



Course material

Course:

## Understanding the digital supply chain and its stakes for humanitarian actors

Video:

### 1.1.2 Hardware supply chain Stakeholders

Concepts (extracted from automatically generated subtitles):

**Hardware supply chain. Overview of the supply chain phases. Very complex fab machine. Train companies. Innovative designs. Hardware developers. Standard train tracks. Size of chips. Common ground. Fabrication foundry. Power consumption. Much power. Silicon wafer. Hardware vendors. Such specifications.**



[to video sequence search](#)

(within Understanding the digital supply chain and its stakes for humanitarian actors.)



[to video](#)

Center for Digital Education. More educational support material here:

<https://www.epfl.ch/education/educational-initiatives/cede/educational-technologies-gallery/boocs-en/>

# THE HARDWARE AND SOFTWARE SUPPLY CHAINS

## The Hardware Supply Chain: Stakeholders

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notes

summary

0m 0s



# Stakeholders Ecosystem



**Processes**



**People**



**Product**

With that overview of the supply chain phases, let's dive deeper into the stakeholders in this ecosystem.

notes

summary

0m 4s



# Stakeholders Ecosystem



**Processes**



**People**



**Product**

It is a delicate balance of processes, people, and products. Any ecosystem that has several players offering the same services need a common ground, especially if they need to interact with other services.

notes

summary

0m 13s



# Standards and Specifications in Hardware



*Any ecosystem that has several players offering the same services needs a **common ground**, especially if they need to interact with other services.*

For example, you've built standard train tracks that can be used by multiple train companies. Just like this example, the hardware supply chain also relies on standards and specifications.

notes

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0m 25s



# Standards and Specifications in Hardware



*Any ecosystem that has several players offering the same services needs a **common ground**, especially if they need to interact with other services.*

There are commonly understood contract between phases.

notes

summary

0m 37s



# Standards and Specifications in Hardware



*Any ecosystem that has several players offering the same services needs a **common ground**, especially if they need to interact with other services.*

This allows stakeholders to develop their pieces in barrel. They don't have to worry about whether the end products will function with each other correctly. They know it will.

notes

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0m 38s



# Standards and Specifications in Hardware



**Innovation** : Specifications provide room for innovation. They enable the creation of competing products that perform the same operations but excel in different areas.

- e.g., Arm, USB-C

**Modularity** : This approach allows developers to license their designs. It promotes the reuse of building blocks, saving time and resources.

- e.g., AMD, Arm, Intel, Nvidia, Synopsys, Qualcomm

Such specifications are also useful for maintaining a healthy balance. They allow room for innovation and incubation of competing products

notes

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0m 52s





# Standards and Specifications in Hardware



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that perform the same operations. Just like there are several breads and cheeses that one can use for making sandwiches, because there's a common understanding of what is a bread and what is cheese.

notes

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1m 1s



# Standards and Specifications in Hardware



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**Modularity** : This approach allows developers to license their designs. It promotes the reuse of building blocks, saving time and resources.

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This way, hardware developers can focus on creating innovative designs that compete on their merits. For example, on factors such as performance, functionality, power consumption, size of chips, to name a few.

notes

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1m 13s



# Standards and Specifications in Hardware



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**Modularity** : This approach allows developers to license their designs. It promotes the reuse of building blocks, saving time and resources.

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This modularity allows developers to licence their design to other stakeholders. This in turn enables reuse of building blocks

notes

summary

1m 28s



# Standards and Specifications in Hardware



instead of creating their own designs every time. Now, we get into the game of maximising scale. Once the design is ready, the goal is to produce as many chips as possible,

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summary

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# Standards and Specifications in Hardware



all while minimising resources and time.

