

B4-Flash for Tier 0 SSD Applications

More Features for SSD
with B4-Flash

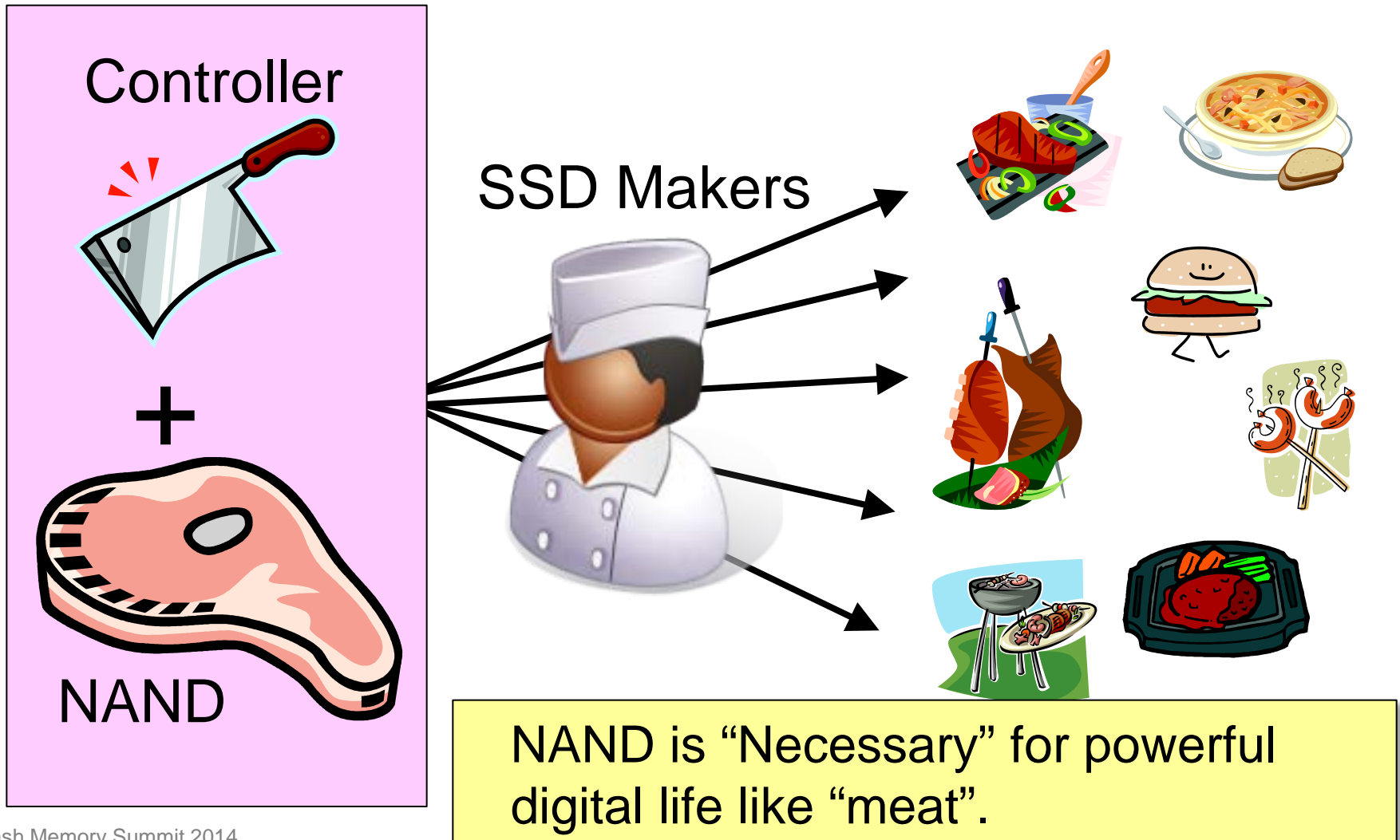
Moriyoshi Nakashima

GENUSION, Inc

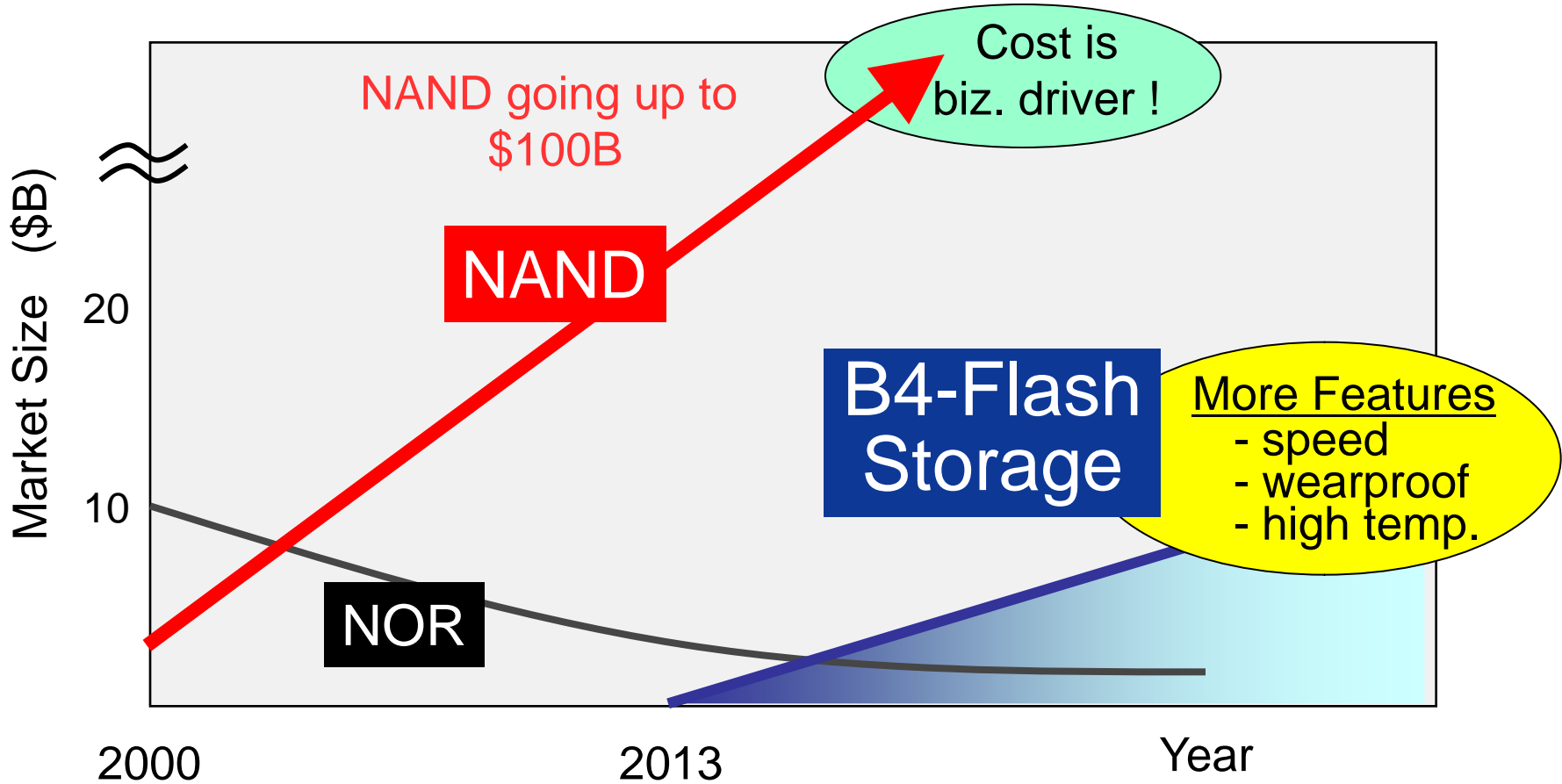
