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# THE DEMISE OF GOOGLE PROJECT ARA: UNRAVELING THE CHALLENGES AND CHARTING A PATH FORWARD [1]

*The demise of Google Project Ara unveils the complexities of innovation, yet within challenges lie opportunities to redefine the future.*

On September 10, 2013, Design Academy Eindhoven graduate Dave Hakkens published his "Phonebloks" video to YouTube. The concept was straightforward: replace phone parts that were either faulty or in need of an upgrade. This spurred to the ATAP (Advanced Technology and Projects) team within Motorola Mobility LLC, while it was a Google company, to instantly announce its project ARA as soon as Dav Hakkens' video was released (Weber, 2017). The initial proposal consisted of hardware modules that, when joined with the metal endoskeleton or frame, referred to as "endos," form a functioning smartphone. It begins with the endos and then progresses to pieces frequently seen in today's smartphones, such as the processor, battery, camera, screens, storage, speaker, and so on (Project, n.d.).

The fundamental idea behind Project Ara was straightforward: it featured a basic phone frame designed to accommodate a diverse range of interchangeable modules, including batteries, memory, cameras, and CPUs. Project Ara aimed not only to facilitate hardware customization for smartphones but also to support faster repairs and offer an upgrade path, allowing users to enhance the power or capabilities of their phones without the need to buy an entirely new device (Kastrenakes, 2016).

Project Ara sought to transform the mobile phone business for the better. Instead of waiting in line to acquire another mobile phone, users could simply upgrade the part they needed. Dave had hoped to create a mobile phone that would endure for a hundred years. However, given the inherent limitations of electronic equipment not being designed for longevity, this theory presented its own set of challenges.

Unfortunately, Google was unable to make it a reality owing to issues with sorting out modular pieces with the technology of the time, worries about durability and interoperability, and the difficulty of developing a consumer-friendly model for modular phones. Despite its promising goal, Project Ara eventually faced insurmountable hurdles, leading to its demise (Moore-Colyer, 2023). The demise of Project Ara, however, did not quell the ongoing pursuit of innovation in the smartphone industry. While Google faced challenges in realizing the modular smartphone concept, other technological advancements have continued to shape the landscape. Companies and inventors around the world are exploring alternative approaches to sustainable and customizable mobile devices (Dediu & Dediu, 2017).



**Editor: Prajay Reddy & Ajay Srikar**

# SWOT Analysis

This SWOT analysis presents a holistic evaluation of both internal and external factors impacting the success of Google Ara. Leveraging strengths, addressing weaknesses, seizing opportunities, and mitigating threats are crucial for Google to fully harness the potential of the Ara project.

## Strengths:

Modular design: Google Ara's modular design allows users to customize and upgrade individual components of the smartphone according to their preferences and needs.

Innovation: Google Ara represents an innovative approach to smartphone design, potentially revolutionizing the industry by offering greater flexibility and sustainability.

Ecosystem potential: The modular nature of Google Ara could lead to the creation of a vibrant ecosystem of third-party modules, fostering innovation and differentiation.

Sustainability: By enabling users to replace or upgrade specific components rather than discarding the entire device, Google Ara has the potential to reduce electronic waste and contribute to environmental sustainability.

## Weaknesses:

Complexity: The modular design of Google Ara may introduce complexity for both users and developers, potentially leading to usability issues and compatibility challenges.

Cost: Initially, the cost of modular components and the overall device may be higher compared to traditional smartphones, limiting its adoption among price-sensitive consumers.

Market acceptance: The concept of modular smartphones is relatively new, and there may be skepticism or resistance from consumers accustomed to traditional, non-modular devices.

Limited initial availability: Google Ara may face challenges in terms of initial availability and distribution, particularly if it's launched in select markets or with limited carrier support.

## Opportunities:

Customization: Google Ara can capitalize on the growing demand for personalized technology products by offering users the ability to tailor their smartphones to suit their specific preferences and requirements.

Partnerships: Collaborations with third-party manufacturers and developers could expand the range of modules available for Google Ara, enhancing its appeal and functionality.

