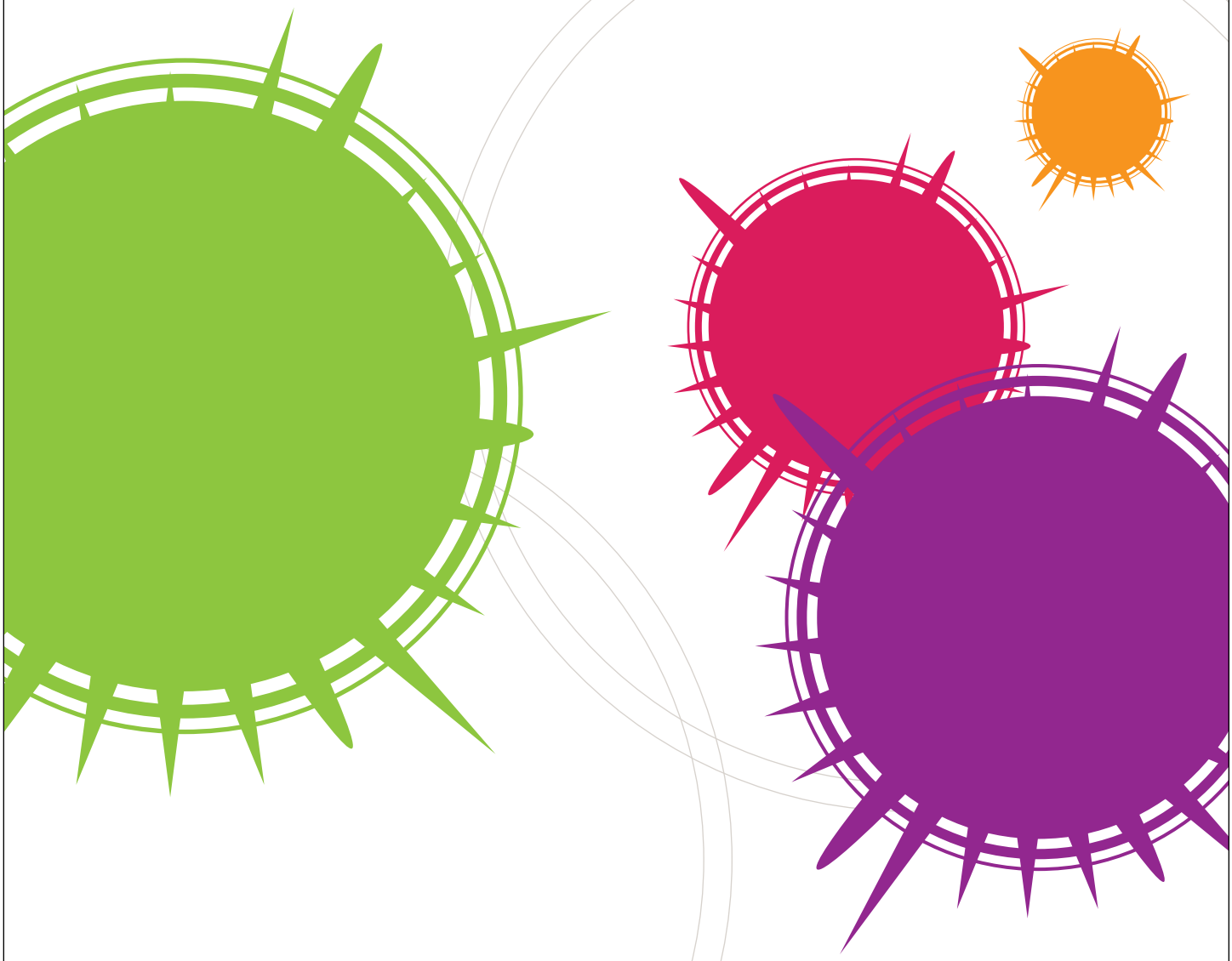


Future Work Skills 2020

Institute for the Future for
the University of Phoenix Research Institute

124 University Avenue, 2nd Floor, Palo Alto, CA
94301 650.854.6322 www.iftf.org

INSTITUTE FOR THE FUTURE

[redacted]

UNIVERSITY OF PHOENIX RESEARCH INSTITUTE

[redacted]

CREDITS:

(\[OVY! $QQD 'DYLHV 'HYLQ)LGOHU 0DULQD *RUELV
*YLH[P]L +PYLJ[PVU! -HDQ +DJDQ
7YVK\J[PVU ,KP[VY! /LVD 0XPEDFK
+LZPNU HUK 7YVK\J[PVU! .DULQ /XEHFN -RG\ 5DG]LN

• 0UZ[P[\[L MVY [OL -\[\YL MVY <UP]LYZP[` VM 7OVLUP_ 9LZLHYJO 0UZ[P[\[L (SS YPNO[Z YLZLY]LK 9LWYVK\J[PVU WYVOPIP[LK ^P[OV\[^YP[[LU WLYTPZZPVU :9 (

contents

4L[OVKVSVN`

:P_ +YP]LYZ VM *OHUNL

-\[\YL >VYR :RPSSZ 4HW

;LU :RPSSZ MVY [OL -\[\YL >VYRMVYJL

0TWSPJH[PVUZ

INTRODUCTION

0U [OL Z 0)4»Z +LLW)S\L ILH[NYHUKTHZ[LY .HY` 2HZWHYV] PU
>H[ZVU Z\WLYJVTW\[LY PZ ILH[PUN JVU[LZ[HU[Z VU *Jeopardy.* *decade ago, w*
worried about obs being outsourced overseas today companies such as ODesk and LiveOps can assemble teams in the cloud to do sales, customer support, and many other tasks. Five years ago, it would have taken years for N S to tag millions of photographs taken by its telescope, but with the power of its collaborative platforms, the task can be accomplished in a few months with the help of thousands of human volunteers.

