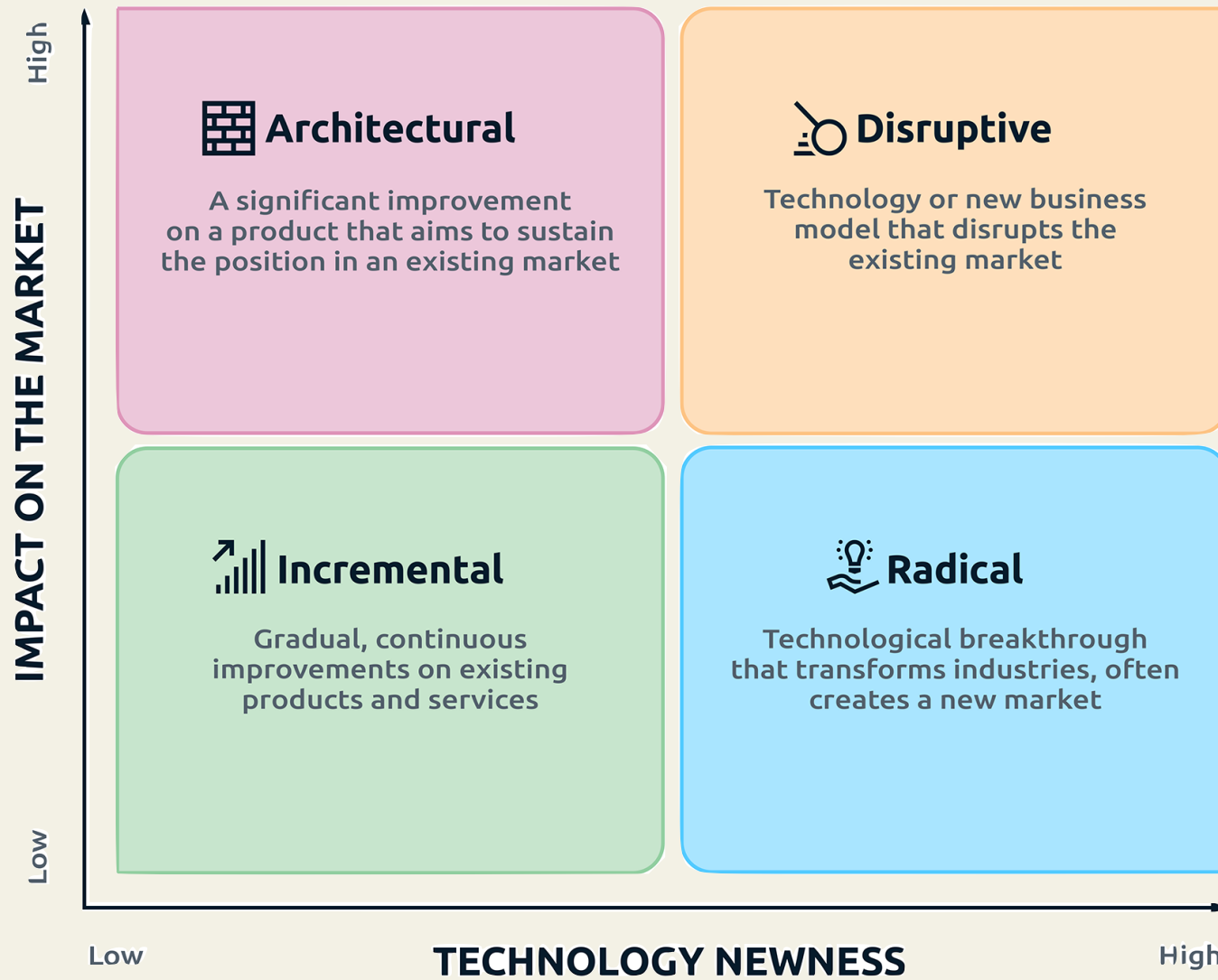


Innovation

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ENGR 401 Professional Practice

...Innovation is, at its core, about solving problems — and there are as many ways to innovate as there are types of problems to solve. There is no one “true” path to innovation — Greg Satell, in HBR.



