We see Requirement 4 holding steady at around 90% compliance in victim environments over the past two years.

We'll end this year's PCI section on a pragmatic note. One of the lingering questions from our discussions around PCI in this report is always that of relevancy. It's all well and good to validate compliance with the PCI DSS, but does it actually help reduce risk? Insofar as that translates to a sincere security program—one that seeks to maintain validation on an ongoing basis—the data strongly suggests the answer is "yes." Let's examine some of the results in Table 16 in light of threat actions discussed earlier in this report.

One of the lingering questions from our discussions around PCI in this report is always that of relevancy. It's all well and good to validate compliance with the PCI DSS, but does it actually help reduce risk? Insofar as that translates to a sincere security program—one that seeks to maintain validation on an ongoing basis—the data strongly suggests the answer is "yes."

The first and perhaps most noteworthy example of this would be found in Requirement 2 (Do not use vendor-supplied defaults for system passwords and other security parameters). In our previous section on Hacking, we find that "exploitation of default or guessable credentials" is represented in two-thirds of all intrusions and accounts for nearly one-third of all records compromised. Similarly, "exploitation of insufficient authentication" is found in 10% of all intrusions and ascribed to 21% of all records breached.

Requirement 5 (Use and regularly update anti-virus software) can be directly mapped to the high frequency of malware used to compromise systems and data. Sure, over 60% of malware is customized and not likely to be detected by AV, but that means about 40% stands a decent chance of being recognized. Who doesn't want a 40% reduction in risk?

When malware isn't recognized by AV and is installed on the system, all is not lost. Requirement 1 (install and maintain firewall configuration) and Requirement 10 (track and monitor all network access) are a critical second line of defense against backdoors and other common types of malware and intrusion methods.

Let's do one more (though we could go on for some time). Requirement 6 (Develop and maintain secure systems and applications) and Requirement 11 (Regularly test security systems and processes) are both important processes that relate to the broader category of Hacking (50% of breaches/89% of records). Because Hacking is often used in order to install malware, secure development and testing can be considered to reduce the risk of that threat action as well (page 24, 49% of breaches/79% of records).

Every year that we study threat actions leading to data breaches, the story is the same; most victims aren't overpowered by unknowable and unstoppable attacks. For the most part, we know them well enough and we also know how to stop them. Mapping common threat actions from 1700+ confirmed breaches to PCI DSS requirements simply does not reveal many gaping holes or grossly inadequate coverage. Does that mean the DSS is perfect? Not at all; few things are. Fortunately, perfection is not a precondition for significant risk reduction benefits.

Conclusions and Recommendations

At the conclusion of our last report, we stated:

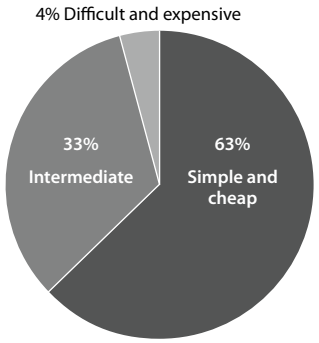
> *"Creating a list of solid recommendations gets progressively more difficult every year we publish this report. Think about it; our findings shift and evolve over time but rarely are they completely new or unexpected. Why would it be any different for recommendations based on those findings? Sure, we could wing it and prattle off a lengthy list of to-dos to meet a quota but we figure you can get that elsewhere. We're more interested in having merit than having many."*

But surely after examining another 800 breaches in the past year, we'd have plenty of new recommendations to solve all your security woes, right? Quite wrong, actually. The latest round of evidence leads us to the same conclusion as before: your security woes are not caused by the lack of something new (Figure 43 looks about like it always does). They almost surely have more to do with not using, under using, or misusing something old.

The argument levied against that notion is that our adversaries are clever rascals and will adapt in order to our thwart our "old" defenses. That is true (and we've seen and discussed evidence of such adaptation), but let's be real, shall we? As a whole, do you really think we're making them scramble to adapt? Year after year our data seems to suggest that we are not, and that is something that needs to change. If they adapt, then they adapt. C'est la vie. But let's quit allowing them to find success in stagnation.

