ACCELINT

Decision Superiority via Napoleon's Glance

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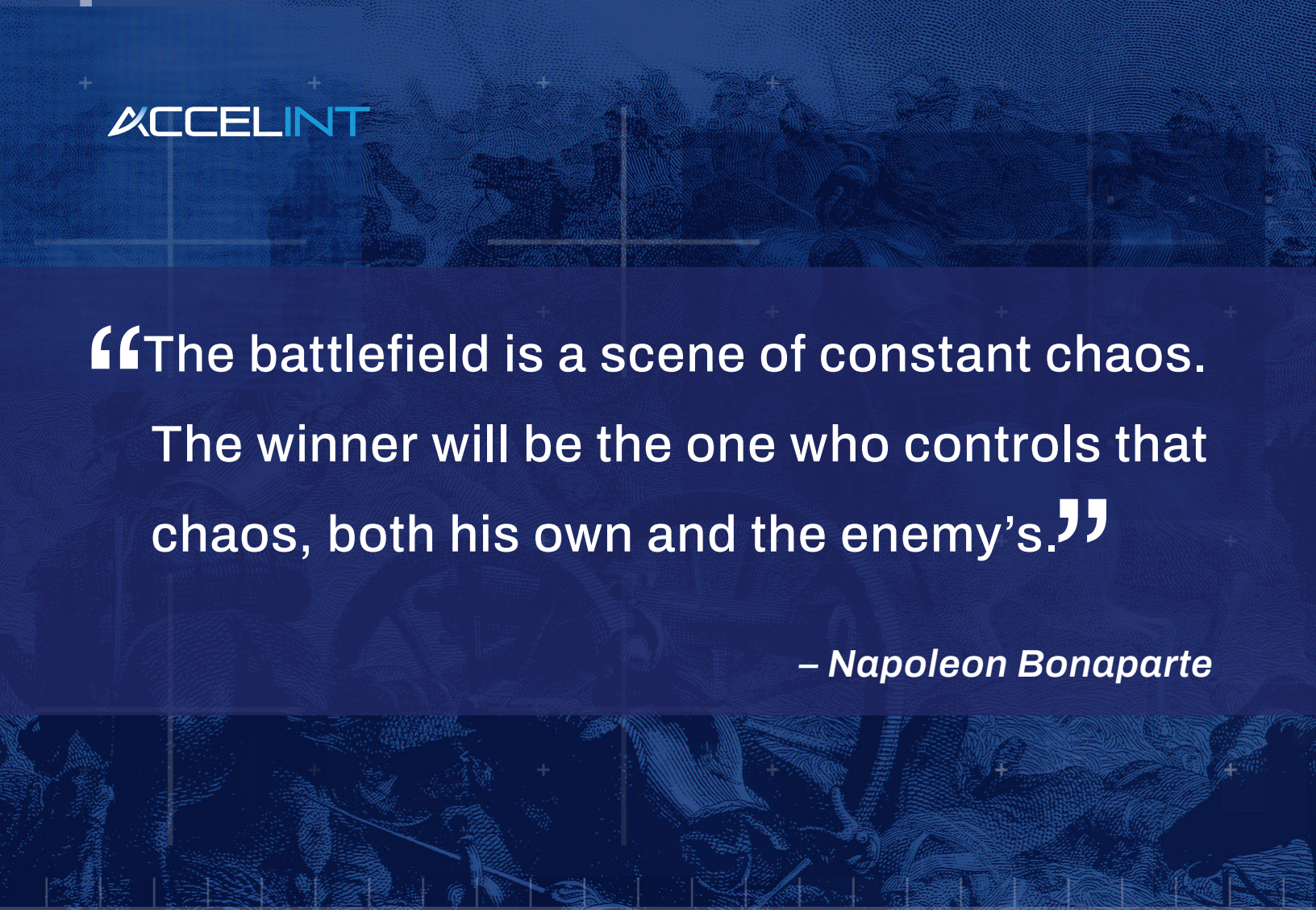

> “The battlefield is a scene of constant chaos. The winner will be the one who controls that chaos, both his own and the enemy’s.”
>
> *– Napoleon Bonaparte*

The term “strategy” entered the English language in 1810, when Napoleon was at the height of his success. The ability to derive strategic insight – where the mind is clear and quickly builds the picture of how things need to come together – has also been called “Napoleon’s Glance.” This term, originally coined by Carl Von Clausewitz, referenced how Napoleon was able to draw from memory a tactic previously used by Joan of Arc, and immediately leverage it for an upcoming battle [1].