Global connectivity, smart machines, and new media are ust some of the drivers reshaping how we think about work, what constitutes work, and the skills we will need to be productive contributors in the future.

This report analyzes key drivers that will reshape the landscape of work and identifies key work skills needed in the next years. It does not consider what will be the obs of the future. Many studies have tried to predict specific ob categories and labor requirements. Consistently over the years, however, it has been shown that such predictions are difficult and many of the past predictions have been proven wrong. Rather than focusing on future obs, this report looks at future work skills proficiencies and abilities required across different obs and work settings.

METHODOLOGY

2YHU LWV KLVWRU\ WKH ,QVWLWXWH IRU WKH)XWXUH ,)7) KDV EHHQ D OH
WKH 'HOSKL WHFKQLTXH D PHWKRG RI DJJUHJDWLQJ H[SHUW RSLQLRQV WR
HWKQRJUDSKLF PHWKRGV LQWR WKH GLVFLSOLQH RI IRUHFDVWLQJ DQG UH
IRUHVLJKWV :H KDYH XVHG WKHVH PHWKRGRORJLHV ZLWK DQ LOOXVWULRX

kil eao pk ckran ia po bkq pek o pk naoo eooqao o eranoa o bqpqna o ea a p
bqpqna kb knc ev pek o pda bqpqna kb a q pek

IFTF uses foresight as a starting point for a process we call Foresight to Insight to ction, a process that enables people to take future visions and convert them into meaningful insights and actions they can take to be successful in the future.

In writing this report, we drew on IFTF s foundational forecasts in areas as diverse as education, technology, demographics, work, and health, as well as our annual Ten-Year Forecast. The Ten-Year Forecast is developed using IFTF s signals methodology an extension of decades of practice aggregating data, expert opinion, and trends research to understand patterns of change. signal is typically a small or local innovation or disruption that has the potential to grow in scale and geographic distribution. signal can be a new product, a new practice, a new market strategy, a new policy, or new technology. In short, it is something that catches our attention at one scale and in one locale and points to larger implications for other locales or even globally. Signals are useful for people who are trying to anticipate a highly uncertain future, since they tend to capture emergent phenomenon sooner than traditional social science methods.

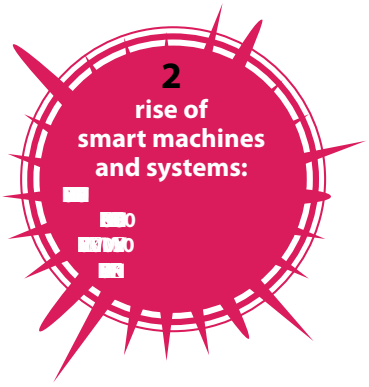
e enriched and vetted this research at an expert workshop held at our headquarters in Palo lto, where we brought together experts in a diverse range of disciplines and professional backgrounds, engaging them in brainstorming exercises to identify key drivers of change and how these will shape work skill requirements. Finally, we analyzed and filtered all of this data in order to identify the six key drivers and ten skills areas that will be most relevant to the workforce of the future.

Many thanks to each of our workshop participants:

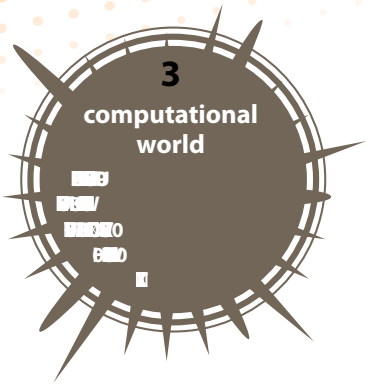
(THUKH +\[YH 9PNO[4HUHNLTLU[

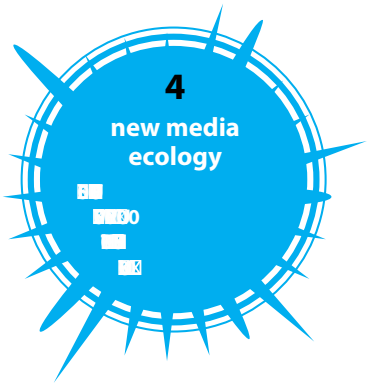
- *HYVSPUL 4VSPUH 9H`
  <UP]LYZP[` VM 7OVLUP_ 9LZLHYJO 0UZ[P[
- +H]PK 7LZJV]P[a 0-;-
- +L]PU -PKSLY 0-;-
- /\TLYH 4HSPR ,SLJ[YVUPJ (Y[Z
- 1HZVU ;LZ[LY 0-;-
- 1LYY` 4PJOHSZRP 0-;- (MÄSPH[L
- 1PT :WVOYLY 0)4
- 3LZSPL 4PSSLY <UP]LYZP[` VM 7OVLUP_
- 4HYPUH .VYIPZ 0-;-
- 4HY[OH 9\ZZLSS 4LKPH ? H[:[HUMVYK <U
- 4PJHO (YUVSK (WVSSV .YV\W
- 5H[HZOH +HSaLSS 4HY[PULa <UP]LYZP[`
- 9HJOLS 4HN\PYL 0-;-
- :VUU` 1HUKPHS 7YVJ[LY .HTISL
- :[L]L 4PSV]PJO ;OL >HS[+PZUL` *VTWHU`
- ;YHJL` >PSLU +H\NLU[P
  <UP]LYZP[` VM 7OVLUP_ 9LZLHYJO 0UZ[P[

