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Tech fluency

A foundation of future careers

By Anthony Stephan, Martin Kamen, and Catherine Bannister
Illustration by Doug Chayka

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```

/*globals $, setTimeout*/
function menuItem(select, not, menu) {
  "use strict";
  var elemset = $(select).not(not);
  if (elemset.length > 0) {
    console.log(elemset.length);
    var item = $(elemset[0]);
    $('button.closeNotification').click();
    item.contextmenu();
    setTimeout(function () {
      console.log("click menu");
    }, 100);
  }
}

```

```

System.out.println("Hello, World!");
} catch (Exception e) {
  System.out.println("ERROR: " + e.getLocalizedMessage());
  for (StackTraceElement ee : e.getStackTrace())
    System.out.println(ee);
}

```

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```

:method :get
:feed-slug feed-slug
:user-id user-id))

```

```

(ns fub.timeline.stream
  (:require [clojure.string :as str]
            [clojure.data.codec.base64 :as b64]
            [full.core.sugar :refer :all]
            [full.async :refer :all]
            [full.core.config :refer [opt]]
            [full.http.client :as http]
            [full.core.log :as log]
            [full.time :refer [dt<->iso-ts dt->iso-ts]]
            [full.json :refer [write-json]])
  (:import (java.util) Crypto Mac))

```

```

import requests
import re
from bs4 import BeautifulSoup

page = requests.get(self.getUrl())
soup = BeautifulSoup(page)

```

```

void main(){
  vec3 worldCameraToVertex = vVertexWorldPosition - cameraPosition;
  vec3 viewCameraToVertex = (viewMatrix * vec4(worldCameraToVertex,
  viewCameraToVertex = normalize(viewCameraToVertex);
  float cosTheta = dot(vVertexNormal, viewCameraToVertex);
  float intensity = pow(cosTheta, power);
}

```

```

(defn follow [feed-slug user-id target-feed-slug target-user-id]
  (req {:resource (str "feed/" feed-slug "/" user-id "/following/")
        :method :post
        :feed-slug feed-slug
        :user-id user-id
        :body {:target (str target-feed-slug ":" target-user-id)}}))

```

```

(defn unfollow [feed-slug user-id target-feed-slug target-user-id]
  (req {:resource (str "feed/" feed-slug "/" user-id "/following/"
        target-feed-slug ":" target-user-id "/" "unfollow/")
        :method :delete}))

```

```

;Entrada de datos
mov cx, 20
mov [si], offset arreglo
Do2:mov ah, 01h
int 21h
mov ah, 6
mov dl, ' '
int 21h
mov [si], al

```



```
code segment para public 'code'
    assume cs:code
    mov ax,data
    mov ds,ax
    assume ds:data
    ;Inicio del programa
    main proc far
```

```
port org.eclipse.swt.SWT;
port org.eclipse.swt.internal.ole.win32.IDispatch;
port org.eclipse.swt.internal.ole.win32.IUnknown;
port org.eclipse.swt.internal.win32.OS;
port org.eclipse.swt.layout.FillLayout;
port org.eclipse.swt.ole.win32.OLE;
port org.eclipse.swt.ole.win32.OleAutomation;
port org.eclipse.swt.ole.win32.OleControlSite;
port org.eclipse.swt.ole.win32.OleFrame;
port org.eclipse.swt.ole.win32.Variable;
port org.eclipse.swt.widgets.Display;
```

```
:feed-slug feed-slug
:user-id user-id}}

<?
:results
(map deserialize-activity))
```

```
(defn serialize-activity [activity]
  (-> activity
    (update-in [:time] dt->iso-
    (update-in [:to] add-to-sig))

(defn deserialize-activity [activity]
  (-> activity
```

```
;Entrada de datos
mov cx, 20
mov [si], offset arreglo
Do2:mov ah, 01h
int 21h
mov ah, 6
mov dl, ' '
```

```
stack segment para stack 'stack'
    db 256 dup(0FFh)
stack ends
;
data segment para public 'data'
    arreglo db 20 dup(?)
data ends
;
```

```
chomp(my $input =<STDIN>);

my $hoge = 1;

for my $num (1 .. $input) {
    $hoge += $num;
}
```

```
code ends
end main
```

```
:headers (-> headers
  (assoc-auth-headers feed-slug user-id)
  (cond-> body (assoc "Content-Type"
:params (assoc (or params {}) "api_key" @api-key)
:body (when body (write-json body :json-key-fn name))))
```