To that end, we've found some old recipes for achieving newfound success. We examined top attacks from 2010 and identified recommendations from our previous reports most applicable to them. They are categorized and listed below and we hope they help you at the planning and budget negotiations table.

Figure 43. Cost of recommended preventive measures by percent of breaches*



* Verizon caseload only

Overall

Achieve essential, and then worry about excellent: We find that many organizations achieve very high levels of security in numerous areas but neglect others. Criminals will almost always prefer the easier route. Identifying a set of essential controls and ensuring their implementation across the organization without exception, and then moving on to more advanced controls where needed is a superior strategy against real-world attacks.

The argument levied against that notion is that our adversaries are clever rascals and will adapt in order to our thwart our "old" defenses. That is true (and we've seen and discussed evidence of such adaptation), but let's be real, shall we? As a whole, do you really think we're making them scramble to adapt?

Access Control

Change default credentials: Simple and sweet, when system/network admins stand up a new system, change the password. If you outsource this to a third party, check that they've changed the password. Don't assume that your staff or your partners consistently follows through on all policies and procedures. Along with changing default credentials, organizations should ensure that passwords are unique and not shared among users or used on different systems. This was especially problematic for assets managed by a third party.

Every year that we study threat actions leading to data breaches, the story is the same; most victims aren't overpowered by unknowable and unstoppable attacks. For the most part, we know them well enough and we also know how to stop them.

User account review: Prior year's data breach reports and years of experience lead us to believe in the value of reviewing user accounts on a regular basis. The review should consist of a formal process to confirm that active accounts are valid, necessary, properly configured, and given appropriate (preferably least) privileges.

Restrict and monitor privileged users: Trust but verify. Use pre-employment screening to eliminate the problem before it starts. Don't give users more privileges than they need (this is a biggie) and use separation of duties. Make sure they have direction (they know policies and expectations) and supervision (to make sure they adhere to them). Privileged use should be logged and generate messages to management. Unplanned privileged use should generate alarms and be investigated.

Network Management

Secure remote access services: In many instances, remote access services have been enabled and are Internet-facing. We recommend tying these services down where only specific IP addresses or networks can access them. Additionally, it's important to limit access to sensitive systems within the network. Many organizations will allow any device on the network to connect and remotely access any other device; we highly recommend not managing your devices this way. Tie down remote access services to specific management networks via access control lists.

Monitor and filter egress network traffic: At some point during the sequence of events in many breaches, something (data, communications, connections) goes out that, if prevented, could break the chain and stop the breach. By monitoring, understanding, and controlling outbound traffic, an organization will greatly increase its chances of mitigating malicious activity.

Secure Development

Application testing and code review: SQL injection attacks, cross-site scripting, authentication bypass, and exploitation of session variables contributed to nearly half of breaches attributed to hacking or network intrusion. It is no secret that attackers are moving up the stack and targeting the application layer. Why don't our defenses follow suit? As with everything else, put out the fires first: even lightweight web application scanning and testing would have found many of the problems that led to major breaches in the past year. Next, include regular reviews of architecture, privileges, and source code. Incorporating a Security Development Life-Cycle (SDLC) approach for application development is recommended as well. Finally, help your developers learn to appreciate and write more secure code.

Log Management and Analysis

Enable application and network witness logs and monitor them: All too often, evidence of events leading to breaches was available to the victim but this information was neither noticed nor acted upon. Processes that provide sensible, efficient, and effective monitoring and response are critical to protecting data.

However, don't just focus your logging efforts on network, operating system, IDS, and firewall logs and neglect remote access services, web applications, databases, and other critical applications. These can be a rich data set for detecting, preventing, and investigating breaches.

Define "suspicious" and "anomalous" (then look for whatever "it" is): This is admittedly vague, but—in truth— generalizing what this entails in order to prescribe something for everyone would counteract the point. Discover what is critical, identify what constitutes normal behavior, and then set focused mechanisms in place to look for and alert upon deviations from normality.

Change your approach to event monitoring and log analysis: Based on the data we collect in the Time of Breach events, we believe that organizations would be better served to focus less on the "real-time" methods of detection, and more on the "this-week" methods. If we can shift Compromise to Discovery time frame from Weeks and Months to Days, it will significantly reduce the damage done to your organization. Focus on the obvious things rather than the minutia. This need not be expensive; a simple script to count log lines/length and send an alert if out of tolerance can be quite effective. We are confident that this approach will reap benefits and save time, effort, and money.