Strategic insight is different than the concepts of expert intuition espoused by Gladwell [2] or the OODA loop developed by Boyd, because it is more focused on the human elements of decision making. Strategic insight requires data, sensing, training, and practice just like those other concepts but also requires human reflection and cognitive thinking to make the correct strategic and tactical decision.

Human-centered decision superiority

There has been a lot written about decision superiority as a key strategy for modern warfare. Most of that discussion is centered around getting more high-quality data into the hands of the warfighter. As several leaders have stated over the past few years - the data in and of itself is worthless; data's value comes from getting the right information to the right person at the right time [4][5][6]. A significant part of this problem lies in adopting appropriate solutions for IT infrastructure and data integration. However, there is another aspect to this problem that few are talking about, and that is around how we present that data to a human so it is actionable and effective. That problem is just as technically challenging and important as the others.

> "The decision to go into a conflict cannot be based on artificial intelligence; it has to be based on human intelligence and the human decision process."
>
> ***Gen. Hyten*[3]**

The data services industry has experienced a flurry of activity resulting from the Department of Defense (DOD) articulation of its data strategy. By and large, those data services have focused on connecting data sources to centralized systems, improving data operations (e.g., optimizing extract-transform-load [ETL] architectures and data tagging), and automating data transformation and information processing through artificial intelligence (AI) and machine-to-machine (M2M) data flows. No matter how many M2M data flows or AI-powered automations are present in the system, in any human-centered command and control (C2) system the final data integration is happening through the human operator's sensory inputs (e.g., eyes, ears, touch) and in their mind. *In almost every DOD mission context, the human is the sole component of the system empowered to make final decisions based off of their synthesis of the available information.* In a data rich environment, the paramount problem for the systems designer is thus to maximize the utility of all that data to the human. From a design perspective, this means applying design best practices to conduct research, implement, and test a well-defined library of digital assets to de-clutter the user interface (UI), to reveal the important data to the end user, and to streamline the interface to speed human-centered decision making. This doesn't imply the use of automation to hide or interpret all the underlying system data. It is actually the opposite; the UI needs to ensure that the human can drill down from a broad view and expose detailed, organized, and accurate data to gain clarity and context when needed.

Upon failure to gain decision superiority, some might think the problem is that we need more data, more computing power, more automation, more cowbell. However, the solution might simply be filtering the data to show only what is needed, presenting the data so it is easily understandable and consumable by the human operator, and then streamlining the user interface so the operator can efficiently execute their mission. We can replace a pound of compute and network improvements by a few ounces of thoughtful design. And the greatest thing about this investment in system design is that it scales much more rapidly and cost effectively than the other options.

UI elegance

Typically when describing a modern UI, key talking points gravitate toward graphics visualization, also known as the "look and feel" of the UI. The emphasis on a graphical user interface (GUI) is reasonable because simple information or sparse data can be effectively conveyed via tables or text. Graphics provide a way to represent large and complex data sets that cannot be managed in any other way. However, a GUI does not magically solve problems with communicating or synthesizing information; any user of Microsoft Windows will back that assertion. While data reduction techniques can be used to help fix issues such as graphics overcrowding, high information graphics (such as those associated with large and rich data sets) must be designed with special care. This is where the designer becomes a critical cog of the balanced team.

> "Excellence in statistical graphics consists of complex ideas communicated with clarity, precision, and efficiency.... Graphics *reveal* data."
>
> ***Edward Tufte*** [7]

A good software designer isn't just a Figma-trained software developer or a tech savvy graphics artist. A good software designer understands the principles of design and software architecture. They have passion for creating the best user experience (UX) and a knack for simplistic expression. They understand how different human-machine interface modalities (e.g., touch, visual, audio) affect operator workflows. They understand the history of design, current trends, and state of the art. They practice time-proven design methodology for extracting favorable user-centered design solutions. Experience in human centered design as part of a balanced team means the designer knows how to work with a product owner to integrate the design into the larger product, and they know what questions to ask the operator to elicit the implied requirements and quality attributes of the user interface. A good software designer knows how to work collaboratively with the software developers to bring their design to life, and what results from that process is an elegant, highly effective UI.

