R & D MAKES ROOM FOR E & S (EXPERIMENT & SCALE)

Michael Schrage

Disciplined digital design experimentation and testing cultures increasingly drive tomorrow's innovations and strategies.

The power, pervasiveness and potential of digital networks continue to create new value worldwide. Networks and their digital-media platforms-- such as Amazon, Google and Netflix-- have successfully evolved into virtual research centers, laboratories and design studios for entrepreneurs and enterprises alike. Because the platforms empower innovators to quickly and cheaply model, prototype and experiment, they can profoundly disrupt how innovators explore and exploit opportunities. As a result, traditional 20th-Century innovation investment paradigms emphasizing Research & Development (R&D) increasingly yield to practices supporting Experiment & Scale (E&S).

Simply put, digital platforms and devices radically reduce cost, risk and time required to productively run business experiments. Crucially, networked experiments—which take place all the time at digital-driven businesses--can be swiftly scaled into new products, new services and better user experiences that help convert innovation from a fixed-cost to a variable and/or marginal-cost investment.

THE EXPONENTIAL ECONOMICS OF NETWORKS

What we call the exponential economics of networks alters the real and perceived value of digital experimentation changing how top management should invest in innovation opportunity and risk. Taking a chance on provocative ideas become cheaper, easier and more compelling.

The Innovator's Hypothesis: How Cheap Experiments Are Worth More than Good Ideas
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MIT INITIATIVE ON THE DIGITAL ECONOMY

OUR WORK STRONGLY SUGGESTS THAT EXPERIMENT & SCALE HAS BECOME AN INNOVATION BEST PRACTICE FOR DIGITALLY SOPHISTICATED ENTERPRISES.

Amazon, Google, Microsoft, Netflix, Facebook, Microsoft, Intuit and Capital One are just a few high-profile market leaders who publicly attribute innovation prowess to their ongoing commitment to digital experimentation. MIT Sloan's Dean Eckles, also has offered some examples based on his tenure at Facebook and Yahoo. Digital businesses have made experimentation both a core competence and a cultural value: They expect innovators to experiment, and - given their platforms' scale and scope - experimental quantity is almost as important as quality. More is better.

IN THIS RESEARCH BRIEF

- Innovation investment paradigms emphasizing Research & Development (R&D) will increasingly yield to practices supporting Experiment & Scale (E&S).

- 'Born Digital' businesses make experimentation both a core competency and a cultural value.

- The biggest challenges to successful experimentation are cultural and organizational. Management overwhelmingly favors planning, programs, projects and pilots over experimental knowledge and insight. Money is rarely the issue.

- At digitally sophisticated organizations, data science teams play a dual role of acquiring and analyzing data and collaboratively designing business-experiment portfolios.

- Machine learning may have the most profound and potentially disruptive change in the analytics/experimentation ecosystem.

As Amazon founder Jeff Bezos famously observed, "If you double the number of experiments you do per year, you're going to double your inventiveness." Networked enterprises can more than double the number of annual experiments with only incremental increases in cost.

AMAZON'S RECOMMENDATION ENGINES, FOR EXAMPLE, WEREN'T LAUNCHED AS A GRAND VISION TO TRANSFORM DIGITAL SHOPPING; THEY SERENDIPITOUSLY EMERGED THROUGH RAPID DIGITAL EXPERIMENTATION AND SCALING.

As former Amazon intrapreneur Greg Linden recalls, real-world results from fast, cheap and iterative experiments were vital in overcoming top management resistance to recommendation innovation. Agile experimentation, not strategic planning, drove recommendation engine development, deployment and success, he said.

This highlights a painful, but persistent, core insight into digitally driven enterprise experimentation: The biggest challenges to successful adoption are not technical or financial, but cultural and organizational. At most firms, management overwhelmingly favors planning, programs, projects and pilots over the real-world benefits of experimental knowledge and insight. Most don't realize how the exponential economics of experimentation should shift their innovation investment portfolios. Legacy corporate cultures haven't caught up with the new cost structures and opportunities.