SIX DRIVERS OF CHANGE



SIX DRIVERS OF CHANGE





;OL KPMM\ZPVU VM ZLUZVYZ JVTT\UPJH[P5VLU^ZT\ISUPKTLWKYPVHJL[ZZ[OUNSVNPLZ HYL IYPUNPU
WV^LY PU[V L]LY`KH` VIQLJ[Z HUK LU]PYV[YTHLWZ[ZMVYPTSS[PUVSJLHPZO[OL ^H` ^L JVTT\UPJH[L
HU \UWYLJLKLU[LK [VYYLU[VM KH[H HUK [MOVLYV]WWLVY[WUYPV[K\[VPZVLL KPNP[HS HUPTH[PVU
WH[[LYUZ HUK KLZPNU Z`Z[LTZ VU H ZJHSLNHUTLPLUN ILHMUKYTLWKPZLPK P[PUN ILJVTL L]LY T
ISL ,]LY` VIQLJ[ L]LY` PU[LYHJ[PVU L]LYH[UOKP^UPNKLZWJYTLHKP UH[VUL^ LJVZ`Z[LT ^PSS [HR
JVU[HJ[^P[O ^PSS IL JVU]LY[LK PU[V KH[H[OGZOULH^YLHKZJ¥KLHYL SP[LYHSS` KL]LSVWPUN
[OL ^VYSK HYV\UK \Z HUK Z[HY[ZLLPUN P[U[OYSVHNNO\HONLL SMUVZY VMTT\UPJH[PVU
KH[H ^L ^PSS PUJYLHZPUNS` MVJ\Z VU THUPW\SH[PUN [OL KH[H [V
HJOPL]L KLZPYLK V\[JVTLZ ;O\Z ^L ^PSS \(ZSOYLYHKP`U [HOLL L[LY_H[VMMZLK 0U[LYUL[PZ [YHUZM
¸L]LY`[OPUN PZ WYVNYHTTHISL¹·HU LYH V]MP[KOPUHRHPHNH[PW\[[OLUK V[OLY TVYL]PZ\HS
^VYSK PU JVTW\[H[PVUHS WYVNYHTTHISLTLKKLPZHPN(U[H[OSLL Z[LHYTLZ[PTL]PY[\HS UL[^VYRZ H
NYH[LK TVYL HUK TVYL ZLHTSLZZS` PU[V V\Y
;OL JVSSLJ[PVU VM LUVYTV\Z X\HU[P[PLZ \SMP]KZ[HJOPSSUSLSJPHUSNLUL^ TLKPH PU[V V\Y KH
TVKLSPUN VM ZVJPHS Z`Z[LTZ H[L_[YLTL ZJPHSSSLPZVUZ[VMTPZJLYWZHNULKULYH[PUN HUK]PL^PU
THJYV OLSWPUN \UJV]LY UL^ WH[[LYUZ HUKVUY[LSJH[[MPVVZZ[OVMTPZJLYWZHNULKULYH[PUN HUK TVIPSL K
^LYL WYL]PV\ZS` PU]PZPISL (NLUJPLZ ^PSLSUPVVJYVWZ[ZPPUÅN\SSUJLVKVUSJ\S[\YL
THJYV SL]LS WOLUVTLUH Z\JO HZ NSVIHS WHUKLTPJZ [V Z[VW
[OLPY ZWYLHK HJYVZZ [OL NSVIL ([H TPJYVL^STLJKSHPPUZKPW]PHKJPHSSZ[^UPLS^SKLTHUKZ VU H[[
IL HISL [V ZPT\SH[L [OPUNZ Z\JO HZ [OLPYJVVMU[P[PVV[UOLO[VMPZJLUH[IVISPUN UL^ WSH[MVYTZ
H]VPK [YHMÄJJVUNLZ[PVU IHZLK VU YLHSPKRTLU[PY[HMÄJJPSKLHHL [4OPLJZVMTL [PTL YLX\PYPUN
HUK THJYV ZJHSL TVKLSZ ^PSS TLZO [V JYPLUH[HJT[PVKPL[SPZLZ[OZHJOHYLZ VUSPUL WLYZVUHS Y
\UWYLJLKLU[LK PU [OLPY JVTWSL_P[` HUK TJHVUTWSLT[LUU[ZZ[ PZ LUHISPUN UL^ ^H`Z MVY
[VNL[OLY HUK JVSSHIVYH[L IYPUNPUN PU U
(Z H YLZ\S[^OL[OLY P[PZ Y\UUPUN H I\ZPVUHLYZLZJVY`[VHMN^PVUYR HUK WLYZVUHS SP]LZ
PUKP]PK\HS OLHS[O V\Y ^VYR HUK WLYZVUHMYSZ\SHPZLZP^SPS[S [PVU^JHYLKHZYLHSP[` HUK [Y\[O P
PUNS` KLTHUK HIPSP[PLZ [V PU[LYHJ[ ^P[OHSK[HYHLKZIL[OWLHJ[PL[LYTJZKPPUH LJVSVN` >L T\Z[S
KH[H THRL KH[H IHZLK KLJPZPVUZ HUK \ZHWWYVWYVHJVKVZUP[W[^P[O TVYL ZRLW[PJPZT H
MVY KLZPYLK V\[JVTLZ [OH[^OH[`V\ ZLL [VKH` TH` IL KPMMLYLU[[V
HYL ^L NVPUN [V OH]L T\S[PWSL PU[LYWYL[H
L]LU[Z I\[^P[O \IPX\P[V\Z JHW[\YL HUK Z\Y]
^PSS IL ZLLU MYVT T\S[PWSL HUNSLZ HUK W
WVZZPIS` [LSSPUN H KPMMLYLU[ Z[VY` VM P

