

Enriching the User Interface for Next Generation IoT Design

APRIL 2018



SECURE CONNECTIONS
FOR A SMARTER WORLD



PUBLIC



IoT SMART REVOLUTION

Expand your *senses* into an *immersive* world

FROM INTERFACE TO *RELATIONSHIP*

Enriched User

Experience

UNDERSTANDING & CORRECT RESPONSE

Smart Design, High

Performance

A NEW LEVEL OF CONNECTION IS HERE

High Speed

Connectivity



i.MX 8M Consumer Target Applications: Media IOT

Video, Voice, and Audio for Connected Devices



Video Streaming

- By 2018 IP video will represent 79% percent of all global traffic (source: Cisco)
- Cord cutting momentum shifts markets from traditional STB to OTT (over-the-top IP based video on demand)
- 4K and HDR driving need for updated equipment – Amazon, Google Chromecast, Roku, and MSOs drive volume – Key specs are video quality and low power.

Voice



- 25-30% of ALL internet searches today are initiated by voice commands, and this number is growing rapidly (source: Google)
- Industry partnerships with major players such as Google, Amazon, Apple Homekit drive consumer adoption.
- Developer reference platforms to speed time-to-market.



Audio Streaming & Immersive Audio

- With TV Panels are getting slimmer, audio is being separated into separate sound bars.
- Also, DSP migration to ARM driving system architecture change for immersive audio.
- Fast migration of Bluetooth speakers to Networked Wifi Speakers with the advent of voice control (always connected, always ready to answer).

Smart Home



- Surge of IOT and voice control are revolutionizing the smart home. Machine learning and Artificial Intelligence (AI) to drive this market even higher.
- Major ecosystems to drive all the growth.
- Many home appliances are adding voice or other smart controls

i.MX 8M Industrial Target Applications

HMI, Voice and Vision for Harsh Environments



Imaging and Scanning

- Portable platforms need faster response and battery life that exceeds a work shift (12 hours)
- Sensor module targets are now below 10 cubic millimeters
- Durable products operate more than 10 years in an unconditioned environment (-40C to +85C ambient)

Human Machine Interface (HMI)



- Industrial workers expect to use rich graphics and video on higher resolution displays, similar to their personal devices
- Time is money – the HMI must respond accurately, and in milliseconds, to voice, touch screen and gesture inputs
- Efficient development leverages scalable performance and reusable software across multiple product platforms



Building Automation

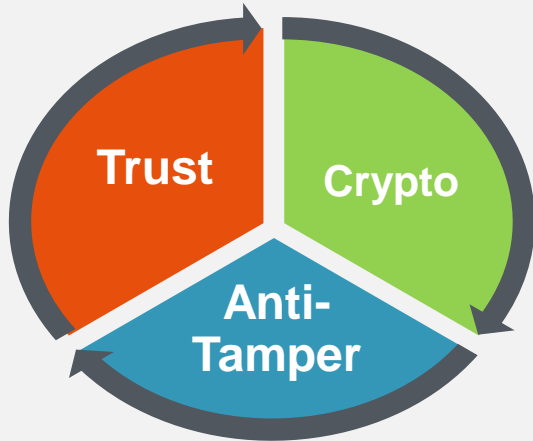
- Mobile and stationary machines want full access to cloud-based knowledge
- This demands increasingly faster and more reliable wired and wireless connectivity
- Security is at the forefront, to protect human privacy and commercial assets

Machine Vision



- Machines “see” through multiple camera and sensor inputs
- Developers prefer to migrate away from DSPs and ASICs to leverage well-supported GPU and ARM technology
- Software tools and reference designs enable advanced math processors (GPU, ARM NEON) for faster image processing

Product Longevity



Embedded Design Requirements

- **Scalability for Maximum Platform Reuse**
 - Pin compatibility and software portability
 - Integration: CPU (single/dual/quad, asymmetric), GPU, IO
 - Software: Linux, Android, Windows-embedded, RTOS
- **Trusted Supplier**
 - Product longevity: Minimum 10 to 15 years
 - Security and safety: Hardware acceleration, software
 - Reliability: Zero-defect methodology, ULA and low SER FIT
 - Quality: Automotive AEC-Q100, Industrial/Consumer JEDEC
- **Enablement for Ease of Use**
 - Industry-leading partners and support community
 - Manufacturability: 0.65 to 0.8mm options, fewer PCB layers
 - System solutions: SoC, sensors, memory, PMIC, connectivity, standard products, software

The i.MX 8M is a Game Changer, and we are just getting started!