THE LANGUAGE OF TECHNOLOGY

In the 21st century, it's often said, *every* company is a technology company. Across industry sectors, powerful technological forces—including mobile, cloud, analytics, and social collaboration—now drive business strategy, fuel new opportunities, and upend long-established markets.

Think about how technology-enabled possibilities that emerged over the past decade have transformed the way we work now, whether in a securities trading office in Manhattan, on a factory floor in Ohio, or in an automobile in Los Angeles that is part of a ridesharing network. In each, technology is both ubiquitous and foundational, enabling the communica-

tions, transactions, and operations that drive revenue and strategy.

Indeed, technology is integral to almost everyone's daily work, and businesses increasingly rely on innovative applications to engage customers and partners, engineer new products and services, and identify business insights buried within mountains of data. And technology's disruption of business models, markets, and career paths doesn't end there: Cognitive computing, machine intelligence, and advanced robotics are poised to replace some traditional human employees and augment the skills and productivity of others.¹

Analysts have written plenty about this phenomenon's impact on enterprise technologists

THE SPECTRUM OF TECH FLUENCY

Tech fluency is a concept that, like being fluent in a foreign language, encompasses a spectrum of proficiency. With a basic Spanish vocabulary, for example, a tourist may be able to successfully navigate the streets of Madrid. At the other end of the fluency spectrum, a dedicated student of the Spanish language can thrive in a less polyglot region of Spain, and perhaps even work as a translator. Similarly, the spectrum of tech fluency begins with a basic understanding of enterprise technology principles and systems. This understanding makes it possible for workers to contextualize deeper technology concepts; it enables employees to follow technology trends, differentiate between tech "myth" and fact, and understand how the tools they use each day contribute, directly or indirectly, to business success.

Further along the spectrum, tech fluency becomes more role- and business-function-specific, consisting of a detailed working knowledge of how technology capabilities and their adjacencies can drive new revenue and open fresh opportunities in the near term. At this intermediate level of fluency, employees may be able to understand the possibilities of technology more broadly and harness system capabilities to create efficiencies, drive strategy, and pursue new revenue. And at the advanced end of the tech fluency spectrum, individuals can sense future disruptive opportunities that emerging innovation may make possible three or even five years down the line—and use that foresight to help their companies create sustainable competitive advantage.

and their work within IT organizations. But what does it mean for non-IT workers? If every company is now a tech company, will business leaders, marketers, and HR professionals need to learn to write code in order to get ahead?

We wouldn't go that far—though some have suggested that computer programming could be the next big blue-collar job opportunity.² It does mean, however, that to engage in and contribute to a tech-driven business environment, to be able to quickly learn the next big emerging technology's functions, and to grow professionally, all workers—from executives to interns—will need to learn much more about critical systems: their capabilities and adjacencies, their strategic and operational value, and the particular possibilities they enable.³ In other words, individuals will need to become *tech fluent*.

As established companies across industry sectors reshape and reorganize themselves to capitalize on emerging technologies, some are recognizing that helping workers become more tech fluent can be key to achieving that competitive advantage. Consider, for example, global communications giant AT&T's ongoing effort to retrain its employees. This multifaceted learning program, dubbed Workforce 2020, is driven by strategic necessity: Over the past decade, the storied company that traces its origins to Alexander Graham Bell's 1876 invention of the telephone has been transitioning from cables and switches to IP networks and

the cloud and, in the process, is recreating itself as a digital-first purveyor of wireless communication and data services.⁴

For longtime AT&T employees whose expertise lies in business models, systems, and processes that are becoming obsolete, this means developing new skills and, critically, thinking beyond the status quo. For prospective hires, this likely means that the multinational corporation with which they are interviewing next week is now looking for the kind of flexible, digital-first skill sets (and mind-sets) traditionally found in start-ups.

