

Challenges and Advances in Data Recovery of SSDs

Session 201

Troy Hegr

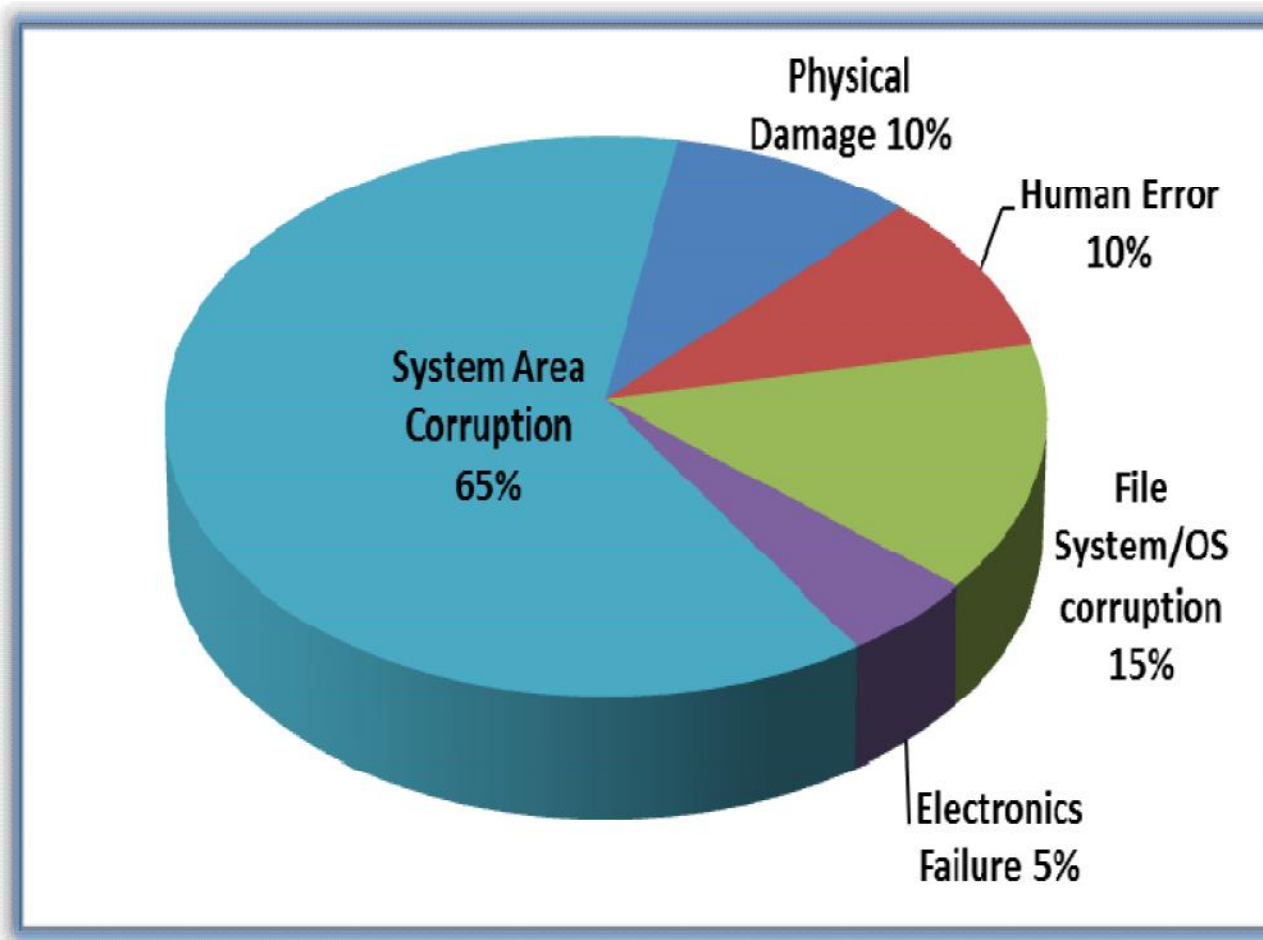
Technology Manager, Data Recovery



Overview of Challenges and Advances of SSD Data Recovery

- SSD Data Loss Causes
- Adoption Rates and Customer Perceptions of SSD based Storage
- Data Loss Realities, Advancements and Challenges

