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Accounting for the Development of Generative AI Software Products

The Bottom Line

- More and more companies are considering purchasing or developing software that uses or leverages artificial intelligence (AI) to enhance internal productivity or are incorporating generative AI into their revenue-generating products. Although developing or enhancing generative AI applications may involve more traditional software development costs (e.g., internal or external labor), some generative AI developments may be more advanced and may incur additional costs. For example, large amounts of data are typically necessary to train generative AI applications. Businesses that invest in generative AI will need to consider the accounting impacts of the software or software-related costs associated with generative AI.
- The software costs incurred for generative AI could include fees paid to use third-party foundation models or large language models (LLMs) as well as fine-tuning and other training costs. Entities developing generative AI applications will need to consider whether the developed software will be used internally or whether it will be sold as a hosting arrangement, an on-premise software license, or a hybrid software offering. Depending on the nature of the generative AI software, the software costs related to the project may be subject to the guidance in ASC 985-20¹ or ASC 350-40 while other costs incurred to support the generative AI software may be subject to other U.S. GAAP.

¹ For titles of FASB Accounting Standards Codification (ASC) references, see Deloitte's "[Titles of Topics and Subtopics in the FASB Accounting Standards Codification.](#)"

Beyond the Bottom Line

This *Technology Spotlight* discusses accounting considerations for entities developing generative AI technology (whether for their own use or external marketing). Specific topics addressed include (1) whether costs related to generative AI technology should be accounted for under ASC 350-30, ASC 350-40, ASC 985-20, or other U.S. GAAP and (2) how such costs should be evaluated under the applicable accounting literature.

Background

Generative AI is a subset of AI that focuses on the ability of machines to take in inputs (e.g., text, images) and create outputs in various formats (e.g., text, images, audio, code, voice, video). Generative AI applications serve as interfaces for end users. These applications are powered by significant infrastructure (e.g., cloud-based AI foundation models or LLMs) and generate content on the basis of how the underlying models were trained as well as the end user's inputs. Foundation models typically use neural networks to learn patterns from huge amounts of data and predict outcomes on the basis of historical data patterns. Like traditional AI, foundation models predict outputs by making inferences related to the inputs they receive. However, through fine-tuning, prompt engineering, and adversarial training (discussed further below), these models produce outputs on the basis of their understanding of human-generated inputs.

Generative AI Foundation Model

Generative AI applications are powered by foundation models, LLMs that use deep learning to process huge amounts of data. A foundation model can perform a wide range of tasks in natural language processing (NLP), a subfield of AI that enables computers to interpret input prompts and generate outputs such as text, translation, summarization, and answers to questions. With a foundation model, the software can predict outputs on the basis of statistical inferences it makes from the inputs received. The quality, accuracy, and relevancy of a generative AI application's outputs depend on the training the underlying foundation model receives.

The development of AI infrastructure foundation models is based on machine learning algorithms that consider linguistic rules and statistical models so that a computer can "understand" the natural language of a user's input prompt.

Entities that intend to develop a foundation model may incur the following costs:

- *Software developer costs* — Internal and external labor costs related to the development of the AI infrastructure code, time-intensive training, validation of outputs, and optimization activities.
- *Data acquisition costs* — Foundation model developers might incur costs to acquire the vast amount of data they need to develop foundation models that perform various NLP tasks and produce a wide range of responses.
- *Computation resources* — High-performance hardware must be used to train a foundation model. An entity could choose to purchase either specific hardware (e.g., computers with powerful CPUs, GPUs, or RAM) or platform or infrastructure services from third parties (i.e., cloud services) that offer the same computational scalability.
- *Storage costs* — Because of the amount of data needed to train and maintain a foundation model, entities may incur significant storage costs. An entity could choose to purchase or lease hardware for storage or to purchase cloud storage services from third parties.

Generative AI applications interact with and rely on a foundation model to generate outputs on the basis of user prompts. The dependency of AI applications on foundation models can be thought of as similar to the reliance of traditional software applications on operating systems. As a large-scale, pretrained language model, a foundation model serves as an engine that software developers train and calibrate for specific scenarios when creating their own generative AI applications. Currently, a limited number of companies have developed foundation models and some have provided access to this technology as open-source software or software sold as part of a hosting arrangement.

Because of the complexity of foundation models, the development of this technology is expected to be labor- and resource-intensive. We therefore expect most generative AI application developers to leverage existing foundation models in their applications rather than create their own. However, foundation models can vary in size and some entities might develop a private foundation model or LLM that is trained only on entity-specific data.

