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Mobile Intelligence™

8/15 IEEE Presentation

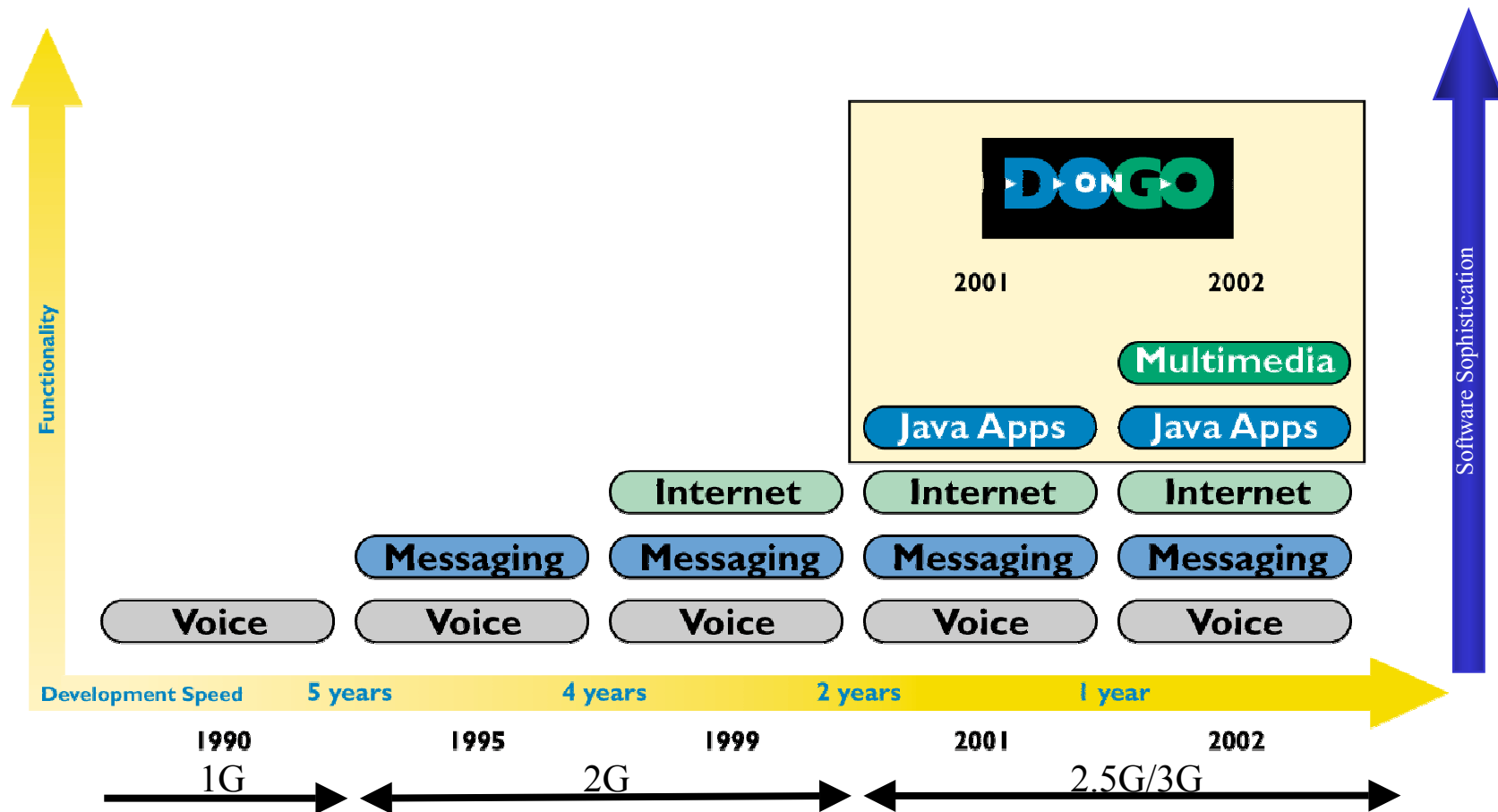*Michael Liu*
VP of Engineering

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Market Trends & Core Technologies

