

All you need to know  
to leverage **barcodes**  
in your **apps**



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Bringing together the digital and physical worlds



# Barcodes with iOS

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# Barcode Basics

What do these have in common?

# 40th Anniversary

Oliver



July 24, 1974



UPC



June 26, 1974

# Advantages of Barcodes

- “tried and true” technology
- inexpensive to add to packaging
- reliable (check digits, redundancy)
- passive: no privacy “leakage”
- scanning technology widely available



UPC

1973



EAN

1977



JAN

1978

2009

G T I N

**G**lobal

**T**rade

**I**tem

**N**umber

# GTIN

- Standard maintained by **GS1 International**
- GTIN is the number/symbol
- UPC = GTIN-12
- EAN, JAN = GTIN-13
- GTIN-12 plus leading zero = GTIN-13
- GTIN-8 needs special permission

# GS1 International

- Big renaming of organizations in 2005:
  - Universal Product Code Council became **GS1 US**
  - European EAN Association became **GS1 International**
- 4 years later UPC, EAN and JAN were unified to GTIN
- Most countries have national GS1 office with 3-digit prefix
- Manufacturer code assigned by national office
- Product number chosen by manufacturer

**NETGEAR**

**\*WGT624GR\***



TA



**\*100-11165-01R7\***

SN



**\*18E15A7V0074E\***

**MADE IN CHINA**

**W**

**NETGEAR**

**\*WGT624GR\***



TA



**\*100-11165-01R7\***

SN



**\*18E15A7V0074E\***

**MADE IN CHINA**

**W**

**Universal Product Code**  
as GTIN-12 (aka UPC-A)

**NETGEAR**

**\*WGT624GR\***



TA



**\*100-11165-01R7\***

SN



**\*18E15A7V0074E\***

**MADE IN CHINA**

**W**

**Model Name**

as Code39

**NETGEAR**

**\*WGT624GR\***



TA



**\*100-11165-01R7\***

SN



**\*18E15A7V0074E\***

**MADE IN CHINA**

**W**

**Top Assembly (?) Number**  
as Code39

**NETGEAR**

**\*WGT624GR\***



TA



**\*100-11165-01R7\***

SN



**\*18E15A7V0074E\***

**MADE IN CHINA**

**W**

**Serial Number**  
as Code39

**MD531FD/A iPad mini Wi-Fi 16GB White**

Designed by Apple in California,  
Assembled in China Model A1432

(1P)Part No.MD531FD/A



UPC



(S) Serial No. F4KJP6CGF196

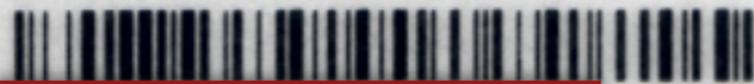


Approved in all EU countries  
Producent Apple Inc

**MD531FD/A iPad mini Wi-Fi 16GB White**

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**Universal Product Code**  
as GTIN-12

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UPC



(S) Serial No. F4KJP6CGF196



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Producent Apple Inc

**Part Number**  
as Code128

**MD531FD/A iPad mini Wi-Fi 16GB White**

Designed by Apple in California,  
Assembled in China Model A1432

(1P)Part No.MD531FD/A



UPC



(S) Serial No. F4KJP6CGF196



Approved in all EU countries  
Producent Apple Inc

**Serial Number**  
as Code128

# 1D Barcodes

- Bars and Spaces
- Longer lines: Marker bars
- Can be scanned with laser that touches all lines
- CCD simulates the scan line
- Numeric or alpha-numeric
- Caption: human-readable text