<http://www.genusion.co.jp/>

info@genusion.co.jp

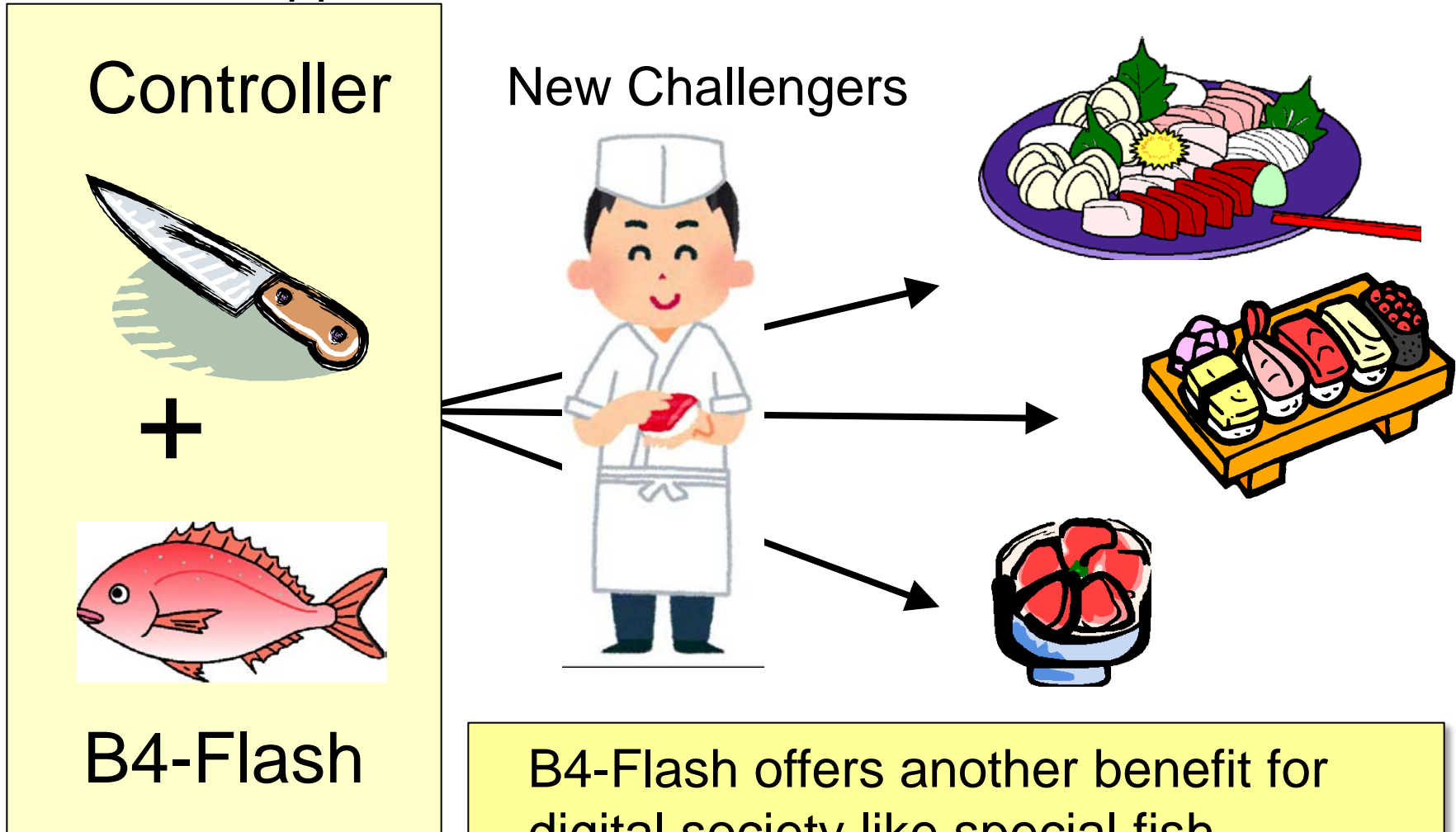
NAND has been well cooked with good controllers by nice SSD makers for great business.



