Microsoft

# winhec

Taipei 2015

Microsoft

# Mobile Device Project End-to-End Process

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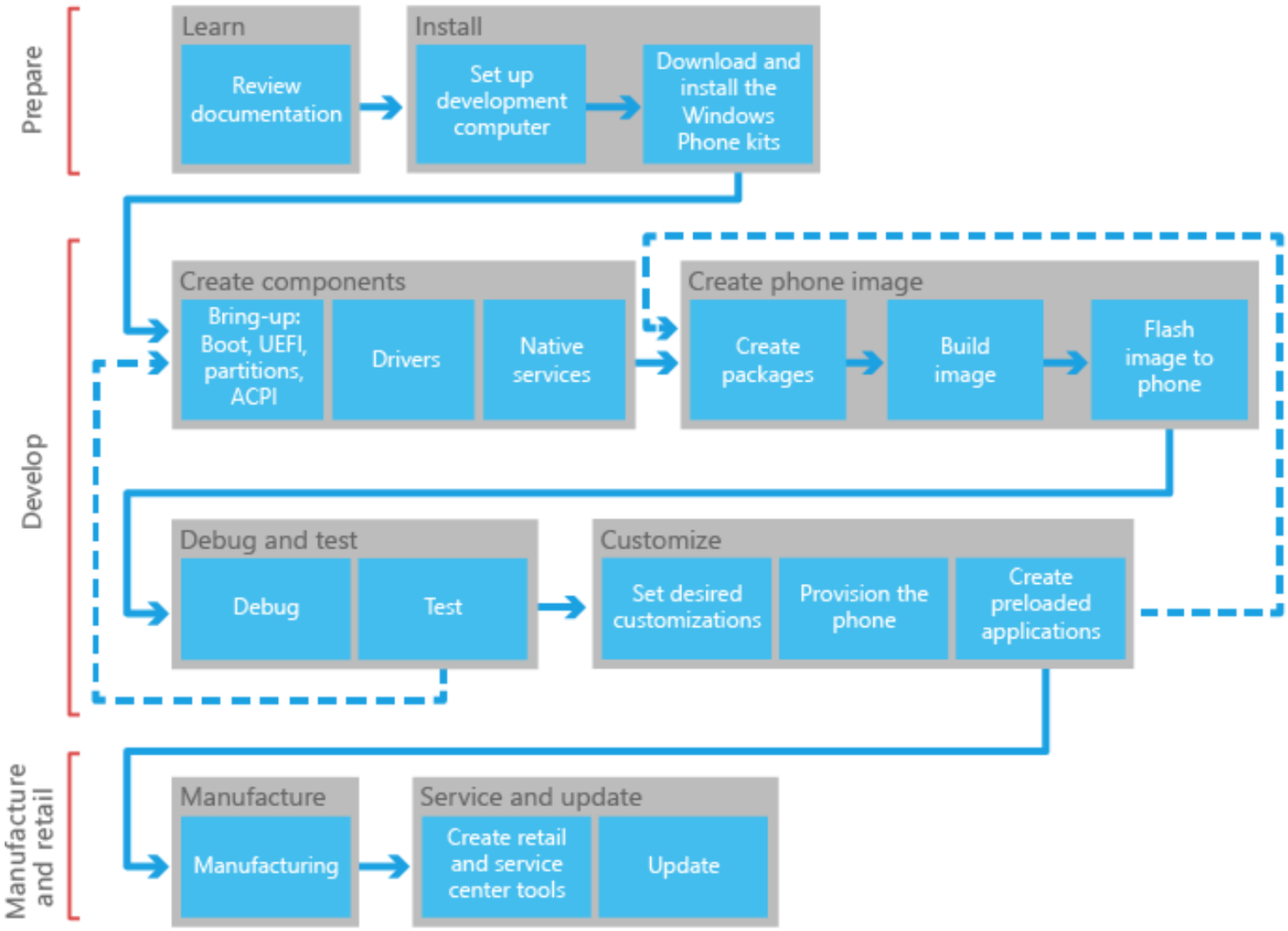
# What You Will Learn