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summary

1m 49s



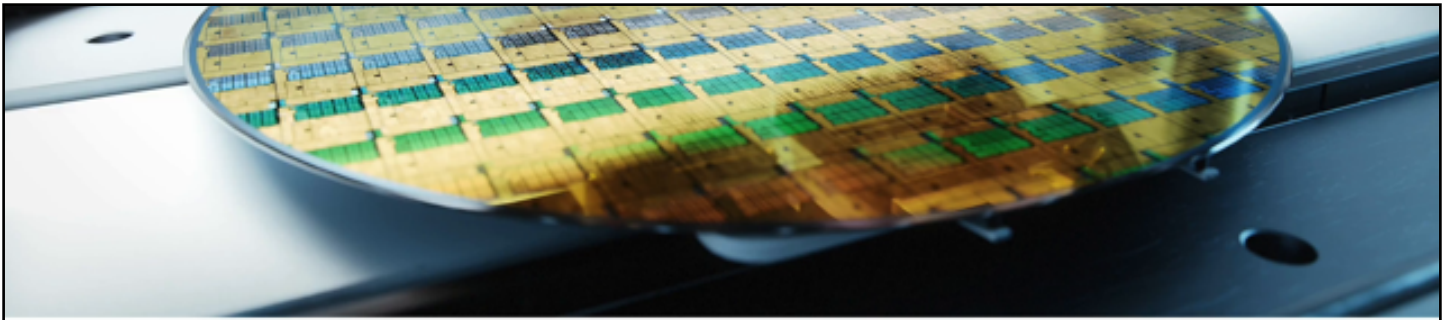
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## Complex Chain: Maximizing Scale

### Blueprint Creation

Designers create detailed blueprints, considering functionality, power consumption, and layout. They aim to minimize chip size without compromising performance.

### Fabrication

The blueprint is sent to a fabrication foundry (fab). Complex machines transform silicon wafers into chips based on the design.

First up, there are quite a few steps to create a blueprint of what needs to go into a chip. Is it going to be functional? How much power will it consume?

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### summary

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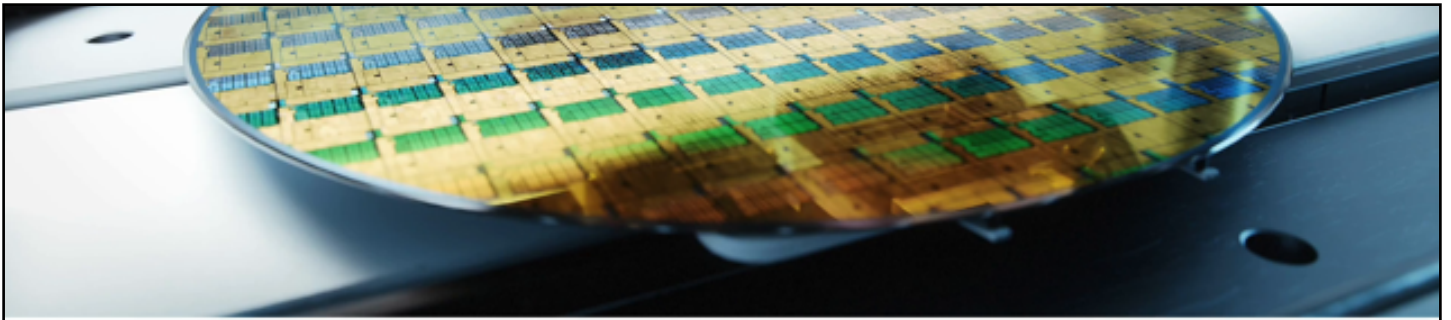
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## Complex Chain: Maximizing Scale

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How much area will it take up? What will its layout look like? Can it be minimised further, all while without compromising functionality? So on and so forth.