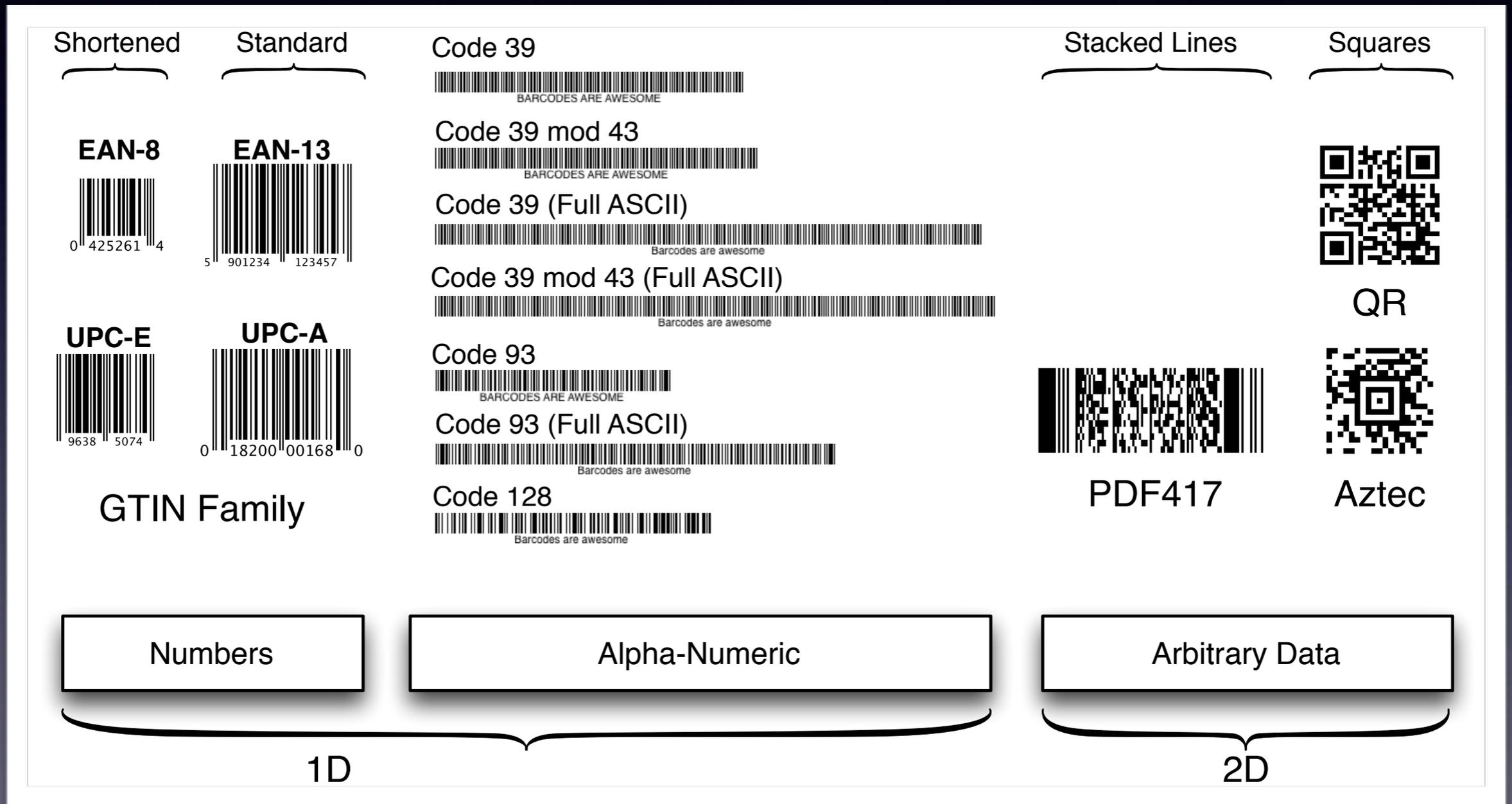


# 2D Barcodes

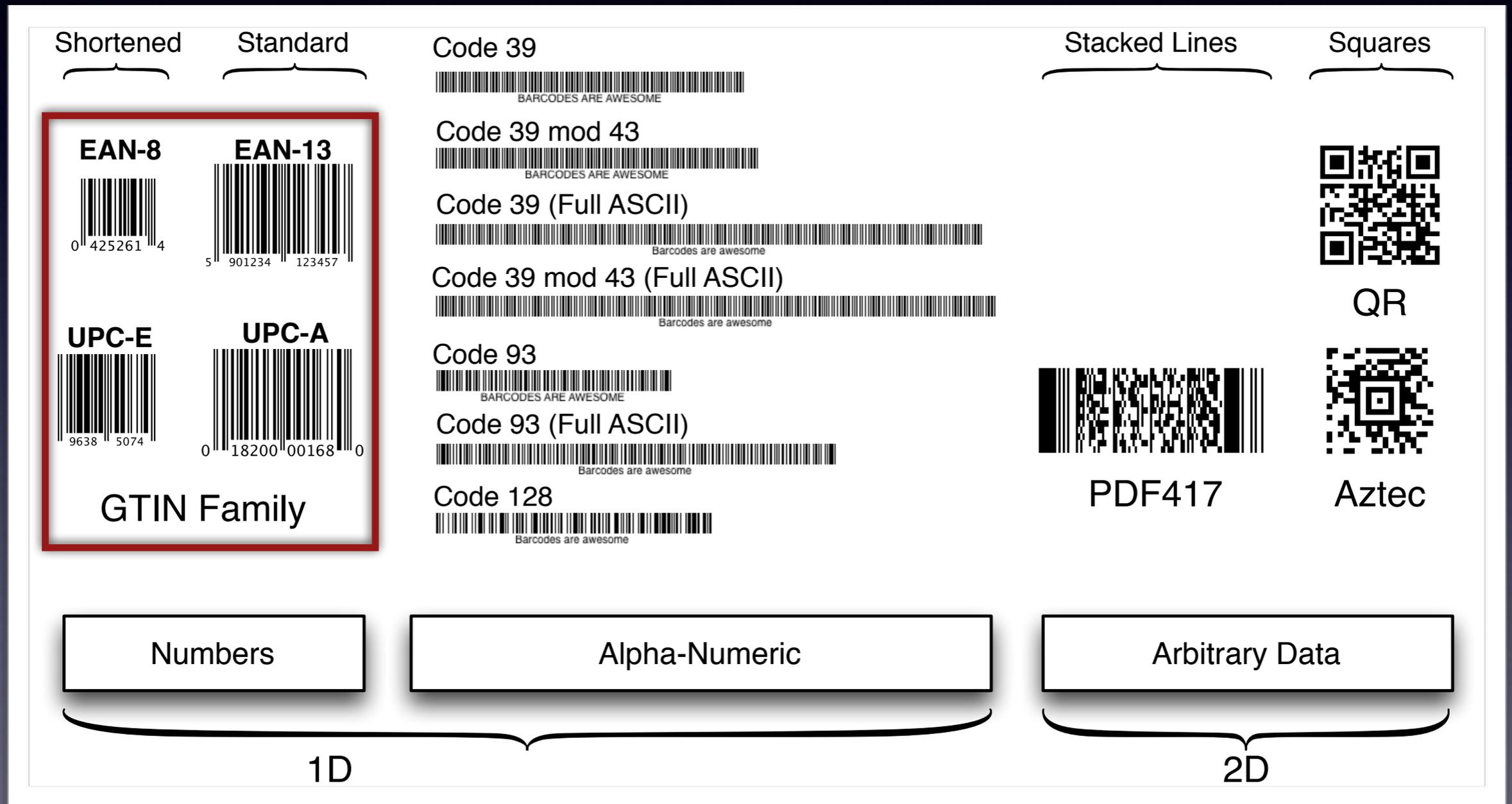
- No bars, but 2D squares
- Smallest element: Module
- Cannot be read with laser
- Requires CCD camera
- Arbitrary data



