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Testimony of Dr. Elizabeth Chamberlain, Director of Sustainability, iFixit
For the Oregon House Committee on Business and Labor

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- Appendix A: iPhone 15 Parts Pairing Testing Results
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Hello, Chair Holvey, Vice-Chairs Elmer and Sosa, and the members of the House Committee On Business and Labor.

I'm Liz Chamberlain, and I'm Director of Sustainability for iFixit, and I'm here today in strong support of SB 1596. iFixit is a repair company with over 100,000 step-by-step repair guides for how to fix everything from toasters to tractors, and we sell parts and tools for consumer gadgets so that people can fix things themselves. We also sell parts and tools wholesale to independent repair shops. Recently, we've started helping manufacturers get original parts to their customers—we're now the official parts distributor for Samsung, Google, Nokia / HMD, Logitech, and Valve, and we have made repair guides for Patagonia and The Home Depot.

Through our business, we hear from individuals and independent repair shops about the things that make repair difficult. Both groups complain that they have trouble finding spare parts—manufacturers of products like vacuum cleaners and fitness trackers often don't have any parts available at all. Other products have only a very limited range of parts.

But even when you can find a replacement part, repair may still be blocked. Increasingly, software locks make repairs difficult or impossible. Through a process called parts pairing, manufacturers link a part to a device serial number and then limit the part's functionality unless you put in a special code. Some parts pairing just makes annoying warnings pop up. Other systems actually make a part impossible to replace.

SB 1596 would solve all of these problems. It would make sure that individuals and independent repair shops can get access to the same parts, tools, and documentation that manufacturers' shops have. It would require that manufacturers give customers access to the software necessary to make parts functional. It would level the playing field for repair, making repair cheaper and more widely available for all Oregonians.

iFixit has conducted extensive research on the extent of parts pairing in consumer devices. When new gadgets come out, we take them apart and give them a repairability score on a scale of 0–10. When the iPhone 15 came out in September, we bought two devices, took them apart, and tried swapping parts between them. Lots of refurbishers and independent repair shops rely on this sort of parts swapping—they save broken devices and harvest the working parts. Parts harvesting is a big part of how independent shops stay competitive in a market where manufacturers have the upper hand in parts supply and customer access.

In the iPhone 15, more parts have parts pairing limitations than in any iPhone before. Some parts can't be replaced at all, specifically the selfie camera, front-facing sensors, and lidar. Some parts, like the display, can be replaced but will have several functions turned off at the source, specifically True Tone and Auto Brightness. Replacing the display, main camera, or battery will result in repeated warnings and notifications, some of which can't be dismissed by the user.

Repair shops we work with tell me that those "unidentified part" warnings scare away customers all the time, even when a device is working perfectly otherwise. One independent technician told me about a customer who was so unsettled by the warnings that she came back in and demanded he reinstall her old, cracked screen, even though the new one seemed to be working fine.

We gave the iPhone 15 a repairability score of 4 out of 10—so low largely because of the parts pairing limitations.

Apple has testified against this bill because of its parts pairing provision. In light of their testimony, I want to clarify some things.

Apple argues that this bill will compromise customers' safety, security, and privacy. Their arguments are misleading and incomplete.

Of course all manufacturers need to ensure customer safety. But Apple provided just one example of how parts pairing might hurt customers: batteries. We sell many third party batteries for all kinds of phones, and I can assure you that battery fires are quite rare. The fact that Apple secures iPhone batteries with fragile adhesive strips means that many users and repair technicians end up having to pry batteries out—that prying is the most dangerous part of a battery replacement. Even still, to be clear, electronics repair is six times safer than the average job in the US, according to the Bureau of Labor Statistics.

If Apple was truly concerned about the risk of thermal events from battery replacements, they could introduce less aggressive adhesive and hard-shell instead of soft-pouch batteries. That was the recommendation of battery experts at the European certifying body TUV Rheinland.

Apple also spent a lot of time emphasizing the importance of parts calibration. The restrictions on parts pairing in this bill wouldn't prevent Apple from calibrating parts. Some parts for Google Pixel phones have a calibration step—for instance, the fingerprint sensor. Apple could still include a calibration step as part of the standard repair process, as long as that calibration step is available for all kinds of parts, including harvested parts.

Of course, manufacturers are not expected to guarantee the quality of third-party or secondhand parts. If a part doesn't meet the specifications necessary to provide a feature, of course, users will have to accept the loss of that feature.

This bill would simply prohibit manufacturers from *artificially* limiting parts' capabilities. Apple wouldn't be allowed to automatically turn off features like battery health, True Tone, and Auto Brightness for any devices repaired outside their ecosystem.

Apple expressed concern about device security and customer privacy, suggesting that allowing the replacement of FaceID and TouchID parts could result in them being required to let parts bypass customers' biometric data. In fact, the bill says exactly the opposite, that manufacturers aren't required to provide materials that would "disable or override, without an owner's authorization, anti-theft or privacy security measures."

The parts pairing restrictions in this bill would leave intact the two systems that prevent iPhone theft: Apple's Activation Lock system and the mobile carrier blacklist system.

Apple's current parts pairing system does nothing to identify stolen parts. In fact, stolen parts currently operate exactly the same as any legitimate harvested, secondhand, or third-party parts. If parts pairing were intended to prevent theft, it would operate very differently. It might block stolen parts altogether, or warn customers that they've installed a part from a phone that was stolen. We have never seen a parts pairing system that operates this way.