• Enriched User Experiences

- Video quality up to 4K UltraHD resolution and HDR
- High Performance 3D Graphics Acceleration
- Dual displays and camera inputs
- Highest levels of pro audio fidelity
- Voice Solutions



• Performance and Versatility

- Up to four 1.5 GHz Cortex-A53 processors
- Cortex-M4 for real time requirements
- Flexible, high speed, low power memory options
- Configuration less than 3 watts.



• High-Speed Interfaces

- Interconnected Devices (smarter edge devices)
- Newest high-speed interfaces for flexible connectivity
- High System Data through-put



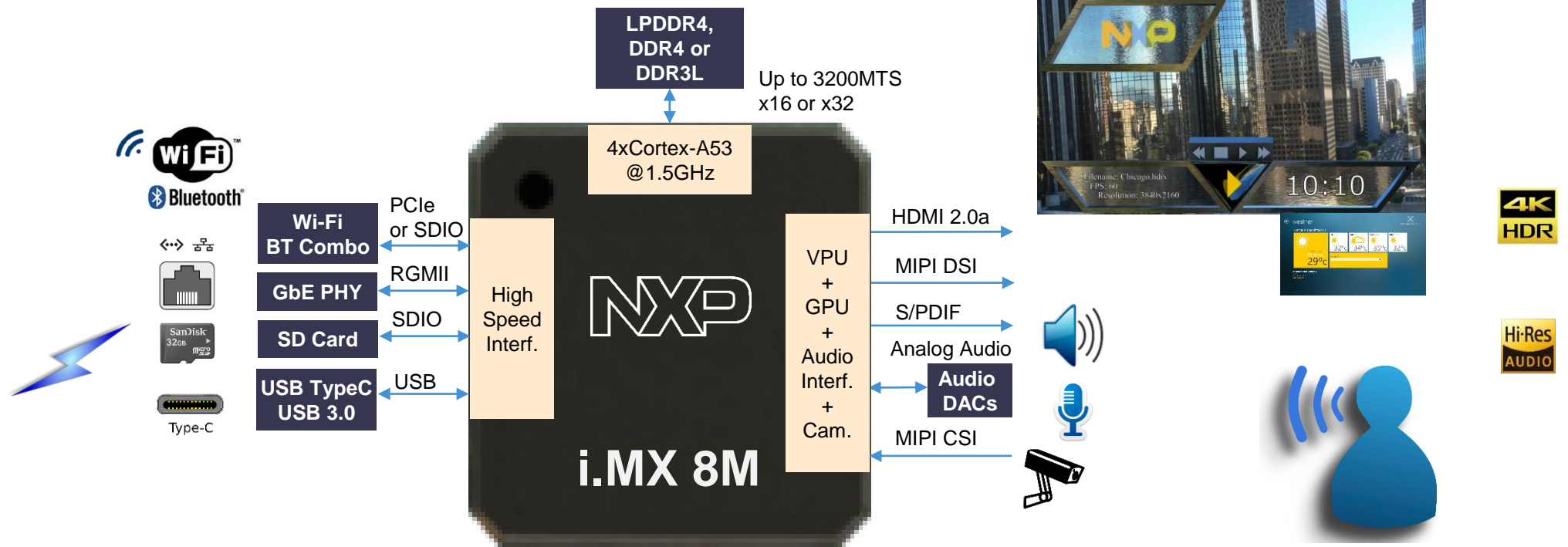
Smart IoT Building Blocks

High Speed Interfaces

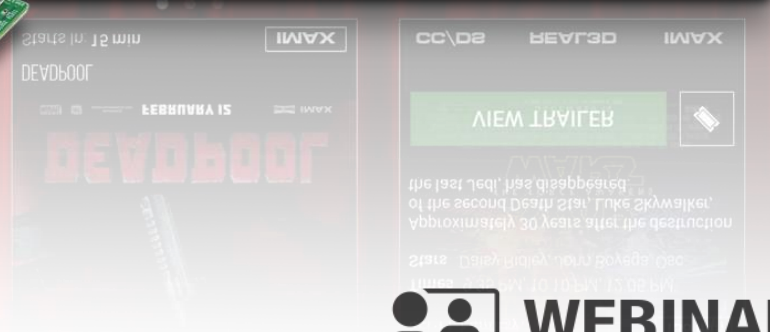
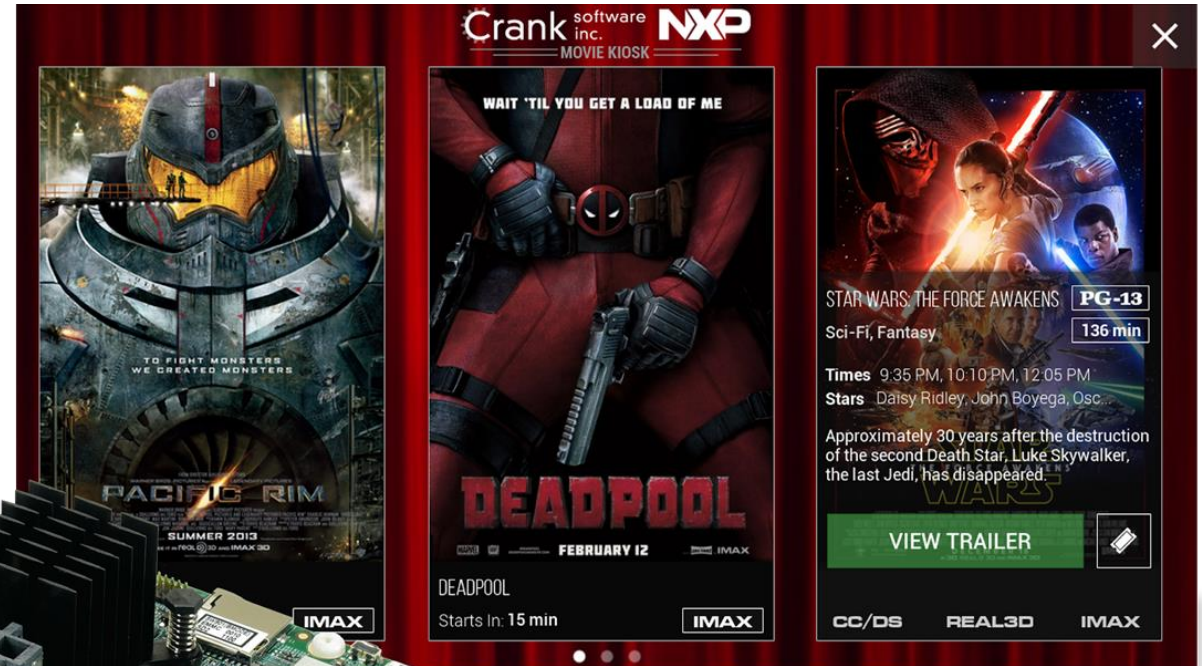
Smart Performance