NAND makes new opportunity for another Flash

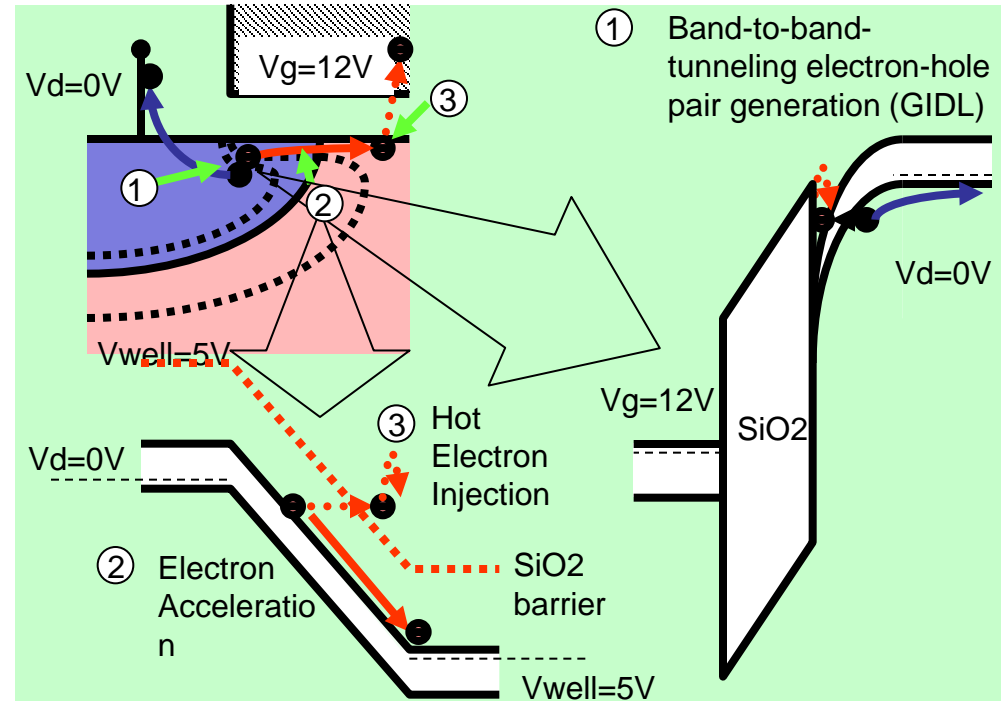
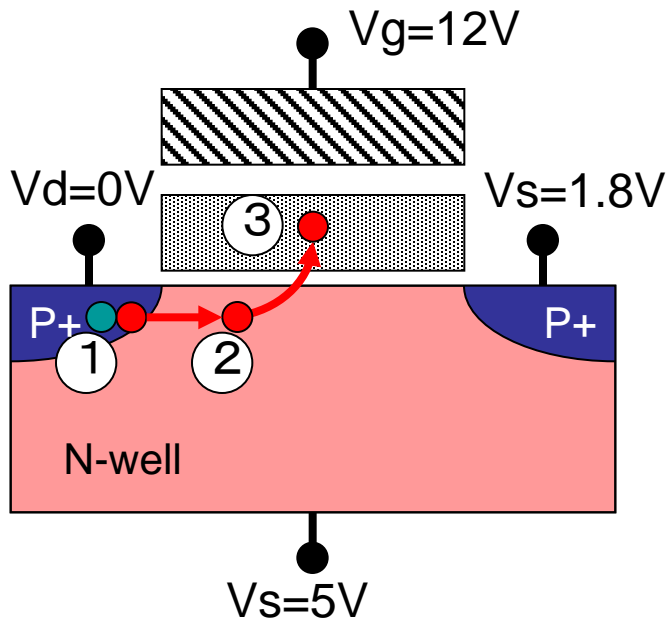


B4-Flash will be cooked with dedicated controllers by challengers for special applications.