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2.5G/3G and Wireless Java is Industry New Trends

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Industry Opportunities and Challenges

- Opportunities
  - 2.5G/3G: improved communication bandwidth – enables rich software offering and multimedia access
  - Java: open and industry standard platform for application development and deployment – stimulates and accelerates wireless application advancement
- Challenges
  - Increased embedded software sophistication – embedded software is prone to bugs and an infrastructure for bug fixing is indispensable
  - Accelerated standard evolution – enforcing version control over kernels, libraries, and tools saves huge maintenance cost
  - Transition to new value-added, higher ARPU services – enabling embedded software for open feature update is the key to success of miniature computing

Embedded software advancement → *Application advancement* → *User experience improvement* → *Hardware advancement*
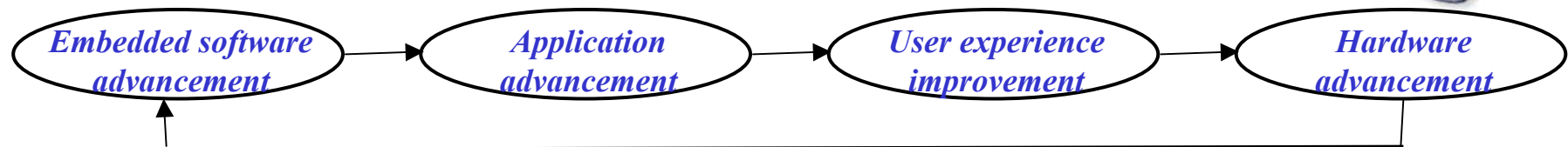
Phone Recalls: Only the Tip of the Iceberg!

NTT DoCoMo embarrassed by Java handset sales suspension
Financial Times, February 9, 2001

SONY to recall 120'000 mobile
phones at a cost of $95 millions.
Nikkei Electronics, May 22, 2001

Nokia recently disclosed a software
problem that could affect its plans to
launch next-generation technology,
called "3G."
CNet, April 24, 2001

Vodafone Warns of 3G Services Delay
Financial Times, August 8, 2002
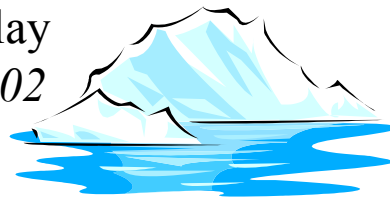
Sales Suspended of Latest
i-Mode Wireless Phone
3G News, April 26, 2002

SK Telecom May Delay 3G Until 2004
Financial Times, April 25, 2002

SonyEricsson Puts 3G Phones on Hold
BWCS, October 25,2001

NTT DoCoMo scales back its plans
for 3G due to software problems
Financial Times, April 24, 2001

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Introducing Intelligent Software Infrastructure

Application Layer	• Games/E-mails • Banking Application • Micro Browser
Intelligent Software Infrastructure	• S/W Maintenance • Java App Mgmt & Prov • Caching/Virtual Memory
Wireless Communication Layer	• GPRS/CDMA Servers • IP Servers • HTTP/WAP Servers
Hardware	• Base Stations • Networking Equipment • Switch Centers

The Bridge for Advanced Wireless Internet

Wireless Carriers

Content

Mobile Users

Intelligent Device Software Maintenance

Intelligent Java Application Management and Provisioning

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Scalable & Integrated S/W Mgmt Infrastructure

DoOnGo Technology Foundation

| Client Side Billing Data |
| Personalized Service |
| Server Side Billing Data |
| Centralized Update Control |
| Remote Change Notification |
| Critical Comp Update |
| Device Memory Mgmt |
| Diff Update |