5
superstructed
organizations

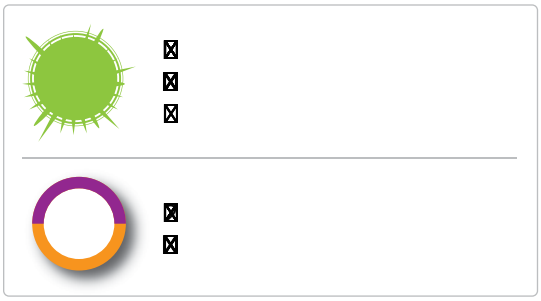
6
globally
connected world

FUTURE WORK SKILLS 2020

:KDW GR WKHVH VL[GLVUXSWLYH IRUFHV PHDQ IRU WKH ZRUNHUV RI WKH Q
GHFDGH" :H KDYH LGHQWLðHG WHQ VNLOOV WKDW ZH EHOLHYH ZLOO EH FUL
IRU VXFFHVV LQ WKH ZRUNIRUFH

:KLOH DOO VL[GULYHUV DUH LPSRUWDQW LQ VKDSLQJ WKH ODQGVFDSH LQ
HDFK VNLOO HPHUJHV WKH FRORU FRGLQJ DQG SODFHPHQW KHUH LQGLFDW
ZKLFK GULYHUV KDYH SDUWLFXODU UHOHYDQFH WR WKH GHYHORSPHQW RI
RI WKH VNLOOV

2,@



TEN SKILLS FOR THE FUTURE WORKFORCE

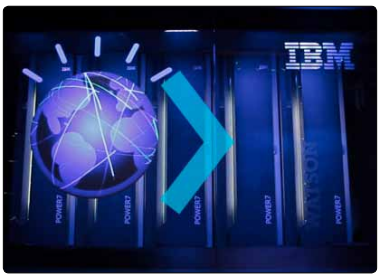
1 SENSE-MAKING

+ , - 0 5 0 ; 0 6 5 ! *ability to determine the deeper meaning or significance of what is being expressed*

s smart machines take over rote, routine manufacturing and services obs, there will be an increasing demand for the kinds of skills machines are not good at. These are higher-level thinking skills that cannot be codified. e call these sense-making skills, skills that help us create unique insights critical to decision making.

hen IBM s supercomputer, Deep Blue, defeated chess grandmaster Gary asparov, many took this of a sign of its superior thinking skills. But Deep Blue had won with brute number-crunching force its ability to evaluate millions of possible moves per second , not by applying the kind of human intelligence that helps us to live our lives. computer may be able to beat a human in a game of chess or Jeopardy by sheer force of its computational abilities, but if you ask it whether it wants to play pool, it won t be able to tell whether you are talking about swimming, financial portfolios, or billiards.

s computing pioneer Jaron Lanier points out, despite important advances in rtificial Intelligence I research it is still the case that, if we ask what thinking is, so that we can then ask how to foster it, we encounter an astonishing and terrifying answer: we don t know. s we renegotiate the human machine division of labor in the next decade, critical thinking or sense-making will emerge as a skill workers increasingly need to capitalize on.



0)4»Z SH[LZ[Z\WLYJVTW\[LY >H[ZVU YLJLU[S` [VVR VU O\THU JVU[LZ[HU[Z H[ NHTL ZOV^ 1LVWHYK`

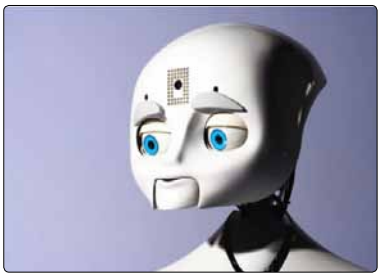
O[[W! ^^^ PIT JVT PUUV]H[PVU \Z ^H[ZVU

2 SOCIAL INTELLIGENCE

+ , - 0 5 0 ; 0 6 5 ! *ability to connect to others in a deep and direct way, to sense and stimulate reactions and desired interactions*

hile we are seeing early prototypes of social and emotional robots in various research labs today, the range of social skills and emotions that they can display is very limited. Feeling is ust as complicated as sense-making, if not more so, and ust as the machines we are building are not sense-making machines, the emotional and social robots we are building are not feeling machines.