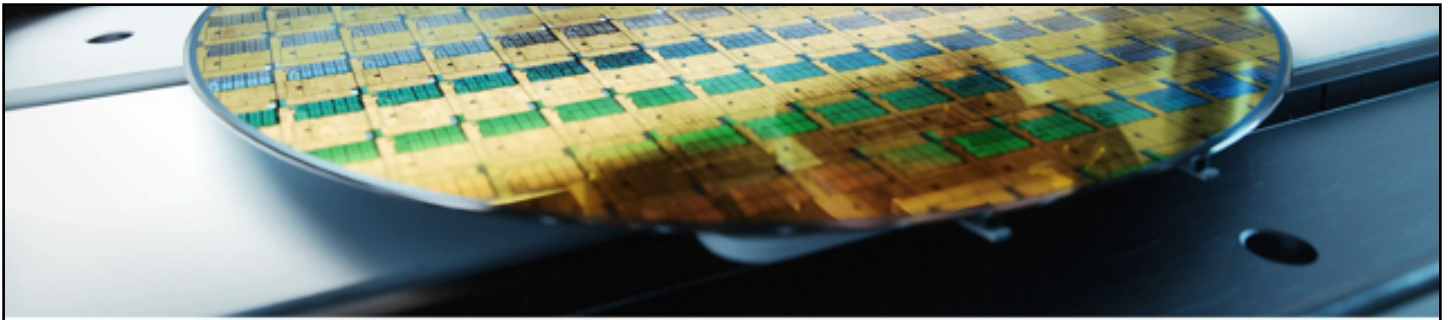
### notes

### summary

2m 1s







## Complex Chain: Maximizing Scale

### Blueprint Creation

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### Fabrication

The blueprint is sent to a fabrication foundry (fab). Complex machines transform silicon wafers into chips based on the design.

After the blueprint is ready with a lot of due diligence, it is time to bake that bread. Oh, I mean, fabricate the chip. The fabrication foundry is usually referred to as a fab.