SSD Data Loss Causes



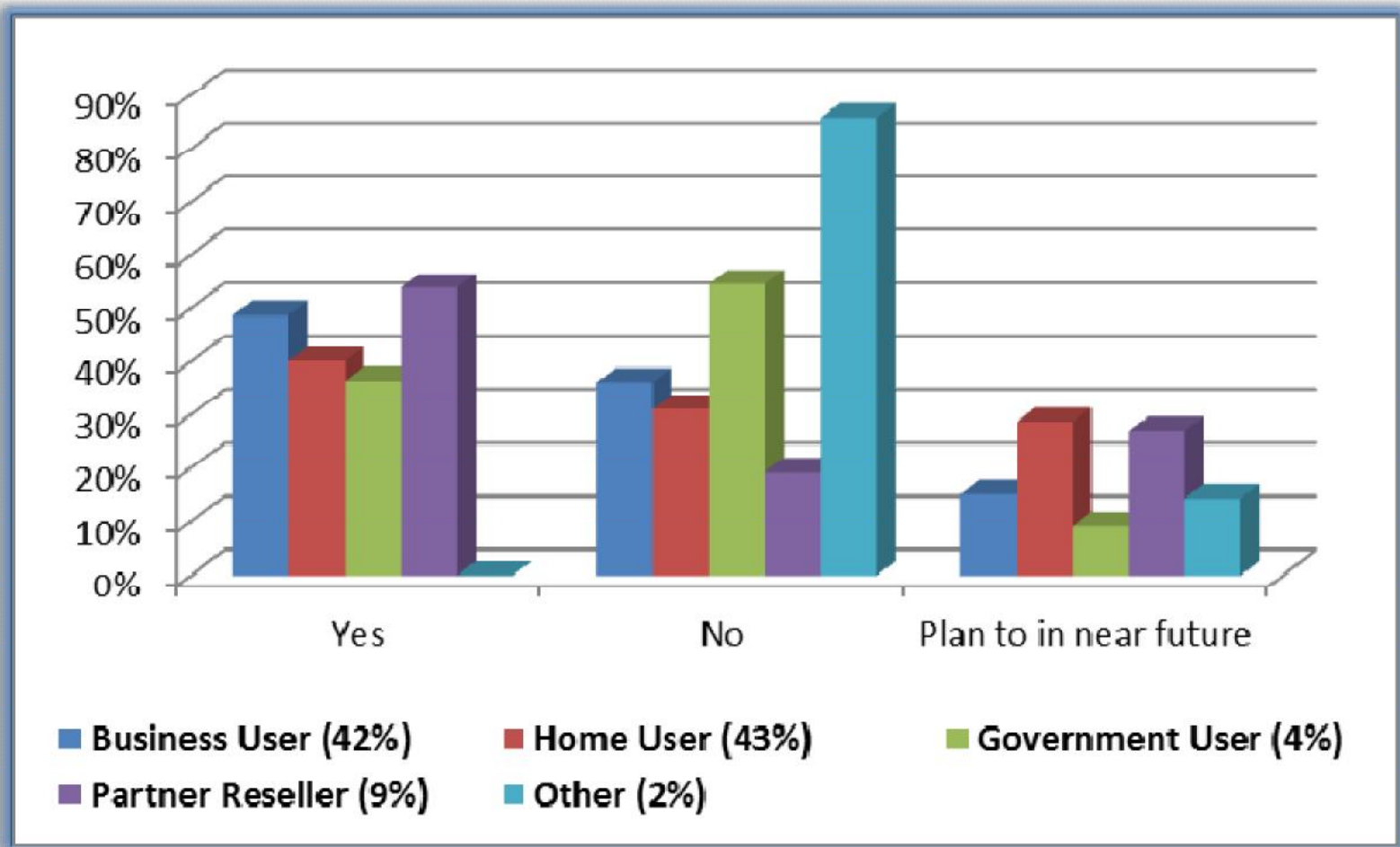
- Physical Damage**
 - Fire, Flood, Spilled Coffee
 - Dropped; Broken Connectors
- Human Error**
 - Deleted data, Reformat
- File System Corruption**
 - OS corruption, Virus
- Electronics Failure**
 - Controller, NAND Flash, voltage regulator
- System Area Corruption**
 - Mapping table, Firmware

Source: Kroll Ontrack July 2011

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Adoption Rates: Do you currently use SSD Technology?