B4-Flash is the Innovation of Flash technology

Back Bias assisted Band to Band tunneling (B4) - Hot Electron Injection

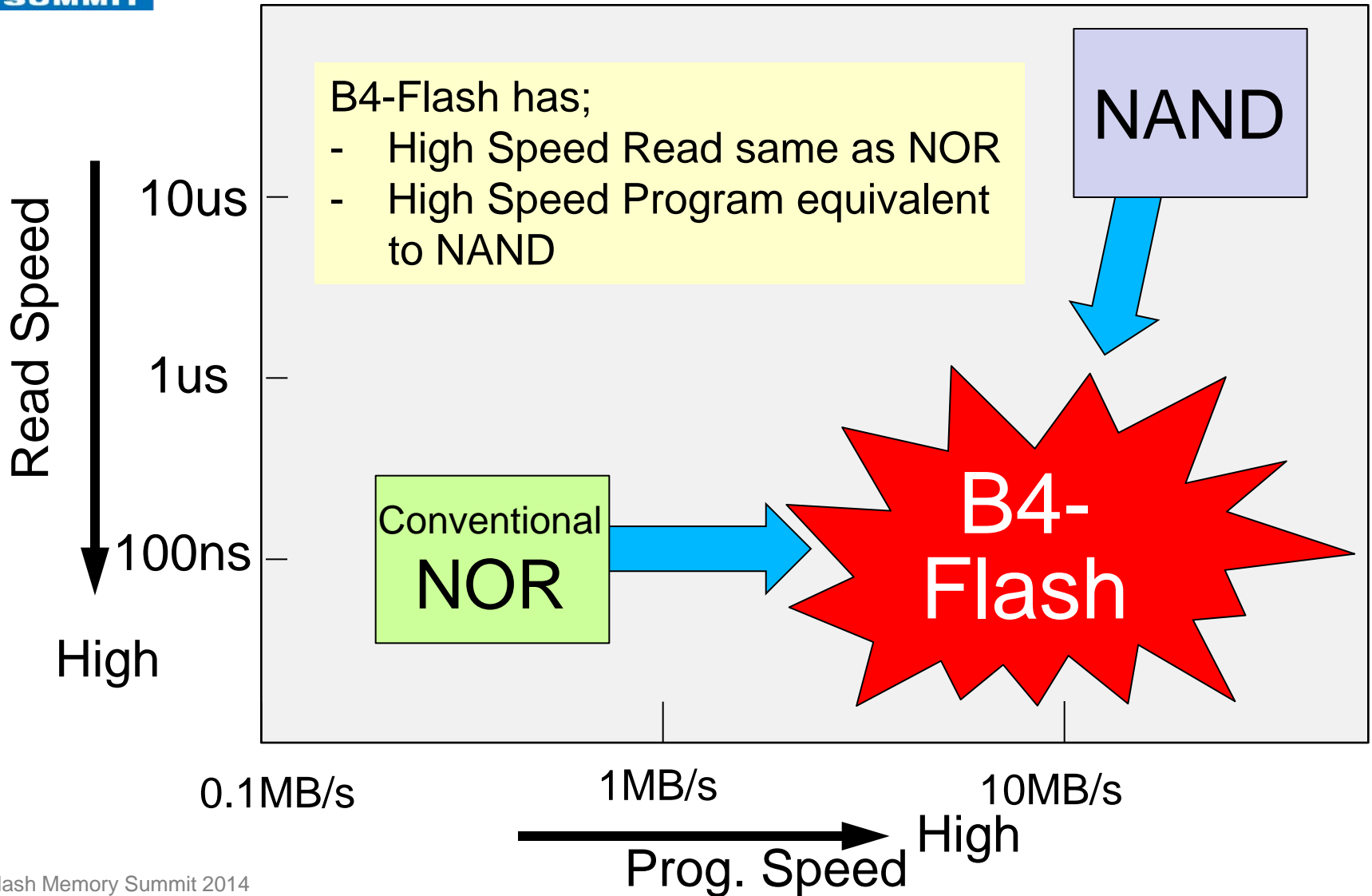


B4-HE injection + Pch MOS transistor memory cell



- NOR random read
- NAND level Program/Erase Speed
- Excellent Reliability

B4-Flash brings the new feature to Flash



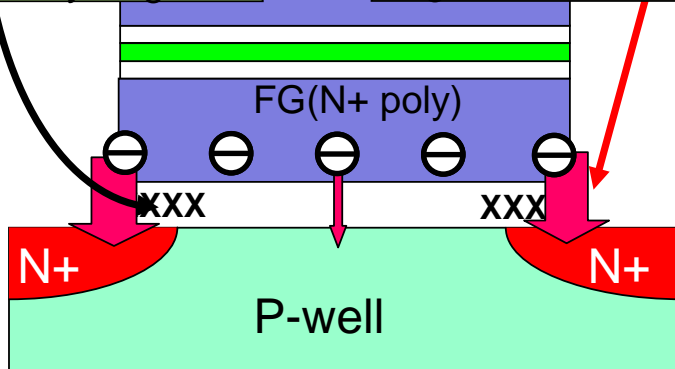
B4-Flash can offer Highest Reliable Flash Memory

