



## Editorial — Notes on sustainability and the lifecycle management of constructed assets

### Editorial — Apontamentos sobre sustentabilidade e gestão do ciclo de vida de ativos construídos

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Asset management is recognized as a catalyst for sustainable development. Asset management mainly contributes to achieving 7 (out of 17) of the United Nations Sustainable Development Goals (ISO/TC 251, 2018): clean water and sanitation, renewable energy, decent jobs and economic growth, innovation and infrastructure, sustainable cities and communities, responsible consumption and combating climate change.

The core principle of asset management is value realization from assets (GFMAM, 2016; ISO 55000, 2024; The IAM, 2022). Achieving sustainable value is thus the aim of applying asset management to different areas of economic activity and different asset types. Engineering asset management (asset management applied to engineering assets) is a very important subset of asset management, as engineering assets and asset systems (Fig. 1) cover both physical and non-physical items that consume not only significant financial resources from public and private budgets, but also other forms of capital (natural, social, manufactured, intellectual, etc.).

Engineering asset management is a subset of asset management currently attracting much attention from the scientific community (Fig. 2). This subject area deals, for example, with constructed assets (infrastructure, buildings, industrial facilities, equipment, etc.). Disciplines such as risk management and project management can be combined in this context and act as a bridge for the embedding of asset management principles in the AECO industry (Amadi-Echendu, 2016; Azevedo, 2019), thus supporting Engineering Asset Management (EAM) as a key enabler of sustainable construction (Maletič et al., 2018) (Fig. 3).

Figure 1: The fundamental nature of engineering assets (adapted from Amadi-Echendu et al., 2010).

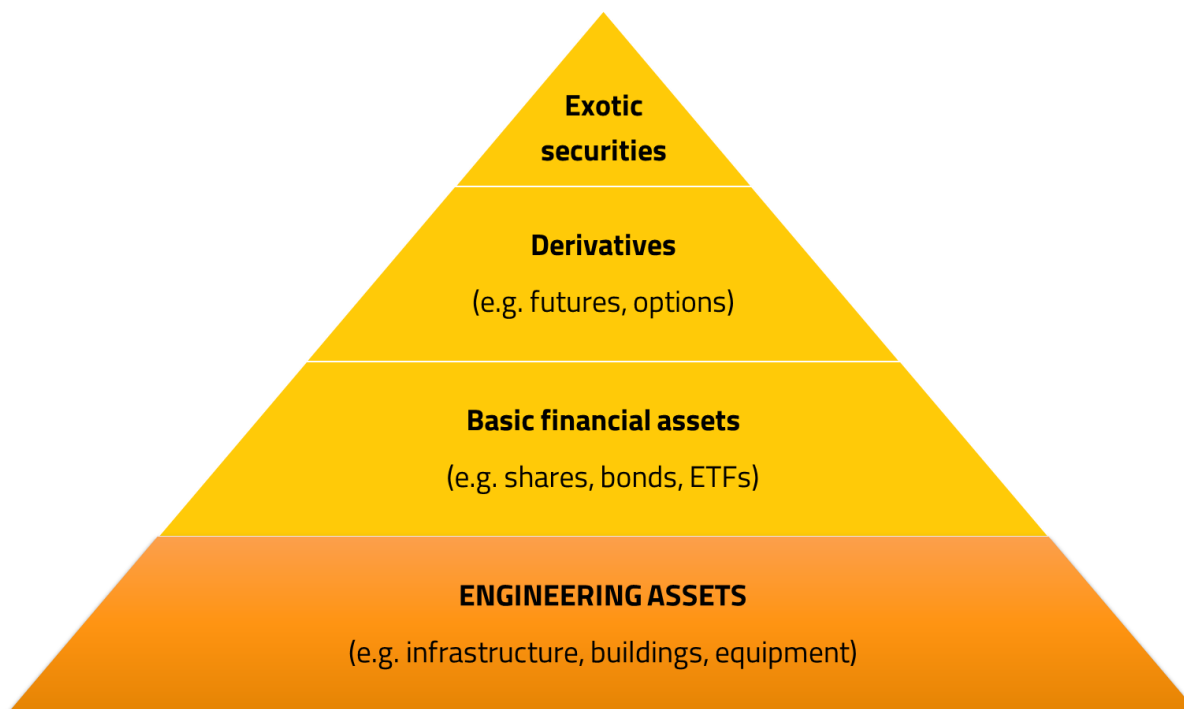




Figure 2: Distribution of publications about “asset management” by subject area (Diop et al., 2022).