Architectural Innovation - examples

1. Product Innovation

- Introducing new or significantly improved products or services to the market.
- Examples: Apple's iPhone, Tesla's EVs.



2. Process Innovation:

- Improving or creating new methods, techniques, or processes for producing goods or delivering services.
- Examples: Toyota's lean manufacturing system, Amazon's logistics and supply chain innovations.

3. Organisational Innovation:

- Implementing new organisational structures, management practices, or workplace policies and systems.
- Example: Zappos' Holacracy organisational structure.



Incremental Innovation - examples



1. Smartphone Camera Improvements

- Over successive smartphone generations, incremental innovations have been made in camera technology. This includes enhancements in megapixel count, low-light performance, image stabilisation, and the introduction of additional lenses (e.g., wide-angle, telephoto).
- Outcome: Improved photo and video quality, and expanded creative possibilities for users.

2. Personal Computer Processor Speed and Efficiency Improvements

- In personal computers, incremental innovations have focused on improving processor speed, energy efficiency, and overall performance. Each new generation of processors offers higher clock speeds, better multitasking capabilities, and reduced power consumption.
- Outcome: Faster computing, improved multitasking, and energy efficiency.

Disruptive Innovation - examples

1. **Uber:**

- Disrupted the taxi industry by introducing a ride-sharing platform that connects passengers with drivers through a mobile app.
- This model offers a more convenient, flexible, and often cost-effective alternative to traditional taxi services.
- Outcome: Uber transformed urban transportation, changing the way people commute and challenging traditional taxi services worldwide.

2. **Netflix:**

- Netflix disrupted the home entertainment industry by shifting from a DVD rental-by-mail service to a streaming video-on-demand platform.
- This allowed users to instantly access a vast library of movies and TV shows over the internet, challenging traditional cable and satellite TV models.
- Outcome: Netflix revolutionised how people consume entertainment, leading to cord-cutting trends and influencing the rise of streaming services.

Disruptive Innovation - examples

3. Amazon

- Disrupted the retail industry by pioneering e-commerce and creating an online marketplace. It started as an online bookstore and expanded into selling a vast range of products, challenging brick-and-mortar retailers.
- Outcome: Amazon transformed the retail landscape, influencing the shift towards online shopping and setting new standards for customer convenience, fast delivery, and a vast product selection.

4. Airbnb:

- Disrupted the traditional hotel industry by creating a platform that allows individuals to rent out their homes or spare rooms to travellers.
- This decentralised model challenged the traditional hotel business and offered unique, affordable, and often more accommodation options.
- Outcome: Airbnb transformed the hospitality industry, providing travellers with alternative lodging choices and enabling hosts to monetise their unused spaces.

Radical Innovation - examples

1. Smartphones

- The introduction of smartphones combined communication, computing, cameras, GPS, and various other functionalities into a handheld device.
- Outcome: Altered the way people communicate, work, and access information.

2. Washing Machines

- The transition from manual to fully automatic washing machines represented a radical innovation in the laundry industry.
- Outcome: This innovation significantly transformed a time consuming household chore, and possibly society too.

Radical Innovation - examples

3. **Cloud technology:**

- Cloud services provide scalable and on-demand access to computing resources, storage, and applications over the Internet (Amazon again).
- Outcome: changed the way we design software, build infrastructure, store data and process information.

4. **Artificial Intelligence (AI):**

- AI has the potential to transform industries such as healthcare, finance, and manufacturing through automation and advanced data analysis.
- Outcome: we're yet to find out...