OVERCOMING MANAGEMENT RESISTANCE

More perniciously, executives frequently resist easy opportunities to cost-effectively experiment because they fear challenges to their hard-won professional intuitions and authority. Jim Manzi, a founder of Applied Predictive Technologies (APT), a digital experimentation/test-and-learn platform acquired by Mastercard for over $600 million, notes that such executive resistance is common.

"Executives often don't want the answers because it threatens their authority (if senior) or autonomy (if mid-level)," Manzi observes. Many line executives and business unit leaders dislike data-driven digital experiments that might challenge or undermine pet hypotheses or business perspectives.

As behavioral economics research powerfully suggests, such resistance reflects both overconfidence and 'confirmation bias' by individual managers rather than a willingness to invest in insights that might benefit the entire firm. The irony, as Manzi and others point out, is that ongoing cost reductions and technical improvements guarantee digital experimentation will become an even more threatening enterprise option. Conflicts between ever-greater technical/economic value and passive-aggressive managerial/cultural resistance will become sharper and clearer.

The cultural/organizational pathology that enterprise leaders must inevitably confront is captured well by Intuit founder Scott Cook. As the Internet overwhelmed packaged software business models, Cook painfully, but successfully, reengineered his multi-billion dollar company's culture around design experimentation. He became an experimentation evangelist.

"I wondered why Google beat Yahoo! at search," Cook recalled. "A Yahoo! executive told me that Google succeeded by installing the system and culture to decentralize decision-making" and change it to decision-by-experiment. Google's chief economist, Hal Varian, has said that Google runs 3,000 to 5,000 search experiments a year — when you use Google you're part of those experiments. Today, that number may now be at least 10 times higher, in fact.

WHEN GOOGLE ENGINEERS HAD AN IDEA, THEY DIDN'T NEED APPROVAL TO PURSUE IT; THEY LET THE EXPERIMENT MAKE THE DECISION. GOOGLE UNDERSTOOD THAT INNOVATORS WANT TO TAKE THEIR IDEA, BUILD IT, AND SEE IT WORK.

Intuit's Cook explicitly links experimentation to an empowerment ethos. A former Procter & Gamble brand manager who now sits on that company's board, Cook was reportedly less successful getting the global consumer products giant to embrace more experiments-driven approaches. A great business experiment has to inspire the same degree of top-management energy, enthusiasm and engagement as a great business plan. Indeed, can business plans truly be great without fast, frugal and compelling business experiments to test them?

FRUGAL EXPERIMENT TO ACQUIRE CREATIVE INSIGHTS
In many respects, these challenges recall the early days of Six Sigma quality and Lean-management initiatives. Instead of seeing Lean as a way to manage EOQs and inventory more efficiently, Lean should assist in managing continuous flows. Instead of running experiments that validate plans and analyses, see them as methods to acquire creative insight and information.

To be sure, significant technical distinctions exist, for example, between A/B and multivariate designs. Some organizations define experiment by comparing options, i.e., does blue outperform red? While others devise portfolios of fast digital experiments to test rigorously defined strategic business hypotheses. Either way, commitment to experiment early and often – and act on the outcomes and insights – is necessary.

The growing dominance of cloud architectures creates global enterprise environments that can further amplify experimental opportunities and effectiveness. Clouds are constructed with simple and easy scalability in mind. Similarly, the DevOps movement – linking software development and operations – is explicitly designed to encourage iterative seamlessness between new software capabilities and their network deployment. In addition, the rise of big data and effective real-time management of terabytes and petabytes guarantees a wealth of interesting and important correlations worthy of experimental exploration.

CONSEQUENTLY, HOW EXPERIMENTAL DESIGNS CO-EVOLVE WITH BIG DATA ANALYTICS WILL ARGUABLY PROVE THE MOST SIGNIFICANT ORGANIZATIONAL, OPERATIONAL AND CULTURAL VALUE DIFFERENTIATORS FOR ENTERPRISES WORLDWIDE OVER THE NEXT DECADE.