Source: Kroll Ontrack July 2011

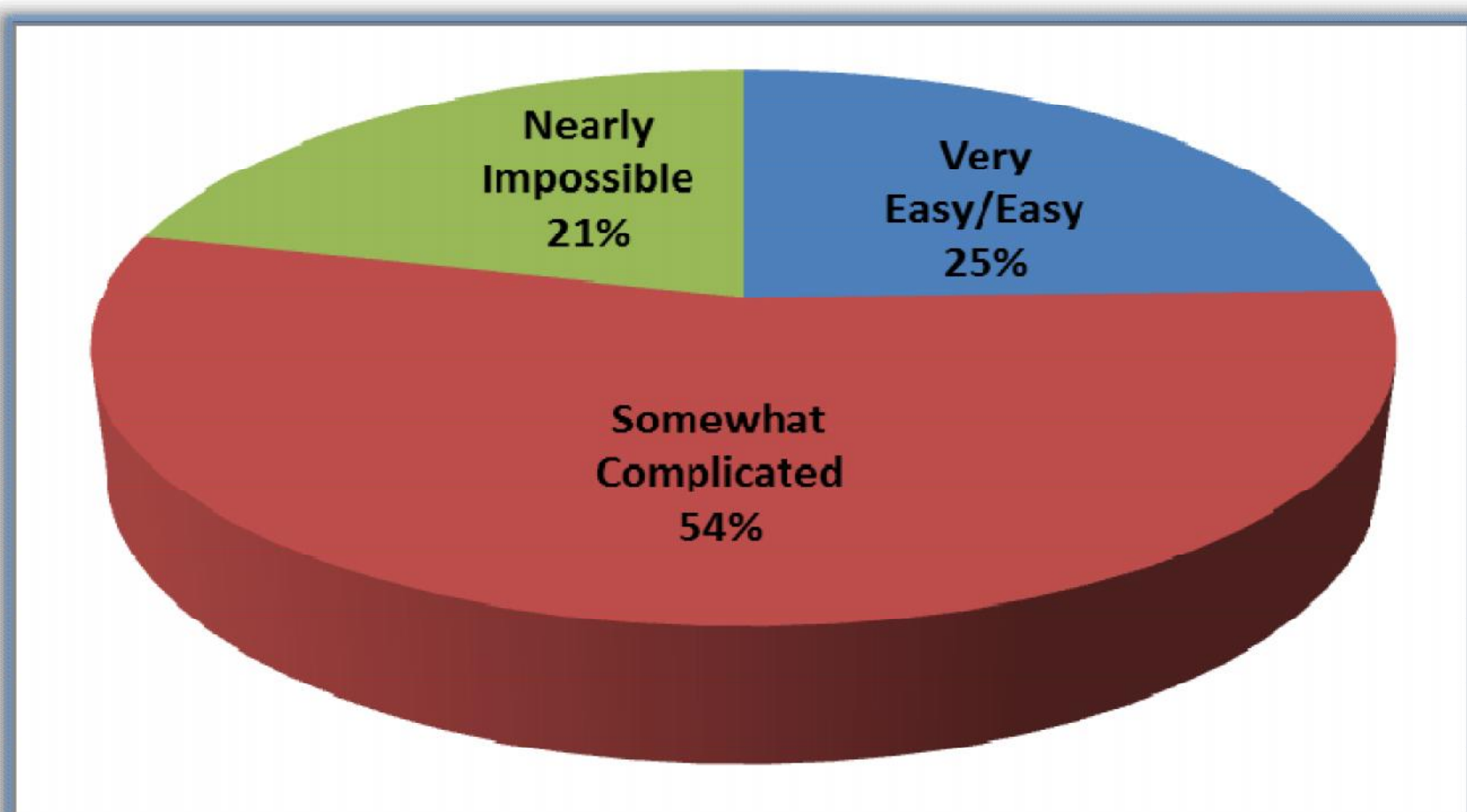
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Customer Perception

If you lose data on a Flash device or SSD, how easy do you think it is to recover it?