Generative AI Applications

Generative AI application developers are likely to incur additional training costs in refining foundation models to generate outputs tailored to their applications. Foundation models might be further trained through a combination of the following methods:

- *Fine-tuning* — Using specific data to train the foundation model to create outputs for a subset of prompts beyond the existing scenarios for which the model was trained. For example, a company that is creating a generative AI application to produce medical diagnoses for a user's symptoms may need to fine-tune the foundation model by acquiring information from medical encyclopedias, patient data, online databases of research articles, and scientific publications. An entity would expect to incur data acquisition and labor costs related to fine-tuning.
- *Prompt engineering* — Creating or adjusting the prompt to communicate with the foundation model to output an optimal answer. A company could incur specific internal or external software development costs in creating the prompt.
- *Adversarial training* — Two different deep-learning models can be pitted against each other to train both models. In this approach, one model, the generator, creates synthetic data samples while the other model, the discriminator, receives synthetic data samples and real data samples. The generator's objective is to produce samples that are indistinguishable from real data, while the discriminator's goal is to become better at distinguishing between real and generated data. An entity would expect to incur data acquisition, software development, and other labor costs related to adversarial training.

In addition to the data and training costs, an entity may also incur traditional software development costs (e.g., costs related to developing the software application user interface, infrastructure, graphics, and content) when creating a generative AI application. These costs may also be subject to capitalization or expense under ASC 985-20, ASC 350-40, or other U.S. GAAP.

Accounting Considerations Related to Generative AI Development Costs

Because generative AI is essentially a form of software, we believe that general software development accounting considerations apply to generative AI costs, including whether the related project will be used for internal purposes (including being sold as a service) or sold or marketed externally. Similar costs may be incurred, and similar considerations will be relevant, regardless of whether an entity is developing a foundation model (or LLM) or an application that leverages an existing model.

Generative AI Software Used as Internal-Use Software or Software Marketed or Sold Only as a Hosting Arrangement

Although the development of foundation models marked a crucial milestone in NLP and AI research, there was initially significant uncertainty about whether this technology would meet its specified performance requirements. Development risks affect whether costs incurred to develop software can be capitalized. Different guidance applies depending on whether the software (e.g., a foundation model or application) is being developed for internal use or for external sale or marketing. Entities developing AI software for internal use or to be sold or marketed as a hosting arrangement would consider applying the capitalization guidance in ASC 350-40 on internal-use software. Alternatively, ASC 985-20 would apply if an entity intends to sell or market its AI software as software licenses. With respect to internal-use software, ASC 350-40-15-2A states:

Internal-use software has both of the following characteristics:

- a. The software is acquired, internally developed, or modified solely to meet the entity's internal needs.
- b. During the software's development or modification, no substantive plan exists or is being developed to market the software externally.

When AI software is developed for internal use, a significant portion of the software development costs may be incurred during the preliminary project stage. Unlike ASC 985-20 (discussed further below), ASC 350-40 does not require the establishment of technological feasibility² for capitalization but does have other requirements for capitalization depending on the stage of development. Generally, development costs incurred during the application development stage are capitalized, while costs incurred during the preliminary project stage and postimplementation-operation stage are expensed as incurred.

The following are some indicators of when an entity is in the preliminary project stage and when costs should therefore be expensed as incurred in accordance with ASC 350-40:

- The entity is considering allocating resources (i.e., developers, financial budget) between different projects (e.g., different AI applications or other software projects).
- The entity is still determining the performance requirements for the AI application or the infrastructure requirements necessary for the application to operate.
- The entity is holding ongoing conversations with vendors (e.g., foundation model vendors, hardware vendors, cloud computing vendors) to determine which products are best aligned with the entity's software performance requirements.
- The entity is still exploring alternatives related to achieving the performance requirements identified (i.e., using internal software developers to train foundation models versus hiring third-party consultants).
- The entity is determining whether there is an existing technology for developing a specific generative AI application to meet the identified performance requirements.

The preliminary project phases for many AI applications and software projects may be longer than those for other software development projects given the use of new and advanced technologies as well as the emergence of high-risk development issues that could affect the successful completion of the project.

Once the preliminary project stage is complete and the application development phase commences, entities developing AI applications will need to identify and capitalize the direct internal and external costs incurred to develop the AI application. When both foundation models and AI applications are being developed or implemented at the same time, entities will need to carefully track internal and external costs to ensure they are appropriately deferred

² ASC 350-40 stipulates that to proceed from the preliminary project stage to the application development stage, a company would have to determine that the technology it needs to meet the performance requirements exists.

or capitalized in accordance with the guidance in ASC 350-40. In addition, the development and implementation of foundation models and AI applications may involve new activities (e.g., training) performed by employees who have not historically tracked time spent on developing software. In these circumstances, entities may need to create new processes and controls to track these costs accurately.