# Barcodes supported by iOS

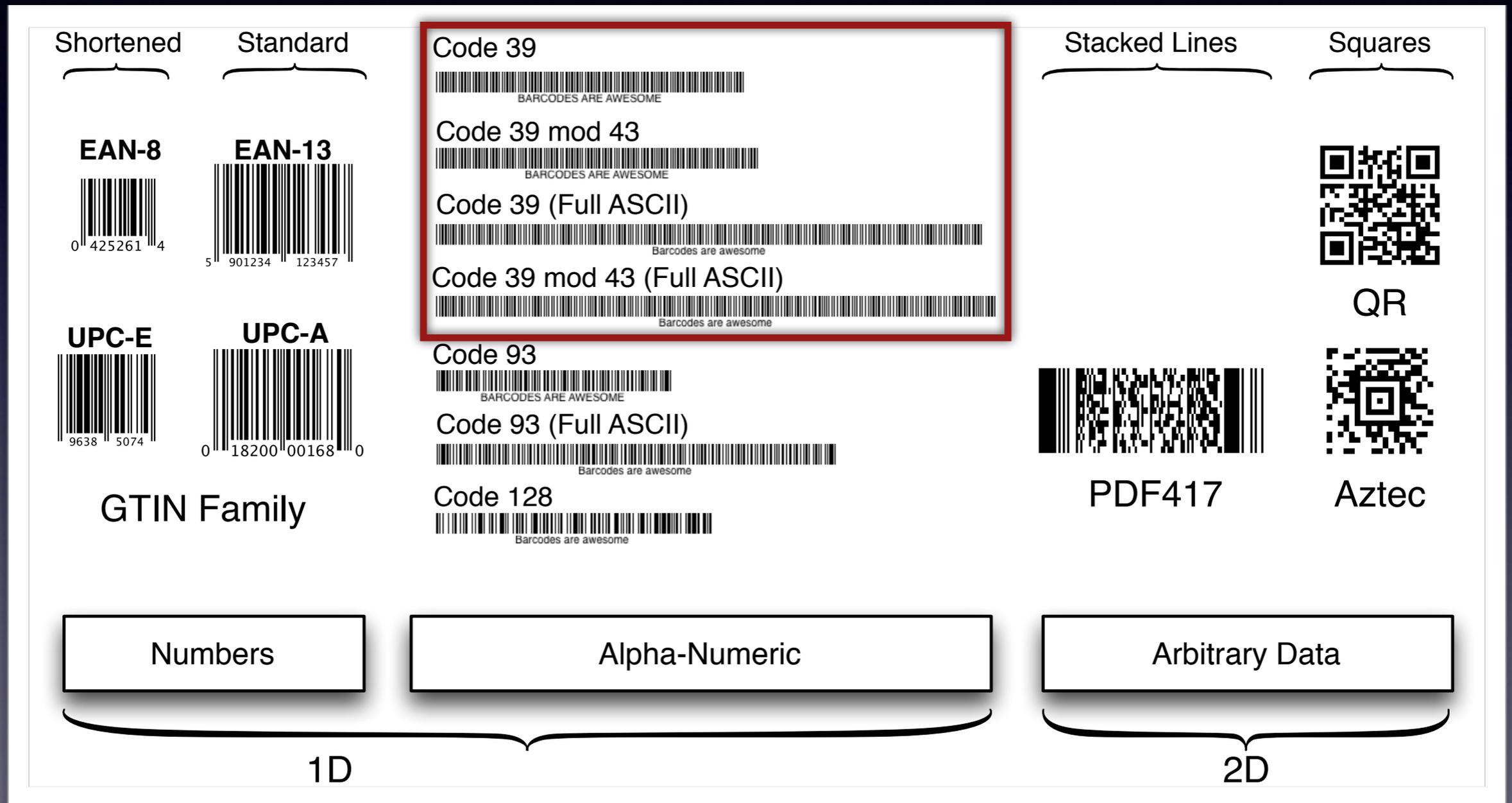


# Barcodes supported by iOS



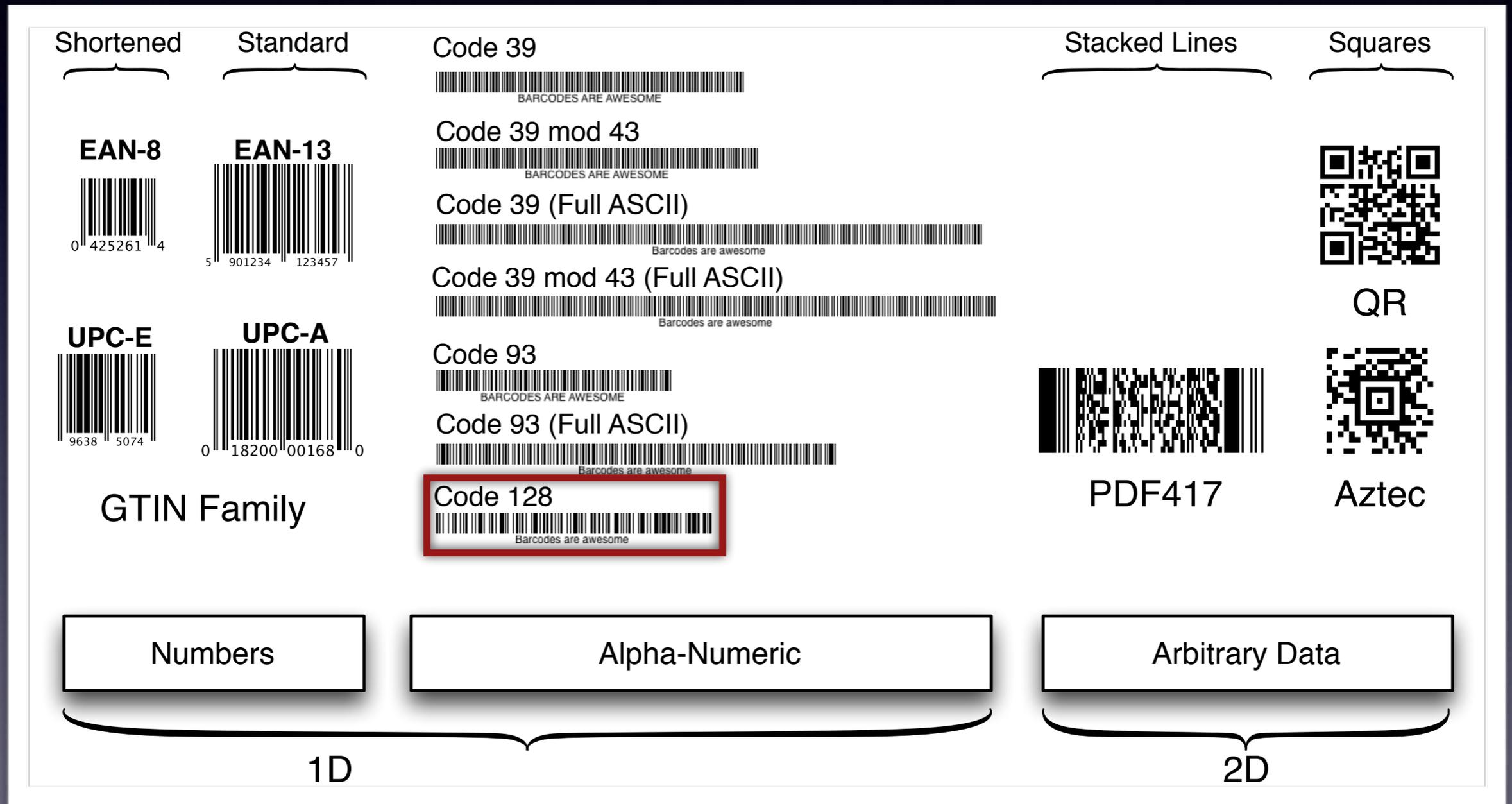
1973

# Barcodes supported by iOS



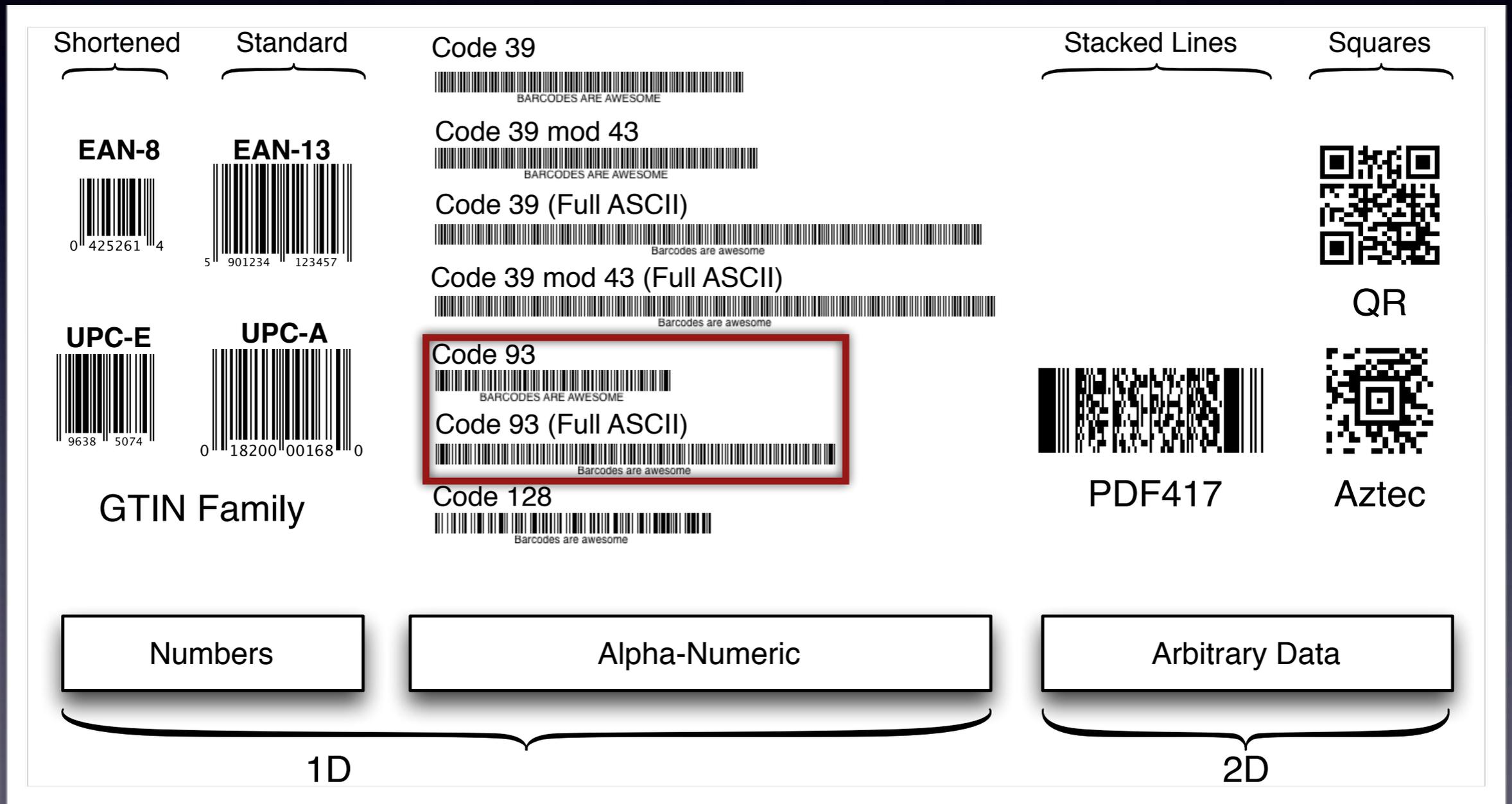
1974

# Barcodes supported by iOS



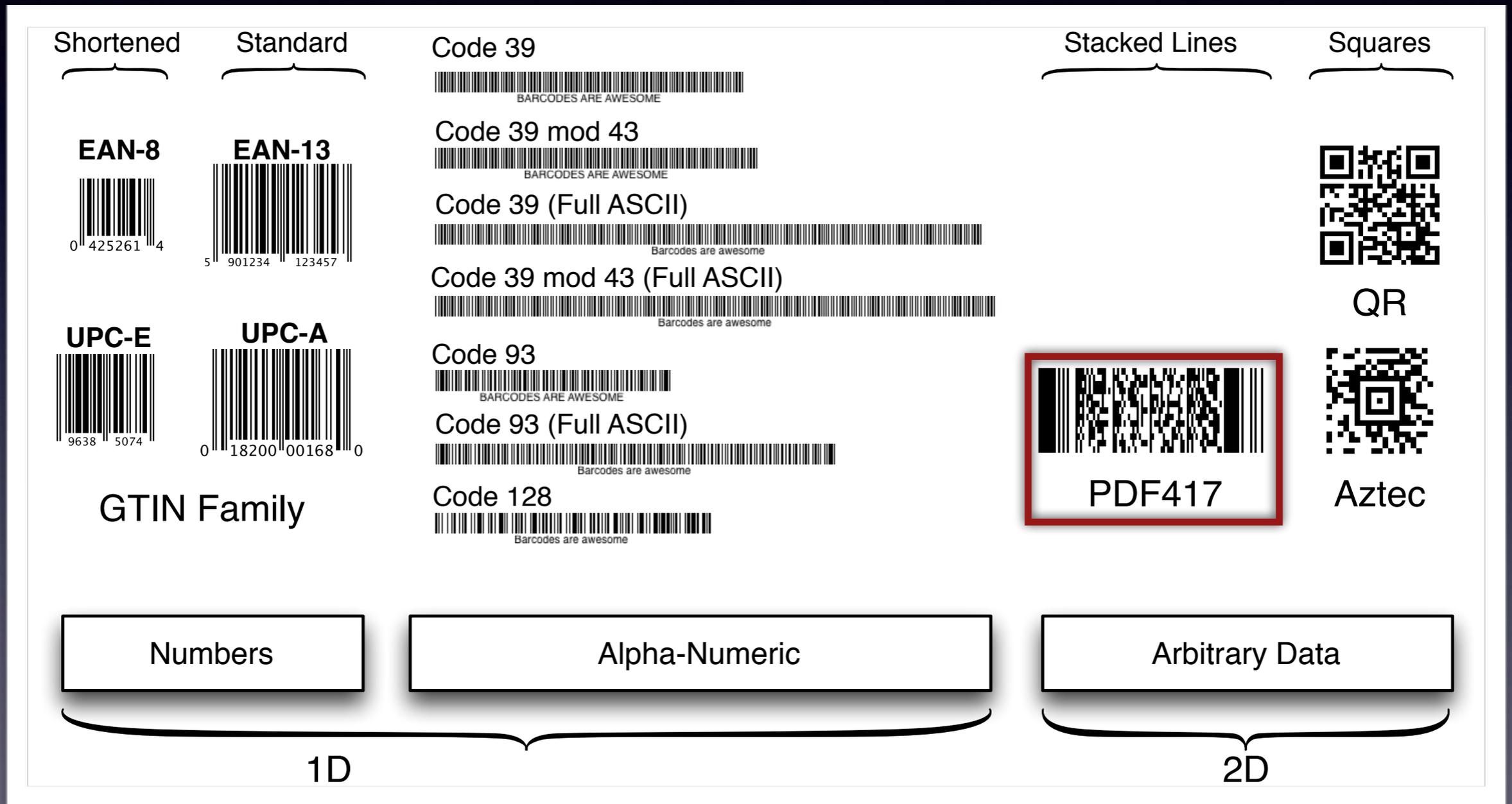
1981

# Barcodes supported by iOS



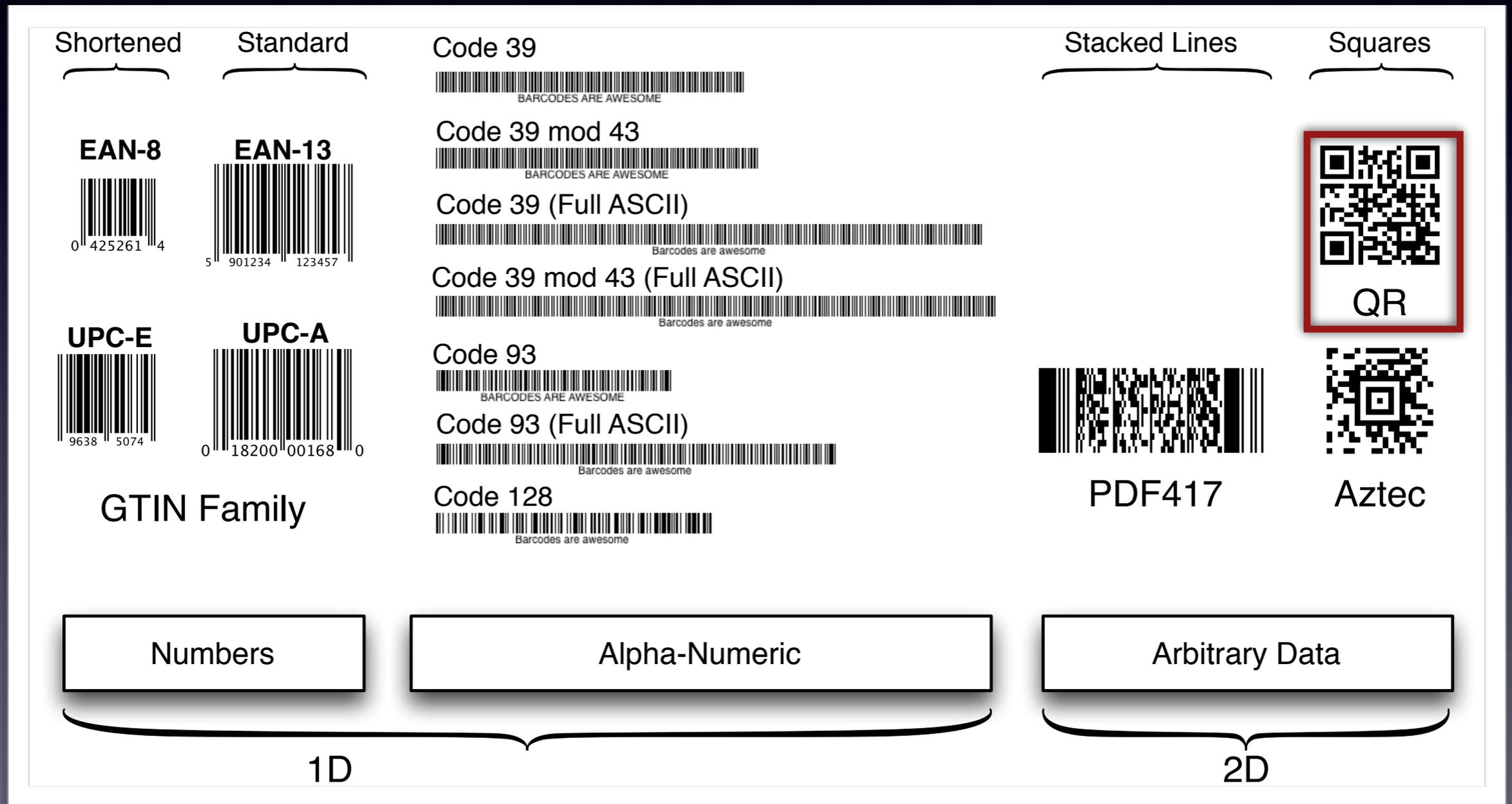
1982

# Barcodes supported by iOS



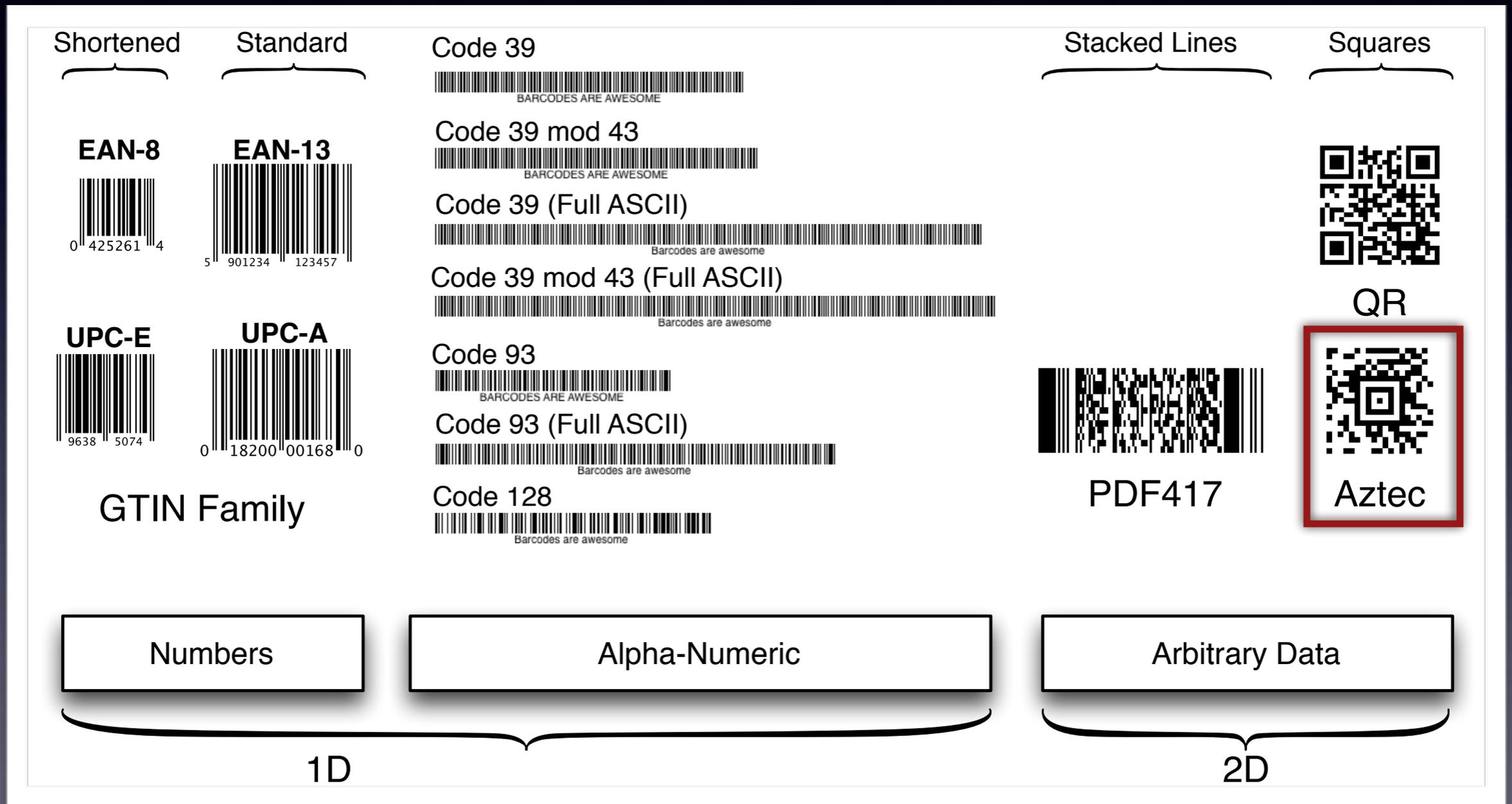
1991

# Barcodes supported by iOS



1994

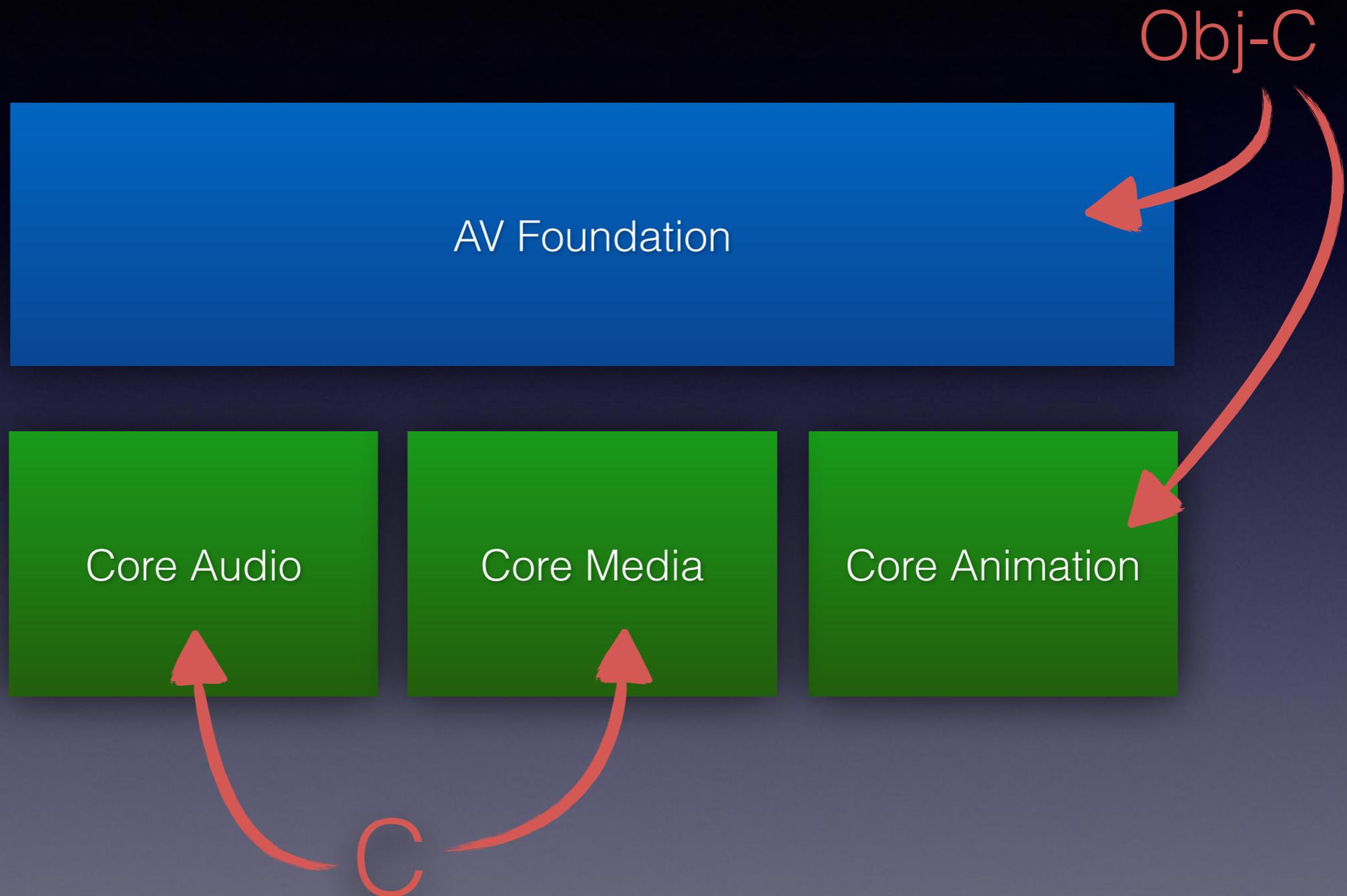
# Barcodes supported by iOS

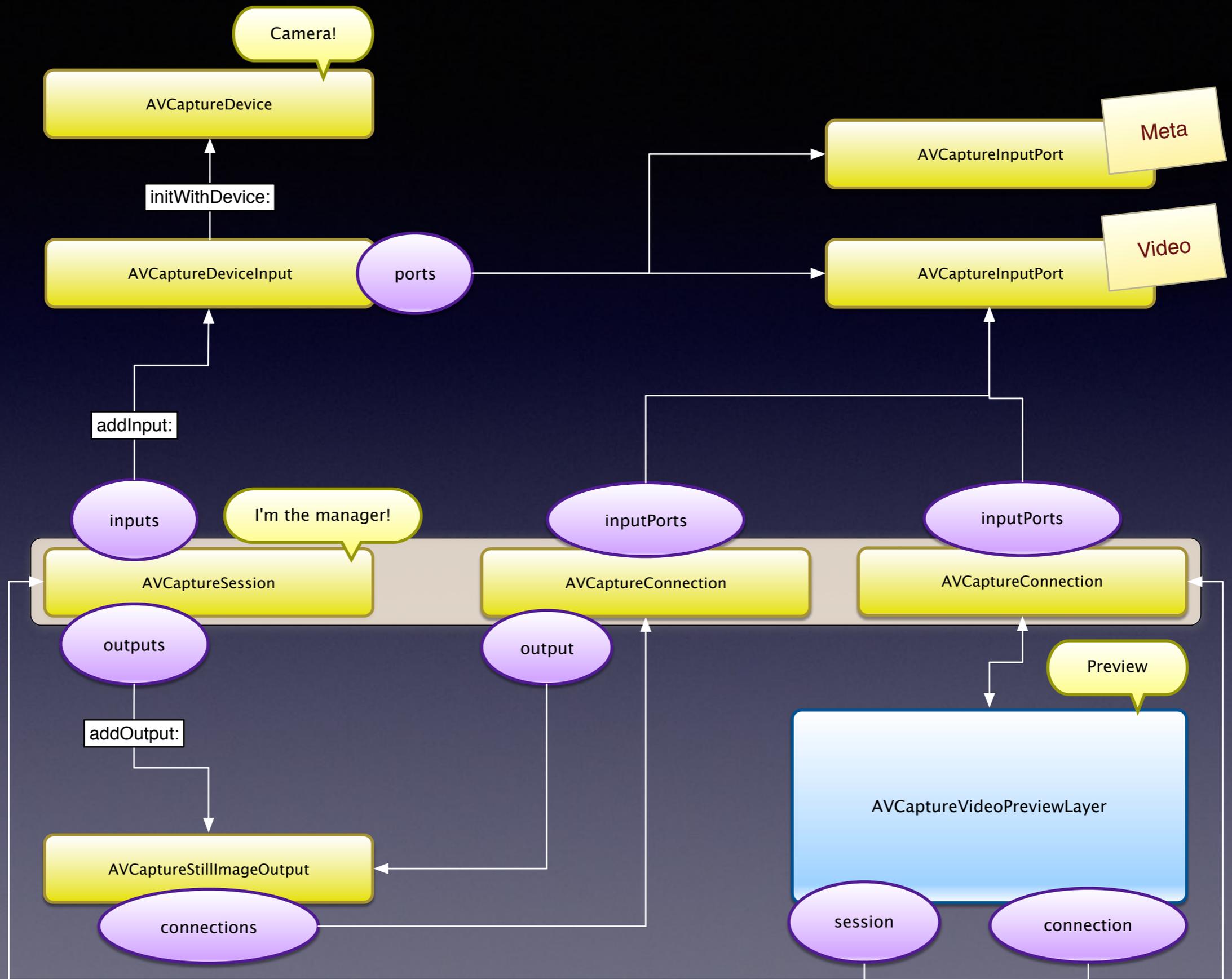