Socially intelligent employees are able to quickly assess the emotions of those around them and adapt their words, tone and gestures accordingly. This has always been a key skill for workers who need to collaborate and build relationships of trust, but it is even more important as we are called on to collaborate with larger groups of people in different settings. Our emotionality and social I developed over millennia of living in groups will continue be one of the vital assets that give human workers a comparative advantage over machines.



40; 4LKPH 3HI»Z 7LYZVUHS 9VIV[Z .YV\W PZ KL]LSVWPUN H YVIV[[OH[JHU NLULYH[L ZVTL O\THU SPRL L_WYLZZPVUZ

O[[W! YVIV[PJ TLKPH TP[LK\

+90=,9:

- L_[YLTL SVUNL]P[`
- JVTW\[H[PVUHS ^VYSK
- YPZL VM ZTHY[THJOPU
- UL^ TLKPH LJVSVN`
- NSVIHSS` JVUULJ[LK ^VYSK

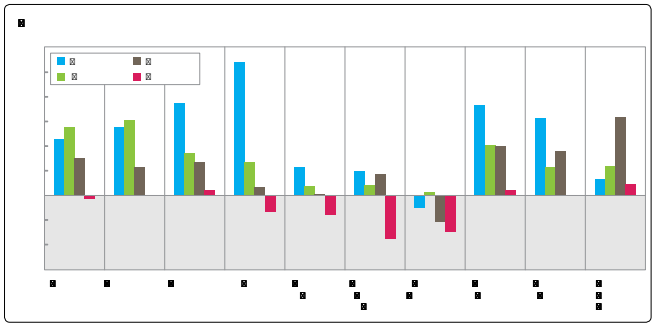
3 NOVEL & ADAPTIVE THINKING

+,-050;065! *proficiency at thinking and coming up with solutions and responses beyond that which is rote or rule-based*

Massachusetts Institute of Technology Professor David utor has tracked the polarization of obs in the United States over the last three decades. He finds that ob opportunities are declining in middle-skill white-collar and blue-collar obs, largely due to a combination of the automation of routine work, and global offshoring. Conversely, ob opportunities are increasingly concentrated in both high-skill, high-wage professional, technical and management occupations and in low-skill, low-wage occupations such as food service and personal care. Jobs at the high-skill end involve abstract tasks, and at the low-skill end, manual tasks.

hat both of these categories of tasks have in common is that they require what utor terms situational adaptability the ability to respond to unique unexpected circumstances of the moment. Tasks as different as writing a convincing legal argument, or creating a new dish out of set ingredients both require novel thinking and adaptability. These skills will be at a premium in the next decade, particularly as automation and offshoring continue.

*OHUNL PU LTWSV`TLU[ I` VJJ\WH[PVU



,TWSV`TLU[NYV^[O PU [OL <UP[LK :[H[LZ PZ W OPNO ZRPSS HUK SV^ ZRPSS QVIZ IV[O VM ^OPJO YL MVY UV]LS [OPURPUN

+H]PK (\[VY *The Polarization of Job Opportunities in the US Labor Market* Center for merican Progress and The Hamilton Pro ect, pril

4 CROSS-CULTURAL COMPETENCY

+,-050;065! *ability to operate in different cultural settings*

In a truly globally connected world, a worker s skill set could see them posted in any number of locations they need to be able to operate in whatever environment they find themselves. This demands specific content, such as linguistic skills, but also adaptability to changing circumstances and an ability to sense and respond to new contexts.

Cross-cultural competency will become an important skill for all workers, not ust those who have to operate in diverse geographical environments. Organizations increasingly see diversity as a driver of innovation. Research now tells us that what makes a group truly intelligent and innovative is the combination of different ages, skills, disciplines, and working and thinking styles that members bring to the table. Scott . Page, professor and director of the Center of the Study of Complex Systems at the University of Michigan has demonstrated that groups displaying a range of perspectives and skill levels outperform like-minded experts. He concludes that progress depends as much on our collective differences as it does on our individual I scores.

Diversity will therefore become a core competency for organizations over the next decade. Successful employees within these diverse teams need to be able to identify and communicate points of connection shared goals, priorities, values that transcend their differences and enable them to build relationships and to work together effectively.

7YVMLZZVY :JV[[, 7HNL OH ZOV^U OV^ KP]LYZL NYV\WZ `PLSK Z\WLYPVY V\[JVTLZ ^ JVTWHYLK [V OVTVNLULV\Z NYV\WZ

O[[W! WYLZZ WYPUJL[VU LK\

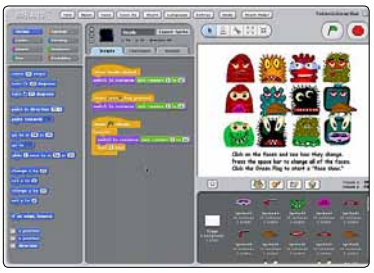
TEN SKILLS
FOR THE FUTURE WORKFORCE

5 COMPUTATIONAL THINKING

+ , - 0 5 0 ; 0 6 5 ! *ability to translate vast amounts of data into abstract concepts and to understand data-based reasoning*

s the amount of data that we have at our disposal increases exponentially, many more roles will require computational thinking skills in order to make sense of this information. Nov - ice-friendly programming languages and technologies that teach the fundamentals of programming virtual and physical worlds will enable us to manipulate our environments and en - hance our interactions. The use of simulations will become a core expertise as they begin to feature regularly in discourse and decision-making. HR departments that currently value applicants who are familiar with basic applications, such as the Microsoft Office suite, will shift their expectations, seeking out resumes that include statistical analysis and quantitative reasoning skills.

