



A Data-Driven Approach to Intelligent Resource Optimization

The 451 Take

All businesses are resource-constrained in some way. To succeed in today's digital business arena, organizations must make intelligent decisions that maximize the return on finite resources such as vehicle fleets, mobile field workforces and production facilities. Decision optimization is becoming a new competitive differentiator, and industry leaders are pursuing artificial intelligence and machine learning (AI/ML) to make data-driven decisions that create a competitive edge.

Historically, resource optimization has been a challenge. Especially when some assets are of higher value and in very limited supply – their availability becomes unpredictable in times of uncertainty and high demand, or when the number of variables that constrain their use are numerous and complex.

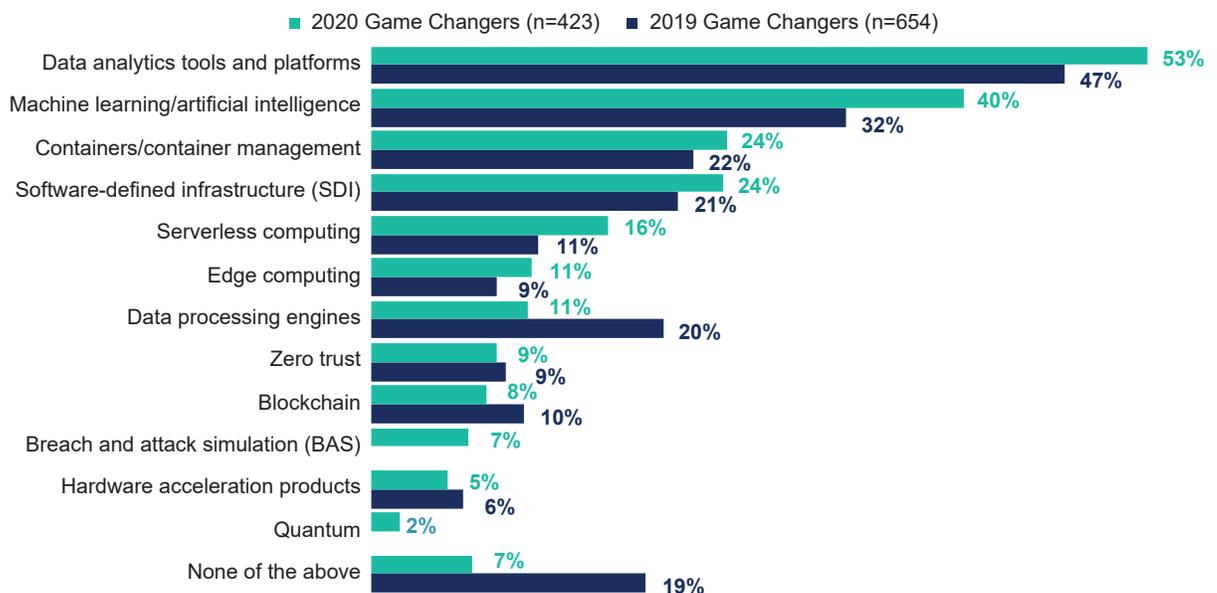
Decisions must be based on analysis of current data and the success rates of prior decisions and outcomes. This requires examination of resource availability, limitations and the dynamic circumstances under which resources must be deployed. What's needed are decision optimization tools, an evolving class of which are now on the market horizon. These tools will be less complex, practical to use, and can quickly guide decision-makers in how best to employ critical business resources – a class of tools we refer to as intelligent resource optimization (IRO).

Analytics, AI & ML Are Fastest-Growing Game Changers

The trends leading to IRO were revealed in 451 Research surveys conducted in 2019 and 2020 that asked decision-makers about the emerging technologies they believe to be critical game changers for their businesses. In 2019, 47% of respondents said that data analytics tools and platforms were the top game changer, with AI/ML the runner-up at 32%. In 2020, though, AI/ML outpaced 2019 by 25%, with 40% of respondents calling it a game changer. Data analytics tools and platforms remained the leader with 53% in 2020, growing nearly 13% over 2019.

Emerging Technology Game Changers – 2019 & 2020

Source: 451 Research's Voice of the Enterprise: Digital Pulse, Budgets and Outlook



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The 451 Take (continued)

Analytic platforms and AI/ML have risen to the top because one of the key priorities of most digital business leaders today is how to make decisions based on critical analysis of business events and operational data. Data-driven decisions of all types are essential to highly competitive digital businesses, and IRO is becoming a top priority.

Some resource optimization problems are harder to solve than others. Things like production scheduling, fleet maintenance and employee rostering can have dozens, hundreds or even thousands of variables, constraints, rules and exceptions that must be factored in. Manual efforts based on experience usually find timely solutions, but they are typically suboptimal, can inadvertently constrain other resources, or can potentially create opportunity costs. Attempts to mathematically determine the absolute optimal answer by calculating all possible options can consume years of compute time, making such 'exact' methods prohibitive.

Traditional approaches were strategic and were driven at high levels within an enterprise because the effort needed was itself resource-intensive. They called on mathematicians and data scientists who used software that codified mathematical models and AI algorithms to narrow the field of analytic complexity based on knowledge of a specific optimization problem (e.g., bin packing). Or by defining a problem in general terms that can be adapted to a range of common optimization problems given the need for a certain solution quality and within allowable computing time (e.g., vehicle or telecom network routing). In any case, they find a 'good enough' solution in a reasonable amount of time, as opposed to an optimum solution in an unreasonable amount of time. But these people are scarce resources themselves, and their tools are complex and costly.

Emerging IRO technologies are now coming to market. They are more easily trained and can draw conclusions faster and more accurately. They abstract away complexity and are pragmatic for use at the line-of-business (LOB) level within organizations by more plentiful software developers familiar with common programming languages. IRO tools aren't yet ready for nontechnical 'citizen' business planners, but they're moving in that direction.

Business Impact

ON THE ENTERPRISE: IRO can directly affect the bottom line of an enterprise and the operating costs of LOBs by making the best use of available resources and minimizing the need to buy or borrow in times of high demand or scarcity.

ON BUSINESS OUTCOMES: Data-driven decisions using IRO can help realize key performance indicators and can minimize or avoid potential opportunity costs through more thorough analysis of problems.

ON DEVELOPERS AND USERS: IRO can lower the risks associated with decision-making and speed time to market value by reducing or even eliminating the need for decisions to be based on intuition and assumption.

Looking Ahead

AI is now an IT architectural precept, in use in various ways across the entire IT spectrum. Enterprises, vendors and service providers alike in nearly all IT disciplines are experimenting with and using AI to gain an edge. Business optimization, driven by a new and evolving class of IRO tools, and applied across an enterprise down to the LOB level, will become common to business operating models as the technology continues to become simplified for pragmatic use by a broader range of technology and business professionals.



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