Market expansion: Google Ara could target niche markets or specific user segments, such as tech enthusiasts, developers, or environmentally conscious consumers, to gain traction and generate early adoption.

Long-term growth potential: As technology advances and more modules become available, Google Ara could evolve into a versatile platform for various applications beyond traditional smartphones, such as IoT devices or specialized tools for professionals.

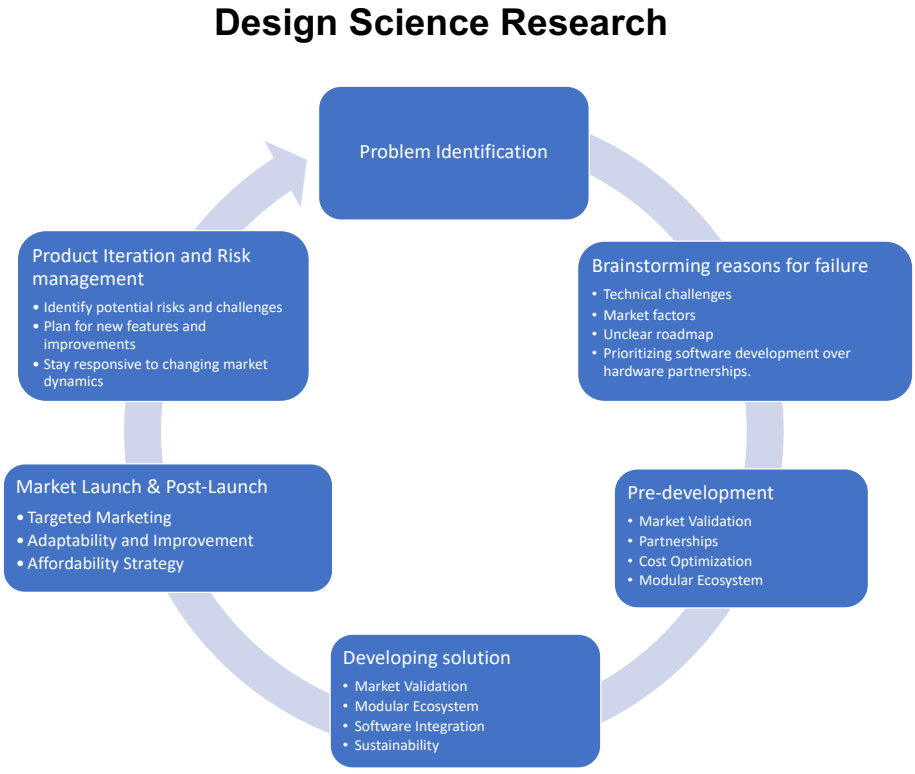
## Threats:

Competition: Google Ara faces competition from established smartphone manufacturers and other emerging players in the modular device market, which could hinder its market penetration and growth.

Technological limitations: Technical constraints or limitations in modular component design could impede the performance, reliability, or functionality of Google Ara compared to traditional smartphones.

Intellectual property issues: Google Ara's modular concept and technology may be subject to patent disputes or legal challenges from competitors or patent trolls, potentially delaying or disrupting its development and commercialization.

Changing consumer preferences: Shifts in consumer preferences, market trends, or technological innovations could affect the demand for modular smartphones like Google Ara, making it challenging to sustain long-term success.




### Problem Identification

In the initial stages of the Google Ara project, thorough problem identification was pivotal. This phase involved recognizing the shortcomings of conventional smartphones and identifying opportunities for innovation through modular design.

**Brainstorming Reasons for Failure**

Acknowledging the multitude of factors contributing to potential failure was crucial. Technical hurdles, shifting market dynamics, ambiguous roadmaps, and challenges in prioritization were among the considerations during this brainstorming phase.

**Pre-development Preparations**

Efforts in the pre-development phase were aimed at establishing a strong foundation for success. Activities included validating the market, cultivating strategic partnerships, optimizing costs, and nurturing a robust modular ecosystem.