To date, AT&T has reportedly spent upward of \$250 million on educational and professional-development programs to support roughly 140,000 employees who are actively engaged in acquiring technology and other skills for newly created roles. In a 2016 interview, Chairman and CEO Randall Stephenson offered a bit of wisdom to his own employees that all workers should take to heart as they navigate the future of work. "There is a need to retool yourself, and you should not expect to stop," he said, adding that people who do not spend 5 to 10 hours a week in online learning "will obsolete themselves with the technology."⁵

NOT YOUR OLD-SCHOOL ENTERPRISE IT

THE emergence of tech fluency as a driver of career success among non-IT workers is a relatively new phenomenon. Until recently, enterprise workers typically

viewed technology as someone else's responsibility: Executives chose it; IT implemented and maintained it. Help was just a support ticket away. Talent at all levels learned to use specific software capabilities that helped them complete assigned tasks—and proudly listed those mastered capabilities on résumés and in job applications.

In thinking about enterprise technology in purely utilitarian terms—much the same way they would think about a kitchen appliance—few workers likely considered its broader potential as a driver of strategy or a new, exciting means for engaging customers, nor did their employers ask them to. Perhaps fewer still recognized the real face of technology disruption: a powerful force that was redefining their careers and futures.

This failure to recognize technology's potential no doubt still permeates many organizations, from bottom to top. For example, there may be C-suite executives who welcome new ideas and business opportunities but have a time-stamped view of what technology can achieve. Likewise, within IT organizations, there may be tech talent with proven domain expertise but little experience working within an agile development environment or with potentially disruptive, leading-edge innovations. Still other employees might understand how to use domain-specific tools to accomplish work-related tasks but have no insight into how and why these tools operate within the larger IT ecosystem.

The days when enterprise technology can be viewed as someone else's concern are coming rapidly to an end. IT workers have long been encouraged to “speak the language of business,” but increasingly it is becoming just as important for the business to speak the language of IT, says Jikin Shah, senior vice president and head of OMNI Sales and Services Tech at Atlanta-based financial services company SunTrust Banks Inc.

Shah is currently leading a broad technology transformation effort at the bank that includes, among other components, an initiative to help employees learn about and fully utilize new systems. “Within all companies, technology has moved from being a function to an enabler of strategy,” he says. “Yes, everyone must still be a ‘student of the business’—that is ultimately how they deliver total value. However, business teams—executives and strategists in particular—must now also understand top-level technology trends, and the particular possibilities these trends offer the business.”⁶

Technology's rapid advance will likely only accelerate. Driven by growth in software and IT services revenue, worldwide IT spending is forecast to reach \$3.5 trillion in 2017, up 2.9 percent from estimated 2016 spending, according to Gartner, Inc.⁷ Meanwhile, CIOs are working to erase traditional boundaries between IT and business by embedding software developers in business teams to work hand in hand with strategists, sales executives, and marketers to design, build, and deploy mission-critical

software tools quickly and efficiently.⁸ Expect many CIOs to move aggressively on similar efforts going forward. Deloitte's 2016 Global CIO Survey of 1,200 IT executives found that

78 percent of respondents identified strategic alignment with the business as the organizational capability most critical to IT's success.⁹

BUILDING A CULTURE OF CONTINUOUS LEARNING

To create the agility and flexibility necessary to build competitive advantage, companies will need workers who understand enterprise technology along with the specific applications and systems that enable their own roles—and are aware of potentially disruptive innovations and trends. Developing new and innovative ways of learning and institutionalizing tech fluency learning opportunities can help workers contribute substantively, creatively, and consistently, no matter their roles.

As the 2017 Deloitte *Global Human Capital Trends* report¹⁰ explores, digital organizations are recognizing the need to build continuous learning programs that not only help employees develop technology skills and knowledge quickly but also help them grow and advance within an enterprise model that is ever-evolving.