Advanced User Interface



Delivering performance, functionality, and stunning design to embedded products



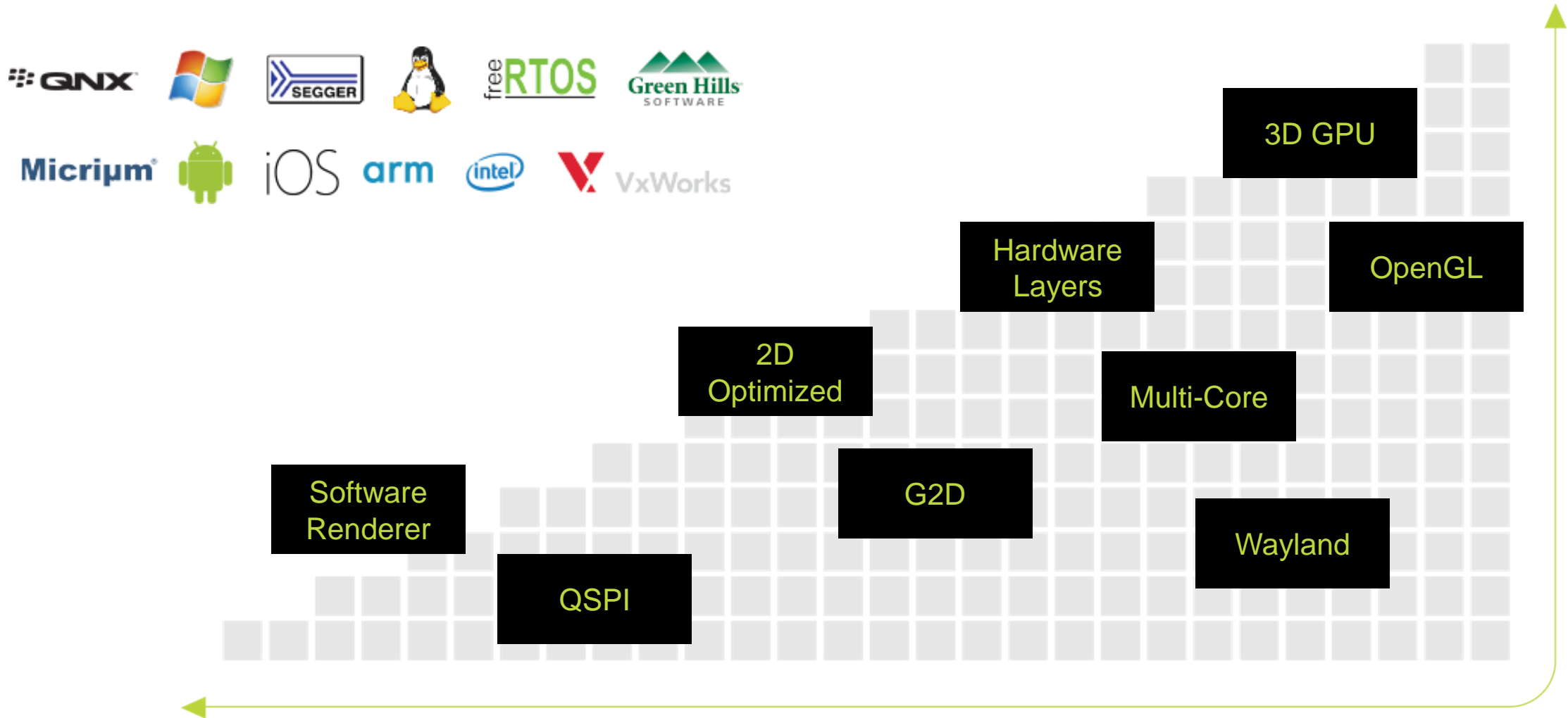
State of the industry



A high-angle, close-up photograph of a group of people in a meeting. They are gathered around a table, looking at and pointing to documents and a laptop. The scene is dimly lit, with a focus on the hands and the documents. The text 'Why Storyboard & NXP?' is overlaid in white on a dark horizontal band across the center of the image.

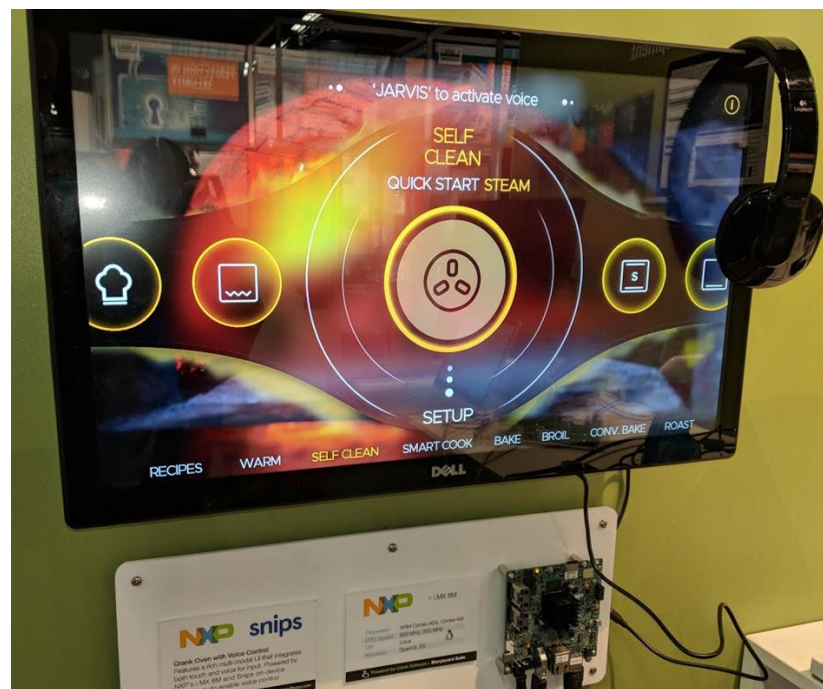
Why Storyboard & NXP?