System Upgrade

DeltaRewrite™

DeltaUpgrade™

SmartJAMP™

WAMP/DTF

Embedded S/W Maintenance

Java Provisioning & Mgmt
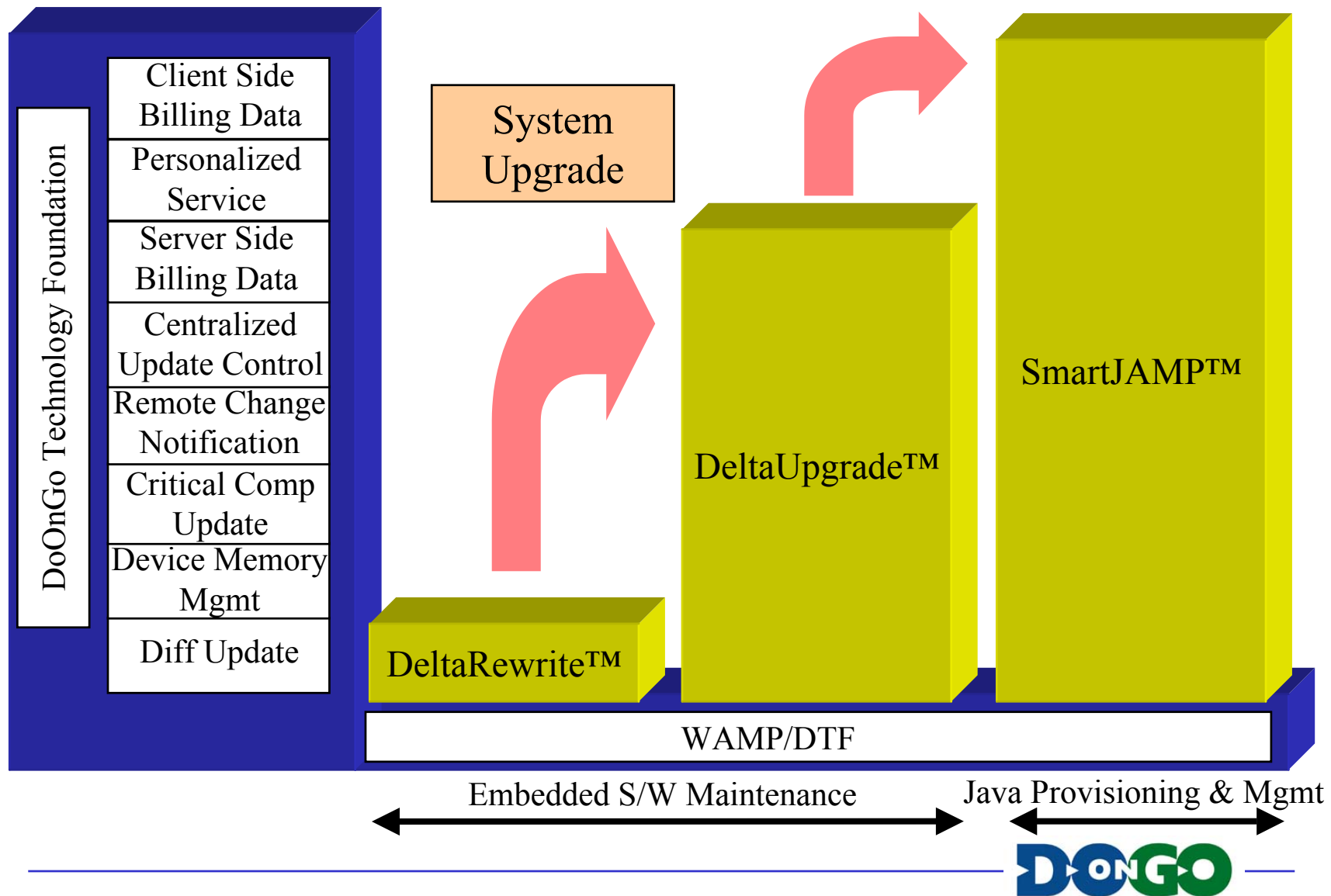
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Products & Core Technologies

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DoOnGo Core Technologies

14 Patents filed!

Diff Engine and **Critical Module Update*** are most critical!