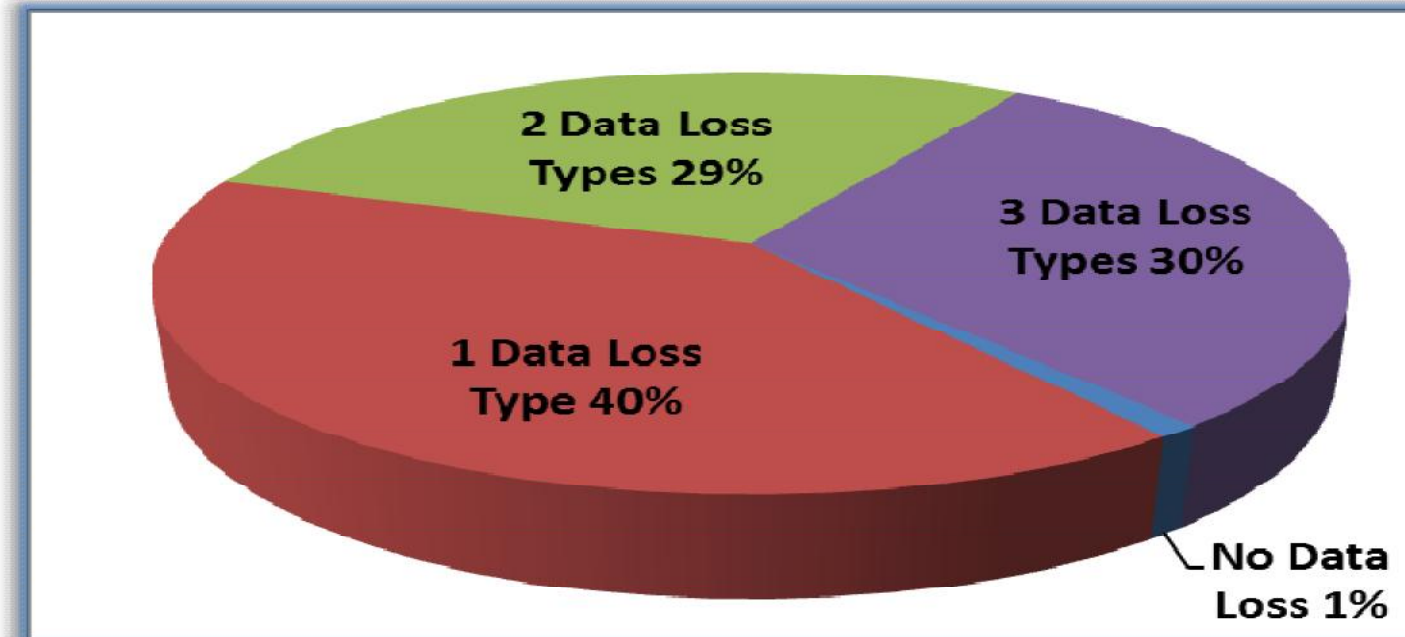


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Who Experiences Data Loss? Nearly EVERYONE!