**Developing Solutions**

As the Google Ara project progressed, the focus shifted towards devising comprehensive solutions. Continuous market validation informed decision-making processes, while attention remained on refining the modular ecosystem, integrating software effectively, and ensuring sustainability.

**Market Launch & Post-Launch Strategies**

Strategic planning for both market launch and post-launch phases was imperative. Components of this phase included targeted marketing efforts, adaptability to market changes, ongoing improvement initiatives, and implementing an affordability strategy.

**Product Iteration and Risk Management**

The Google Ara project adopted a proactive stance towards product iteration and risk management. By identifying potential risks and challenges early on, the team could plan for the introduction of new features and enhancements, all while staying responsive to evolving market dynamics.

# Major Factors That Influenced the Downfall of the Project

## Technical Challenges

Manufacturing Complexity: Integrating modules seamlessly into the phone chassis for durability and optimal performance posed challenges in miniaturization and maintaining tight connections. These complexities in the modular design presented significant manufacturing obstacles (Sinha, 2021).

Supply Chain and Quality Control: Managing a diverse ecosystem of module manufacturers and ensuring consistent quality across components became a logistical nightmare. Coordinating the supply chain to maintain standards for each module added complexity to execution and quality control processes.

Limited Module Availability: The open-source approach, designed to foster creativity, inadvertently resulted in a limited pool of available modules. This limitation reduced the immediate appeal of the platform as users faced constraints in choosing from a variety of modules, hindering the envisioned customization potential.

Immature Technology: Essential modules, like high-performance processors, were not mature enough during Project Ara's development. This technological immaturity hindered the creation of a compelling

modular experience, as key components lacked the advanced capabilities necessary to meet ambitious goals.

## Cost and Profitability Concerns

High Development Costs: Designing and testing Project Ara's modular system incurred substantial costs in prototyping and engineering. Achieving optimal cohesion and functionality across diverse modules added to the financial challenges of development (Savov, 2016).

Creating a New Ecosystem: Incorporating third-party modules into the framework required major investments in infrastructure and support. Cultivating a flourishing ecosystem around modular customization demanded substantial resources and commitment.

Software Development: Integrating modules into the operating system posed a multifaceted challenge, demanding intricate software development efforts. Ensuring seamless compatibility across module configurations heightened complexity and incurred additional expenses for a cohesive user experience.

Complex Assembly: The commitment to module integration mandated precise engineering and sophisticated manufacturing methods. The intricate assembly process, designed for seamless modular integration, contributed to increased production costs.

Quality Control: Rigorous quality control measures for diverse modules added complexity and costs. Maintaining consistent quality across varied modules sourced from different manufacturers presented an extra layer of complexity.

Limited Economy of Scale: The fragmented structure of the modular ecosystem posed challenges in achieving economies of scale. Diverse modules and production processes hindered optimizing production costs per unit, contributing to financial intricacies.

Uncertain Income Streams: The open-source strategy fostered creativity but came at the cost of minimal control over module prices and revenues. This uncertainty posed challenges in establishing stable and predictable income streams, especially in the long term.

Long Payback Time: High upfront development and production expenditures, coupled with uncertainties in market demand, resulted in an extended payback period. This prolonged timeline deterred potential investors seeking more immediate returns.

Sustainability Considerations: Despite the goal of reducing e-waste, the environmental impact of manufacturing and replacing modules needed careful balance against the sustainability advantages of the modular approach. The complex interplay of ecological considerations added nuance to the financial and developmental landscape of Project Ara.

## Market Dynamics

Consumer Uncertainty: The radical shift from conventional cellphones to a modular design faced potential resistance as users hesitated to embrace a new paradigm in mobile technology. The familiarity of existing devices posed a challenge, where the convenience of modular customization might not immediately outweigh the comfort of the established status quo (N, 2024).

Carrier Resistance: Mobile carriers, influential in the phone industry, may have had reservations about supporting a device with unforeseen settings and potential network compatibility challenges. Concerns about the seamless integration of modular components into existing networks, disrupting the traditional mobile ecosystem, could have contributed to carrier resistance.