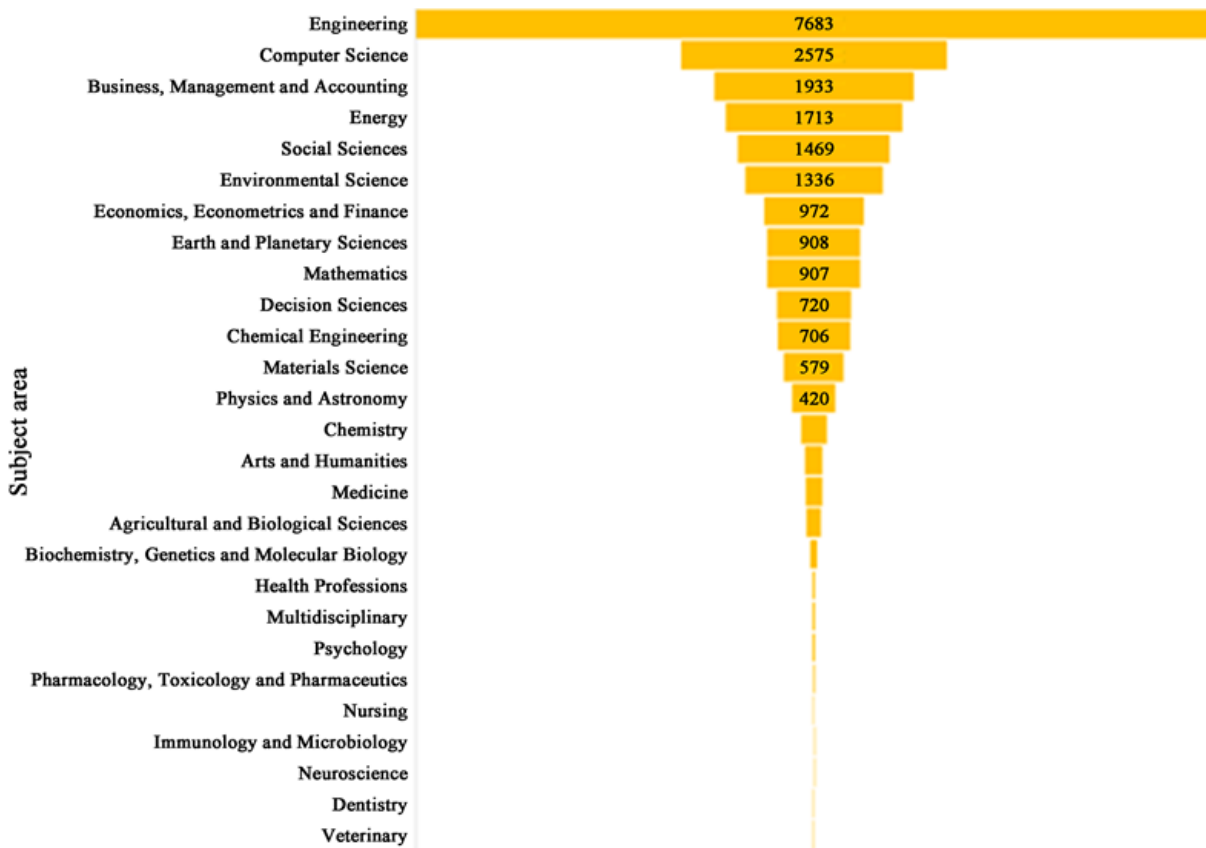
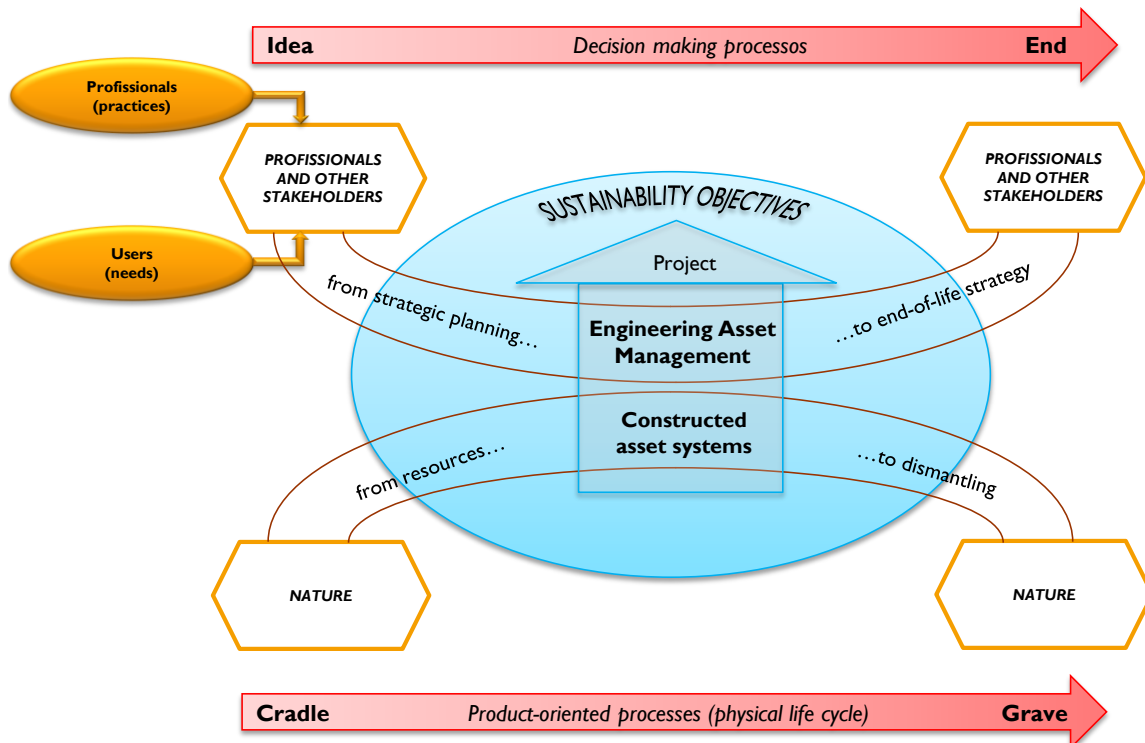