Have you ever experienced data loss? *

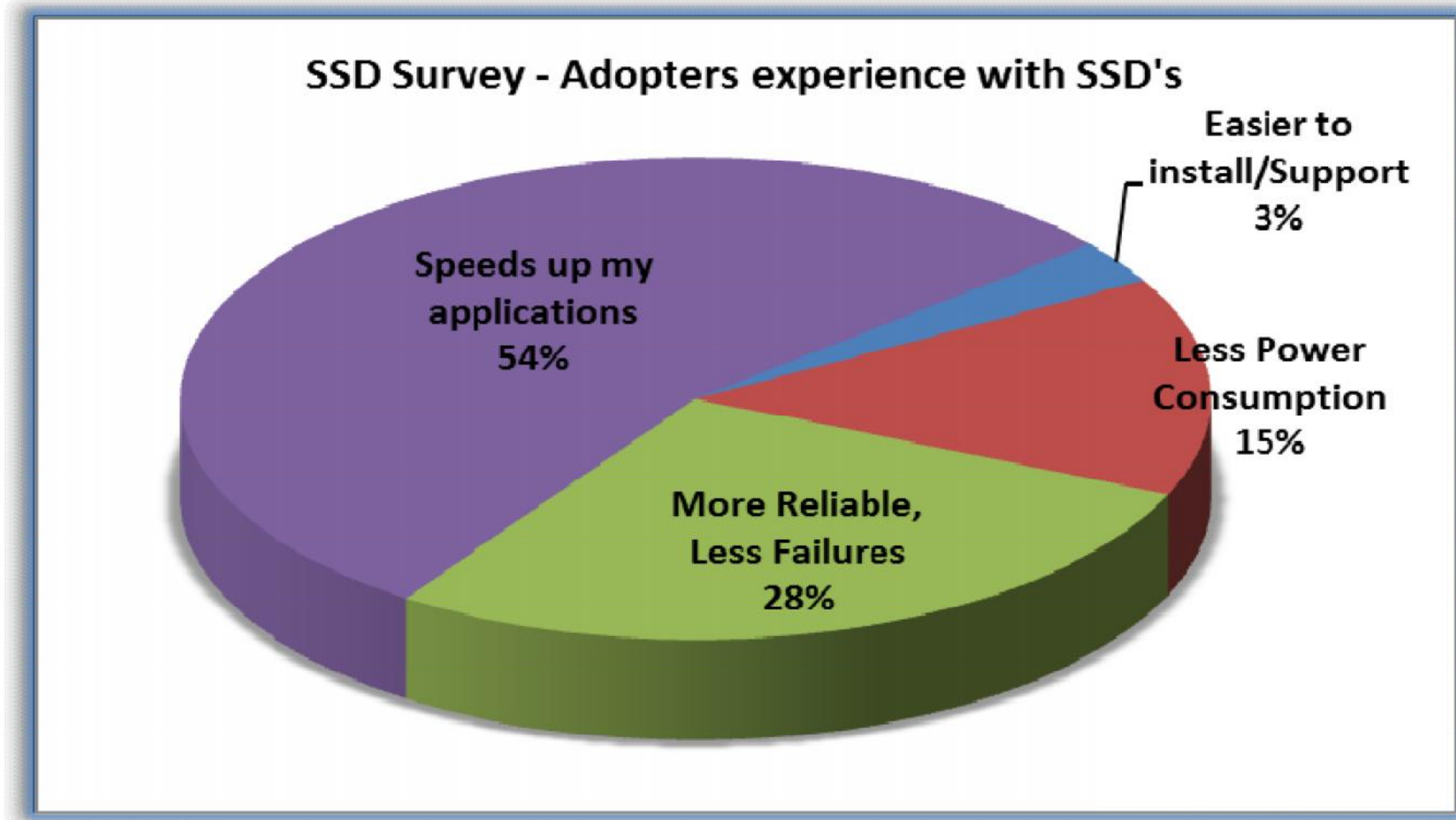
95%	Traditional HDD Data Loss
42%	Removable Flash (Camera Media, Smart Phone, USB stick, etc)
31%	Other (Tape, CD/DVD, etc)
15%	Solid State Drive (Enterprise/PC grade, Tablets, Music players, etc)