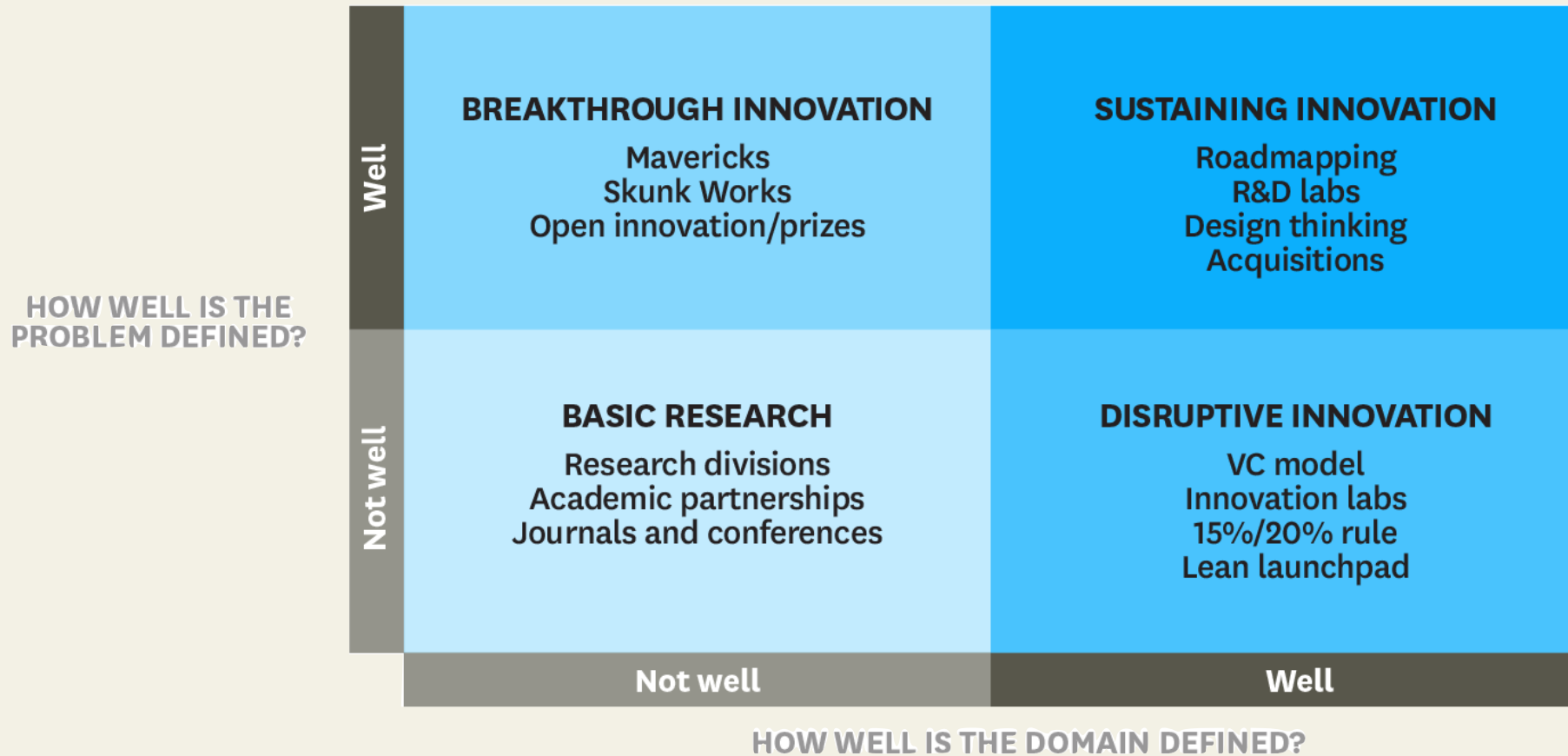
Table 1

Aspect	Incremental Innovation	Disruptive Innovation	Radical Innovation
Definition	Makes gradual improvements to existing products, services, or processes	Introduces new products or services that disrupt existing markets by offering lower cost, simpler, and more convenient solutions	Introduces new-to-the-world products or services that create new markets and industries
Technology Involved	Typically involves refining or optimising existing technologies	Often leverages existing technology in new ways	Often relies on breakthrough technological advancements
Companies Involved	Can come from companies of any size or maturity level	Often comes from small start-ups or new entrants to an industry	Often comes from large, established companies with significant R&D investments
Market Impact	Maintains or incrementally grows market share, keeps pace with industry trends	Displaces established incumbents and reshapes existing markets	Creates new markets and industries, redefines the competitive landscape