In addition to developing computational thinking skills, workers will need to be aware of its limitations. This requires an understanding that models are only as good as the data feeding them even the best models are approximations of reality and not reality itself. nd second, workers must remain able to act in the absence of data and not become paralyzed when lacking an algorithm for every system to guide decision making.



:JYH[JO PZ HU PU[LYH[P]L
SLHYUPUN LU]PYVUTLU[
KL]LSVWLK I` 3PMLSVUN
2PUKLYNHY[LU .YV\W H[
[OL 40; 4LKPH 3HI 0[
[LHJOLZ `V\UN WLVWSL
[OL M\UKHTLU[HSZ VM
JVTW\[H[PVUHS TL[OVK
VSVN` PU H M\U SV^ YPZR
LU]PYVUTLU[

O[[W! ZJYH[JO TP[LK\

6 NEW-MEDIA LITERACY

+ , - 0 5 0 ; 0 6 5 ! *ability to critically assess and develop content that uses new media forms, and to leverage these media for persuasive communication*

The explosion in user-generated media including the videos, blogs, and podcasts that now dominate our social lives, will be fully felt in workplaces in the next decade. Communica - tion tools that break away from the static slide approach of programs such as PowerPoint will become commonplace, and with them expectations of worker ability to produce content using these new forms will rise dramatically.

The next generation of workers will need to become uent in forms such as video, able to critically read and assess them in the same way that they currently assess a paper or presentation. They will also need to be comfortable creating and presenting their own visual information. nowledge of fonts and layouts was once restricted to a small set of print designers and typesetters, until word processing programs brought this within the reach of everyday office workers. Similarly, user-friendly production editing tools will make video language concepts such as frame, depth of field etc part of the common vernacular.

s immersive and visually stimulating presentation of information becomes the norm, workers will need more so - phisticated skills to use these tools to engage and persuade their audiences.

/V^HYK 9OLPUNVSK»Z
:VJPHS 4LKPH *SHZZ
YVVT [LHJOLZ]PL^
LYZ [OL]LYUHJ\SHY
VM]PKLV

O[[W! ZVJPHSTLKPHJSHZZYVVT
JVT

+90=,9:

- L_[YLTL SVUNL]P[`
- JVTW\[H[PVUHS ^VYSK
- YPZL VM ZTHY[THJOPU
- UL^ TLKPH LJVSVN`
- NSVIHSS` JVUULJ[LK ^VYSK

7 TRANSDISCIPLINARITY

+,-050;065! *literacy in and ability to understand concepts across multiple disciplines*

Many of today s global problems are ust too complex to be solved by one specialized discipline think global warming or overpopulation . These multifaceted problems require transdisciplinary solutions. hile throughout the th century, ever-greater specialization was encouraged, the next century will see transdisciplinary approaches take center stage.

e are already seeing this in the emergence of new areas of study, such as nanotechnology, which blends molecular biology, biochemistry, protein chemistry, and other specialties.

This shift has ma or implications for the skill set that knowledge workers will need to bring to organizations.

ccording to Howard Rheingold, a prominent forecaster and author, transdisciplinarity goes beyond bringing together researchers from different disciplines to work in multidisciplinary teams. It means educating researchers who can speak languages of multiple disciplines biologists who have understanding of mathematics, mathematicians who understand biology.

The ideal worker of the next decade is T-shaped they bring deep understanding of at least one field, but have the capacity to converse in the language of a broader range of disciplines. This requires a sense of curiosity and a willingness to go on learning far beyond the years of formal education. s extended lifespans promote multiple careers and exposure to more industries and disciplines, it will be particularly important for workers to develop this T-shaped quality.

;OL *HSPMUZY[PHL MVY
;LSLJVTT\UPJH[PVUZ HUK
UMVYTH[PVU ;LJOUVSVN`
*HSP[H[[OL <UP]LYZP
VM *HSPMVYUPH»Z :HU +
JHTW\Z IYPUNZ [VNL[OLY
YLZLHYJOLYZ MYVT :;,4 Ä
VM ZJPLUJL HUK LUNPUL
^P[O HY[KLZPNU HUK T
V[OLY KPZJPWSPULZ [V [
SHYNL ZJHSL ZVJPL[HS W

O[[W! ZVJPHSTV]LTLU[VYN

8 DESIGN MINDSET

+,-050;065! *ability to represent and develop tasks and work processes for desired outcomes*

The sensors, communication tools and processing power of the computational world will bring with them new opportunities to take a design approach to our work. e will be able to plan our environments so that they are conducive to the outcomes that we are most interested in. Discoveries from neuroscience are highlighting how profoundly our physical environments shape cognition. s Fred Gage, a neurobiologist who studies and designs environments for neurogenesis the creation of new neurons , argues, change the environment, change the brain, change the behavior.

One recent study found that ceiling height has a consistent impact on the nature of participants thinking. Participants in the study were asked to rate their current body state or feeling. Those who were in the room with higher ceilings responded more favorably to words associated with freedom, such as unrestricted or open . Those in the lower-ceiling room tended to describe themselves with words associated with confinement. This impact on mood was directly transferred to mental processes those in the high-ceiling group were more effective at relational thinking, creating connections and the free recall of facts.

orkers of the future will need to become adept at recognizing the kind of thinking that different tasks require, and making ad ustments to their work environments that enhance their ability to accomplish these tasks.