Economic Viability: Doubts surrounding Project Ara's long-term profitability stemmed from factors including high development costs, manufacturing intricacies, and a nascent market for modular components. Scrutiny arose as stakeholders questioned whether the innovative approach could translate into sustainable financial success amid uncertainties in the evolving mobile landscape.

Sustainability Considerations: While Project Ara aimed to reduce e-waste, reservations existed about the environmental advantage compared to conventional phones. Concerns revolved around manufacturing processes and potential module replacements, raising important considerations about the project's true sustainability impact. The delicate balance between minimizing electronic waste and the ecological footprint of producing and replacing modular components was a central concern.

# Minor Factors That Influenced the Downfall of the Project

## Insufficient Developer Engagement

Complex Development Kit (MDK): The early MDK posed a significant challenge, particularly for smaller developers and amateurs, as it demanded specialized expertise and hardware, creating a barrier to entry and hindering broad developer engagement (Rubin, 2015).

Limited Module Incentives: The absence of clear income sources and a nascent market for specialized modules dampened developers' enthusiasm, hindering their commitment to creating innovative components for the modular platform.

Lack of Community Support: Without a vibrant community ecosystem, developers faced obstacles in sharing information, debugging, and collaborative problem-solving. The absence of a supportive community impeded the growth of a collaborative developer network.

## Limited Third-Party Support

Carrier Concerns: Mobile carriers hesitated to adopt the platform, citing concerns about network compatibility and potential support challenges with diverse modules. This reluctance restricted Project Ara's market reach and overall appeal (Rayner, 2019).

Manufacturing Complexities: The intricate manufacturing process and rigorous quality control requirements discouraged several potential third-party module producers from joining the ecosystem. These complexities stifled the expansion of the modular platform's ecosystem.

Uncertain Market Demand: The lack of proven demand for modular phones made it challenging for component makers and retailers to justify investments in Ara's ecosystem, contributing to a limited third-party support base.

## Organizational Changes and Shifting Priorities

Internal Rivalry and Resource Allocation: Within Google, internal competition for resources and attention, particularly with high-profile initiatives like the Pixel phones, may have diverted crucial resources away from Project Ara, impacting its development trajectory (P, 2023).

Changes in Strategic Direction: Shifting market goals at Google towards software and services diminished the strategic relevance of a hardware-focused project like Ara, potentially leading to a reevaluation of priorities and resources.

Lack of Key Personnel: The departure of key executives and engineers who were champions of the Project Ara concept may have resulted in a loss of momentum and focus, affecting the project's direction and execution.

## Leadership Changes and Lack of Continuity

Frequent Team Reshuffles: Ongoing changes in leadership and team composition disrupted project cohesiveness, impacting communication, knowledge transfer, and long-term planning (Smith, 2016).

Loss of Institutional Knowledge: The departure of experienced team members led to a loss of accumulated knowledge and expertise, affecting crucial development and decision-making processes.

Reduced Vision and Ownership: Frequent leadership changes diluted the initial vision and passion for the project, resulting in a drop in team morale and commitment, ultimately contributing to a lack of continuity in Project Ara's development.

# External Factors That Influenced the Downfall of the Project

## Market Competition

Dominant Players: Established giants like Apple and Samsung, commanding substantial market share and brand loyalty, posed a formidable barrier for a novel concept like Ara to gain traction. The overwhelming market presence of these companies overshadowed the potential of Project Ara to carve its niche (Savov, 2016).

Rapid Innovation: The relentless pace of innovation in the smartphone industry, with major manufacturers continually releasing feature-rich devices, created a challenging environment for Ara to compete solely on functionality. The constant influx of cutting-edge features made it difficult for Ara to stand out and capture consumer attention.

Price Pressure: Intense competition in the smartphone market led to a downward pressure on prices for standard devices. This made it challenging for Ara to justify its potentially higher cost associated with the modular design, as consumers sought cost-effective alternatives over innovative but pricier modular phones.

