

mbed HDK from prototype to production

ARM

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mbed HDK – Origin and heritage

- The origins of mbed are in rapid prototyping and productivity
 - Creating abstractions
 - Choosing defaults that suit the common case
 - Pulling tricks/stunts to make things JustWork™
 - Pushing complexity away from the consumer to the creators (80/20 rule)
- The HDK was originally a set of schematics for the LPC1114 DAPLink and the first supported MCU's. It was a recipe for dev boards... It worked!



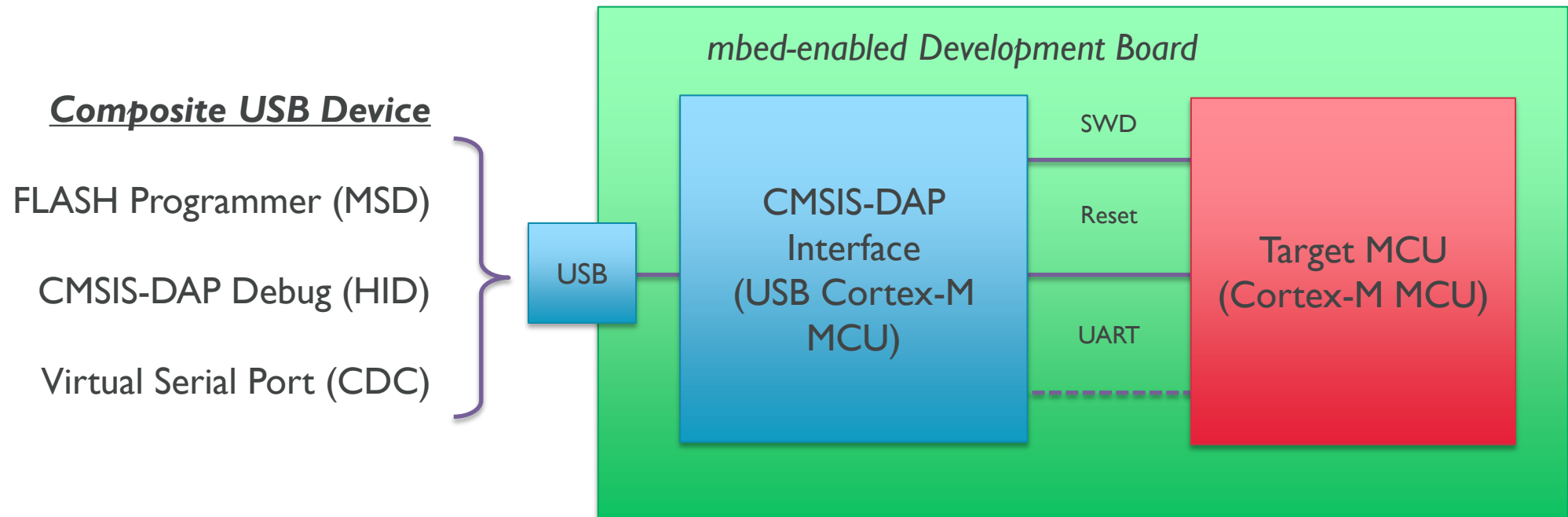
mbed HDK – Who and what it's for

- The first revision of the mbed HDK aimed to provide a solution to inter-linked problems
 - Recreating LPC1768 (and other) designs, that were compatible with the mbed SDK, and included debug interface (circuit and firmware)
- Released under permissive proprietary license, compatible with Apache 2.0
- No clear audience, other than those who wanted to reuse what we'd built.
- A zipfile included schematics, libraries, and some binaries for the DAPLink
- The philosophy remains the same, but the scope has widened
 - We learned from what we did right and wrong!