To meet this need, chief learning officers and other human capital leaders should consider taking one or more of the following approaches:

Make tech fluency learning programs self-directed, digital, and dynamic. Traditional learning management systems are being replaced by new technologies for curation, delivery, and mobile use that put learners in the driver's seat. Moreover, a wide variety of low-cost learning opportunities are emerging in various online and video channels.

Tie learning to professional growth. Offer a curriculum focused on the baseline learning requirements of given roles. This allows users to explore adjacencies and prepare for other jobs within the organization.

Make continuous learning opportunities part of the corporate brand. The employment brand needs to be visible and attractive and learning needs to be part of that brand. Here's why: Glassdoor data shows that among Millennials, the "ability to learn and progress" is now the principal driver of a company's employment brand.¹¹

Recruit candidates who have open minds and an endless capacity to learn. Beyond making continuous learning an attractive part of the corporate brand, human-capital strategists and recruiters should consider focusing less on attracting candidates with specific backgrounds in technology and more on recruiting those who are curious, creative, and emotionally intelligent. Candidates with these qualities may be more open to nontraditional learning approaches and to working collaboratively within diverse teams and across enterprise functions.

The challenge is that achieving tech fluency, at whatever level, isn't a once-and-done matter of mastering a particular set of knowledge.

TUNING INTO THE POSSIBLE

GIVEN the sheer number and variety of technologies available for enterprise use, becoming tech fluent may seem daunting, if not impossible, to non-IT workers. The challenge is that achieving tech fluency, at whatever level, isn't a once-and-done matter of mastering a particular set of knowledge. Rather, the process of developing tech fluency is, as AT&T's Stephenson suggests, not a finite journey between two fixed points but, rather, an open-ended adventure of continuous learning. Indeed, given today's rapid-fire pace of innovation, even CIOs, software engineers, and others with advanced technological expertise must continually refresh their knowledge and work to stay on top of the latest trends.

Yawning gaps in employee digital knowledge are not only common—they are likely undermining technology transformation efforts. In a 2016 global survey of managers and executives conducted by *MIT Sloan Management Review* and Deloitte, only 11 percent of respondents said their company's current talent base can compete effectively in the digital economy.¹²

Interestingly, those same respondents cited “lack of agility, complacency, and inflexible culture” as significant internal barriers to digital

success.¹³ And of course, workers stuck in the past comprise functional departments that have trouble looking forward. Therein lies what may be the strongest argument for all workers aiming to become more tech fluent—and for their employers to create learning environments to help them on this journey. In the absence of a shared understanding of enterprise technologies and their possibilities, companies cannot nurture the collective imagination necessary to move beyond the way things are done today toward a new strategic and operational future. Becoming conversant in technology can help workers of all backgrounds understand not only the realities of today but the possibilities of tomorrow in terms of markets, customers, products, and strategy.

As an example of this concept in action, consider SunTrust, which has been on a technology transformation journey for several years that has involved, among other phases, building a data lake, constructing a private cloud, and transitioning software development teams in its online banking and digital groups from traditional waterfall approaches to an end-to-end, team-based agile approach. Along the way, SunTrust also acquired an online consumer lending business that introduced an entire agile ecosystem into the organization.

According to Scott Case, chief technology officer for the bank's consumer segment, SunTrust's embrace of agile led to a broader adoption of team-based approaches within a framework called the Business Accelerator program.¹⁴ "By early 2016, we realized we needed to reorganize our entire transformation effort," he says. "Our Business Accelerator approach brings together various capabilities—business, IT, design—from across SunTrust who work together in 'accelerator studios' to deliver solutions for our clients and teammates." Case, the program's executive sponsor, says these diverse teams are currently working on public cloud strategies, continuous integration and development capabilities, the implementation of an API strategy, and other initiatives that are powering SunTrust's transformation forward.