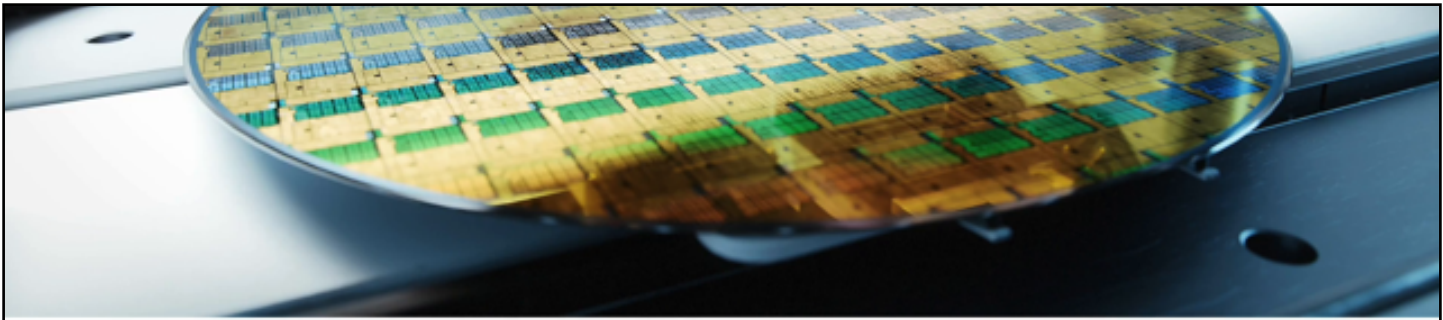
### notes

### summary

2m 13s







# Complex Chain: Maximizing Scale

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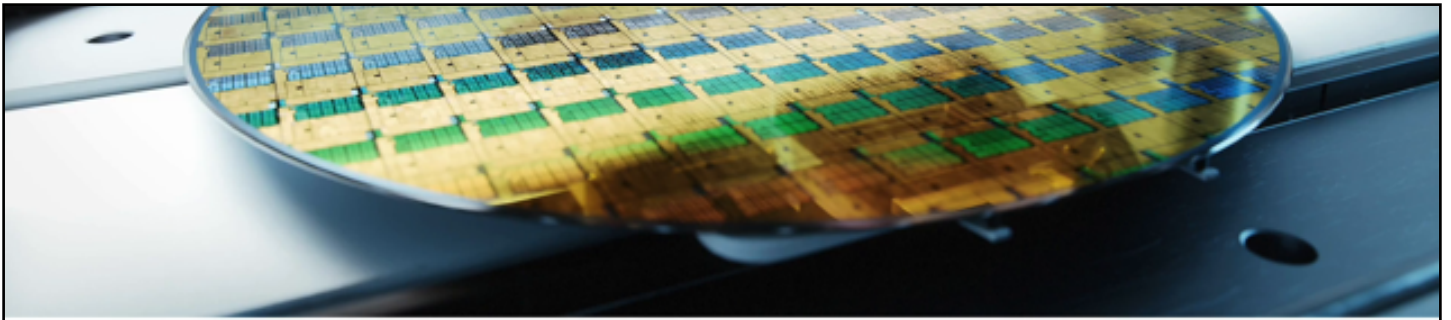
The fab has a very complex fab machine.

notes

summary

2m 25s





## Complex Chain: Maximizing Scale

### Blueprint Creation

Designers create detailed blueprints, considering functionality, power consumption, and layout. They aim to minimize chip size without compromising performance.

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This machine takes in silicon wafer and the blueprints and produces chips. Typically, the quality of a fab is judged based on its yield.

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### summary

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# Stakeholders Ecosystem



## Quality of a FAB

- **Yield:** Number of quality chips produced in a given time
- **Size of the chip**

This means the number of quality chips that it can produce within a given time and resources.

notes

summary

2m 42s



# Complex Chain: Maximizing Scale



## Tale of Two Manufacturers

One at the head, one at the tail of the supply chain.

### Photolithography Machine Manufacturers

These companies create the machines used to fabricate chips. They conduct cutting-edge research to improve chip miniaturization processes. e.g., ASML

### Product Manufacturers

These entities assemble final products. They combine chips, batteries, and other components to create devices like smartphones or smartwatches. e.g., Foxconn, Pegatron, Wistron

The more chips, the better. The other factor is usually the size of the chip. The smaller, the better. Manufacturers, such an overloaded term. What does it even mean? In the hardware supply chain, there are two manufacturers that we care about, and it can get a bit confusing at times.

### notes

### summary

2m 49s



# Complex Chain: Maximizing Scale



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The first is a photolithography machine manufacturer.

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summary

3m 11s



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I know. Sounds scary. Well, it is simply the company that creates the machines that are used to fabricate the chips.

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3m 13s



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So think of it as a company that makes bread maker machines, and sells it to bread makers. This is an important link in the chain.

notes

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3m 25s



# Complex Chain: Maximizing Scale



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These companies have to do cutting-edge research to continuously improve the physics of making smaller and smaller chips. All right. Now, on the other hand of the chain is the manufacturer.

### notes

### summary

3m 37s





# Complex Chain: Maximizing Scale



## Tale of Two Manufacturers

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### Product Manufacturers

These entities assemble final products. They combine chips, batteries, and other components to create devices like smartphones or smartwatches. e.g., Foxconn, Pegatron, Wistron

This manufacturer takes in all the components, namely the chips, batteries, wires, casings, cooling,

