



Flashprofiling

selecting the optimal flash storage product



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THE COMPANY

1986 GEGRÜNDET IN HANNOVER

1991 ERSTER EUROPÄISCHER DISTRIBUTOR FÜR SANDISK FLASH MEDIA

2,000 QM SICHERHEITSLAGER

2,500 QM BÜRO & PRODUKTION

30 YEARS OF
FLASH TECHNOLOGY EXPERIENCE
IN 2018

1989 HERSTELLER DER ERSTEN EUROPÄISCHEN SSD

1999 HERSTELLER DER ERSTEN FLASH-KOPIERSYSTEME

2006 VORSTELLUNG DES ERSTEN KOPIERROBOTERS

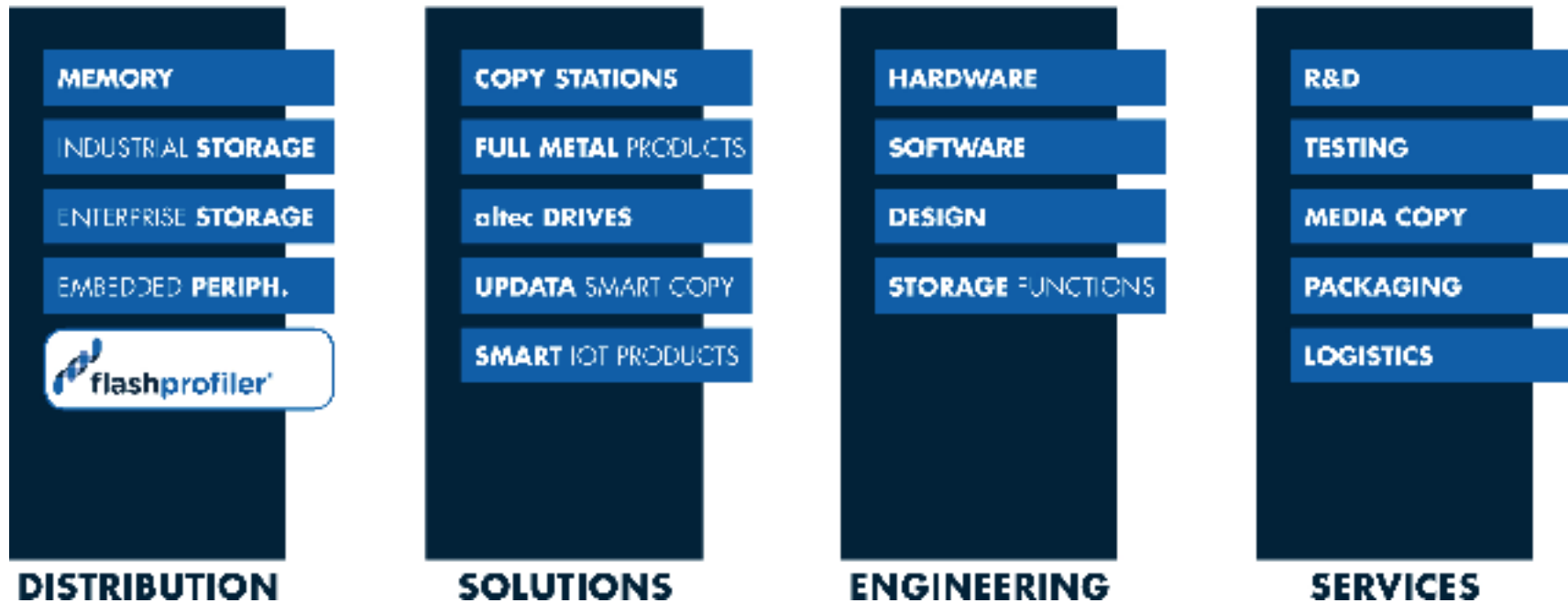
2009 MARKTEINFÜHRUNG DER SERIE IQ -
DIE WELTWEIT SCHNELLSTEN KOPIERSYSTEME

2012 VORSTELLUNG DER SPEZIAL-FLASHSPEICHER
SEAL, FULL METAL UND HERMETIC

2016 VORSTELLUNG DES FLASHPROFILER® - DEM
ANALYSEWERKZEUG ZUR SPEICHEROPTIMIERUNG

2017 PRÄSENTATION DER INDUSTRIELLEN
FLASHSPEICHERMARKE acon®

THE COMPANY



WHY IS AN OPTIMAL FLASH PRODUCT NEEDED?