DAPLink – mbed interface firmware

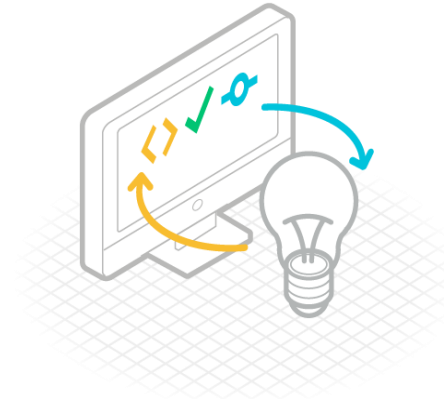
- An open source project that implements the embedded firmware required for a Cortex-M debug probe



What's new! (and still in progress)

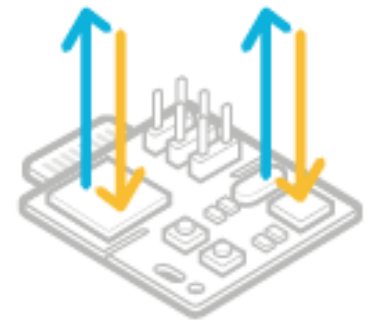
- **Reference Libraries – Convenient resources for the Pros**

- Eagle Component Libraries; The components our “reference designs” are built from
- Eagle Schematic libraries; Schematic chunks that can be re-used



- **Reference designs – Complete designs, laid out, ready to fabricate**

- Built from the Reference Component and Schematic Libraries,
- Can be manufactured, most likely to be tweaked and extended
- Bits of kit that we built for our own needs, but others might need them too!
- Linked to and supported by software projects



What's new! (and still in progress)

- **Version control!**
 - <https://github.com/ARMmbed/mbed-HDK>
 - The hardware guys finally listened to the software guys!
 - Hosted in GitHub, complete with releases to avoid Zip Archive Hell!
 - We accept Pull Requests!

Look out for Acceptance Criteria, Coming Soon!



Whats new! (and still in progress)

■ OSH Park PCB, eBOM

- PCBs available in OSH Park, ready to be ordered
- Eagle component libraries being linked against Octopart eBOM feature
- Generates purchasable BOMs across major the distributors (Farnell, Mouser, Digikey)

The screenshot shows a GitHub repository page for 'mbed-HDK/Production Design Projects / CITestShield'. The page includes a commit history table and a 'readme.md' file content.

Commit	Message	Time
BlackstoneEngineering	added readme with links to software, ebom, and pcb	Latest commit d392116 25 days ago
v1.0.1	Added CI Test Shield Production Design	a month ago
CITestShield.brd	removed obsolete silkscreen on hidden layers that showed up on OSHPar...	26 days ago
CITestShield.sch	Added CI Test Shield Production Design	a month ago
readme.md	added readme with links to software, ebom, and pcb	25 days ago

CI Test Shield

The CI Test Shield has two parts

1. Hardware - physical board with sensors and wiring to hook pins together. The hardware design files can be found in
2. Software - tests that use the hardware. The software can be found in the [CI Test Shield github repository](http://...)

How to get hardware

1. Buy pre-assembled board from vendor (todo)
2. Do it yourself, order PCB from OSHPark and parts from the BOM. You can either use the BOM in this folder or order from an eBOM on OctoPart.

How to use the software

For full instructions on how to use the software see the github page.

The screenshot shows the OSH Park product page for 'CI Test Shield v1.0.1'. The page features a purple header with the OSH Park logo and navigation links. The main content area includes the product title, a description of the board, and a list of links for ordering and downloading files.

OSH Park

CI Test Shield v1.0.1

by [mbedAustin](#).

2 layer board of 2.10x2.15 inches (53.37x54.64 mm).
Shared on September 27th, 2016 20:05.

mbed CI Test Shield v1.0.1

[Order board](#). [Download](#). [Permalink](#). [Embed order link](#).