Paul's thoughts...

- Technology can be a “disposable scaffolding” for supporting exploring business innovation – the technology used might be throw away investment – fail quick and try again with something else. You learn something from failed innovation every time –or it can be the enabler for the same.
- “Everything was innovative at some point in its life” – the innovative things that transition to be *business as usual* are the ones that become ubiquitous through either lifestyles/behaviours changing to align to them, or they naturally fit into existing behaviours/lifestyles.
- Innovation is a business disruptor that can realise transformational new value or equally drive efficiencies in existing value

Another way to think about innovation



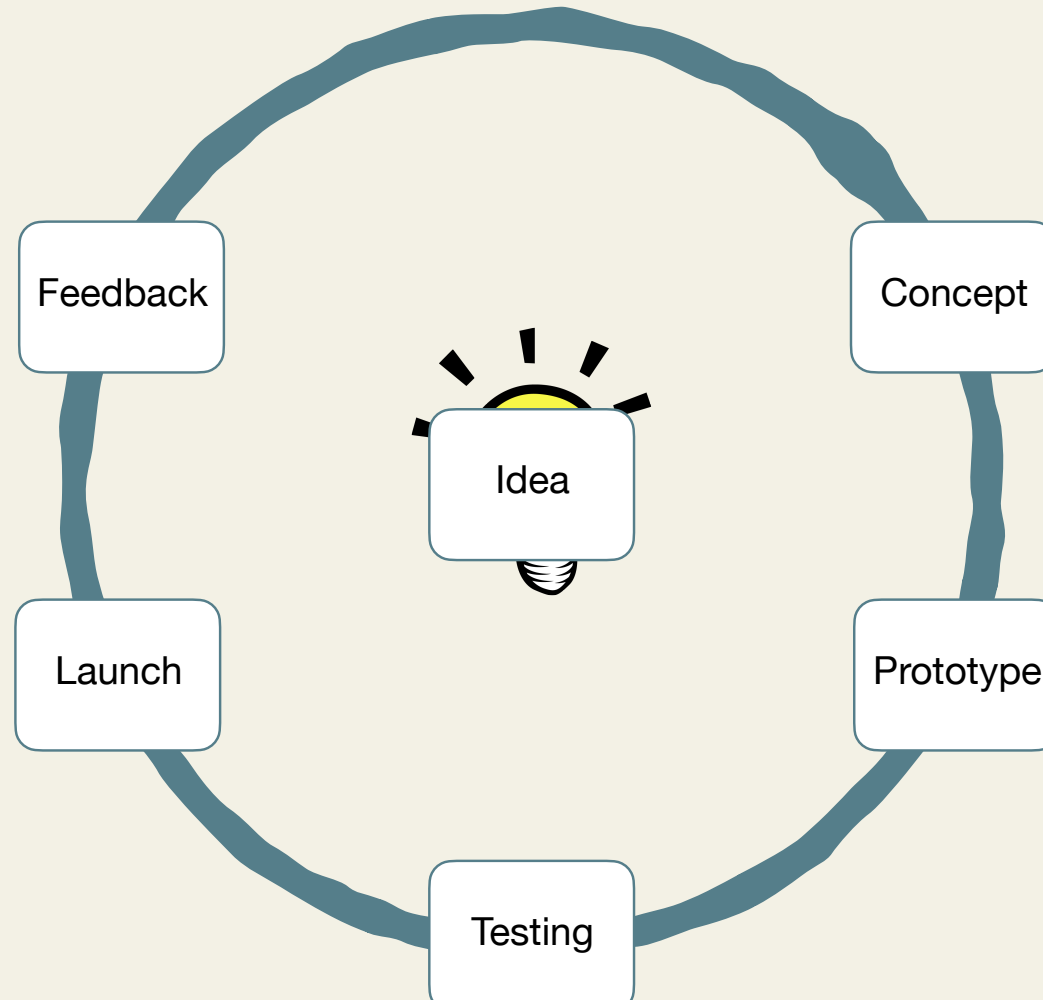
What does it mean to be innovative?