1995

# Barcode Scanning

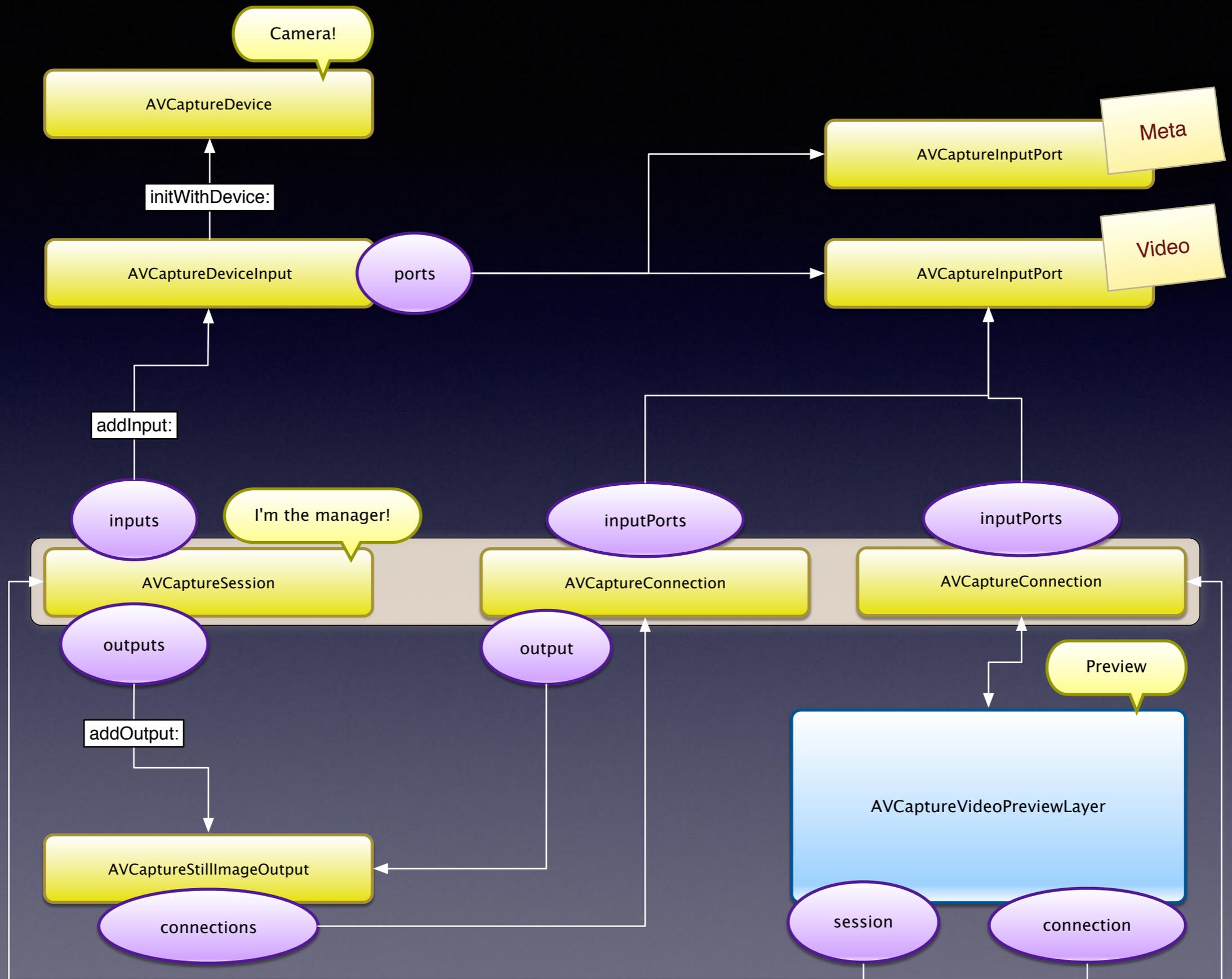
# AV Foundation

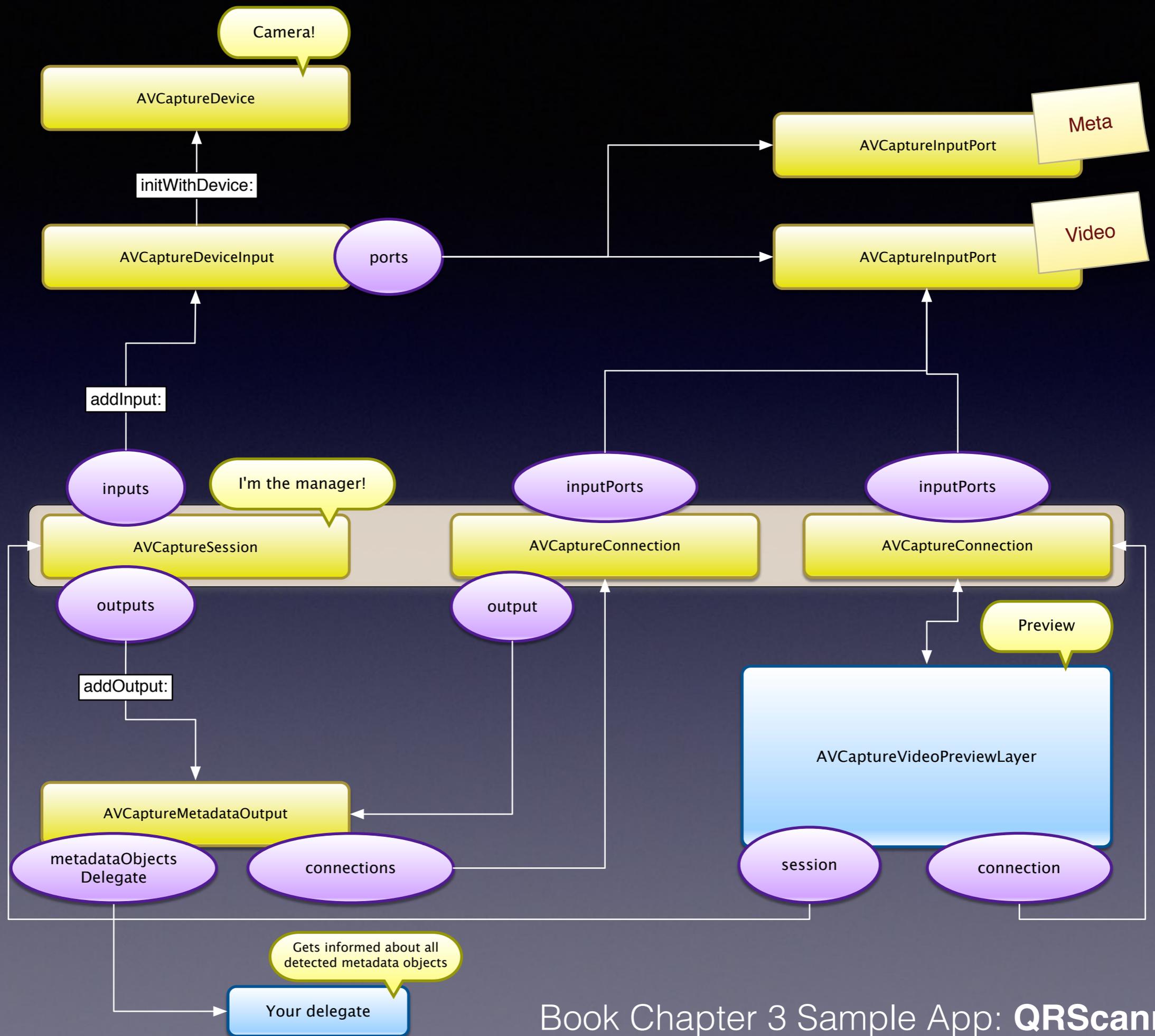




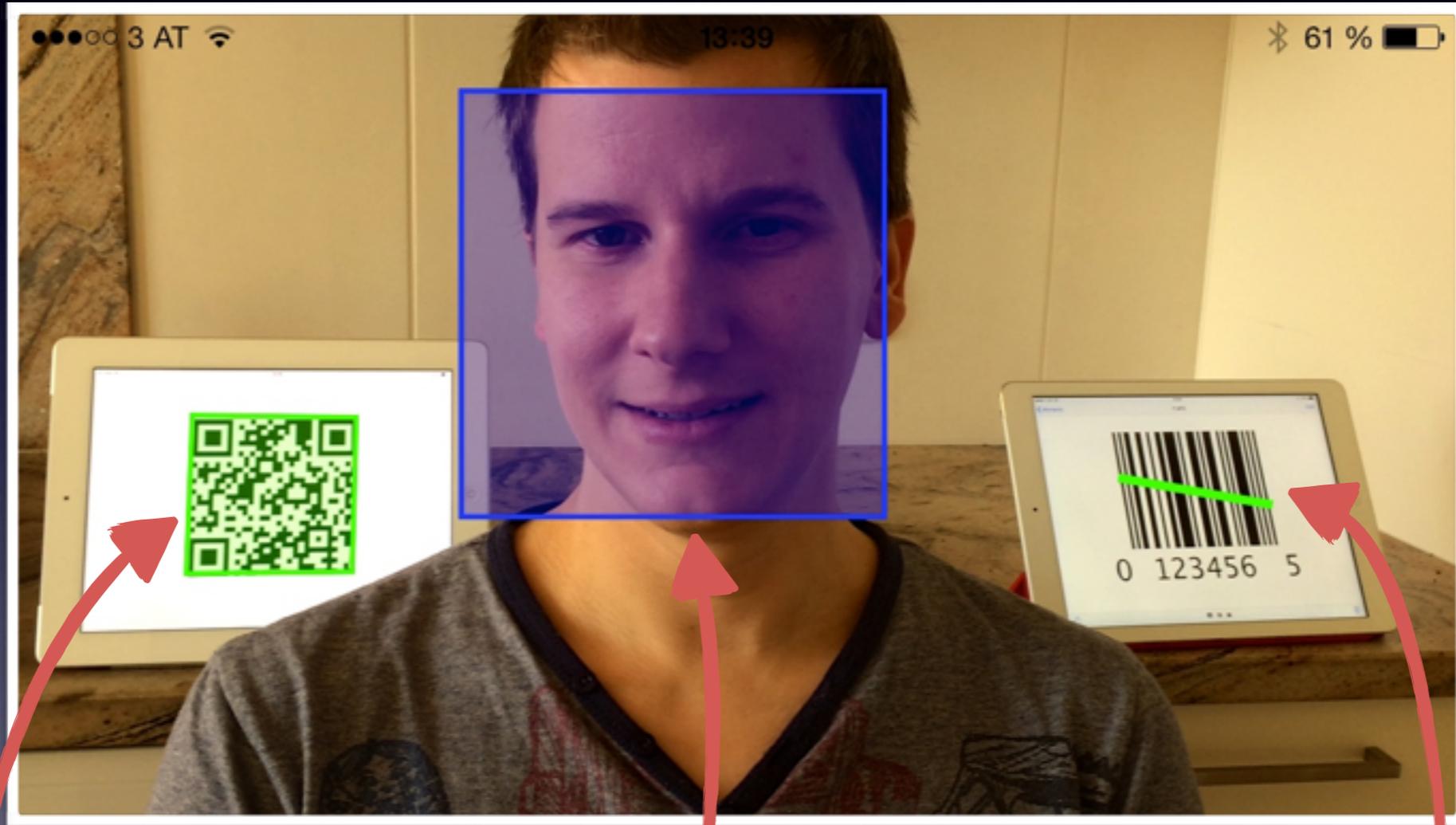
# Camera Authorization

- since iOS 7, but only for device sold in China
- since iOS 8 for all devices
- **not determined** - request authorization
- **authorized** - all is fine
- **denied** - user's choice
- **restricted** - higher power's choice
- deal gracefully with loss of functionality





# Metadata Objects



2D Barcode

Face

1D Barcode

# Scanning Takeaways

- Delegate called separately for faces and barcodes