Training and Awareness

Increase awareness of social engineering: Educate employees about different methods of social engineering and the vectors from which these attacks could come. In many of our cases, we see where users click on links they shouldn't and open attachments received from identified persons. Reward users for reporting suspicious e-mail and sites and create the incentives necessary for vigilance.

Train employees and customers to look for signs tampering and fraud: Such awareness campaigns have been around in certain areas for some time, but ATM and Pay-at-the-Pump tampering/fraud seem to be increasing in number and scope. Organizations operating such devices should consider conducting regular examinations of them. Additionally, empower customers to help protect themselves as well as aiding the organization in spotting potential issues.

Incident Management

Create an Incident Response Plan: If and when a breach is suspected to have occurred, the victim organization must be ready to respond. An effective Incident Response Plan helps reduce the scale of a breach and ensures that evidence is collected in the proper manner.

Engage in mock incident testing: I mean listen, we're sitting here talking about practice; not an incident, not an incident, not an incident—but we're talking about practice (sports fans among you might get that reference). Yes, we are talking about practice, because practice makes perfect. In order to operate efficiently, organizations should undergo routine IR training that covers response strategies, threat identification, threat classification, process definition, proper evidence handling, and mock scenarios.

A Call to Data Sharing

One of the most critical and persistent challenges plaguing efforts to manage information risk is a lack of data. As community decision-makers and practitioners, we have little data because we do not share and while there are many reasons for this, doubts that it can be done in a practical, private, and mutually beneficial manner are chief among them. We would like to think that this report is an example that sensitive and useful data can be shared responsibly to the benefit of many. In the past two years, several other investigative firms have begun to share their results and we commend those efforts. Every little "bit" shared helps. It would be great if others joined in as well—and if you'd like to report results using VERIS so we can all compare apples to apples, we'll be glad to help however we can.

We would also like to extend an invitation to other organizations to consider using the VERIS community website[12] to anonymously report security incidents (any kind—not just data breaches). All (aggregated and anonymous) results will be made freely available to the community. By sharing incident information, you will add to the collective knowledge of the community while gaining access to the VERIS dataset for yourself. The overall goal is to lay a foundation from which we can constructively and cooperatively learn from our experiences to better manage risk.

We realize that your time is valuable, so we once again thank you for taking out a chunk of it to read this report.

12 https://www2.icsalabs.com/veris/

Appendix A: Case Statistics from the Dutch High Tech Crime Unit

The data and statistics below represent a sample of 32 data breach investigations by the Dutch National High Tech Crime Unit reaching back to 2006. As mentioned in the methodology earlier in our report, the NHTCU caseload varies from year to year, data breaches being only one aspect of their mission. The NHTCU targets cases they classify as "high tech crime," which can roughly be defined as those forms of crime that are organized, target computer systems, and use sophisticated new technology or methods. Cyber-related issues that target vital national interests are also taken up.

These 32 breaches encompassed a total of 144,076 data records confirmed by the NHTCU to be compromised. However, the extent of data loss could not be determined for the majority of incidents, so this figure represents the lowest end of the potential range (we discuss reasons for this in the main report). In this section, we highlight findings from these investigations, concentrating on the agents, actions, assets, and attributes involved. In reviewing this data, you will see that these are not unlike those seen in both the Verizon and USSS case sets over the last several years.

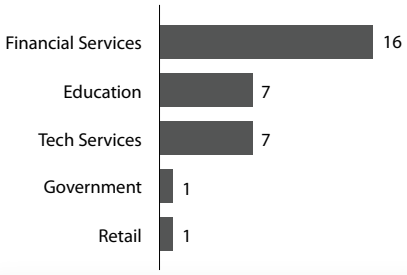
Table A1. Organizational size by number of breaches (number of employees)

1 to 10	0
11 to 100	1
101 to 1,000	4
1,001 to 10,000	9
10,001 to 100,000	14
Over 100,000	2
Unknown	2

Demographics

The NHTCU's cases spanned several different industries, organizational sizes, and locations. The top victim industry was that of Financial Services, which included some of the largest banks in the Netherlands as well as others throughout Europe and the United States. Those victims within the Education industry consisted mostly of European universities. Technology Services victims were a mix of managed IT and security services firms and software development shops. Several of these organizations lost valuable IP and other sensitive data. Per Table A1, organizational size was weighted toward larger organizations.