- A big picture of the end-to-end engineering process
- What you need to do at each milestone

So you can

- Plan your learning and activities
- Get focused, not being buried in documentation
- Have a smooth project without delays or urgent issues caused by not doing something right in time

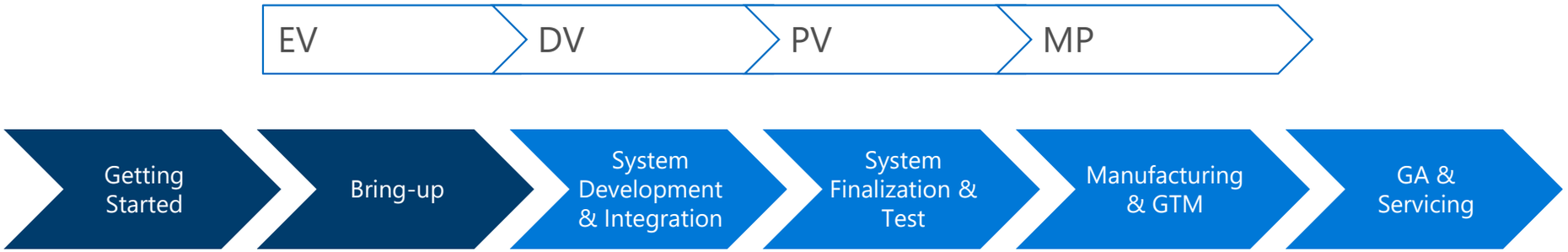
# Overall Work Flow



But I still don’t know when to do what.

OK, let’s use what you’re familiar with to explain

# Device Project Milestones




- EV: Engineering Validation
- DV: Design Validation
- PV: Production Validation
- MP: Mass Production

# Getting Started

- Sign Distribution Master Agreement with MSFT
- SoC vendor engagement for hardware, documentation and software (BSP)
- Review Windows Mobile and SoC vendor's documentation
- Get started with Windows Mobile development environment

# Bring-up

- Goal
  - Boot to Windows Mobile Start Screen successfully on your board
- Activities
  - Purchase or borrow reference devices from SoC vendor
  - Review HW requirements and choose components
    - To choose components that don’t already have drivers, you can evaluate having IHVs develop for you, or developing on your own, or outsourcing to third party
  - Design HW
  - Perform HW review with SoC vendor

# Bring-up Activities (Cont.)

- Follow SoC vendor's documents to
  - Modify boot loader code and build image (for example, SBL1.mbn)
  - Modify UEFI code and build image (UEFI.mbn)
    - Mainly customize display configuration if chosen display not already supported
- Practice creating and flashing FFU images to reference devices
- Develop drivers critical to bring-up such as Touch if needed
  - Touch is needed to operate the devices
- SMT

# Bring-up Activities (Cont.)

## After SMT

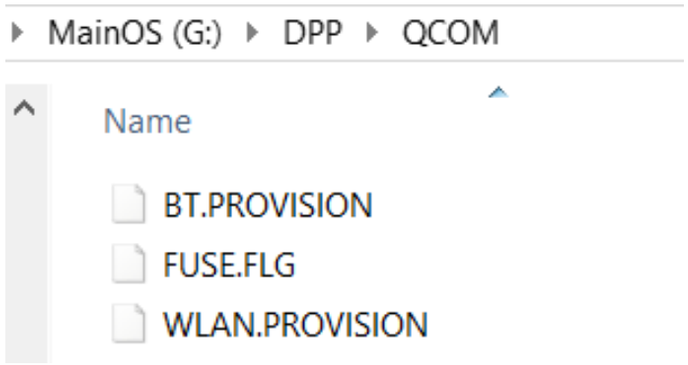
- Build BSP packages and create/flash FFU images to OEM devices
  - Simple Test Image is okay
- Work with SoC vendor to solve bring-up problems (display can't be turned on, etc)
- After booting to Start Screen, verify function of all HW components with SoC vendor's support if needed