I've spent a lot of time talking about Apple, since they're the most vocal opponents of this bill and because they are the most egregious parts pairing offenders in the consumer electronics space. But I do want to emphasize that we've seen parts pairing in lots of other devices, too—in chainsaws, food processors, and game consoles, for example.

Parts pairing is not effective at protecting consumers' safety, security, or privacy. Systems designed primarily with those goals in mind would look very different. But parts pairing is *quite* effective at making third-party repairs more difficult or impossible to complete. It's very effective at scaring customers away from third-party repair.

Limiting parts pairing would be a huge boon to independent repair shops, refurbishers, and DIY repair people throughout Oregon.

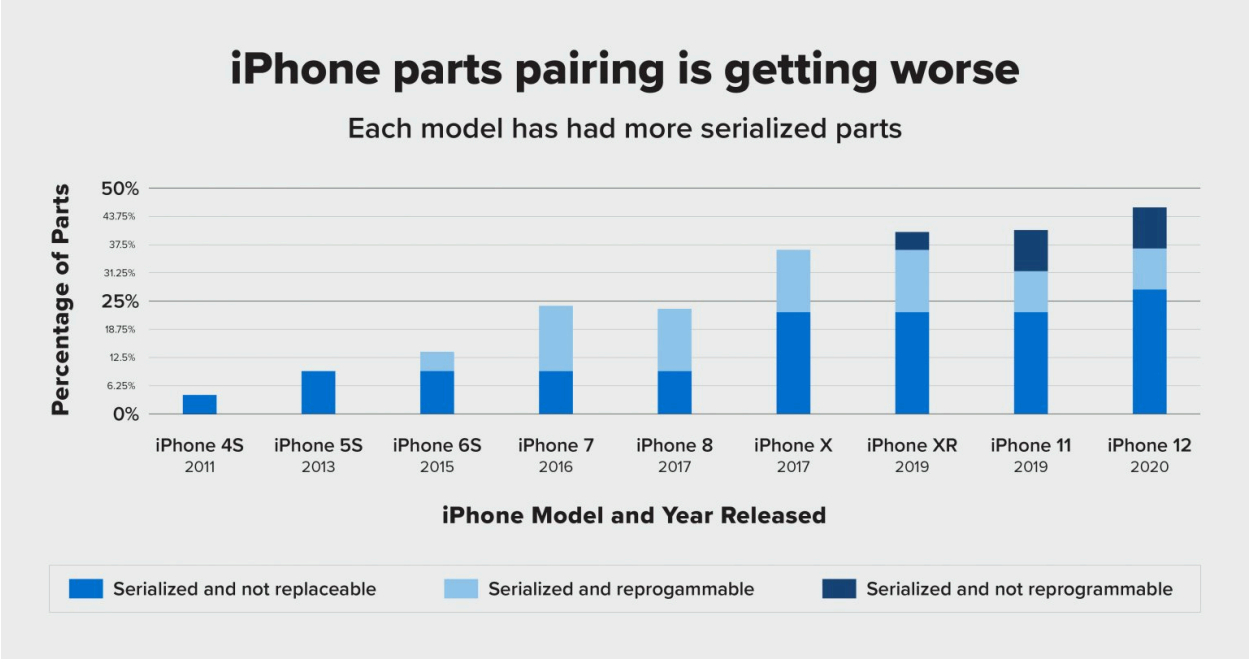
iFixit stands in strong support of SB 1596 and asks for your support, too. Thank you for your time.

Appendix A: iPhone 15 Parts Pairing Testing Results

iFixit iPhone 15 Parts Pairing Testing			
Component	**Test**		**NOTES**
Display	Boot & Display	Functional	
	Face ID	Functional	
	Genuine Part Warning?	Warning Present	
	True Tone	Not Functional	True tone option not present.
	Auto Brightness	Not Functional	Ambient light sensor seems to be non-reactive: screen does not dim when placed in dark box.
	Night Shift	Functional	
	Front Camera	Functional	
Battery	Boot	Functional	
	Genuine Part Warning?	Warning Present	Max capacity and peak performance capability data unavailable.
Main Camera	Boots with usable camera	Functional	
	Genuine Part Warning?	Warning Present	
Lidar	Full function	Not Functional	Lidar struggles to function; selfie camera light turns on. Screen often hazes over or freezes, showing a real-time picture for just 0.1-1.0 seconds at a time.
Selfie Camera and Sensors	Boots with usable camera	Not Functional	
	FaceID	Not Functional	
	True Tone	Not Functional	
	Auto Brightness	Not Functional	
Earpiece Speaker	Full function	Functional	
Logic Board	Full function	Functional, but the device considers all parts swapped.	Warnings for Camera, Face ID, Battery, Display. True Tone option not present. Face ID setup fails. Selfie camera crashes camera app. Battery health data inaccessable. Lidar in Measure App is non-functional and crashes. Auto brightness does not function. No issues present with the original Logic board.
Main Speaker	Full function	Functional	
Taptic Engine	Full function	Functional	
USB-C Assembly	Data Transfer Speed	Functional	
	Charge Speed	Functional	Recognizes all tested chargers.
	Recognition from Mac/Windows	Functional	
Wireless Charging Coil	Full function	Functional	

See full discussion at
https://www.ifixit.com/News/82867/iphone-15-teardown-reveals-software-lockdown

Appendix B: iPhone Parts Pairing Is Getting Worse



See full discussion at
https://www.ifixit.com/News/69320/how-parts-pairing-kills-independent-repair

Appendix C: It's Not Just Apple: Lots of Products Limit Repair Through Paired Parts

See more at https://www.ifixit.com/News/77259/esa-opposes-console-repairs