Figure A1. Industry groups represented by number of breaches



Agents

Every case involving a data breach within the NHTCU's incidents involved an external agent, of which most were from Eastern and Western Europe. Based on the details of case selection listed above, it's not surprising that three-quarters of the external agents are categorized as organized criminal groups. The next largest group is unaffiliated person(s). One of the NHTCU's investigations included an insider who did not act deliberately, but nonetheless broke a policy regarding the reuse of corporate passwords that led directly to one of the data breaches.

Yet another dataset showing a strong majority of external agents in both frequency and data loss. Isn't that interesting?

Figure A2. Threat agents (inclusive) by number of breaches

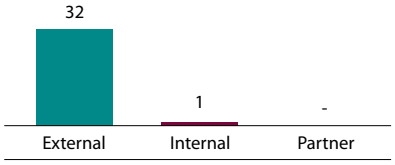
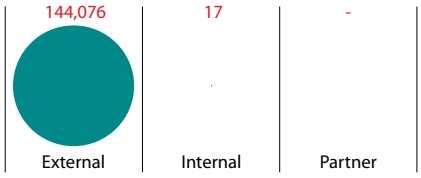


Figure A3. Compromised records by threat agent



Actions

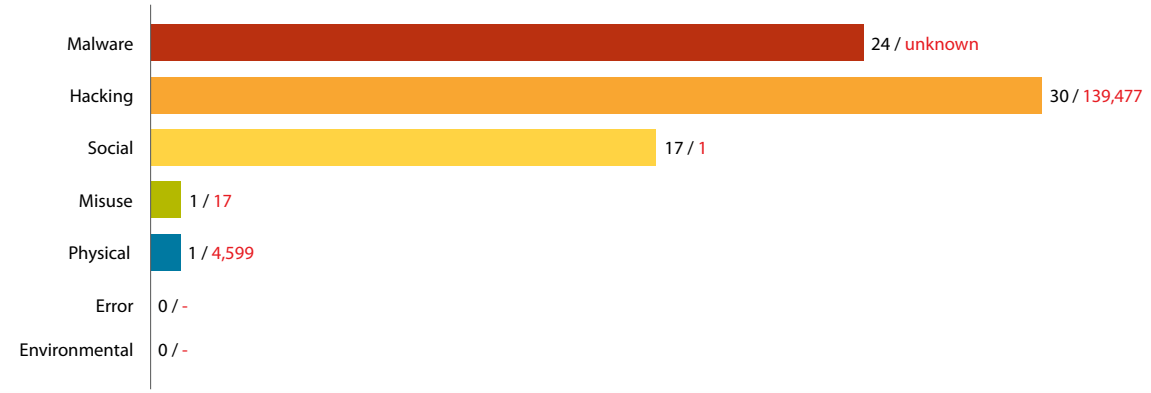
The top three threat action categories were Hacking, Malware, and Social. The most common types of hacking actions used were the use of stolen login credentials, exploiting backdoors, and man-in-the-middle attacks. These were often carried out via the web or backdoors opened by malware. Malware functions most often seen were form grabbers (capture data from user activity), backdoors that allowed remote access, and exfiltration mechanisms such as sending data to an external entity. Infection vectors reflect two of the common pathways seen in Verizon and USSS data sets of user-executed or download via the web or Internet or where it was installed directly by the attacker. Lastly, the action category of Social shows phishing and spam attacks via e-mail combined with fake websites that mostly targeted customers of Financial Services organizations.