### Consumer Preferences

Sleek Design Aesthetics: Consumer preferences for sleek and minimalist designs in traditional smartphones posed a hurdle for Ara's modular form factor, which, while functional, might not have aligned with the prevailing aesthetic tastes. The emphasis on aesthetics influenced consumer choices, impacting the adoption of the modular concept (Grush, 2015).

Incumbent Operating Systems: Users' familiarity with established operating systems and app ecosystems from incumbent companies led to caution in transitioning to a new platform like Ara. The resistance to change hindered Ara's ability to attract users away from the comfort of their existing mobile ecosystems.

Limited Awareness of Modular Benefits: Consumers' limited awareness of the benefits of modular technology resulted in a knowledge gap, leading to hesitancy and unwillingness to embrace the innovative features offered by Project Ara. The challenge lay in educating users about the advantages of modular customization.

### Economic Factors

Production Cost Challenges: The intricate structure of Ara's modular hardware contributed to heightened production costs, impacting the final price point. This cost challenge made it more challenging for Ara to compete with mass-produced conventional phones, which benefited from economies of scale (Morris, 2021).

Unknown Return on Investment: The uncertainty surrounding the market demand for modular phones deterred investors from engaging in large-scale production. This hesitation restricted resources available for Project Ara, impeding its ability to penetrate the market effectively.

Global Economic Uncertainties: Economic downturns or instability in key economies potentially influenced consumer purchasing behavior, reducing the inclination to invest in high-priced, specialist items such as Ara. The broader economic landscape added an external layer of uncertainty to the project's market prospects.

## Internal Factors That Influenced the Downfall of the Project

### Organizational Changes

Reorganization and Shifting Priorities: Google's internal reorganization and strategic shift towards software and services in the mobile market diverted resources away from hardware-centric initiatives like Ara. This change in priorities impacted the project's funding and development capabilities (Smith, 2016).

Competition for Internal Resources: Project Ara faced internal competition for resources with other high-profile Google initiatives, such as Pixel phones. This competition potentially limited funding and development capabilities, affecting the project's progress.

Lack of Long-Term Commitment: Google's frequent changes in direction and objectives may have weakened long-term commitment to Project Ara. This uncertainty affected team morale and hindered the project's overall progress.

## Leadership Decisions

Unclear Vision and Communication: Project Ara may have suffered from a lack of a clearly defined vision and plan, leading to confusion and ambiguity among teammates and stakeholders. The absence of a cohesive vision impacted project stability and decision-making (Feldman, 2016).

Frequent Leadership Changes: Frequent changes in leadership resulted in a lack of continuity and loss of institutional expertise, compromising the stability of Project Ara. The revolving leadership may have affected decision-making processes and the project's overall direction.

Risk Aversion and Internal Skepticism: Google's leadership's concerns about the risks and uncertainties associated with a disruptive initiative like Ara may have constrained support and resources for the project. Internal skepticism impacted the project's ability to garner the necessary backing.

## Marketing and Communications

Failure to Educate Consumers: Project Ara's marketing efforts may have failed to effectively convey the benefits and value proposition of modularity to a broader audience, resulting in low awareness and understanding among consumers (Sinha, 2021).

Mismatch of Message: A mismatch between the project's technical capabilities and the marketing intended for customers may have led to high expectations and subsequent disappointment. This misalignment impacted the perception and reception of Project Ara.

Inconsistent Communication: The absence of consistent communication with potential developers and early adopters may have discouraged participation and hampered ecosystem growth. Inconsistent outreach hindered the development of a vibrant and engaged community around Project Ara.

# Recommendations to the Company

## Option 1: Strategic Collaboration

Form strategic alliances with top smartphone producers, like Samsung and Apple, to promote industry standardization for modular components. Google solidifies its place as a key participant in the modular smartphone market by forming alliances with these titans of the industry. By working together, the consortium can create shared protocols and standards that will guarantee smooth interoperability and compatibility between modular devices. These collaborations help consumers feel more confident about the dependability and adaptability of modular smartphones while also hastening the adoption of modular technology. The industry can surmount technological obstacles and optimize production procedures, leading to reduced expenses and improved market accessibility, by harnessing the combined resources and proficiencies of Google, Samsung, Apple, and other significant stakeholders.