In rolling out the Business Accelerator program, SunTrust is focusing heavily on training teams and individuals as they prepare to "on-board" into this new delivery approach. For example, team members from business backgrounds need to understand what it means to be part of a scrum team. Likewise, developers need to understand why adopting new processes and tools is such a critical part of the bank's strategy for bringing new solutions to

the marketplace and increasing market share. "The more we align delivery teams consisting of both business and technology talent, the more everyone on these teams needs to understand the capabilities required to deliver on an accelerated path," Case says. "It will no longer be OK for a business teammate to stay on one side of the fence, flip some requirements over to a technologist who then goes away and builds something in a vacuum, and comes back in six

months for user acceptance testing. What we build or buy in terms of architecture matters to the team, and the entire team needs to buy into the solution.

"As we shift to a team-based delivery culture, everyone needs to be fluent in the what, the why, and the how," Case continues. "I believe each member of a delivery team is responsible for understanding what good

looks like for platform decisions, the data required for our teammates and clients, and a basic understanding of what it means to leverage an API framework. Becoming fluent in how the technology and operations ecosystem hangs together inside and outside SunTrust will allow the teams to make better long-term decisions that directly relate to our shareholders, clients, and our purpose."

In any given enterprise, the need for tech fluency varies by role, and what each individual learns will be shaped by her unique background and experiences.

Nurturing tech fluency among SunTrust teammates has become an integral part of maturing the Business Accelerator framework. Jikin Shah, who leads the program, is partnering with Case, the bank's HR organization, and others to develop change management, training, team alignment, and skill set learning opportunities to ensure that teams are engaged in

building tech fluency and are coached appropriately along the way. "We have formed 'tiger teams' to support individuals assigned to projects by giving them special, hands-on training and coaching," Shah says. "We are also looking to industrialize tech fluency training as we mature our delivery models."



WHERE TO BEGIN

WHAT, specifically, are we suggesting when we say that non-IT employees will need to be tech fluent in order to navigate the future of work? In any given enterprise, the need for tech fluency varies by role, and what each individual learns will be shaped by her unique background and experiences. However, the following can serve as a general guideline.

The initial goal of individual fluency journeys—and of tech education programs that companies offer to support continuous learning—should be to develop a depth of understanding of the major systems and concepts that form the technological endoskeleton of enterprise IT. For example, which systems support customer engagement and which support internal functions such as accounting? Which of the

major technology forces—cloud, mobile, social media, analytics, cognitive computing—does one’s employer leverage, and why? With a baseline understanding of enterprise systems, an employee can nurture a depth of expertise (think of it as putting down roots) into technology and business adjacencies. Though approaches to learning often differ, the following

incremental steps may help workers develop the level of tech fluency needed for their specific role:

Step one: Workers should study not only the core systems supporting their company’s IT environment but the specific solutions (internal and external) that enable major functions such as finance, customer service, data management, cybersecurity, and sales. Likewise, they should read up on the technology forces that

are changing the world in which we live and work.

Step two: Workers should explore the market in which their company competes. How does technology support market participation and enable competitive advantage?

Step three: Employees should study their company’s business model. Where are the levers of profitability? What technologies support business strategy and drive revenue? How has technology disrupted this business model over the course of the last decade?

When all of an organization’s people share this informational baseline, their ideas become shared currency. Thus, the heavy work of imagining a company’s digital future potentially be-

When it comes to tech fluency, executives need to be more knowledgeable than their counterparts at competitor organizations in the same market if they expect to sustain a marketplace advantage.

comes a lighter lift, as well as more efficient, effective, and impactful.

Building tech fluency for specific roles

From this shared baseline, workers can begin developing deeper tech knowledge in their specific domains while at the same time exploring adjacencies and the way they fit into the bigger picture of core systems, markets, and business strategies. For example:

Executives: When it comes to tech fluency, executives need to be more knowledgeable than their counterparts at competitor organizations in the same market if they expect to sustain a marketplace advantage. For some, this may mean focusing less on numbers and spreadsheets, and more on technology-driven disruption—from within and without the organization. Tech fluency for executives means enhancing the baseline understanding of core systems with in-depth knowledge not only of enterprise adjacencies, but of innovation, R&D, and emerging opportunities on five- or even ten-year time horizons. Executives should be able to monitor and “sense” technology trends continuously. Likewise, they should expect the

strategists and technologists in their employ to match, if not surpass, their sensing efforts. A CFO, for example, will likely have the final say on whether a new technology-driven initiative gets funded. And while this CFO will consider the proposal as set forth by project boosters, to make an informed, objective decision, she should have been following the development and applications of technologies involved over the last several years, and should be fluent in that technology’s capabilities and risks before the project proposal is even written.