Figure A4. Top threat action types by number of breaches

Hacking	Use of stolen login credentials	27
Malware	Send data to external site/entity	22
Malware	Capture data from an application/system process	16
Malware	Download/install additional malware or updates	16
Hacking	Man-in-the-middle attack	15
Social	Phishing (or any type of *ishing)	15
Social	Spam	15
Social	Counterfeiting/forgery (fake website, docs, etc)	15
Malware	Backdoor (allows remote access/control)	8
Hacking	Exploitation of backdoor or command and control channel	8
Malware	Packet sniffer (capture data from network)	7
Malware	System/network utilities (PsTools, Netcat)	7
Hacking	SQL injection	4

In several incidents, organized crime utilized all three of the above actions to meet their goal of stealing data and performing fraud. All in all though, the actions were very similar to those seen in the Verizon and USSS cases over the last several years.

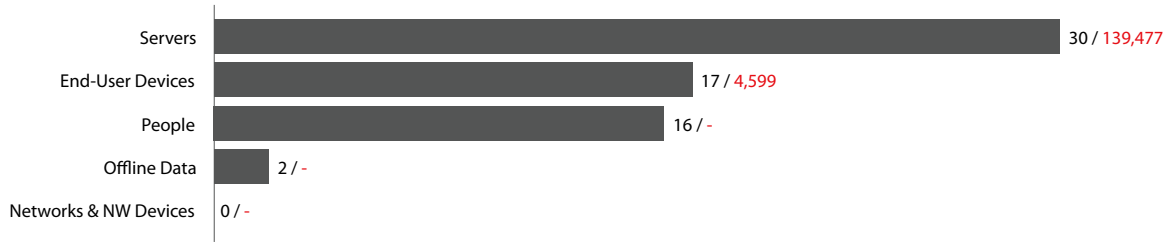
Figure A5. Threat action categories by number of breaches and records



Assets

The most common types of assets involved in breaches investigated by the NHTCU were those within the Servers category. The assets attacked most often in this category were web, database, and file servers. The actions most often used against these devices were use of stolen login credentials and SQL injection. End-users systems regularly attacked were desktop and PIN entry devices. The attacks against desktops were form grabber malware as well as man-in-the-middle attacks. Agents tampered with a dozen or so PIN entry devices belonging to one large firm as part of intricate carding schemes. Lastly, the People category consisted mostly of customers of financial services institutions. In these incidents, the attackers would utilize Social attacks to steal credentials and the commit fraudulent financial transactions. The majority of assets were hosted externally and managed by a third party.

Figure A6. Categories of affected assets by number of breaches and records



Attributes

These results pertain to data breaches, so the security attribute of confidentiality was involved in all 32 incidents. Similar to the Verizon-USSS dataset, this was closely followed by losses of integrity, which encompasses a myriad of unauthorized changes to systems during an attack scenario. Losses of authenticity dealt with fraudulent transactions initiated after perpetrators gained access to and control of these assets.

Figure A7. Security Attributes Affected by number of breaches

Attributes affected	Definition	Breaches
Confidentiality	Limited access, observation, and disclosure	32
Possession	Exclusive (or intended) possession and control (and ability to prove it)	0
Integrity	Complete and unchanged from original state	31
Authenticity	Validity, conformance, and genuineness	17
Availability	Present and ready for use when needed	0
Utility	Usefulness or fitness for a purpose	0

Breach Discovery

Similar to every other dataset we've studied, most breaches investigated by the NHTCU lasted several months before the victim learned of them. Also in line with our other findings, this discovery was usually made by a third party. This was usually found by law enforcement personnel (the NHTCU and others) during the investigation of another (sometimes related) incident.

We'd like to thank the NHTCU for providing us (and you) with this case data and enabling this brief overview of breach trends in Europe. Such cooperation is critical to understanding and managing breaches around the world. We also hope it helps you accomplish that goal in your neck of the woods.

Appendix B: Project Taurus and the Bredolab Takedown

In 2010, the Dutch NHTCU decided to start a public-private partnership to combat botnets. Getting together with members of the CERT community, industry, and internet infrastructure they devised a three stage approach, consisting of intelligence, intervention, and investigation. Project Taurus was born. All partners combined their state of the art botnet information and all botnets were tracked real time using a university-developed tool. The goal was a notice and takedown for most of the botnets and a deeper investigation into some of them. Then, one of the partners, a large internet service provider, found a botnet command and control server in their infrastructure.