Scalability



Storyboard Engine

Multimedia



Demo Image

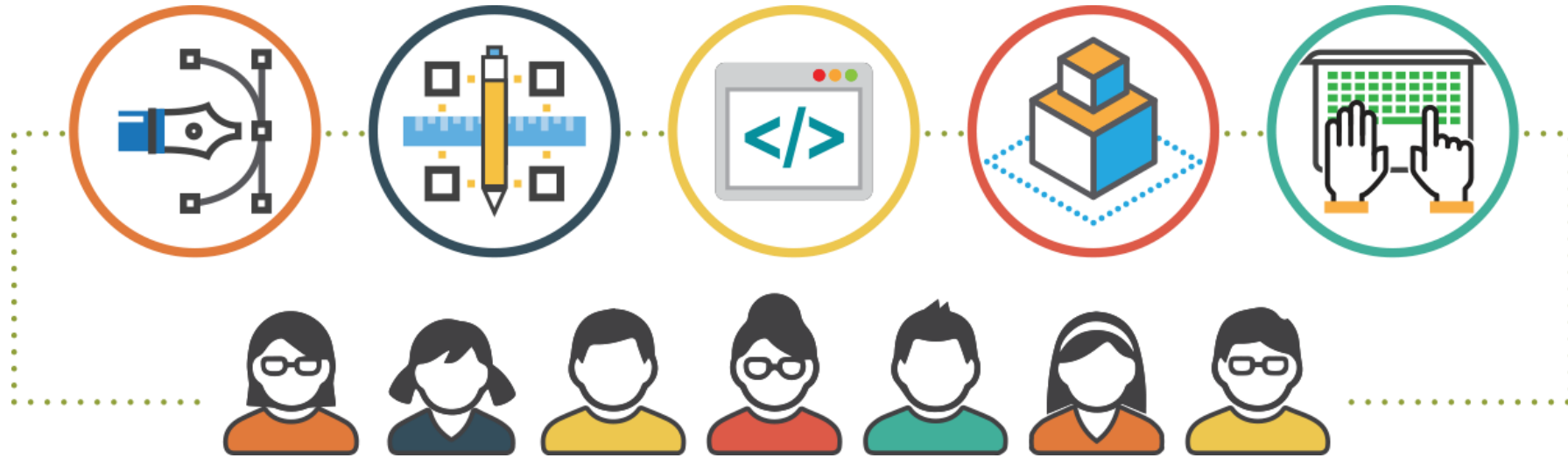
» www.cranksoftware.com/demo_image





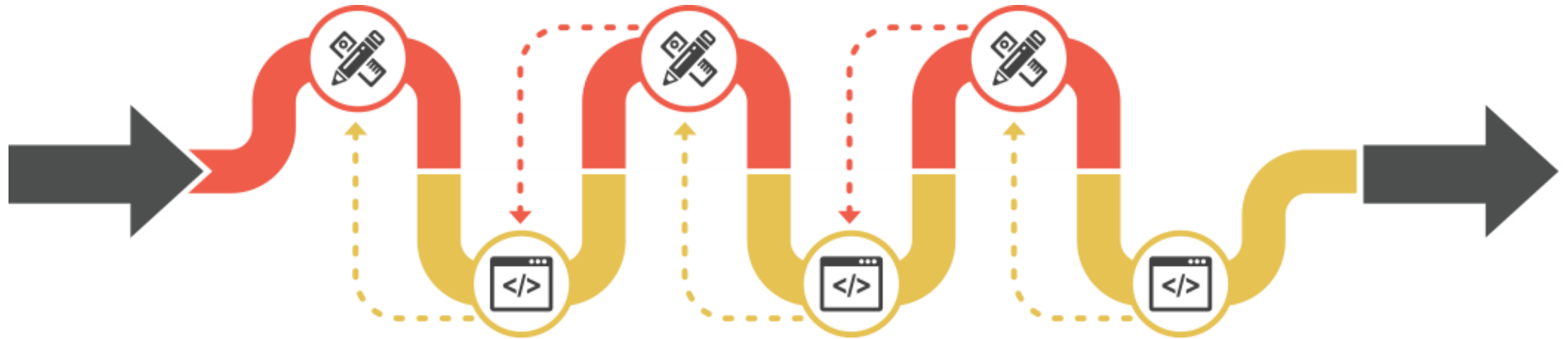
Why is Storyboard Different?