# What Knowledge and Skills You Need for Bring-up

- BSP
- Windows Mobile kits
- Booting sequence & boot loaders
  - PBL -> SBL1 -> UEFI -> Boot Manager -> Main OS
- UEFI & ACPI
- Packages and images
- Visual Studio
- Driver development
- Debugging (WinDbg)

# EV - After Board Bring-up

- Continue to bring-up and customize components
  - Some device drivers are not critical to board bring-up such as camera and sensors
  - Develop and validate these drivers if not done yet. Modifying ACPI settings needed
- Provision (can be done earlier)
  - Obtain MAC addresses and use tools from IHVs to generate and provision WIFI and BT provision file to DPP



# DV Activities

- Continue to develop and validate drivers to complete functions, tuning and integration
- Develop apps and tools (can be started earlier)
- Start building FFU images with customizations
- Start doing comprehensive testing (HLK, scenario tests, OEM tests, etc.)

# DV Activities (Cont.)

- Enable Secure Boot with test keys
  - To simulate retail devices to see if there are any issues
  - Use a Microsoft tool, EnableUefiSBTest.Exe, to provision test keys
    - RPMB needs to be provisioned first
  - After enabling SB, Device Encryption (Bitlocker) will be enabled if an Outlook account is added to the phone, and the Microsoft Exchange server that it connects to is configured to require device encryption
  - Can be turned off by using the same exe tool (not applicable to retail devices)

# DV Activities (Cont.)

- Study and practice production configuration
  - Takes time to understand the requirements, design, process and procedures
  - Critical for PV and MP stage
- Plan for PV (can be started earlier)
  - Review requirements and processes of regulatory certifications and operator certifications
  - Define QA criteria and perform QA validation
  - Design and develop manufacturing tests and tools if needed

# DV Activities (Cont.)

- Sign up for retail package signing and update submissions
  - Need to complete on-boarding process to get **Ingestion Client** for retail package/image signing and update submissions
    - RTM builds are needed for creating and submitting retail images for signing
  - Note that **the process takes a business week.** If you are new to WM development, it's recommended to get Ingestion Client early to get familiar with retail signing and update process

# PV

- Can have big impacts on MP schedule due to critical bugs or unfamiliar processes and tasks taking unexpected long time
- To control schedule, you need to have good understanding of the processes and tasks and to know how much time each of them can take

# PV Activities

- Build FFU images with customizations and preloaded apps
  - Test Image -> Production Image -> Retail Image
- Continue to run tests
  - HLK, scenario tests, OEM tests on Test Images
  - Scenario tests on Production Image
- Self-host
  - Test Image -> Production Image -> Retail Image
- Lab acceptance
  - Go through regulatory/operator/certification lab acceptance tests

# PV Activities (Cont.)

- Sign FW images, drivers, packages and FFU images
  1. Sign SoC vendor's images (MBN files) by following their documentation
  2. Generate packages with test signed drivers and production signed MBN files. Then retail sign the packages using Ingestion Client (submitting to MSFT)
  3. Build retail images from the retail signed packages
  4. Retail sign the retail images (submitting to MSFT)

# PV Activities – Locking Devices

- Review Retail OS requirements checklist
- Validate the process to produce locked retail devices (important)
  - Blow fuses
  - Flash retail signed retail images
  - Provision security
    - Enable Secure Boot with production keys
    - SoC vendor's specific requirements such as SSD, etc by following their document
  - Need to have correct understanding of the whole process to do it right, otherwise it can turn into troubleshooting fire drills
    - Bricked devices
    - Booting issues that are difficult to troubleshoot

# PV Activities (Cont.)

## Plan for MP and servicing

- Plan and validate production process
  - Review documentation from Microsoft and SoC vendor for guidance on manufacturing process and tools
- Plan and test OTA updates
  - OTA updates are serviced via Microsoft servers. It’s important to plan and test fully in advance
- Plan for returned devices and service center handling

# MP

- Ensure that final retail images are configured to meet the security requirements
- Ensure that retail devices are provisioned and validated properly
  - OPM, HDCP, SSD …

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