Moreover, the consortium can pool research and development resources thanks to strategic collaborations, which promotes innovation in modular design and functionality. By working together, we can reach a wider audience and increase Google's profitability and influence in the quickly changing smartphone industry. The smartphone industry's modular ecosystem is growing as leaders band together, providing

customers with a wide variety of modular choices and advancing the sector into a new era of sustainability and customization.

## Option 2: In-House Development

Google's strategic imperative to sustain a competitive edge in the rapidly evolving smartphone market is to invest in the in-house development of modular components and software. With total control over the design, production, and integration processes, Google guarantees an unwavering level of quality in the user experience and painstaking attention to detail. This all-encompassing strategy highlights Google's commitment to innovation, enabling the business to quickly adjust to changing market trends and solidify its standing as a leader in both technological innovation and user-centric design. The collaboration between software and hardware developers not only improves functionality and performance, but also allows Google to experiment with new technologies and explore creative design ideas, which fuels ongoing innovation and differentiation in its modular product offerings.

Additionally, Google's in-house development team enables them to maximize productivity and shorten the time it takes to launch new updates and products. By encouraging creativity and teamwork among its development teams, Google is able to push the limits of modular design and introduce ground-breaking features and capabilities that differentiate its products from those of competitors. Google is able to stay ahead of the curve by quickly adjusting to changing consumer preferences and market dynamics thanks to its agile approach. In the end, Google's decision to invest in internal development is a clear indication of its dedication to providing users with unmatched innovation and experiences, cementing its status as a pioneer in the tech sector and ensuring its growth and success for years to come.

## Option 3: Open-Sourcing

Google can stimulate innovation in the larger tech community by adopting open sourcing of Google Ara's design, documentation, and technology. By making the project's resources available to a wide spectrum of enthusiasts and developers, Google creates a collaborative atmosphere where ideas can grow and breakthroughs that go beyond the company's capabilities can be made. This strategy keeps Google Ara at the forefront of technological innovation while also quickening the pace of innovation. This action improves Google's standing and power in the tech sector and is consistent with the company's openness and collaboration ethos. Google demonstrates its commitment to advancing technology for the greater good by actively participating in the community.

Furthermore, by pooling its resources and experience, Google is able to draw in top talent and create alliances that promote creativity and growth for all parties. Google's adoption of open sourcing further establishes the company as a progressive leader in the cutthroat smartphone industry. Through extending an invitation to collaborate and participate to a broad spectrum of stakeholders, Google Ara can adapt to the varied requirements and inclinations of its global user base. This inclusive strategy enhances Google Ara's surrounding ecosystem and solidifies Google's leadership in utilizing technology to promote positive change.

## Option 4: Strategic Divestment

Google can recover investment costs and help expand the use of modular smartphone technology by strategically leveraging its technology through partnerships or sales and considering divesting from

Project Ara. Google will be able to focus its resources on strategic initiatives and core competencies instead of Project Ara, which will allow it to remain flexible in the quickly changing tech industry. By implementing this calculated tactic, Google is able to leverage its groundbreaking work in modular technology and free up resources for other exciting projects. Google can guarantee that the technology will continue to flourish and benefit customers by carefully partnering with or selling it to industry players who are better positioned to realize its potential.

Furthermore, Google can maximize its influence and streamline its operations in areas where it can truly set itself apart by concentrating on its core competencies. Thanks to this strategic alignment, Google can continue to be flexible and adaptable to changing market conditions while promoting innovation and expansion in important strategic areas. In the end, Google is able to maximize its resource allocation, support industry-wide advancements, and position itself for long-term success in the quickly changing tech landscape by exiting Project Ara and strategically utilizing its technology.