Product teams today



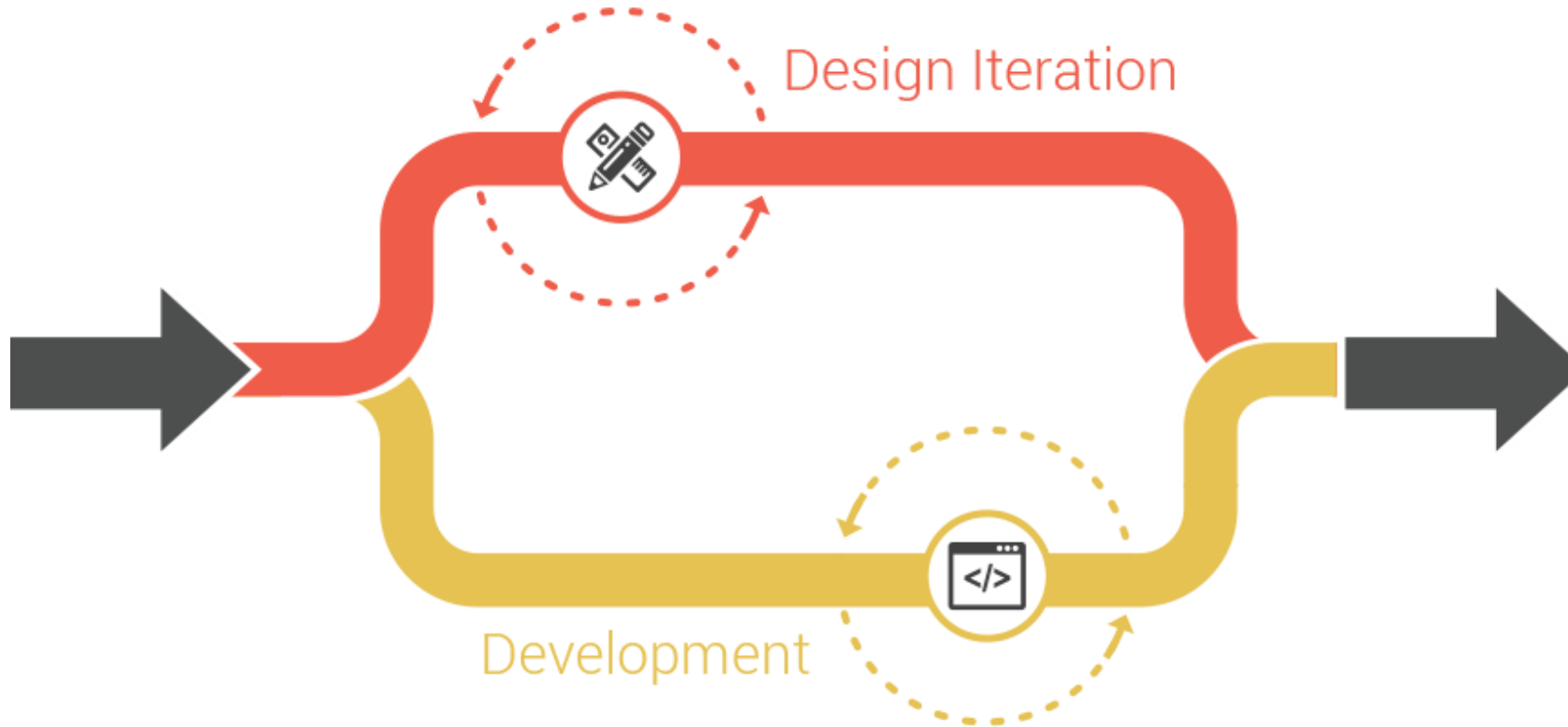
Traditional workflow

Serialized workflow that leads to product delays or shipping with suboptimal UI



Parallel workflow

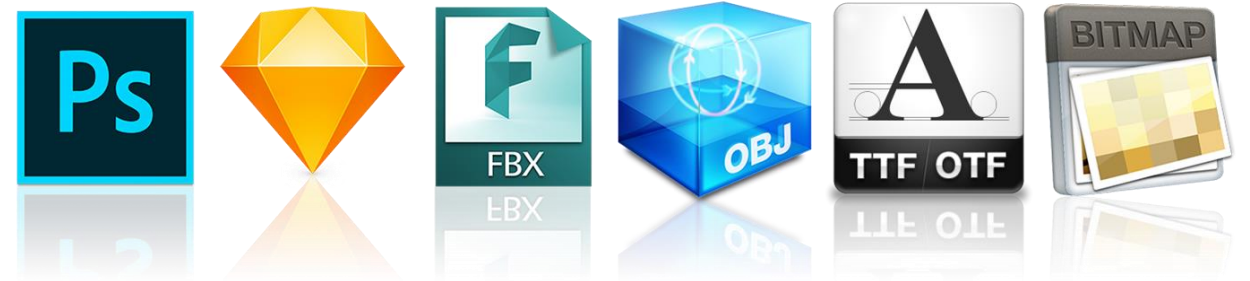
Parallel workflow streamlines work between roles





How does Storyboard help?

Pulling in assets - Storyboard



The designer's assets are pulled directly into Storyboard and ready to apply movement and behavior