Figure 3: Management framework for sustainable construction (adapted from ISO/TS 12720, 2014)



EAM is a medium/long-term perspective oriented towards realizing value from engineered assets throughout their entire life cycle (Azevedo C, 2019; Dewan & Smith, 2005; Woodhouse, 2019) (Fig. 3). This editorial briefly discusses constructed physical assets to illustrate how EAM accounts for both the present and future needs and

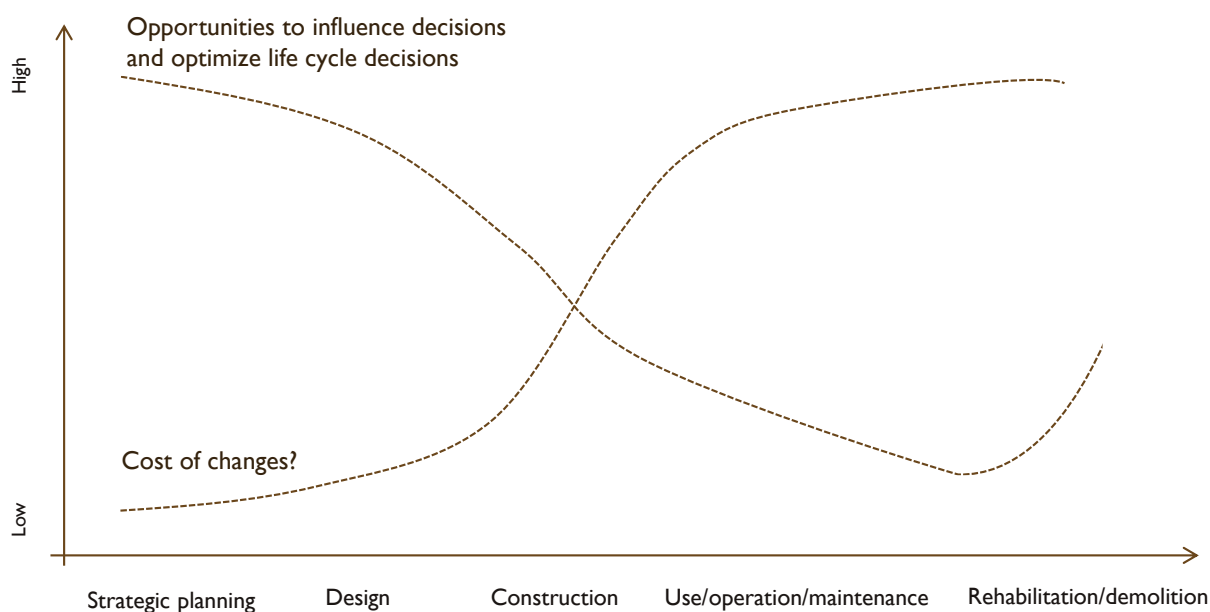


expectations of society, in general, and, for example, in the case of constructed assets, the various stakeholders of the AECO industry, in particular.