Current NOR / NAND Flash

Retention failure initiates defects at gate edge region

1. Generating defects at gate edge by E/W cycling

2. Retention failure caused by gate edge defects

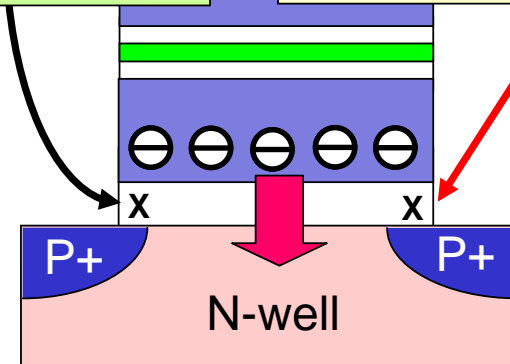


B4-Flash

No retention failure at gate edge

1. Electron doesn't pass through gate

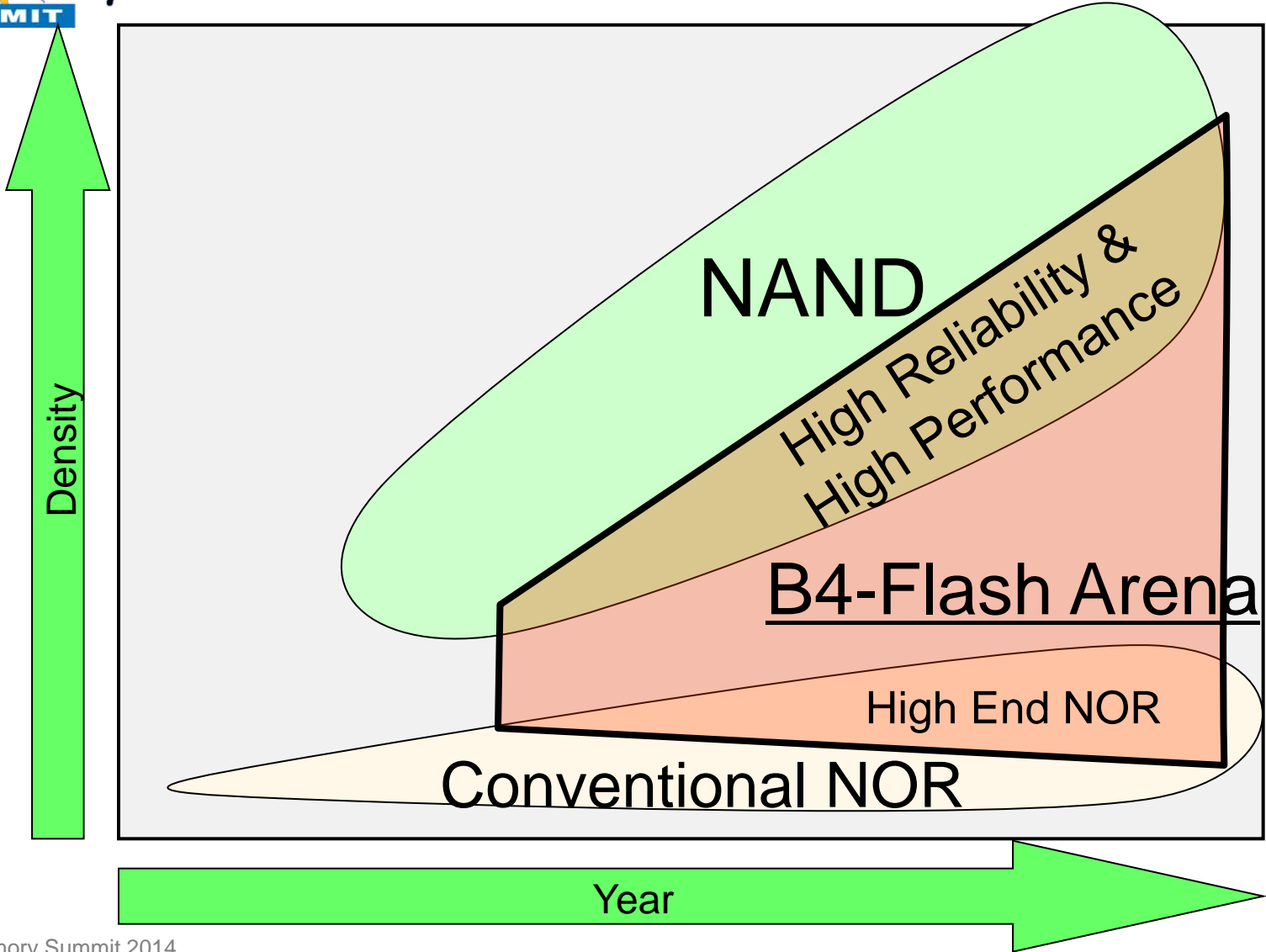
2. Electric field at gate edge is reduced