At virtually every digitally sophisticated organization we studied, the data science team plays a dual role of both acquiring and analyzing data and collaboratively designing business-experiment portfolios. In some firms, analytics drive experiments; at others, experiment drives analytics.

Perhaps the most profound and potentially disruptive change in the analytics/experimentation ecosystem is machine learning. Machine learning already plays powerful roles in identifying meaningful – and potentially valuable – patterns in datasets, such as transforming medical and machine diagnostics, as well as recommender systems. But leading-edge data scientists have also begun training machine-learning systems to generate interesting hypotheses for experiments. That is, the systems are being trained to recommend data-driven business hypotheses for marketers, managers and innovators to experimentally test. It's become easy to envision a time in the very near future when the most important experiments –such as improving UX, or identifying lead users or suggesting new features/functions -- will come from an exceptionally well-trained machine-learning system. Indeed, it's computationally inevitable.

Until then, we advise eight key learnings from our research, as follows:

Analyze Less; Experiment More

Digital organizations increasingly emphasize learning from experiment over predictive analytics for their innovation explorations.

Testable Hypotheses over Good Ideas

Arguably the most disconcerting epistemological shift for data-driven organizations is moving away from 'good ideas' as the dominant framing for innovation and/or optimization opportunities. Rather than discussing business suggestions, intuitions and proposals, data-driven managers insist that people present testable hypotheses for experimental and/or analytical development. Defining explicit business hypotheses imposes an organizational discipline measurably improving experimental design and impact.

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Celebrate Creative Constraints

For most organizations, performing digital experiments to test business hypotheses is not a priority. Learning the maximum amount possible with specific constraints – i.e., time, money, customer segment, technical implementation, etc. – is the goal. But constraints themselves can be sources of enterprise ingenuity– i.e., something that works on a mobile device; an event actuated by a swipe; a color-change; a chat-bot bubble, etc.

Make Experiments Social

Organizationally, experiments should not be treated as either the province or privilege of technocratic elite. They can be part of enterprise chats or dialogues around innovation inviting and inspiring comments and critiques. Socialization of enterprise experiments– sometimes including suppliers, channels and customers – will keep constituents aware of the experiments agenda and the ongoing results.

Do the Experiments That Matter Most

Prioritization matters. Organizations beyond the experimental stage typically have more good potential experiments than they can handle. Their challenge shifts from generating high-impact hypotheses to prioritizing their portfolio. Tensions typically emerge between marketing/customer-facing UX owners and devops/ technical managers about what's most important to learn first/fastest.

Insights First, Solutions Later

Data-driven organizations with robust digital experimentation capabilities initially emphasize insights over solutions. They see the best as enemy of the good. The perfectionist engineering is suppressed in favor of quicker, iterative sensibilities. It may be better to run – and learn from – an imperfect weekly experiment for five weeks than a perfectly designed, one-shot every five weeks.

Track the Hypothesis Trajectory

Experimentally mature and committed enterprises don't just track outcomes they chart the focus of the business hypotheses over time. Do the bulk of business hypotheses reflect concerns about customers or suppliers? Channels or partners? Lead or typical users? What value paths and trajectories do the hypotheses appear to be on? Are they more tactical or strategic? Focused or diverse?

People Aren't Lab Rats

Ethical considerations and concerns around experiment can't be ignored. Facebook, for example, created a firestorm of bad publicity and regulatory interest worldwide when it tweaked user newsfeeds – without their knowledge or consent – to explore hypotheses around networked emotional contagion. Serious digital experimenters explicitly accept that they experiment with people, not on them. This distinction is non-trivial even though it could pose challenges to the validity of the experiment. Assuring that customers are respectfully treated in business experimental contexts is a paramount concern. Several leading digital enterprises are drafting mission statements and codes of ethics as experimentation accelerates.

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