**Multiple Responses allowed*

Source: Kroll Ontrack July 2011

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Adopters SSD Experience

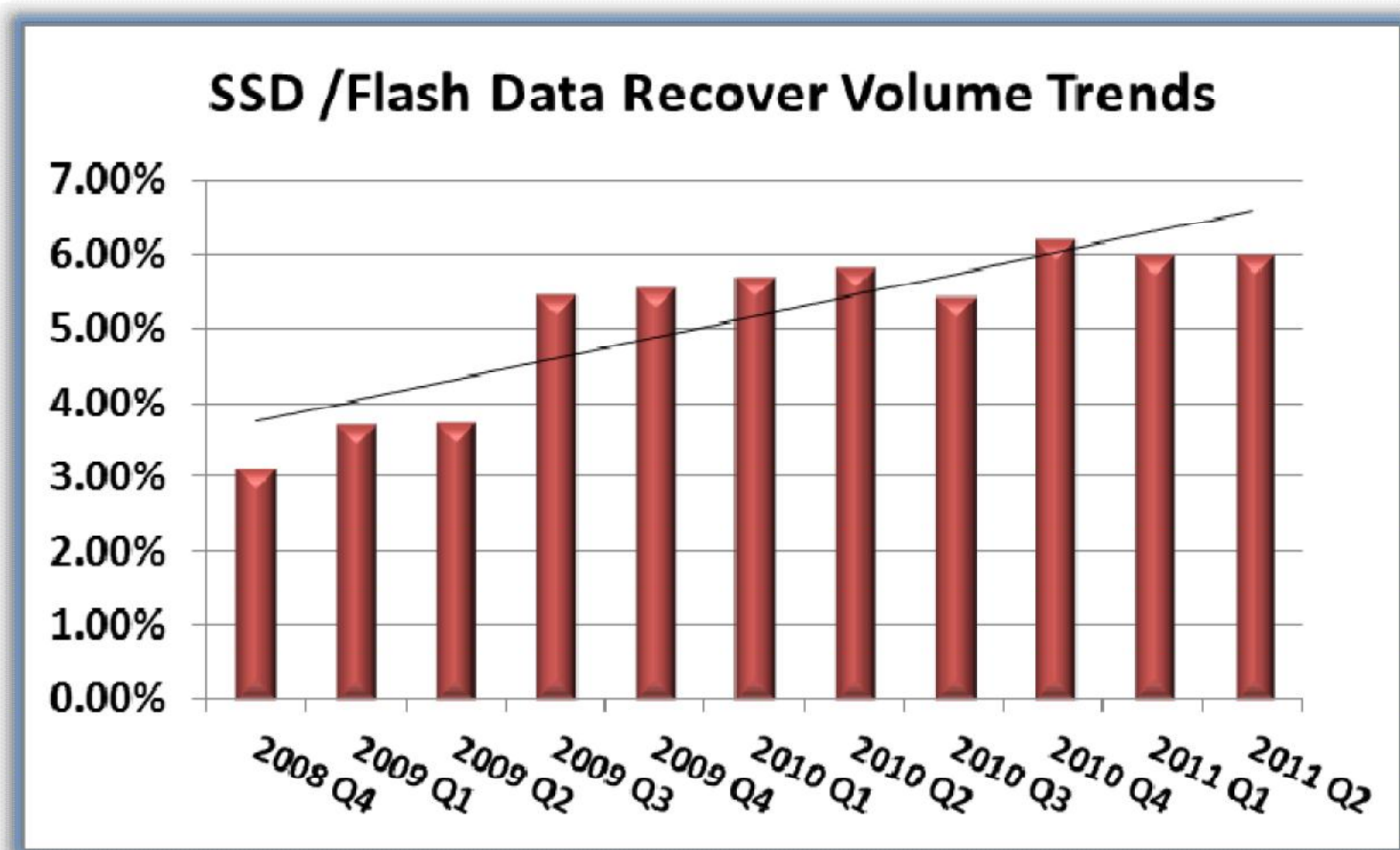


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Data recovery growth trends for SSD/Flash recoveries



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Data Recovery Advances and Challenges for SSD

- System area access via diagnostic port *
- Proprietary Interfaces (Ex. MacBook Air Blade, Camcorder, Monolithic SD, etc)
- Various NAND flash package styles (Ex. LGA52, TSOP56, Synchronous)
- FLASH structure rebuild from raw NAND flash data extraction
 - ECC decoding (BCH, Reed Solomon, LDPC *)
 - Data striping
 - Data Scrambling *
 - Wear Leveling
 - Encryption *
 - Compression *
 - Mapping

* Ongoing Challenges & Future R&D direction





Maintaining User Confidence in SSD Technology

- Design considerations for improving data accessibility
 - Mapping data redundancy
 - Multiple copies of mapping table(s)
 - Varied mapping data formats and locations
 - Store mapping info in metadata bytes within each data block
 - Enable rebuilding / restoration of corrupted mapping table
 - Run automatically from diagnostic mode?
 - Non-Destructive Firmware updates
- Other Design considerations
 - Secure Erasure verification for ensuring data destruction
 - Certification Report showing number of blocks successfully erased (Active, Spare, Bad, System Area, etc)



Thank You

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Troy Hegr is the Technology Manager for Kroll Ontrack's Data Recovery division. With more than 20 years in the data recovery and computer forensics industry, he serves on Kroll Ontrack's global Technology Committee and functions within the Product Line Management group. During his tenure, Mr. Hegr has held positions in data recovery, computer forensics, and clean room engineering, as well as R&D and IT management. He is a graduate of DeVry Institute of Technology.

About Kroll Ontrack

Through its Ontrack Data Recovery products and services, Kroll Ontrack is the largest, most experienced and technologically advanced provider of data recovery products and services worldwide. Using its hundreds of proprietary tools and techniques, Ontrack Data Recovery helps businesses and consumers recover lost or corrupted data from virtually all operating systems and types of storage devices through its do-it-yourself, remote, in-lab, and onsite capabilities.