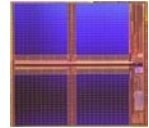
B4-Flash offers the Reliability Solution as;

- 100K Endurance,
- 20 years data retention @125C after 100K E/W
- operation capability @ 125C (under tough environment)

B4-Flash generates the new arena of Flash



The features of B4-Flash makes the new applications



NOR based

Arbitrarily
page write

100ns

100K E/W

Easy Random
Write

High Speed
Random
Access

Less E/W
Degradation

High
Read Disturb
Immunity

**B4-Flash
More Features !!**

Excellent
Retention

20yrs
@125C
After
100K
E/W

Wide Rang
Temperature
Operation

-40 - 105C
(125C challenge)

Which features will be needed for Tier 0 SSD
to achieve the highest performance ?

Specific SSD Applications with B4-Flash

Tier 0 SSD

- Low Latency, High IOPS
- Less Degradation of Performance
- Arbitrarily Random Page Write

B4-Flash Feature

- Fast Random Read; 100ns
← x100 faster than NAND
- High read disturb immunity
- Less E/W degradation

Long Life SSD

- 100 yrs retention SSD

B4-Flash Feature

- 20 yrs retention @125C
after 100K E/W
- High read disturb immunity

Utilizing B4-Flash Features !!

Tough SSD

- High Temp. Use SSD
- Continuous Read SSD

B4-Flash Feature

- 20 yrs retention @125C
after 100K E/W
- -40 -105C
(125C challenge)