Organizations responsible for investing in the acquisition or renovation (CAPEX) and for the operation and maintenance expenses (OPEX) associated with constructed assets, have been progressively adopting asset and risk management principles, combined, in view of creating and protecting value and transparently demonstrate optimal lifecycle management decisions and overall performance, including in terms of whole of life cycle costs (TOTEX) (Woodhouse, 2019). Risk management is significant in this context (Al-Bahar & Crandall, 1990; Campos & Moreira, 2022; Chapman, 2006; Komljenovic et al., 2019; Osei-Kyei et al., 2022; Wijnia & de Croon, 2015) because it can translate into simple terms the impacts arising from decisions made at the early stages of the life cycle of constructed assets (pre-construction stages) and the influence and repercussions extending beyond the moment when those decisions are made (construction and/or post-construction phases of constructed assets), in terms not only of costs but also of the overall performance of the assets created/acquired (adapted from Amadi-Echendu, 2016) (Fig. 4).

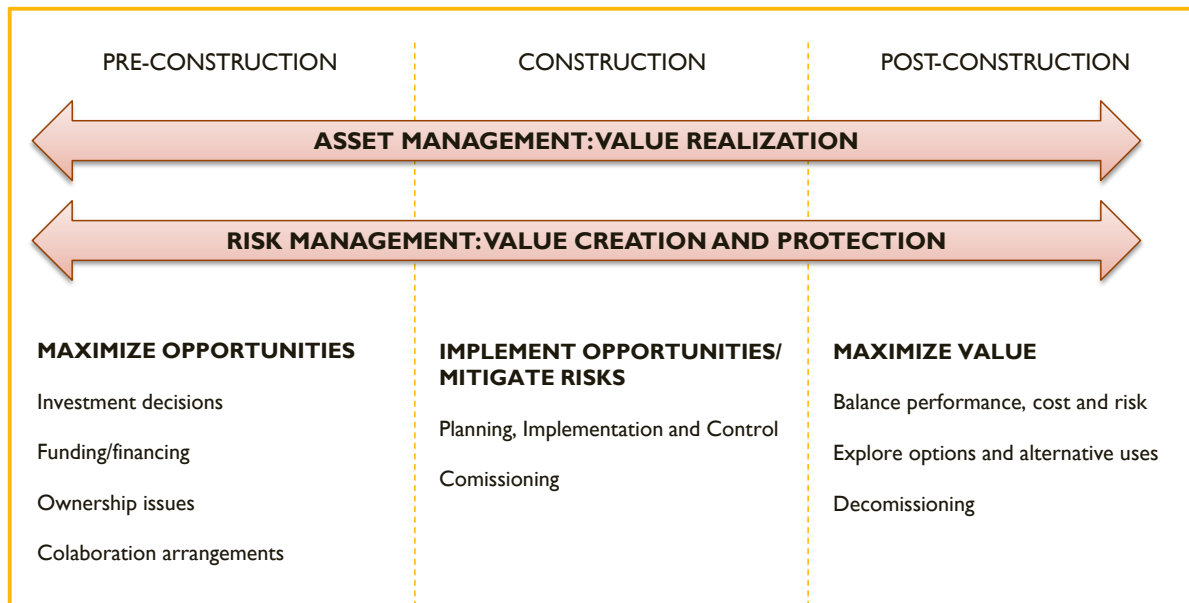
Risk management is particularly suitable to create and protect value deriving from the organizations and projects of the AECO industry. This approach became particularly popular in different contexts following the publication, in 2009, of the first version of the international standard ISO 31000 with principles and guidelines on risk management. This international standard boosted the use of several risk management techniques that were already being applied by engineering professionals in different contexts for several decades (ISO 31010, 2019). Asset management, used in combination with risk management, provides a proper framework to enable a systematic consideration of a medium/long-term perspective focused on realizing value from constructed assets throughout their entire life cycle (Fig. 5). The balancing of costs and risks needs to be achieved in a way that accounts for the needs for innovation and modernization and the accounting for various uncertainties associated with the long life cycles of the physical assets of the AECO industry (Parlikad & Srinivasan, 2016). This is particularly challenging for various reasons, one of which being that the stakeholders of this industry have different motivations and even conflicting goals.

**Figure 4:** Representation of the impact of decisions throughout the lifecycle of constructed assets (adapted from Hendrickson, 2008; PMI, 2016).





**Figure 5:** Life cycle management approach to constructed assets and asset systems (adapted from Amadi-Echendu, 2016).



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### Declaração Ética

**Conflito de Interesse:** Nada a declarar. **Financiamento:** Nada a declarar. **Revisão por Pares:** Dupla revisão anônima por pares.



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