- **Identifying opportunities:** Innovation involves recognising unmet needs, pain points, or opportunities for improvement that others may have overlooked.
- **Problem-solving:** Being innovative requires creative problem-solving skills to develop novel solutions to existing challenges or to address new problems that emerge.
- **Execution and implementation:** Innovation requires not just generating ideas but also the ability to execute and implement those ideas effectively, bringing them to fruition.
- **Creating value:** ~whether in the form of improved products, services, processes, or business models that benefit customers, organisations, or society as a whole.

What does it mean to be innovative II?

- **Thinking differently:** Innovative individuals and organisations are able to think outside the box, challenge assumptions, and approach problems from new angles or perspectives.
- **Risk-taking:** Innovation often involves taking calculated risks, experimenting with new approaches, and being comfortable with uncertainty or failure along the way.
- **Resourcefulness:** Innovative individuals and teams are able to make the most of available resources, whether limited or abundant, to create something new or better.
- **Adaptability:** Innovative people and organisations are flexible and able to adjust their approach or pivot as needed in response to feedback, changing market conditions, or new information.

The Innovation Process



Feedback from customers and the market is collected and analyzed. This information is used to make improvements and adjustments to the product or service, feeding back into the ideation and concept development stages.

Barriers to Disruptive Innovation

1. **Inertia:**

Established companies may be reluctant to embrace disruptive innovations that could threaten their existing business models or market dominance.

2. **Resourcing:**

Companies may prioritise incremental improvements over disruptive innovations due to resource constraints and risk aversion.

3. **Technological Lock-In:**

Existing technologies and infrastructure can create barriers to adopting new, disruptive solutions.

4. **Market Acceptance:**

Disruptive innovations may face challenges in gaining customer acceptance, as they often require changes in behavior and perceptions.

Ethics and Innovation

- **Potential harmful consequences:** While innovation aims to create value and solve problems, some innovations may have unintended negative consequences or pose risks to individuals, society, or the environment. These potential harms need to be identified and mitigated.
- **Privacy and data:** Many modern innovations involve the collection and use of personal data, raising ethical issues around privacy, data protection, and the responsible use of sensitive information.
- **Fairness and equity:** Innovations may disproportionately benefit or disadvantage certain groups or populations, leading to concerns about fairness and equity.
- **Environmental sustainability:** Some innovations may have negative environmental impacts, contributing to resource depletion, pollution, or ecological degradation. Ethical innovation should prioritise sustainability and environmental responsibility.
- **Transparency and accountability:** Innovators should be transparent about their processes, goals, and potential risks, and be accountable for the consequences of their innovations.

Barriers to Radical Innovation

1. **Resource Intensity:**

Radical innovations require significant investments in R&D, engineering, and market development, which can strain resources and require long-term commitment.

2. **Regulatory Challenges:**

New-to-the-world products and services may face regulatory hurdles, as existing rules and standards may not be equipped to handle these innovations.

3. **Market Education:**

Educating customers and stakeholders about the value and potential of radical innovations can be a significant challenge, particularly when the innovation represents a paradigm shift in thinking or behavior.