The partners started investigating and found a cluster of 143 malicious servers, seven of which were directly related to a botnet called Bredolab. At that point, Bredolab had been able to infect 30 million unique IP addresses. In a ten week period the partners were able to draw a picture of the botnet infrastructure based on the network traffic. They were also able to identify the suspected operator of the network, an Armenian who planned to come to the Netherlands for a dance party. The network was set to be dismantled on the day the Armenian would arrive at Amsterdam airport. The Armenian was to be arrested on arrival but due to visa problems he never showed up.

Instead, he noticed someone attacking his botnet, assumed it was a competitor and fought back. After trying several backdoors, he decided to DDoS what was left of his own botnet. Due to good international cooperation, the command and control server of the DDoS botnet was quickly dismantled. An Interpol red notice led to the arrest of the suspect the following day at Yerevan airport.

A piece of code was written and put on the botnet server to be downloaded by the bots. This code would cause a warning window containing cleaning instructions to pop up at the victims' computers. The law enforcement obligation of helping the victims was judged to precede potential judicial concerns in this action. The combination of creativity, new techniques, close cooperation, and hard work enabled the Taurus partners to go further than any of them would have been able to go alone.

About Verizon Investigative Response

Security breaches and the compromise of sensitive information are a very real concern for organizations worldwide. When such incidents are discovered, response is critical. The damage must be contained quickly, customer data protected, the root causes found, and an accurate record of events produced for authorities. Furthermore, the investigation process must collect this evidence without adversely affecting the integrity of the information assets involved in the crime.

The IR team has a wealth of experience and expertise, handling over 800 security breach and data compromise cases in the last six years. Included among them are many of the largest breaches ever reported. During these investigations, the team regularly interacts with governmental agencies and law enforcement personnel from around the world to transition case evidence and set the stage for prosecution. The expansive data set generated through these activities offers an interesting glimpse into the trends surrounding computer crime and data compromise.

About the United States Secret Service

As the original guardian of the nation's financial payment system, the United States Secret Service has established a long history of protecting American consumers, industries and financial institutions from fraud. Over the last 145 years, our investigative mission and statutory authority have expanded, and today the Secret Service is recognized worldwide for our expertise and innovative approaches to detecting, investigating and preventing financial and cyber fraud.

Today's global economy has streamlined commerce for both corporations and consumers. Financial institutions and systems are readily accessible worldwide. Today's financial fraud and cybercriminals have adapted to this new means of global trade and seek to exploit this dependence on information technology. Cybercriminals consequently have become experts at stealing stored data, data in transit, and encrypted data. They operate based on trust, long standing criminal relationships, high levels of operational security, and reliability. The culture also has evolved over the last decade and is now described as non-state sponsored, transnational and is almost impossible to infiltrate due to its dynamic nature and operational security.

To combat these emerging threats, the Secret Service has adopted a multi-faceted approach to aggressively combat cyber and computer related crimes by establishing a network of 31 Electronic Crimes Task Forces (ECTF), including the first international ECTF located in Rome, Italy, 38 Financial Crimes Task Forces (FCTF) and a Cyber Investigations Branch. This approach enables the Secret Service to detect, prevent, and aggressively investigate electronic crimes including cyber attacks on the nation's critical infrastructures and financial payment systems.

For more information or to report a data breach, please contact your local Secret Service office at www.secretservice.gov.

About the Dutch National High Tech Crime Unit

The Dutch National High Tech Crime Unit (NHTCU) is a team within the Dutch National Police Agency, dedicated to investigating advanced forms of cybercrime. The team's vision is to make the Netherlands an unsafe place for cyber crime. In addition to Dutch victims and criminals, this includes the use of Dutch infrastructure in criminal activities.

The team specializes in using out of the box investigation methods and techniques to find and target the most important players in the criminal chain. The team has excellent contacts in North America, Western and Eastern Europe, and often plays the role of bridge builder between High Tech Crime Units in different countries.

Another success factor is the advanced cooperation with other public and private partners, where information is freely shared and joint strategies are implemented. An example of such cooperation can be read in the description of the Bredolab case. The NHTCU recently started up the Dutch Electronic Crimes Task Force, a new cooperation with financial and other parties to institutionalize public-private partnership as a means to actively combat certain types of cybercrime.

pplwc

verizonbusiness.com

verizonbusiness.com/socialmedia verizonbusiness.com/thinkforward