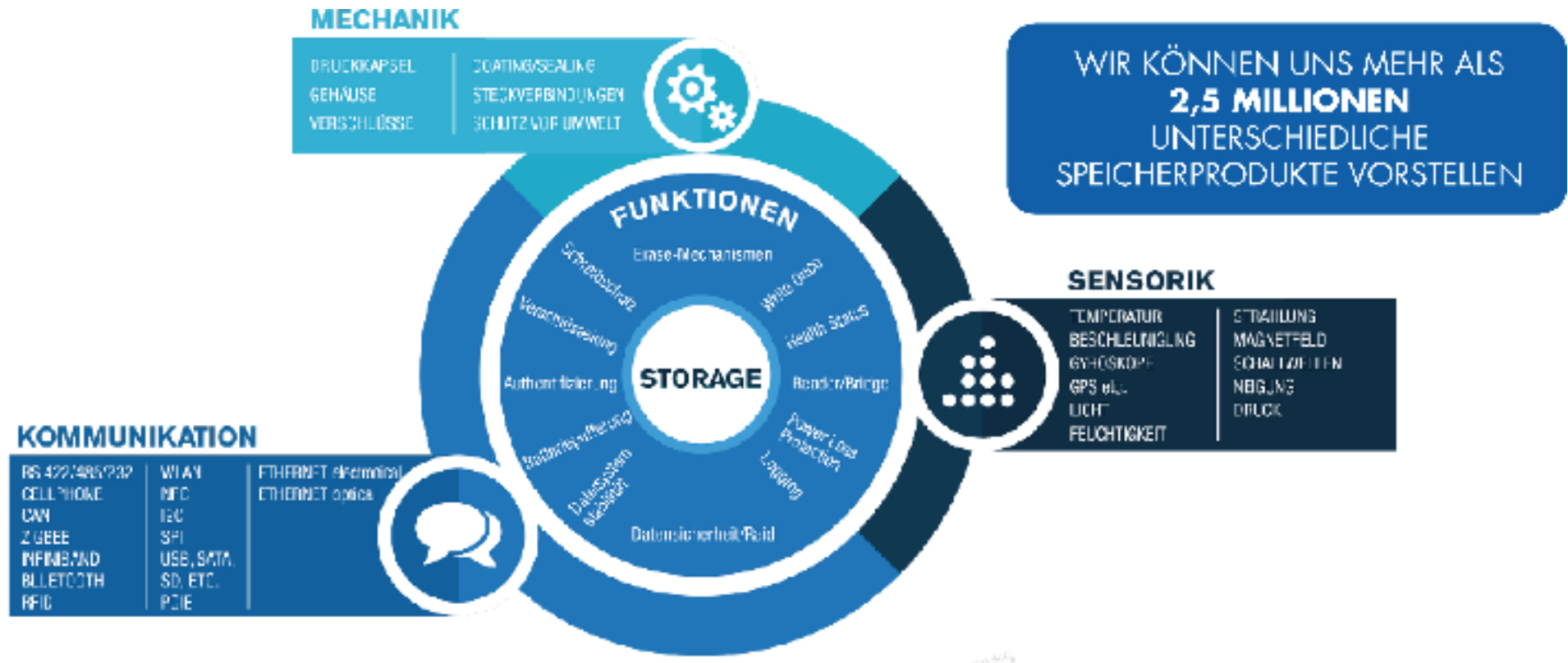
- **Reliability** environment, endurance
- **Performance** under live conditions
- **Price** savings ./ over dosing
- **Availability** product roadmap, popular capacity

THE RIGHT CHOICE...

...IS A MATTER OF DIFFERENT PARAMETERS
RELATED TO:

- **Environment** operating conditions
- **System** frame & architecture
- **Operations** the daily mission

THE VARIETY OF FLASH...



ENVIRONMENT SYSTEM OPERATIONS

- Temperature
- Humidity
- Shock
- Vibration
- Mechanical durability
- Chemical resistance
- Electromagnetic resistance
- Radiation resistance

ENVIRONMENT **SYSTEM** OPERATIONS

- **Form factor** design size
- **Type of media** interface, transfer rate, comm. skills
- **Power efficiency** system independence
- **Power loss function** intermittence, black out

ENVIRONMENT **SYSTEM** OPERATIONS

POWER LOSS FUNCTION

- Save the power consistency
- Reduce event risk by precaution
- Avoid problematic situations
- Physical energy reserve

ENVIRONMENT SYSTEM OPERATIONS

- Technology
- Capacity
- Speed
- Endurance
- Data Retention
- Mechanical requirements
- Highest reaction time
- Special functions

ENVIRONMENT SYSTEM OPERATIONS

TECHNOLOGY

- SLC
- pSLC
- MLC
- TLC
- QLC
- **3D Nand**

+

- Capacity up to 4TB
- Less power 3D TLC./ 2D MLC

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- Lower capacities <32GB
- Long life cycle