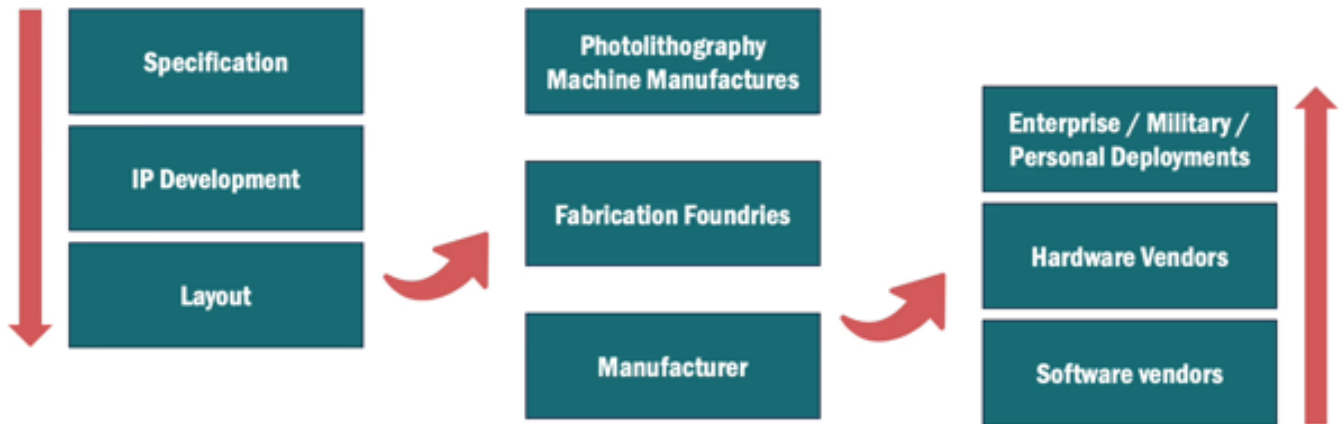
notes

summary

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# Complex Connections in the Chain



to put it together to make a product like a phone or a smartwatch. Now, let's zoom out and look at all the links in the chain. We see all sorts of dependencies and connexions.

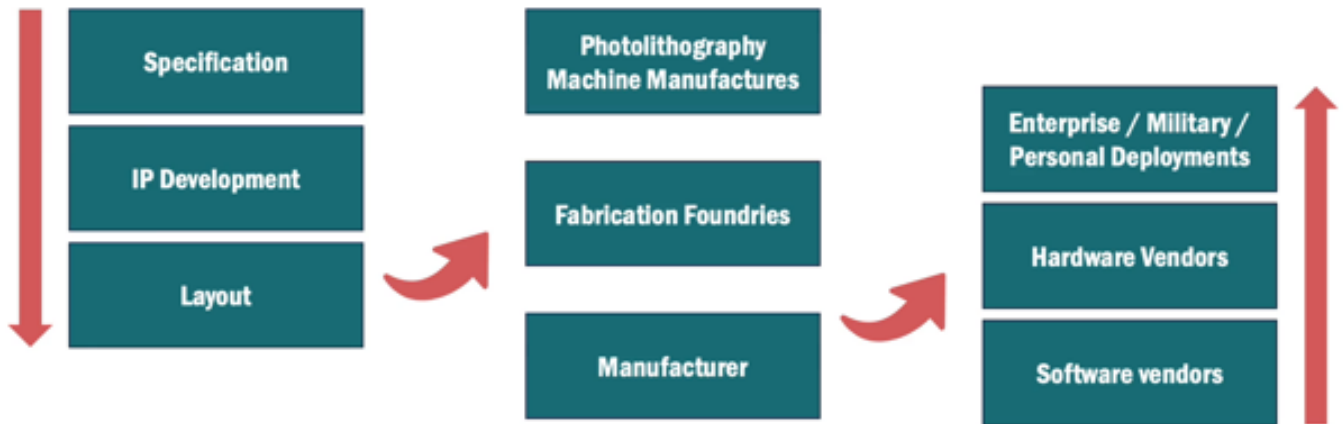
notes

summary

4m 1s



# Complex Connections in the Chain



But there is more when you look at bringing the product to the market.

notes

summary

4m 13s



# Image reference



## In order of appearance

PICTURE1 : Supply Chain concept by tippapatt from Adobe Stock  
ICON1 : Created by Napisah from Noum Project  
ICON2 : Created by Elsa from Noum Project  
ICON3 : Created by Eko Pumomo from Noum Project  
PICTURE2 : By JackF from Adobe Stock  
PICTURE3 : By IM Imagery from Adobe Stock

Think about hardware vendors, contractors, on-site installations, custom-builds, and enterprise or even military deployments. Each of these entities and steps contribute to the hardware supply chain. They can make it or break it.

### notes

### summary

4m 14s