4. **It is risky....**

Risk and Innovation

- **Technology risk:** Evaluate the maturity and reliability of the underlying technology driving the innovation. Emerging or unproven technologies may carry higher risks due to potential technical challenges, scalability issues, or unforeseen problems.
- **Market risk:** Assess the potential for market acceptance and adoption of the innovation. Innovations that disrupt existing markets or create entirely new markets may face higher risks due to consumer resistance, competition, or uncertainty in demand.
- **Financial risk:** Consider the financial investment required to develop, launch, and sustain the innovation. High capital requirements, uncertain returns on investment, or the potential for cost overruns can increase financial risks.
- **Regulatory and legal risks:** Evaluate the regulatory landscape and potential legal implications surrounding the innovation. Innovations in highly regulated industries or those that raise ethical or legal concerns may face higher risks.

Risk and Innovation

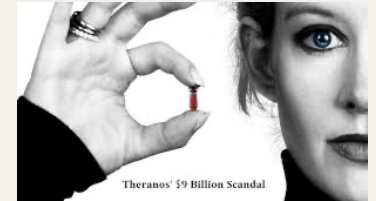
- **Operational and implementation risks:** Assess the potential challenges in manufacturing, distributing, or implementing the innovation at scale. Complex operational processes, supply chain dependencies, or integration with existing systems can increase risks.
- **Competitive risks:** Analyse the competitive landscape and the potential for competitors to develop similar or superior innovations, which could render the innovation obsolete or less competitive. Is there a moat?
- **Reputational risks:** Consider the potential impact of the innovation on the organisation's reputation, brand image, or public perception. Innovations that raise ethical or social concerns may carry higher reputational risks.
- **Unintended consequences:** Evaluate the potential for unintended or unforeseen consequences resulting from the innovation, which could lead to negative impacts on individuals, society, or the environment.

Innovations that failed - Ethics



- **23andMe's Health Tests:** The personal genomics company faced backlash and regulatory scrutiny for offering direct-to-consumer health tests without proper validation or oversight. Concerns over the ethical implications and potential misuse of genetic data led to restrictions and a temporary halt of their health-related tests.
- **Theranos:** The once-celebrated biotech startup claimed to have developed a revolutionary blood testing technology but faced allegations of deception and unethical practices. The company's failure to deliver on its promises and prioritise ethical conduct ultimately led to its downfall.
- **Facebook's Emotional Manipulation Study:** In 2014, Facebook conducted a controversial study that manipulated the News Feeds of nearly 700,000 users to study the impact on their emotions. This unethical experiment, conducted without user consent, sparked widespread criticism and raised concerns about privacy and research ethics.

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Paul's thoughts.

- Unethical innovation that fails due to ethics not tech can bias society against further valid innovation
- Failed innovations like Theranos may have created bias in society about the potential for there to still be real innovation there --- optical chips that can do non-destructive blood testing are out there but there has been commentary that they are now finding it harder to find a market than before Theranos. The idea might have been right but a lack of ethics has had flow on effects potentially biasing community.
- Does untrendy innovation not get airtime due to trendy “innovation”
- Is hydrogen fuel innovation opportunities getting squished due to barriers to entry c/- all the battery charging infrastructure going in. Will barrier to entry eventually mean lost opportunity or delays in disruptive technology replacing/supplementing battery cars

Innovations that failed - Risk



- **Google Glass:** Google's augmented reality glasses project faced numerous risks, including privacy concerns, technical limitations, and a lack of clear use cases. The high-profile product was ultimately discontinued due to these risks and challenges.
- **Juicero:** This Silicon Valley startup created an expensive juicer machine that could be easily outperformed by human hands. The high production costs and over-engineered design led to financial risks, and the company ultimately failed.
- **Segway:** The Segway personal transporter was heralded as a revolutionary innovation but faced risks related to safety concerns, high costs, and limited practical applications. Despite heavy investments, the Segway failed to gain widespread adoption.

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