An elegant UI is not the same as a "gold plated" UI. An elegant UI is purpose-built, reductive, and contains essential functionality for the user which makes it intuitive and free from clutter. The graphics are not "window dressing;" each UI component serves a purpose for the task at hand and is guided by operator preferences, not by software developer convenience. An elegant UI is the opposite of the "Gucci UI" term used by down-trodden bureaucrats who have spent too many years suffering through poorly designed and implemented DOD software applications. The elegant UI is not the function of available front-end software budget and time, but rather a design-driven activity enabled through operator interactions. The resulting benefits of an elegant UI can include reduced costs (i.e., a scalable, reusable design library), improved software development time, improved user engagement and satisfaction, increased user loyalty, competitive advantage, increased revenue, and lower support costs.

Empowering Operators

At Accelint, we follow a semi-scientific process for using frequent and persistent operator interaction to design software. This approach is based on methods that have been proven to work in the commercial sector. In both the commercial and defense sectors, operators intuitively know what they want out of their user experience, but they often have a hard time articulating their vision. Through an iterative process of mission observation, interviews, workshops, prototyping, and feedback sessions, the operators come to consensus on the system design with a balanced team of designers, developers, architects, and subject matter experts. In the worst cases, the system supports the mission as originally intended, at least as well as the previous solution. In the best cases, this iterative design process cuts down on the time required for action as well as the amount of human cognition and dedicated attention required to execute the mission. Through design, we achieve system consistency across operator personas, locations, platforms, and missions. Consistency results in more efficient workflows and less training required for operators.

This point is underscored when we account for the constant evolution of friendly and adversary tactics, techniques, and procedures (TTPs), missions, and technology. These changes require corresponding adjustments to the way the operator interfaces with their system to execute the mission. This design approach is understandably human-oriented. Auto-generating a bad design (e.g., [9]) will lead to human-written or auto-generated code that is also bad, which will lead to a system that is potentially worse than operator's current solutions. However, automation isn't all bad. If applied properly, automation is a game-changer that enables operators to do more with less. But operators require the ability to select different levels of process automation and the insight to understand how the automation is applied to the underlying data to assure the accuracy and fidelity of mission processes.

> "We must empower our incredible airmen to solve any problem."
>
> *Gen. Charles Q. Brown* [8]

Mission-focused Applications

> "The data is kind of an enabling capability. The computer is the machine. The algorithms are the magic. But the software that puts it all together is going to be the key."
>
> ***Gen. Charles Q. Brown*** [8]

This paper has focused on the importance of design to support the development of effective decision-making support software. The creation of an elegant UI tailored for an operator's mission requires a process of iterative human-centered design and prototyping that involves a balanced team and operator interaction. At Accelint, we feel that design is part of our DNA, but it is how those design insights are built into the software and applied to the mission that illustrates the value of an elegant UI to achieve operational efficiency.

A few examples include:

- The use of a heat map to summarize thousands of data points in a manner that draws the decision-maker's attention to where it is needed most.
- The use of Gantt charts with appropriate overlap and redundancy to summarize the time sequenced steps of a plan, used to deconflict scheduling among multiple units.
- The use of context-rich icons (e.g., varying in color, shape, size) to represent separate entities on a map, leading to at-a-glance situational understanding of an entire area of interest without clutter.
- Distilling and co-locating key data elements with contextual graphics to support streamlined workflows and informed decision-making using the least amount of screens and button-pushing.
- Presenting a prioritized list of COAs with associated visualizations of action or future state to execute a mission plan in the most effective and understandable way.

The future of decision-making must smartly incorporate automation and AI to make better and faster decisions than our adversaries. It is through the design process that we discover the best places to apply those technologies in ways that result in the best user experience. It is through constant iteration and user feedback that we determine the mission effectiveness of those improvements and create systems that are intuitive, expressive, and delightful to use without introducing new complexity. At Accelint, it is our objective to ensure that the human operator remains at the center of the decision-making software system versus becoming an afterthought behind the DOD's pursuit of data centricity, AI, and high-performance compute.

Reference

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