## Option 4: Halt Project ARA

It's a wise move for Google to assess whether to stop funding Project Ara going forward and redirect funds to other initiatives that have shown success. Google can make sure that resources are allocated efficiently and protect its short-term financial stability by giving priority to profitable ventures. With this strategy, the organization can concentrate on projects that enhance its overall financial health and are in line with its long-term strategic goals. Project Ara's resources can be redirected to initiatives that have already shown a profit, allowing Google to take advantage of opportunities. Google is able to better direct its talent and capital toward areas where it can produce value and make money by reallocating these resources.

Prioritizing successful endeavors also helps Google reduce the financial risk of continuing to invest in projects that might not produce the expected outcomes. Through prioritizing initiatives that have demonstrated efficacy, Google can maximize resource utilization and improve its financial outcomes. Moreover, Google can guarantee continued growth and competitiveness in the dynamic tech industry by coordinating investments with long-term strategic goals. Google can invest in areas that have the potential to spur innovation, seize market opportunities, and solidify its position in important markets thanks to this strategic approach.

## References

Weber, H. (2017, January 11). *The dream of Ara: Inside the rise and fall of the world’s most revolutionary phone*. VentureBeat. https://venturebeat.com/mobile/inside-project-ara-googles-revolutionary-modular-phone/

Project, I. (n.d.). *Phonebloks - The Index Project*. https://theindexproject.org/post/phonebloks

Kastrenakes, J. (2016, September 2). *Project Ara: Google pieces together the first modular smartphone*. The Verge. https://www.theverge.com/2014/4/10/5601968/project-ara-google-pieces-together-the-first-modular-smartphone

Moore-Colyer, R. (2023, October 29). *Project Ara was the best smartphone idea you never got to try - here's why it deserves a second chance*. TechRadar. https://www.techradar.com/phones/project-ara-was-the-best-smartphone-idea-you-never-got-to-try-heres-why-it-deserves-a-second-chance

Dediu, H., & Dediu, H. (2017, December 5). *The demise of Google's Project Ara and modularity in computing*. Christensen Institute. https://www.christenseninstitute.org/blog/the-demise-of-googles-project-ara-and-modularity-in-computing/

Sinha, D. (2021, May 30). *Why was Google Project Ara Cancelled? [Case Study]*. StartupTalky. https://startuptalky.com/google-project-ara-failure-case-study/

Morris, D. Z. (2021, June 16). *Why Google Canceled Project Ara*. Fortune. https://fortune.com/2016/09/03/why-google-canceled-project-ara/

P. (2023, July 26). *Project Ara’s Failure and the Rise of Google Pixel: What It Means for the Future of Smartphones*. Phadera World Wide. https://www.phadera.com/project-aras-failure-and-the-rise-of-google-pixel-what-it-means-for-the-future-of-smartphones/

Rubin, M. (2015, June 15). *Designing a Google Ara Module and Worrying About MIPI UniPro?* https://community.cadence.com/cadence_blogs_8/b/fv/posts/designing-a-google-ara-module-and-worrying-about-mipi-unipro

Rayner, T. (2019, April 10). *Modular phones haven’t lived up to the initial hype, here’s why*. Android Authority. https://www.androidauthority.com/modular-phones-hype-851085/

Smith, J. (2016, September 2). *Google reportedly kills Project Ara modular phone*. ZDNET. https://www.zdnet.com/article/google-reportedly-kills-project-ara-modular-phone/

Savov, V. (2016, May 24). *Why I'm still skeptical about Project Ara*. The Verge. https://www.theverge.com/2016/5/24/11759234/google-project-ara-skepticism

N. (2024, January 21). *Google's Project Ara: Unveiling the Odyssey of Modular Smartphone Dreams*. Medium. https://medium.com/@nivedita9826/googles-project-ara-the-ascent-and-collapse-of-modular-smartphone-dreams-112759dc882a

Grush, A. (2015, January 16). *Project Ara: Can it find success, or is it just too ambitious?* Android Authority. https://www.androidauthority.com/project-ara-can-find-success-just-ambitious-580984/

Feldman, B. (2016, September 2). *Google Abandons Its Modular Phone, Project Ara*. Intelligencer. https://nymag.com/intelligencer/2016/09/google-abandons-its-modular-phone-project-ara.html

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