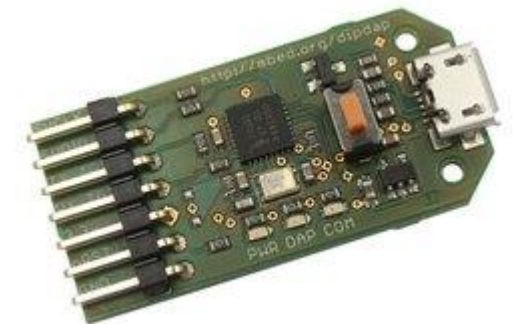
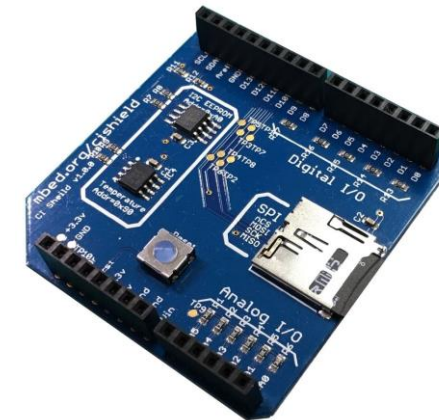
Designed and developed by [Rabid](#).

The screenshot shows an Octopart eBOM table for the CI Test Shield v1.0.1. The table lists various components with their part numbers, descriptions, and prices from different distributors.

Parts	Line Item Details	Preferred Distributors						
Part Number/MPN	Schematic Reference	Internal Part Number	Description	Digi-Key	buy now	Mouser		
3000020EA	R7, R8, R9, R10, R13, R14, R15, R16, R17		0 ohm 0603 surface mount resistor	USD 0.10000	Stock: 3,601,239	USD 0.10000	Stock: 1,333	
71E104KA010	C1, C2, C3		0.1uF (100nF) bypass Capacitor, 0603 package	USD 0.10000	Stock: 4,329,493	USD 0.10000	Stock: 975,53	
667-ERJ-3EKF1002V	R1, R2, R3, R4, R5, R6	Panasonic ERJ-3EKF1002V	10K0hm 0603 size surface mount resistor	USD 0.10000	No Stock	Custom Reel	USD 0.15000	Stock: 955,48
63W1073	R11, R12	Panasonic ERJ-3GEV472V	4.7K0hm 0603 size surface mount resistor, used fr more...	USD 0.10000	Stock: 1,073,225	Cut Tape	USD 0.10000	Stock: 328,58
B3SL-1002P	SW1	Chevon B3SL-1002P	J lead Tactile Push button surface mount for reset switch more...	USD 0.83000	Stock: 8,647	Cut Tape	USD 0.71000	Stock: 7,332
523-101-00660-68-6	CON1	Amphenol 10100660686	micro SD Card connector	USD 1.82000	Stock: 19,946	Cut Tape	USD 1.80000	Stock: 6,617
771-LM75BD.112	IC4	NXP Semiconductors LM75BD.112	LM75BD I2C temperature sensor, SO8 package	USD 0.54000	Stock: 5,192	Tube	USD 0.58000	Stock: 772