Generative AI Software That Will Be Sold or Marketed Externally

If an entity plans to license its generative AI software externally, the software would be within the scope of ASC 985-20. The costs of developing software within the scope of ASC 985-20 cannot be capitalized until technological feasibility is established, which typically occurs toward the end of the development period when all high-risk development issues have been resolved through coding or testing. ASC 985-20-25-1 states:

All costs incurred to establish the technological feasibility of a computer software product to be sold, leased, or otherwise marketed are research and development costs. Those costs shall be charged to expense when incurred as required by Subtopic 730-10.

As a result, minimal costs tend to be capitalized when software is developed to be marketed or sold externally unless the costs incurred are subject to other GAAP.

Generative AI Software Acquired as a Cloud Computing Arrangement

Rather than develop AI software for internal use, an entity may engage with a third party to develop an AI solution that will be accessed as part of a cloud computing arrangement. In such circumstances, the AI software will only be accessed as part of a hosting arrangement. The ASC master glossary defines a hosting arrangement as follows:

In connection with accessing and using software products, an arrangement in which the customer of the software does not currently have possession of the software; rather, the customer accesses and uses the software on an as-needed basis.

Under ASC 350-40, costs incurred to implement a hosting arrangement that is a service contract would be subject to the same recognition and measurement guidance as costs incurred to develop or acquire internal-use software. However, any costs deferred in accordance with this guidance would be presented in the same manner as any prepayments made for the underlying service.

Data Acquisition Costs

As noted above, entities developing foundation models and AI applications may need significant amounts of data to train the models. Entities will need to consider whether the costs of acquiring the data should be (1) expensed as incurred, (2) recognized as a separate intangible asset, or (3) considered for capitalization as part of the AI application or foundation model.

Costs incurred to acquire data from a third party should be evaluated to determine whether it is appropriate to capitalize the costs as a separate intangible asset. The guidance in ASC 350-30 would apply to intangible assets that are acquired individually or as a group of other assets (that do not constitute a business), and ASC 350-30-25-1 states that “[a]n intangible asset that is acquired either individually or with a group of other assets shall be recognized.” Further, ASC 350-30-25-4³ states the following regarding the acquisition of intangible assets:

Intangible assets that are acquired individually or with a group of assets in a transaction other than a business combination or an acquisition by a not-for-profit entity may meet asset recognition criteria in FASB Concepts Statement No. 5, *Recognition and Measurement in Financial Statements of Business Enterprises*, even though they do not meet either the contractual-legal criterion or the

³ The amendments in [FASB Accounting Standards Update \(ASU\) No. 2024-02](#) — which are effective for fiscal years beginning after December 15, 2024, for public business entities and fiscal years beginning after December 15, 2025, for all other entities — will remove all concepts statement references from the *FASB Accounting Standards Codification*. However, we do not believe that the removal of the reference to Concepts Statement 5 in ASC 350-30-25-4 will affect the application of the guidance in this paragraph to data acquisition costs.

separability criterion (for example, specially-trained employees or a unique manufacturing process related to an acquired manufacturing plant). Such transactions commonly are bargained exchange transactions that are conducted at arm's length, which provides reliable evidence about the existence and fair value of those assets. Thus, those assets shall be recognized as intangible assets.

Acquired data will lack physical substance and will most likely be acquired as part of a contract that defines the rights controlled by the entity. In these cases, the acquired data are likely to meet the definition of an asset (because the data are separately identifiable and provide an entity with a present right to future economic benefits) and could be recognized separately as an intangible asset. Entities would need to determine the useful life of the acquired data and perform an impairment assessment in accordance with ASC 350.



Connecting the Dots

ASC 350-30-25-4 refers to the asset recognition criteria in [FASB Concepts Statement 5](#). However, as noted in footnote 3, ASU 2024-02 removed the references to the concepts statements throughout the Codification. Further, the definition of an asset in FASB Concepts Statement 5 was amended by FASB Concepts Statement 8. The definition of an asset in paragraph E17 of [FASB Concepts Statement 8, Chapter 4](#),⁴ is as follows:

An asset has the following two essential characteristics:

- a. It is a present right.
- b. The right is to an economic benefit.