High Reliable SSD

- Less wear leveling
- Stable performance
in life

B4-Flash Feature

- E/W 100K
- High read disturb
immunity

High Secure SSD

- Completely Physically
Erasable for each file
- Perfectly non-recoverable

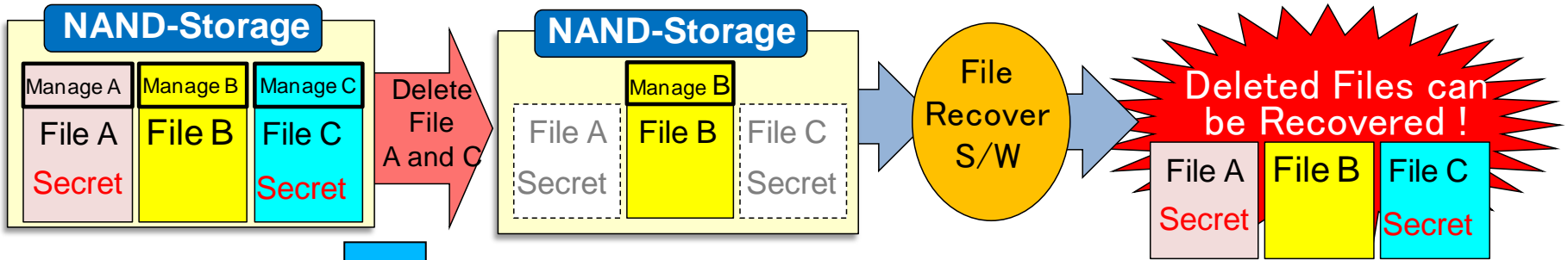
B4-Flash Feature

- E/W 100K Block 1% failure
- Arbitrarily random write

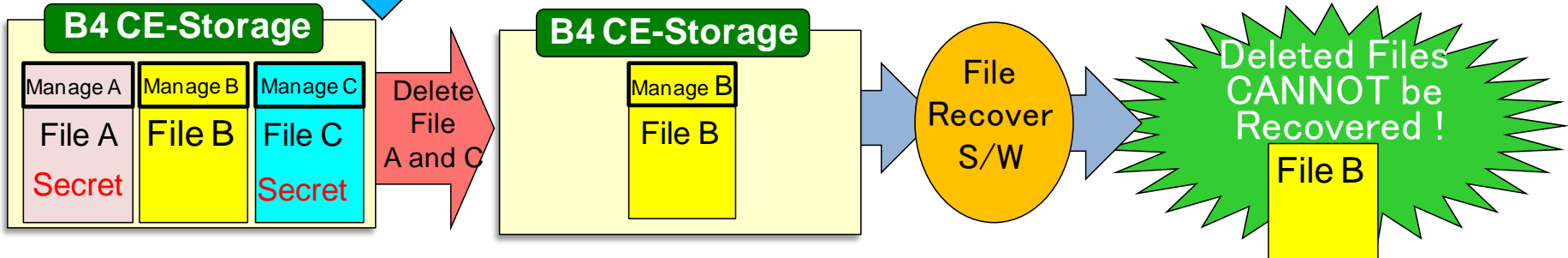


Already
in production

Even two B4-Flash features introduce the highest secure storage

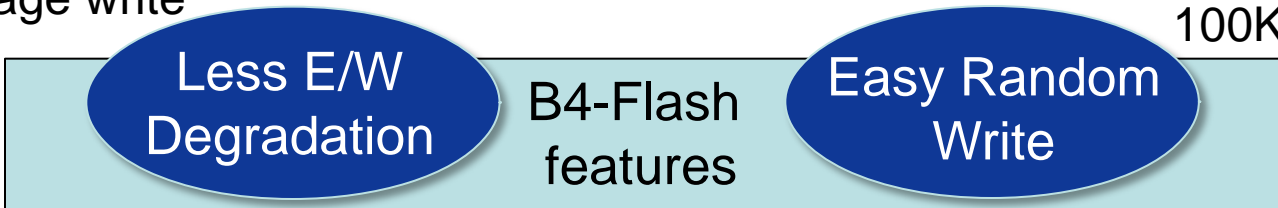


B4-Flash achieves Completely Erasable Data Storage thanks to its High Reliability.