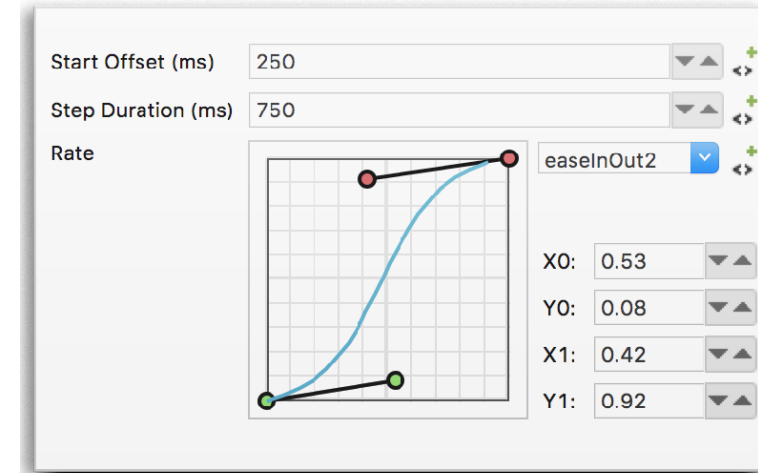
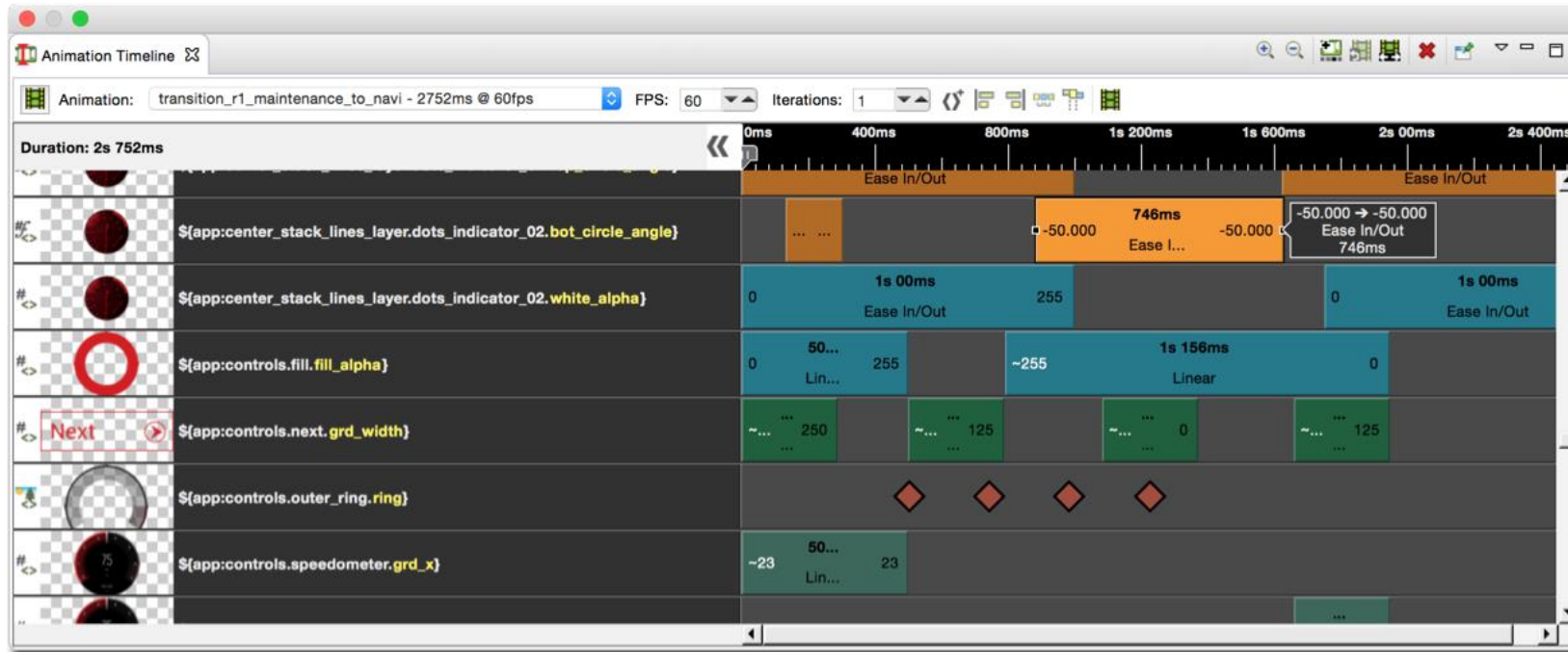
3D For Embedded



- Fully accelerated OpenGL ES graphics pipeline
- Combine and animate 3D models within 2D UI elements
- Built in 3D screen transitions
- Support for custom shaders



Animation Timeline



- Screen record for easy animation creation
- Custom rate editor to allow designers full control
- Frame by frame playback to make sure the subtlety of the animation is not lost