Business strategists: For those ultimately charged with plotting a course toward future success, developing tech fluency not only in their own areas of expertise and responsibility but also in adjacent areas—along with the technologies being deployed in other sectors—will become critical to business and professional success. The ability to sense a potential opportunity in the way a competitor—or, for that matter, a noncompetitor—is leveraging a new platform or tool is grounded in an understanding of technology that is both broad and deep. For example, an HR strategist working to develop new recruitment tactics identifies

When communicating with clients and business partners, faking expertise won’t cut it. To tell a technology story, one must understand the technology.

a start-up currently developing a platform that leverages crowdsourcing, social media, and advanced analytics capabilities to identify hard-to-find workers with unique skill sets. To recognize the potential value such a solution could deliver, the strategist must be sufficiently knowledgeable in current digital recruiting solutions and their capabilities to understand how the emerging technology platform could potentially satisfy an unmet need and add value.

Accountants and auditors: The emergence of big data and real-time reporting has profoundly changed the way back-office employees and executives approach their jobs. Bookkeeping and financial reporting processes that were traditionally backward-facing are now—thanks to technology—more future-facing and focused on how today’s numbers can be used to project tomorrow’s performance. Tech fluency for those working in this domain encompasses not only data management and advanced analytics tools that support forecasting and automated fraud detection—it means a baseline understanding of the various systems that drive revenue. For example, as companies embrace a cloud-based, everything-as-a-service model, finance workers will need to understand how transitioning from internally to externally sourced capabilities could affect IT budgets. They will also need to understand how IT will deploy and utilize cloud services in order to negotiate contract terms with cloud-service pro-

viders and accommodate the tax consequences of any new arrangement.

Marketers, writers, and other communications workers: A critical, if often overlooked, aspect of transformation in the digital age is telling the story of that transformation with the end in mind. For those charged with telling this story—and explaining its relevance to customers, investors, and business partners—tech fluency means developing a broad, baseline understanding of a company’s IT environment and then being sufficiently curious and flexible to pivot in order to master particular adjacencies, opportunities, and business drivers. Wherever enterprise technology goes, marketing and communications professionals must quickly follow with accurate, clear communications that raise market awareness of new offerings. When communicating with clients and business partners, faking expertise won’t cut it. To tell a technology story, one must understand the technology. Meanwhile, there’s another technology story developing that communications workers at all levels would be wise to monitor: Software can now generate basic “just the facts” articles without human input.

A NEW LANDSCAPE

GOING forward, individuals in these roles and others—as well as prospective hires wanting to join them—face a career landscape that is radically different from the one workers surveyed only a decade

ago. Many once-solid career paths have been disrupted while others have, and will continue to, emerge. To thrive in a business environment in which the only constant is change, workers at all levels should learn all they can about one of the strongest forces driving that change: technology.

For Jikin Shah, tech fluency is about more than understanding the justification for moving from physical to virtual servers. “At SunTrust, the ultimate goal of our tech fluency efforts is to change our organizational mind-set. Becom-

ing a technology company is not just a way to make more money—in our industry, it is a matter of survival. Over the course of my career, it has become clear to me that when people with diverse backgrounds and from different functions collaborate as a team and speak a common technology language, they begin thinking about projects as if their own money were on the line and the decisions they make are critical to success. This is the kind of engagement that, I find, results in stronger strategies, better use cases, and more valuable outcomes.” ●

Anthony Stephan, a principal with Deloitte Consulting LLP, focuses on inspiring and developing people to be leaders.

Martin Kamen is the national leader of the Human Capital IT Transformation practice.

Catherine Bannister, a managing director with Deloitte Consulting LLP, is the chief talent officer for the organization’s Technology service area.

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