Production Design Projects in mbed-HDK

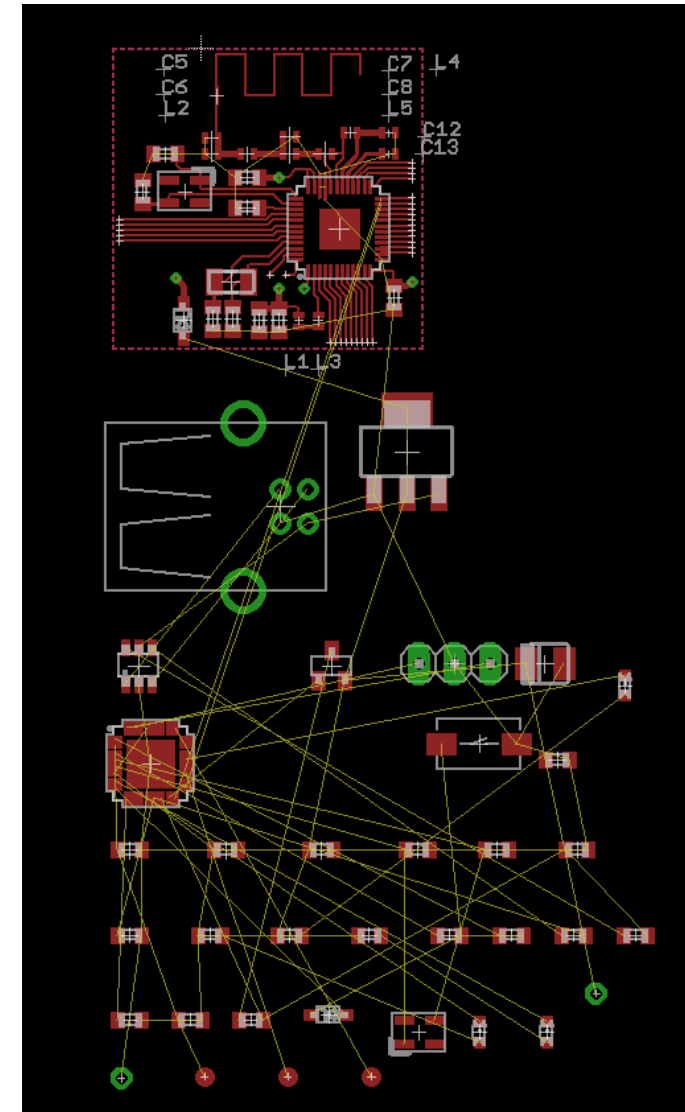
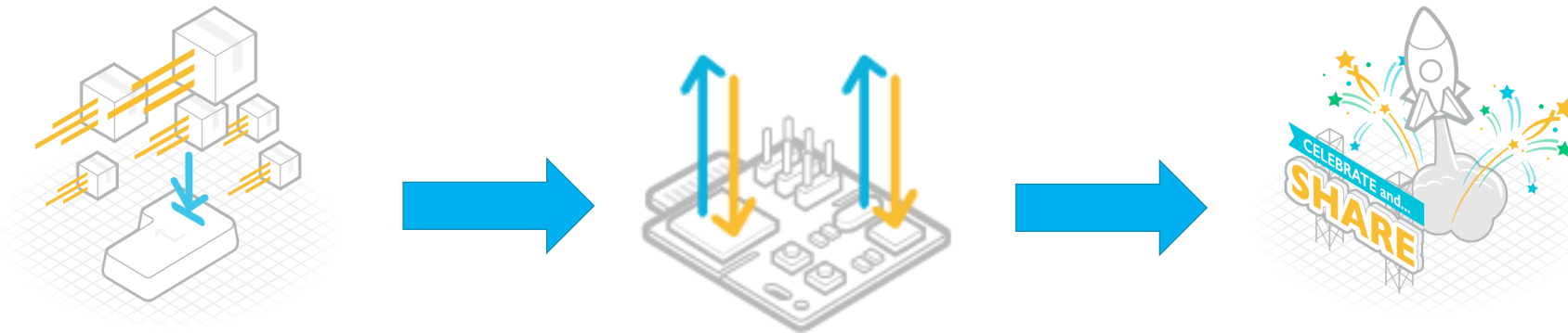
- mbed Application Shield
- CI Test Shield
- DAPLink
 - DIPDAP
 - SWDAP
- mbed 6LoWPAN Border Router HAT



Example – Composability

Let's make a nRF51822 dev board, with an LPC1114 Interface

1. Import MCU subsystem
2. Import DAPLink subsystem from the reference library
3. Add special sauce as required
4. Manufacture -> Ship -> Profit!



Get involved!

- We're happy to take contributions..
 - **Libraries**
MCU, Radio, Modules, components
 - **Subsystem**
Prebuilt schematic blocks that are logically correct
 - **Full examples**
RF examples in particular add a lot of value
- Help us build the go-to place for developers who want full stack solutions
 - Hardware, device software (OS, Stack, Client), cloud connectivity

support@mbed.org

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Thanks for listening! Questions?

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