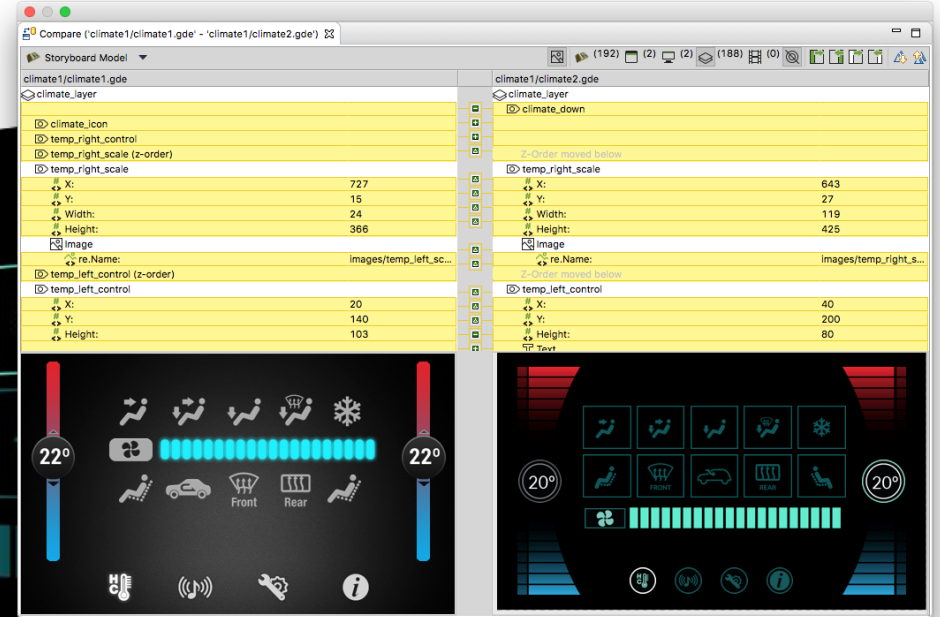
Design Iteration



Photoshop Import



Photoshop Re-Import



Go Back Temperature Spin OFF

Quick Wash Hot High Close

Start Steam ON Sanitize OFF

Kiefer Terry 613 555 0190 mobile

CLIMATE SECURITY LIGHTING NETV

073 MPH

LIGHTING

DOWNSTAIRS UPSTAIRS PEAK PERIODS

PEAK PERIODS

- LOW-PEAK 8.5¢ KW/HR
- MID-PEAK 11.4¢ KW/HR
- ON-PEAK 12.6¢ KW/HR

MID-PEAK 11.4¢ KW/HR

MID-PEAK - ¢ per kw/h

NIBP 130/84 SYS/DIA mmHg(MAP: 89)

Pulse Rate 79 Beats / Minute

Demo

ACTIVITY TRACKER

Cycling April 17 - 23

DISTANCE (km)

SUN MON TUE WED THU FRI SAT

78.4 km/h MAXIMUM SPEED 34.4 km/h AVERAGE SPEED 18:47:56 TOTAL TIME 646.5 km TOTAL DISTANCE 2 x

47

THU

cloudy Sunny Cloudy

22°

FRONT REAR

5.0 1/mi x 1000

OTTAWA 17°

400 m - Exit Right March Road

PACIFIC RIM Starts in: 75 min IMAX

DEADPOOL Starts in: 15 min IMAX

STAR WARS: THE FORCE AWAKENS Starts in: 55 min IMAX

SpO2 95 SYS/DIA mmHg(MAP: 90)

HEIGHT (IN) WEIGHT 72.0 1

About

MAKING IT ALL EASY



How to learn more



Try a 30-day evaluation of Storyboard
» www.cranksoftware.com/storyboard_suite_eval

Download Storyboard Demo Images
» www.cranksoftware.com/demo_image

Crank Software YouTube channel
» www.youtube.com/cranksoftware



Enablement: i.MX 8MQuad Evaluation Kit (EVK)

Part Number: MCIMX8M-EVK

Overview

- NXP i.MX 8MQuad Application Processor
 - 4 x Cortex-A53 @ 1.5GHz
 - 1x Cortex-M4 @ 266MHz
- i.MX 8MDual and 8MQuadLite emulation

Power Management

- NXP PF4210 PMIC

Memory

- 4 GB LPDDR4 memory, x32
- 16 GB eMMC 5.0
- 32 MB SPI Flash
- MicroSD connector

Display / Camera Connectors

- HDMI 2.0a Type-A connector
- mini-SAS MIPI-DSI connectors
- Camera MIPI-CSI through mini-SAS connector

Wireless

- WiFi 802.11 a/b/g/n/ac MIMO 2x2
- Bluetooth 4.1 / EDR
- Onboard chip antenna



Accessory Boards

MINISASTOCSI

MX8-DSI-OLED1

IMX-MIPI-HDMI

Audio

- Audio DAC 24-bit 192kHz Stereo
- headphone 3.5mm jack
- Audio Interfaces board expansion connector

Connectivity

- 10/100/1000 Ethernet port
- USB 3.0 Type C connector
- USB 3.0 Type A connector
- PCIe M.2 Interface

Debug

- JTAG connector
- Serial to USB connector

OS Support

- Linux, Android and FreeRTOS BSPs from NXP
- Others: 3rd parties

Tools Support

- Lauterbach
- ARM (DS-5)

i.MX 8M Evaluation Kit Accessory Boards



Evaluation Kit
i.MX 8M Applications Processor
MCIMX8M-EVK

MIPI to HDMI
miniSAS Convertor
IMX-MIPI-HDMI



MIPI miniSAS
OLED Display
MX8-DSI-OLED1



OV5640 MIPI CSI board
miniSAS based
MINISASTOCSI



Available to order: www.nxp.com/imx8mquadevk

Q&A



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