A present right of an entity to an economic benefit entitles the entity to obtain this benefit from the right and to restrict others' access to it. We believe that rights to data acquired from a third party would generally meet the definition of an asset. Further, while there are differences in the definition of an asset under the two concept statements, the differences are not expected to significantly change what does and what does not represent an asset. Accordingly, we believe that rights to data acquired from a third party would generally meet either definition of an asset.

Although costs incurred to acquire data from a third party would generally be capitalizable as an intangible asset, data acquisition costs would be expensed as incurred under ASC 730-10 if the data will be used in research and development activities *and* do not have alternative future uses.⁵ Such data costs would include those incurred for a specific software development project that is within the scope of ASC 985-20 for which technological feasibility has not been established. This is because, as noted above, costs incurred to develop technological feasibility are considered research and development activities within the scope of ASC 730-10. ASC 730-10-25-2 states, in part:

Elements of costs shall be identified with research and development activities as follows (see subtopic 350-50 for guidance related to website development): . . .

- c. Intangible assets purchased from others. The costs of intangible assets that are purchased from others for use in research and development activities and that have alternative future uses (in research and development projects or otherwise) shall be accounted for in accordance with Topic 350. The amortization of those intangible assets used in research and development activities is a research and development cost. **However, the costs of intangibles that are purchased from others for a particular research and development project and that have no alternative future uses (in other research and development projects or otherwise) and therefore no separate economic values are research and development costs at the time the costs are incurred.** [Emphasis added]

⁴ FASB Concepts Statement No. 8, Chapter 4, "Elements of Financial Statements."

⁵ The term "alternative future use" is not defined in U.S. GAAP. However, Section 3.14 of the [AICPA Accounting and Valuation Guide Assets Acquired to Be Used in Research and Development Activities](#) states, "For an asset acquired in an asset acquisition for use in R&D activities to have an alternative future use, the task force believes that (a) it is reasonably expected that the reporting entity will use the asset acquired in the alternative manner and anticipates economic benefit from that alternative use, and (b) the reporting entity's use of the asset acquired is not contingent on further development of the asset subsequent to the acquisition date (that is, the asset can be used in the alternative manner in the condition in which it existed at the acquisition date)" (footnote omitted).

Data may also be acquired for a specific software project that is being developed for internal use and does not have an alternative future use (e.g., other software projects). In this case, rather than being a separate intangible asset, the data costs may be direct external costs incurred to develop internal-use software within the scope of ASC 350-40. Specifically, an entity could purchase data to train generative AI applications, resulting in the creation of new functionalities. If the AI software project is in the application development stage, it may be appropriate to capitalize the data acquisition costs as direct costs incurred during that phase. Alternatively, as discussed further below, if the data and resulting training were only necessary to maintain the existing features or functionality of the generative AI application, capitalization would not be appropriate because the costs would be akin to maintenance costs. Further, any costs incurred in the preliminary project phase of development should be expensed as incurred.

If acquired data have an alternative future use (as discussed above) and are separately recorded as an intangible asset in accordance with ASC 350-30, we do not believe that the subsequent amortization of the intangible asset would be included as a cost eligible for capitalization under the internal-use software guidance. In such circumstances, the subsequent amortization would not be considered a direct cost incurred during the application development stage and would therefore not be within the scope of ASC 350-40.⁶

Upgrades and Enhancements

After the initial release of their generative AI software, entities will most likely improve the functionality of their application through additional software development and fine-tuning. An entity that develops AI software for internal use should consider whether incurring these costs is associated with an upgrade or enhancement to internal-use software as described in ASC 350-40-25-7 through 25-9:

25-7 Upgrades and enhancements are defined as modifications to existing internal-use software that result in additional functionality — that is, modifications to enable the software to perform tasks that it was previously incapable of performing. Upgrades and enhancements normally require new software specifications and may also require a change to all or part of the existing software specifications. In order for costs of specified upgrades and enhancements to internal-use computer software to be capitalized in accordance with paragraphs 350-40-25-8 through 25-10, it must be probable that those expenditures will result in additional functionality.

25-8 Internal costs incurred for upgrades and enhancements shall be expensed or capitalized in accordance with paragraphs 350-40-25-1 through 25-6.

25-9 Internal costs incurred for maintenance shall be expensed as incurred.

Upgrades and enhancement to generative AI applications that are sold or marketed externally, and that are within the scope of ASC 985-20, would be subject to the same capitalization threshold as the initial product development (i.e., an entity is required to establish technological feasibility of the upgrade or enhancement to capitalize associated costs).

Maintenance activities would be expensed as incurred for all software. ASC 350-40 does not define the term “maintenance,” but ASC 985-20-20 defines it as follows:

Activities undertaken after the product is available for general release to customers to correct errors or keep the product updated with current information. Those activities include routine changes and additions.