*LPSPUN OLPNO[JHU LUJV\Y
VWLU L_WHUZP]L [OPURPUN

O[[W! ZJPLUJLISVNZ JVT TP_PUNTLTV
Y` KVLZFJLPSPUNFOLPNO[FHMM

TEN SKILLS
FOR THE FUTURE WORKFORCE

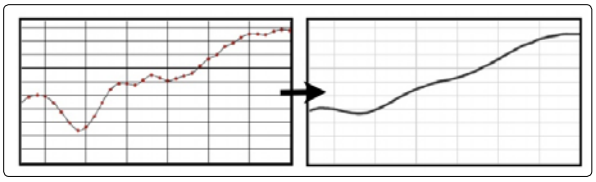
9 COGNITIVE LOAD MANAGEMENT

+ , - 0 5 0 ; 0 6 5 ! *ability to discriminate and filter information for importance, and to understand how to maximize cognitive functioning using a variety of tools and techniques*

world rich in information streams in multiple formats and from multiple devices brings the issue of cognitive overload to the fore. Organizations and workers will only be able to turn the massive in ux of data into an advantage if they can learn to effectively filter and focus on what is important.

The next generation of workers will have to develop their own techniques for tackling the problem of cognitive overload. For example, the practice of social filtering ranking, tagging, or adding other metadata to content helps higher-quality or more relevant information to rise above the noise.

orkers will also need to become adept at utilizing new tools to help them deal with the information onslaught. Researchers at Tufts University have wired stockbrokers who are constantly monitoring streams of financial data, and need to recognize ma or changes without being overwhelmed by detail. The stockbrokers were asked to watch a stream of financial data and write an involved email message to a coll-eague. s they got more involved in composing the email, the fNIRS functional near-infrared spectroscopy, which measures blood oxygen levels in the brain system detected this, and simplified the presentation of data accordingly.



(KHW[P]L PU[LYMHJLZ KL]LSVWLK I` YLZLHYJOLYZ HI[
;\M[Z JHU YLK\JL [OL SL]LS VM KL[HPS PU [OL TMYRL[
PUMVYTH[PVU Z[VJRIYVRLYZ ZLL ^OLU ZLUZVYZ KL[LJ[
[OH[[OL` HYL L_WLYPLUJPUN OPNO TLU[HS ^^YRSVHK

O[[W! ^^^ JZ [\M[Z LK\

10 VIRTUAL COLLABORATION

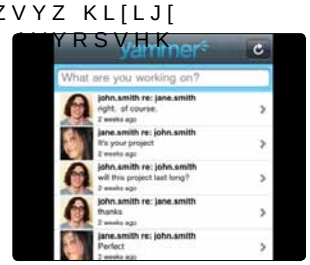
+ , - 0 5 0 ; 0 6 5 ! *ability to work productively, drive engagement, and demonstrate presence as a member of a virtual team.*

Connective technologies make it easier than ever to work, share ideas and be productive despite physical separation. But the virtual work environment also demands a new set of competencies.

s a leader of a virtual team, individuals need to develop strategies for engaging and motivating a dispersed group. e are learning that techniques borrowed from gaming are extremely effective in engaging large virtual communities. nsuring that collaborative platforms include typical gaming features such as immediate feedback, clear ob ectives and a staged series of challenges can significantly drive participation and motivation.

Members of virtual teams also need to become adept at finding environments that promote productivity and well-being. community that offers ambient sociability can help overcome isolation that comes from lack of access to a central, social workplace. This could be a physical coworking space, but it could also be virtual. Researchers at Stanford s irtual Human Interaction Lab exploring the real-world social benefits of inhabiting virtual worlds such as Second Life report that the collective experience of a virtual environment, especially one with D avatars, provides significant social-emotional benefits. Players experience the others as co-present and available, but they are able to concentrate on their own in-world work.

Online streams created by micro blogging and social networking sites can serve as virtual water coolers, providing a sense of camaraderie and enabling employees to demonstrate presence. For example, Yammer is a Twitter-like micro blogging service, focused on business only individuals with the same corporate domain in their email address can access the company network.



@HTTLY HZRZ LTWSV`
LLZ [V WYV]PKL \WKH[LZ
VU [OL X\LZ[PVU ¸>OH[
HYL `V\ ^VYRPUN VU&¹

^^^ `HTTLY JVT

IMPLICATIONS

;OL YLZ\S[Z VM [OPZ YLZLHYJO OH]L PTWSPJH[PVUZ MVY PUKP]PK\HSZ LK\JH[PVUH

;V IL Z\JJLZZM\S PU [OL UL_[KLJHKL PUKP]PK\HSZ ^PSS ULLK [V KLTVUZ[YH[L MVY VM VYNHUPaH[PVUHS MVYTZ HUK ZRPSSZ YLX\PYLTLU[Z ;OL` ^PSS PUJYLHZPUNS` IL HUK X\PJRS` W\[[VNL[OLY [OL YPNO[YLZV\YJLZ [V KL]LSVW HUK \WKH[L [OLZL >VY SPMLSVUN SLHYULYZ

,K\JH[PVUHS PUZ[P[\[PVUZ H[[OL WYPTHY` WVZ[ ZLJVUKHY` SL]LSZ HYL SHYNLS` [OL PUMYHZ[Y\J[\YL HUK ZVJPHS JPYJ\TZ[HU SHUKZJHWL OHZ JOHUNLK HUK LK\JH[PV JVUZPKLY OV^ [V HKHW[ X\PJRS` PU YLZ JOHUNL TPNO[PUJS\KL!