ENVIRONMENT SYSTEM OPERATIONS

SPEED

- Input-Output/s

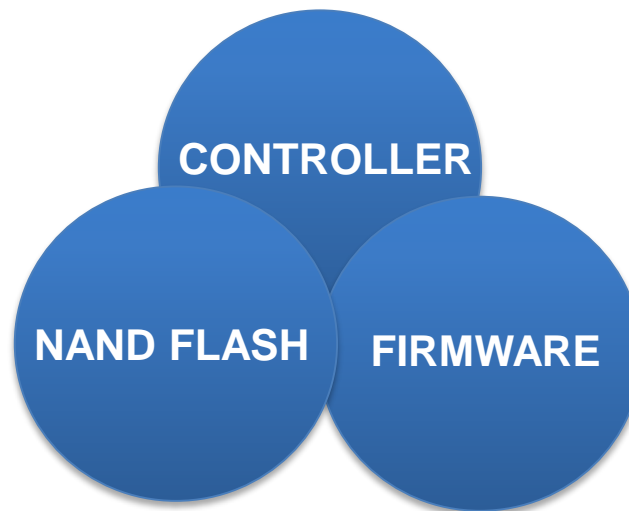
- Write/Read
- **Reaction Time**
- **IOPs**

- Relevant For Realtime Applications
- Guaranteed Data Volume Operations
- 100 MB/s =/10MB/0,1s

ENVIRONMENT SYSTEM OPERATIONS

ENDURANCE

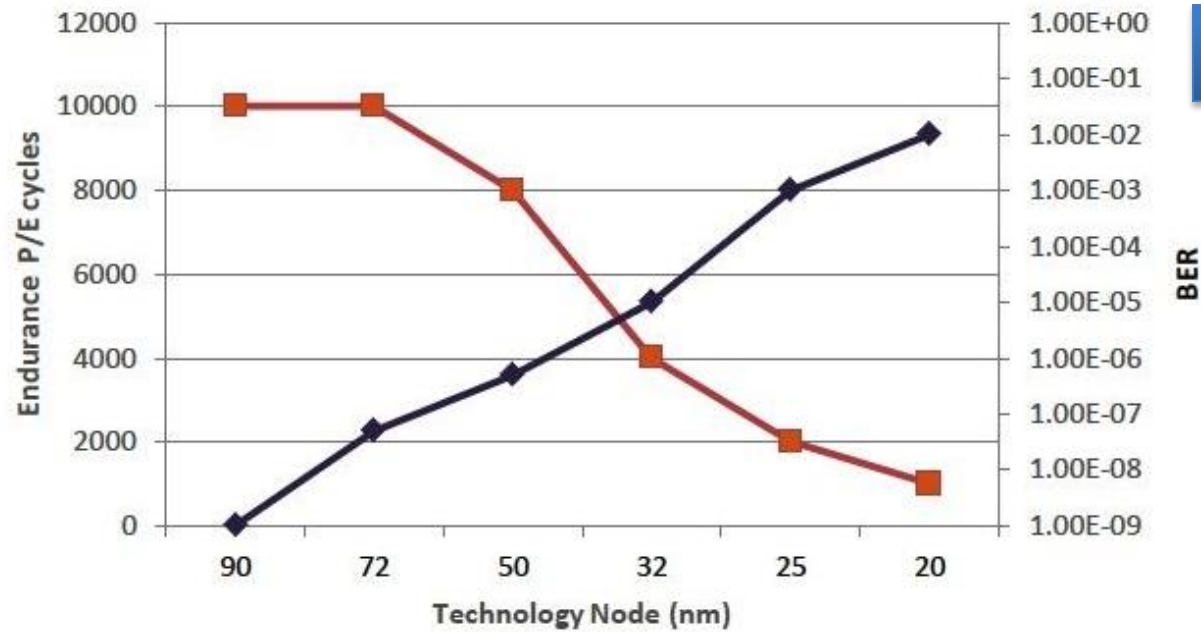
- Read-/Write frequency
- Data block size ./optimal block size
- Trim command supply



ENVIRONMENT SYSTEM OPERATIONS

ENDURANCE a matter of leverage

Program-Erase



Bit-Error-Ratio

Endurance
 BER

OBSTACLES OF FINDING THE PERFECT MATCH

- Resource time (process)
- Resource personnel, equipment
- Less customer focus price-driven
- Less competitor products avoid extra effort

SOLUTION

- Standard + representative testing process
- Focus: environment, system, operations
- Time + resource saving
- Documentation for our customer (proof)
- Taking competitor products in account



FLASHPROFILING

HOW DO WE PROFILE THE FLASH MEDIA?