Differential Engine For File Size Reduction

100% Failure Recovery Mechanism

Module-Based Memory Management

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Update Management And Scheduling

Critical Component * Update

User Notification On Updates

Update Control
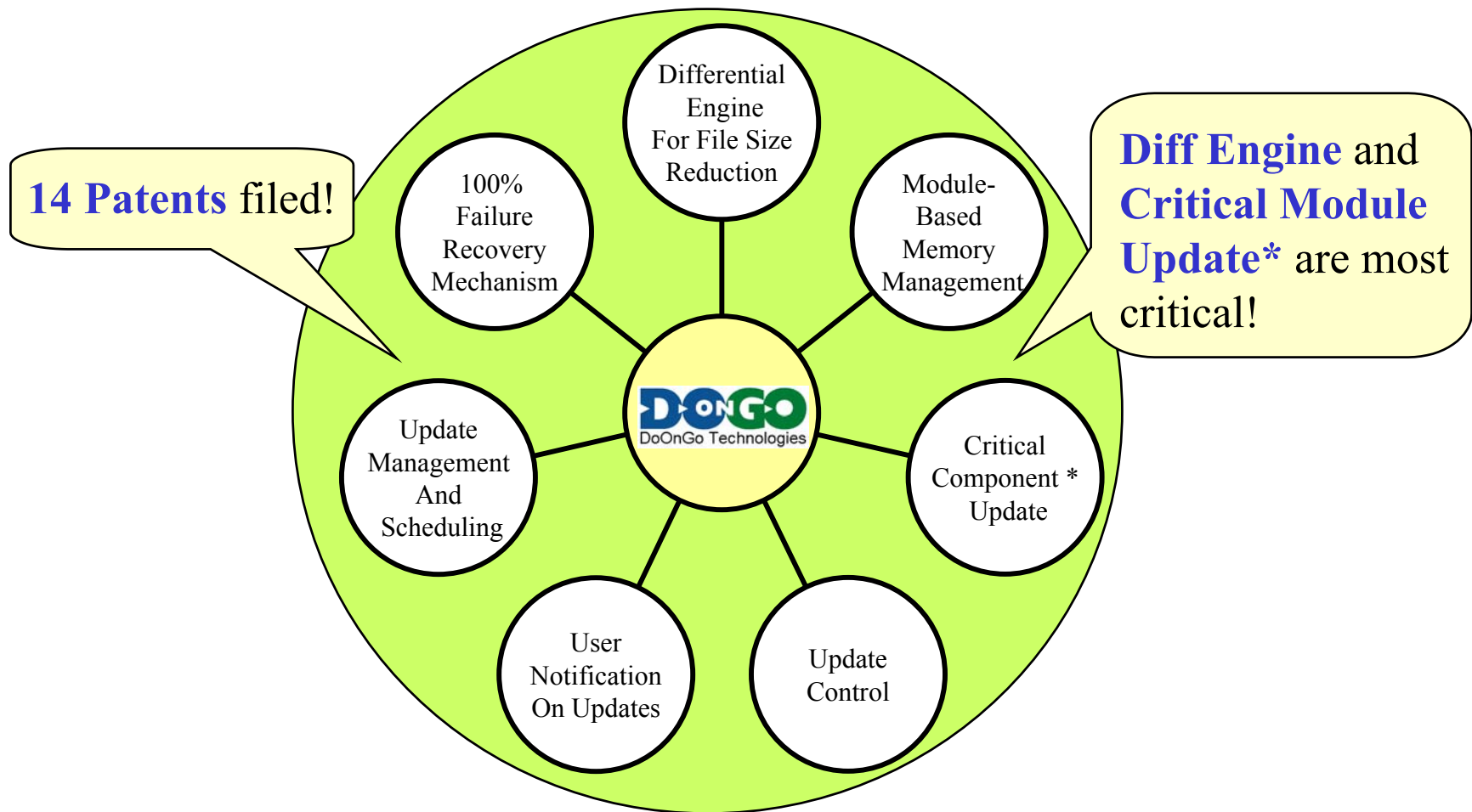
* Critical Components = RTOS/Protocols/Drivers/…

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DeltaRewrite/DeltaUpgrade Architecture

DR is a backup insurance for costly device recall!