- Use background queue if doing CPU-intensive work
- 1D codes use multiple scan lines, max. 1 recognized
- 2D codes can be detected anywhere in video frames, up to 4 recognized (except for PDF417)
- Performance better scanning for fewer types
- Optimize the UI for 1D or 2D: “Rect of Interest”

# Barcode Generation

# Why would you...?

- Nice version of an item's GTIN (instead of photo)
- Data transfer: show dynamic 2D code for other phone to scan it (like Passbook)
- AirPrint QR Codes to A4 sticker sheet
- AirPrint single serial number sticker (e.g. for a hardware inventory tracking app)
- Extend the scannable universe

# 2D Barcode Generation

- Generate with Core Image
- Only `CIQRCodeGenerator` documented
- creates `CIImage`, need to render into `CGImage` and scale afterwards
- Aztec or PDF417 “private API”



# 1D Barcode Generation

- No public APIs in iOS
  - Generate with BarCodeKit
  - Free for owners of my book
  - Draws to bitmap or PDF context
- BarCodeKit creates:
    - Codabar
    - Code 11
    - **Code 39** (plain, modulo 43, full ASCII)
    - **Code 93**
    - **Code 128**
    - Facing Identification Mark (FIM)
    - GTIN family: **EAN-8**, **EAN-13**, **UPC-A**, **UPC-E**, EAN-2, EAN-5
    - Interleaved 2 of 5
    - MSI
    - Pharmacode One Track
    - Standard 2 of 5



# Label Printers

- Inexpensive, ideal for single stickers
- Roll-fed: Endless or Die-Cut
- Endless: calculate cut-off length
- Beware of thermal bleeding
- Paper sensors report size via AirPrint
- Label printers are **endless** fun!



# Product Information

# GTIN is just a number...

- Devices have mobile internet
- Query web services, e.g. Discogs
- No normalization of GTINs
- No reliable source of product info
- GS1 only has manufacturer info
- [amazon.com](http://amazon.com) - guess again...



# Amazon.com Product Advertising API License Agreement

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productlayer

# productlayer

- Free JSON+RESTful web service
- iOS SDK on GitHub (Open Source)
- 1.7 Mio products so far
- Standard categories from GS1 + additional sub-categories
- Build any app you like with it, we'll help you promote it
- Your app users contribute back via SDK (missing details, photos, etc.)
- User's lists of products accessible via API
- Go to [developer.productlayer.com](https://developer.productlayer.com) to sign up for free account



# Thanks for watching!



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