» ▯
▯

» ▯

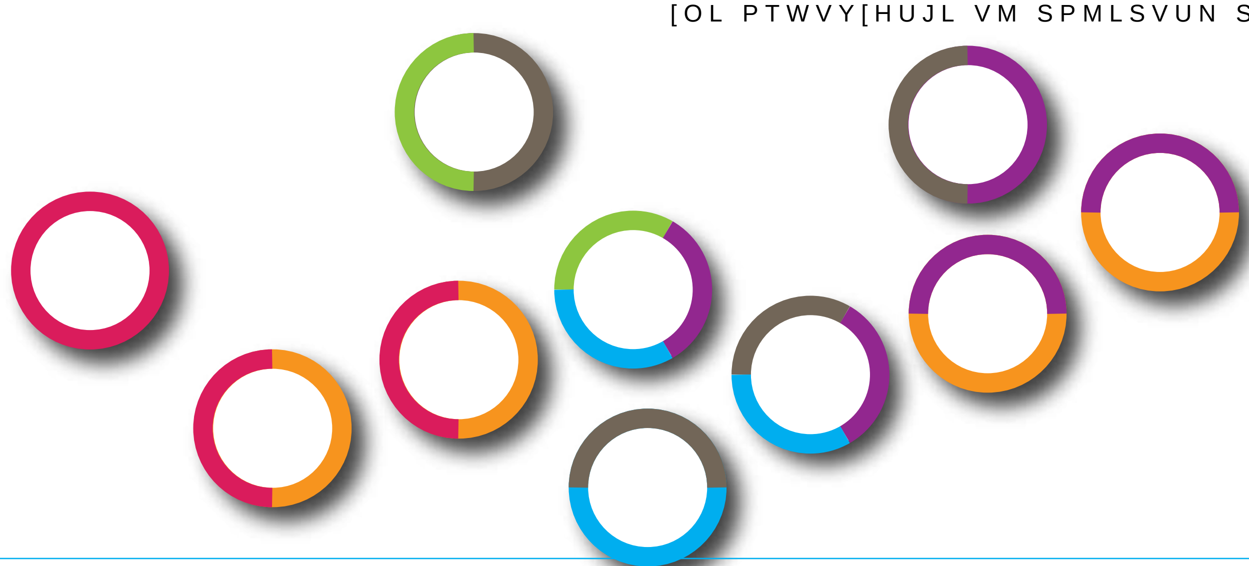
» ▯
▯
▯

» ▯
▯

» ▯
▯

KL]LSVWPUN [HSLU[*VUZPKLYPUN [OL KPZ [OL M\[\YL ^PSS LUOHUJL I\ZPULZZLZ» HIPS [PVUHS [HSLU[OHZ HUK JVU[PU\V\ZS` YLUL MVY [OL Z\Z[HPUHIPSP[` VM I\ZPULZZ NVHS MVY Z\Z[HPUPUN I\ZPULZZ NVHSZ ZOV\SK IL V\[JVTLZ VM O\THU YLZV\YJL WYVMLZZPVUH JVSSHIVYH[PUN ^P[O \UP]LYZP[PLZ [V HKKY ZRPSSZ YLX\PYLTLU[Z

.V]LYUTLU[HS WVSPJ`THRLYZ ^PSS ULLK [V JOHUNPUN SHUKZJHWL I` [HRPUN H SLHKLY LK\JH[PVU H UH[PVUHS WYPVYP[` 0M LK\JH ^L YPZR JVTWYVTPZPUN V\Y HIPSP[` [V WYL OLHS[O` HUK Z\Z[HPUHISL M\[\YL -VY (TLYP HUK MVY V\Y I\ZPULZZLZ [V IL JVTWL[P[P]L JVUZPKLY [OL M\SS YHUNL VM ZRPSSZ JP[P [OL PTWVY[HUJL VM SPMLSVUN SLHYUPUN H



ENDNOTES

1HYVU 3LYUPLY +VLZ [OL +PNP[HS *SHZZYVVT ,UMLLISL [OL 4PUK& *New York Times. September* *nytimes.com magazine fob-essay-t.html pagewanted .*

David utor, The Polarization of Job Opportunities in the US Labor Market. Center for merican Progress and The Hamilton Pro - ect, pril .

Scott . Page, The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools and Societies. Princeton: Princeton University Press, .

uoted in Science & Technology Perspectives, Institute for the Future, SR .

uoted in John P. berhard, and Brenda Patoine, rchitecture ith the Brain in Mind. The Dana Foundation weblog, . vailable at: http: www.dana.org news cerebrum detail.aspx id .

Joan Meyers-Levy, Rui hu, The in uence of ceiling height: The effect of priming on the type of processing people use. Journal of Consumer Research : .

udrey Girouard, rin Treacy Solovey et al., From Brain Signals to daptive Interfaces: using fNIRS in HCI. Brain Computer Interfacts: Human-Computer Interaction Series, , : - .