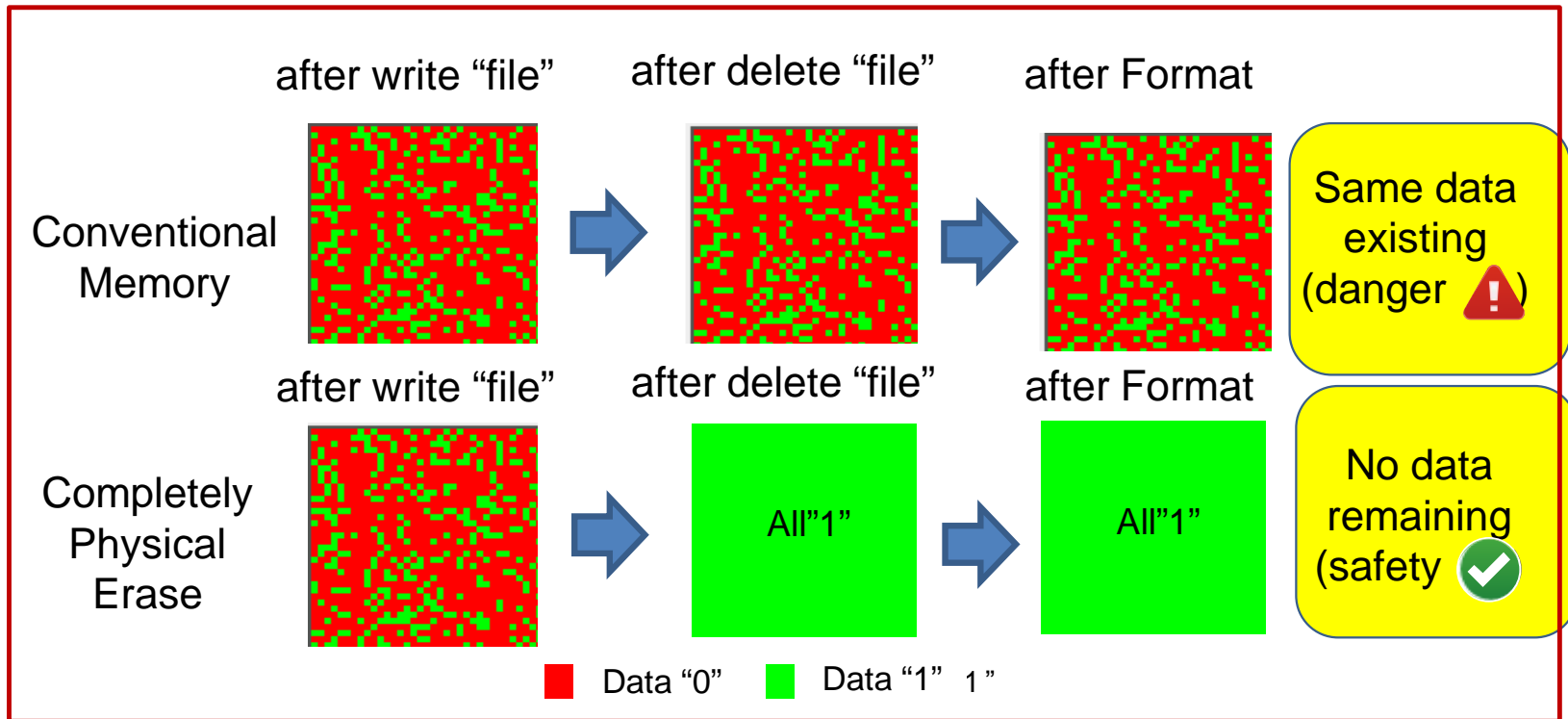
Arbitrarily page write

100K E/W



Bit Map Analysis of each Storage Memory

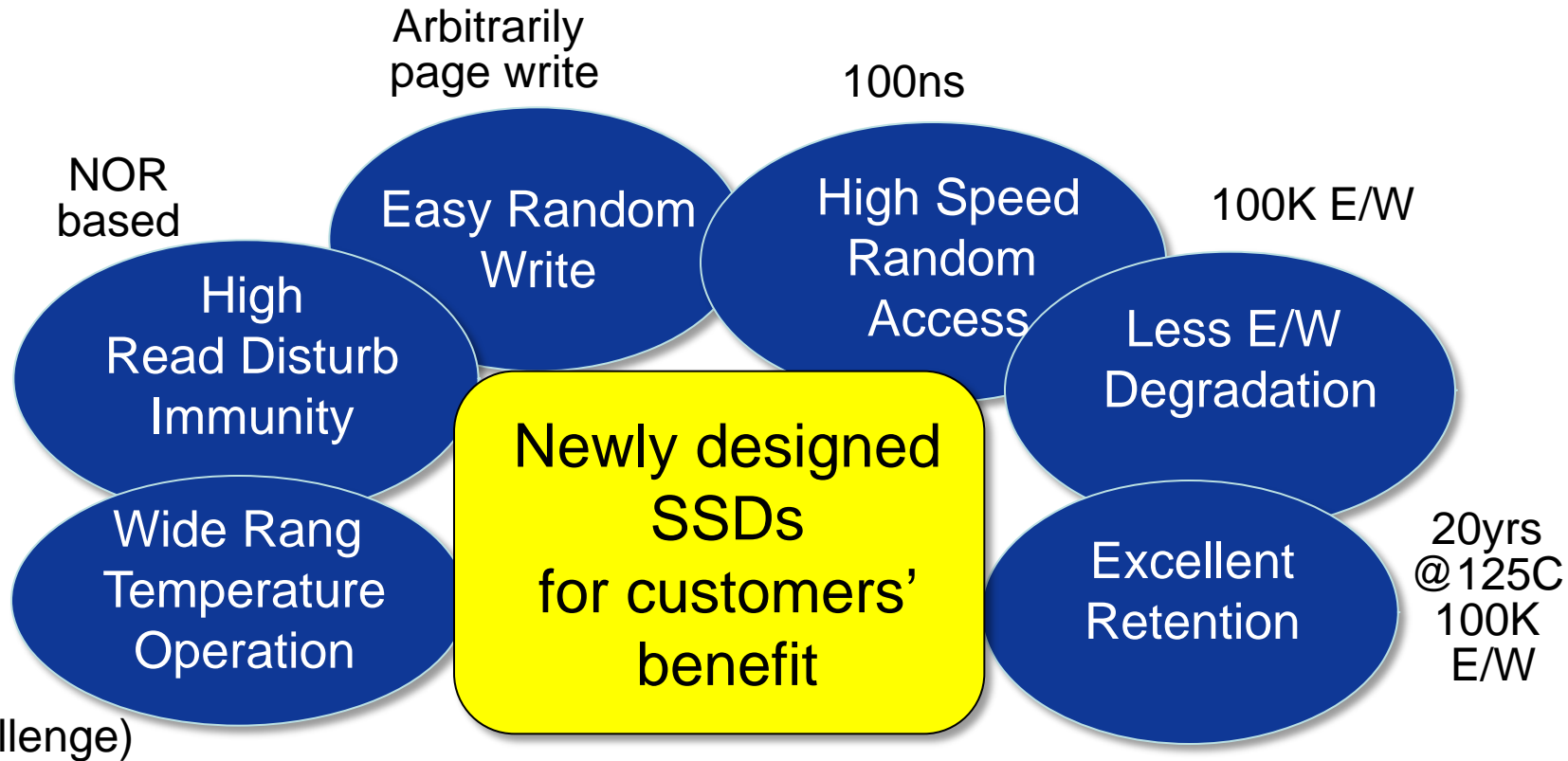
In the case of File Data Delete and Format with NAND based and B4-Flash based



What aspects does Tier 0 SSD need ?

1. Low Latency / High IOPS ?
 - From not the controller but the Flash device itself
 - Controller can accelerate it more with ease
2. No Degradation through its life ?
 - High E/W Endurance
 - High read disturb immunity
 - As a result less wear leveling necessity
3. Long life ?
 - High DWPD (Drive Written Per Day) instead of TBW
4. High Retention ? ----may not be necessary ?
5. High Temperature ? -----may not be necessary ?
6. Others ??

What features do you like to achieve for another SSD ?



You can cook B4-Flash
for your delicious dishes.

GENUSION's direction

We can utilize the features of B4-Flash for specialized SSDs.

We believe NAND has developed the new horizon of the semiconductor business for the IT society and will continue it toward \$100B business.

GENUSION hopes to contribute to create another customer's benefit based on the features of B4-Flash.

GENUSION can develop the best suited B4-Flash architecture for the specific storage applications according to the market requirement supported by controller and SSD makers.



Let's get started with B4-Flash
to inspire your Life !

Your Life of SSD user ?
Your Life of Engineering ?
Your Life of Entrepreneur ?