DR = DeltaRewrite
DU = DeltaUpgrade

New Software Distributor

Packing Server with Diff Engine!

DU is a premium insurance for Costly device recall!

New Software Component Distributor

Device Manufacturer

DU is an enabler for phones that change over time!

Proxy Server

Fixed Network

Rewrite Server

(1) • Distribution

(2) Rewrite

Rewrite Client/ Upgrade Client

Integration   Interoperability

Wireless Network

Software Certification Server

Upgrade Manager

SMS Gateway

(1) Approval   *(2) Control*

Upgrade Server

(3) Notification

(4) Update

(4-1) Query/response
(4-2) Reserve/scheduling
(4-3) Actual update

Carrier

DU is also a great service Promotion tool!

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Product Impact and Market Momentum

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Examples of Cost Savings with DeltaRewrite

DeltaRewrite
**Saving major costs
with software bug fix**

Cost savings with DeltaRewrite

✓ *Prevent considerable goodwill and image loss with wireless handset vendors and carriers*

✓ *Lower logistics cost of recalled handset*

✓ *Lower handling costs (intake of handsets and return distribution)*

✓ *Lower voice/data revenue losses during bug fix*

✓ *No reflash of phone memory at factory site*

✓ *No new packaging of reflashed handset*

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Examples of Cost Savings with DeltaUpgrade