A key consideration related to incurring data costs to train the AI software after initial deployment is whether additional training results in the creation of new functionality (e.g., whether the AI application can perform a different task) or whether ongoing training is necessary to retain the relevance of the AI application (e.g., maintain its intended functionality).

⁶ ASC 350-40-30-1 states that the only internal-use software costs that would be capitalized include (1) “[e]xternal direct costs of materials and services consumed in developing or obtaining internal-use computer software,” (b) “[p]ayroll and payroll-related costs . . . for employees who are directly associated with and who devote time to the internal-use computer software project, to the extent of the time spent directly on the project,” and (3) “[i]nterest costs incurred while developing internal-use computer software.”

Data and associated training that are intended to keep an AI application current or relevant would most likely be considered maintenance. Unless the costs are separately capitalizable as an intangible asset, such costs would be expensed as incurred.

In contrast, training that creates new functionality might be considered an upgrade or enhancement. Therefore, entities will need to determine whether the additional fine-tuning they are performing maintains the current software features of their generative AI application or whether the fine-tuning introduces additional software features that did not previously exist. This would dictate whether the data costs incurred to perform the fine-tuning should be capitalized as costs incurred to develop a software upgrade, expensed as software maintenance, or evaluated for capitalization separately as an intangible asset.

Computation Resources and Storage Costs

In supporting generative AI applications and the underlying foundation or LLM model, an entity may incur significant costs related to (1) hardware for computation resources and (2) storage costs. Generally, such costs will be accounted for under U.S. GAAP other than ASC 985-20 and ASC 350-40. Servers, computers, GPUs, and CPUs purchased to increase an entity's computational power and build out its storage infrastructure would be accounted for as long-lived assets under ASC 360.

If an entity enters into a hosting arrangement with a vendor to leverage the vendor's computation or storage capabilities, it is likely that the arrangement will be accounted for as a service arrangement. Typically, in such circumstances, (1) the entity does not have "the contractual right to take possession of the software at any time during the hosting period without significant penalty"⁷ or (2) it is not "feasible for the [entity] to either run the software on its own hardware or contract with another party unrelated to the vendor to host the software."⁸ Accordingly, the costs incurred to implement third-party infrastructure or storage services would be evaluated for capitalization in accordance with ASC 350-40 and, if capitalized, would be deferred as a prepaid asset and recognized over the contract period (as well as over periods for which contractual renewals are reasonably certain to be exercised). Note that ongoing costs to use or maintain the third-party infrastructure or storage services would not meet the deferral criteria.

In addition, as noted above, AI applications typically need to be developed to work with one or more AI foundation or LLM models. An entity that enters into a hosting arrangement with a vendor to purchase a foundation model will need to determine whether it has (1) purchased or licensed software or (2) purchased a service arrangement. The entity must perform this assessment regardless of whether the foundation model will be used to create a generative AI application for internal use or whether it will be sold as a hosting arrangement or an on-premise license. We expect that most entities will determine that the foundation models or LLMs they acquire will be through a service contract, which could be accounted for as a prepaid asset if an up-front payment is made for the future use of the functionality.

On the Horizon

In June 2022, the FASB added to its technical agenda a project on modernizing the accounting for, and enhancing the transparency of, software costs.

⁷ ASC 985-20-15-5(a).

⁸ ASC 985-20-15-5(b).

At its March 20, 2024, [meeting](#), the FASB decided to limit the project to making targeted improvements to ASC 350-40 while retaining the guidance and including ASC 985-20 within the scope of the project. The FASB is expected to make the following changes to ASC 350-40:

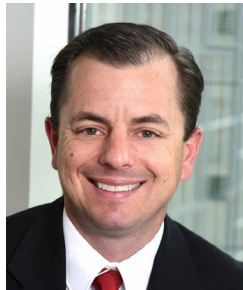
- Removing all references to stages throughout ASC 350-40, which is expected to make the guidance more operable for entities that develop software in a nonlinear manner (e.g., agile software development).
- Retaining a probable-to-complete threshold for capitalization and including specific considerations related to significant development uncertainties and unresolved high-risk development issues when it is not clear whether the software project's completion is probable and whether the software will function as intended.

The proposed guidance is also expected to include factors that may indicate there is significant development uncertainty, including when the software being developed has novel, unique, unproven functions and features or technological innovations or the significant performance requirements have not been selected.

An exposure draft is expected to be issued sometime in the fourth quarter of 2024 for a 90-day comment period.

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