- ① Pre-selection by environmental and system-related requirements
- ② Live recording of the individual pattern
- ③ Pattern analysis
- ④ Test report

FLASHPROFILING PRE-SELECTION

Selection of certain storage product series

Various criteria excluding endurance

Focus on environment

Special function requirements

DEPENDING ON APPLICATION

Interface

Capacity

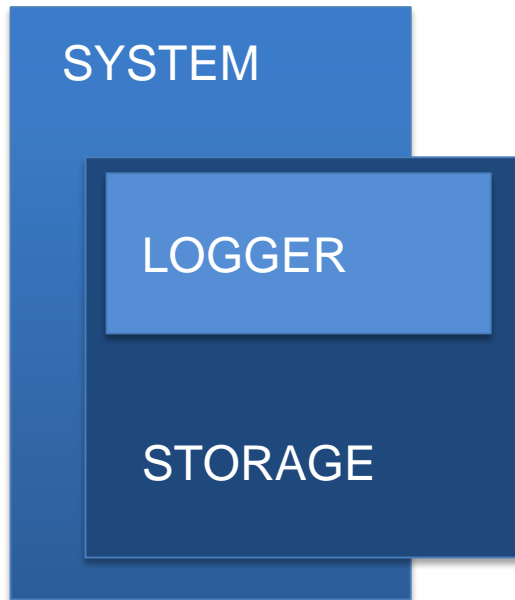
Mating cycles

Form factor

Power consumption

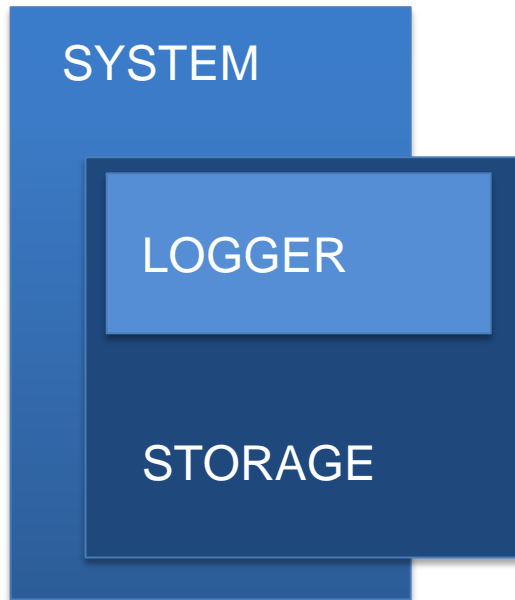
Performance (speed)

FLASHPROFILING LIVE-RECORDING



- Specialized storage device (traffic logger)
- Logging transactions in detail
- Logged information stored directly
- Logging transparent for operating system
- Logging block size distribution pattern
- Logging the exact sequence of individual transactions

FLASHPROFILING LIVE-RECORDING.2



- Storage transactions over a representative time
- Logging within the actual customer application
- Detailed access pattern can be acquired
- Live recording high-level facts
- Number of files within a given time
- Average size within a given time
- Storage transactions over a representative time

FLASHPROFILING PATTERN ANALYSIS

WAY 1 INFORMATION BY REFERENCE

Acquired test patterns classified into existing standard patterns with known impact on given storage products

- + A QUICK SELECTION OF THE BEST FITTING FLASH PRODUCT IS POSSIBLE
 - WITH A CERTAIN RISK

FLASHPROFILING PATTERN ANALYSIS

WAY 2 INFORMATION BY STRESS TO DEATH

Acquired test patterns applied in a time-lapse to different storage products >> products get stressed to death

+ MORE ACCURATE RESULT

+ POSSIBILITY TO DETERMINE THE ACTUAL LIFE-TIME

(REGARDLESS OF PRODUCT'S HEALTH STATUS)

FLASHPROFILING TEST REPORT

- Visualisation of decision chain
- Clear derivation for the particular selection
- Explanation of the endurance results
- Proposal of alternatives (pros/cons)

✦ HIGH CONFIDENCE FOR THE PRODUCT
SELECTION

✦ AIMING AT AN OPTIMAL COST/PERFORM: RATIO

FLASHPROFILING SUMMARY

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FLASHPROFILING



ENVIRONMEN
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SYSTEM

OPERATIONS

MILLIONS OF PRODUCTS
RESULT.

FLASHPROFILING ADVANTAGES

- + Convince your customers with facts
- + Increase your system performance
- + Reduce your qualification efforts
- + Get the perfect flash product
- + Save your system reliability
- + Save money
- + Save time



MERCI.
THANK YOU.
ANY QUESTIONS?



ADD-ON

QCON[®]
TAILORED STORAGE