DeltaUpgrade
Saving major costs
with software bug fix
& *version control*

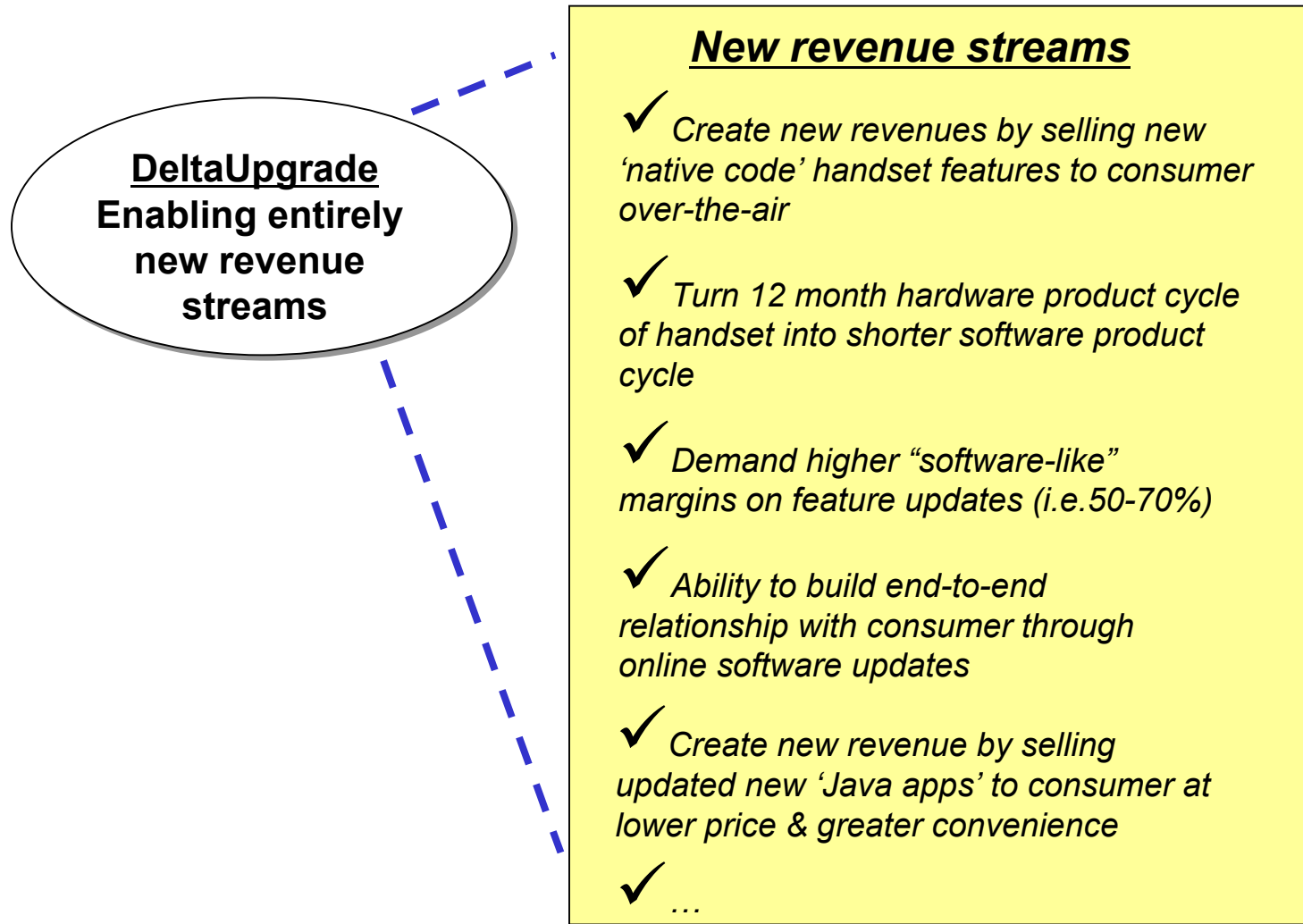### *Cost savings with DeltaUpgrade*

✓ *On Time or Early Time-To-Market*

✓ *Prevent considerable goodwill and image loss with wireless handset vendors and carriers*

✓ *No logistics cost of recalled handset*

✓ *No handling costs (return and re-distribution of handsets)*

✓ *No voice/data revenue losses during bug fix & version control*

✓ *No reflash of phone memory at factory site*

✓ *No opportunity losses (i.e. halted production on other handsets,…)*

✓ *No new packaging of reflashed handset*

✓ ***No hassles related to standard software version upgrade***

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Examples of New Revenues with DeltaUpgrade

DeltaUpgrade
Enabling entirely new revenue streams

New revenue streams

✓ *Create new revenues by selling new 'native code' handset features to consumer over-the-air*

✓ *Turn 12 month hardware product cycle of handset into shorter software product cycle*

✓ *Demand higher "software-like" margins on feature updates (i.e.50-70%)*

✓ *Ability to build end-to-end relationship with consumer through online software updates*

✓ *Create new revenue by selling updated new 'Java apps' to consumer at lower price & greater convenience*

✓ *…*

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Time-To-Market (TTM) Becomes Critical

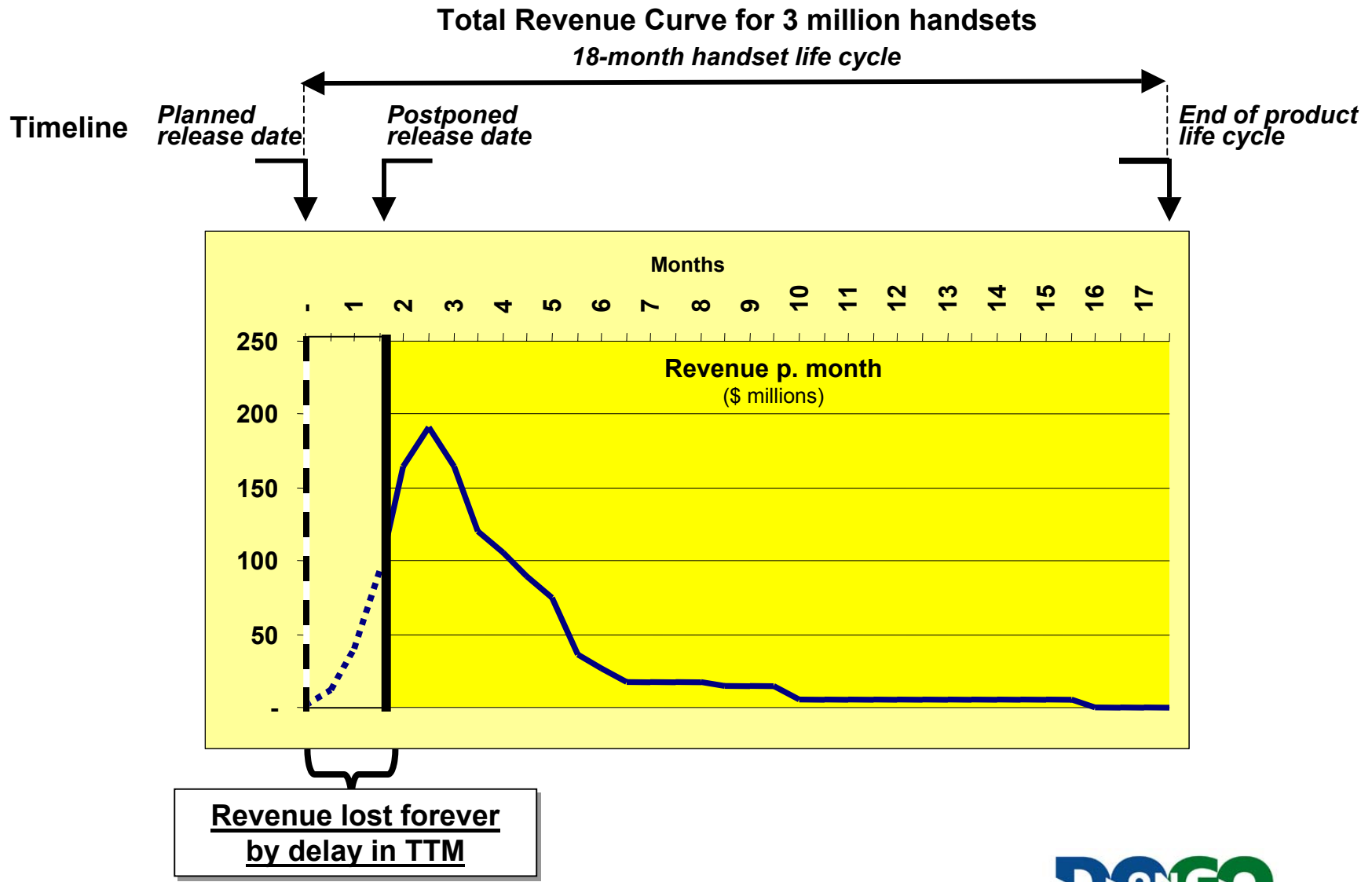**Handset software reaching 16-18MB, upgrade problems can no-longer be ignored**

- **Multiple Wireless Carriers reporting in excess of 100 days to certify new handsets**

- **Applications on handsets being pulled because they are not totally tested & bug free**

- **Handset vendors and carriers loosing hundreds of millions in revenues because of delayed Time-to-Market**

We Decrease TTM by 2 Months and More

Total Revenue Curve for 3 million handsets

18-month handset life cycle

Timeline

Planned release date

Postponed release date

End of product life cycle

Months

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

250
200
150
100
50
-

Revenue p. month
($ millions)

Revenue lost forever by delay in TTM

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Thank You!