

EQUITY RESEARCH

November 17, 2022

Industry Update

Trust Issues – Bits & Bytes Weekly

Taking Fake News To Another Level

Our Conclusion

The technology for computer-generated “deepfakes” has evolved since the term was first coined in 2017, to become much more convincing today. From advertisers using unauthorized, computer-generated, celebrity endorsements to bad actors creating fake videos from political leaders, the possibility for harm is only increasing. Detecting deepfakes has been challenging, with unbiased data sets difficult to develop and cyber attacks potentially leading deepfakes to be classified as “real”. Technology companies continue to look for solutions, with Intel announcing this week that it has developed a real-time deepfake detector, which analyzes blood flow in video pixels.

Key Points

According to the annual Trust in Technology survey by Edelman Public, fear of misinformation and deepfakes has risen over the last 18 months, with 73% of respondents globally worried about false information being used as a weapon and 65% of respondents worried that technology will make it impossible to know what is real. The findings are unsurprising given how recent innovations have made deepfake technology widely available for anyone to use and social media has given them a large-scale platform to spread misinformation.

Celebrity deepfakes are now being used in advertising, with a recent Elon Musk-like appearance in a marketing video from a real-estate investment firm just one example. These digital simulations use computer-generated renditions to make the Hollywood and business notables say and do things that are artificially created. Recently, the FBI brought attention to deepfakes being used to interview for remote software-related roles, with the role potentially allowing access to corporate and financial information. Deepfake videos going viral through social media such as Tik Tok are an increasing issue. A recent example is a video of President Volodymyr Zelensky telling the Ukrainian army to surrender to Russian forces.

While certain U.S. states have explicit laws on deepfakes, the laws typically extend to political campaigns and a few select use cases. Europe and China, by contrast, are taking swift action with Europe adopting a new regulation earlier this year requiring big tech to clean up bots and deepfakes, with a hefty fine of up to 6% of their global revenue on the line for non-compliance. In China, it is now a criminal offense to share a deepfake without disclosing its origin. Given the wide array of use cases, we expect computer-generated “deepfake” simulations to see increasing regulatory scrutiny.

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Sector:
Information Technology

CIBC Experiments

We used OpenAI’s DALL-E text-to-image platform to generate this image of a fire in Union Station in Toronto. Typing “Union Station Toronto fire” generated this image, demonstrating just how easy it is to manufacture fake news.

Exhibit 1: Fake News Example – Image Of A Fire At Union Station – DALL-E

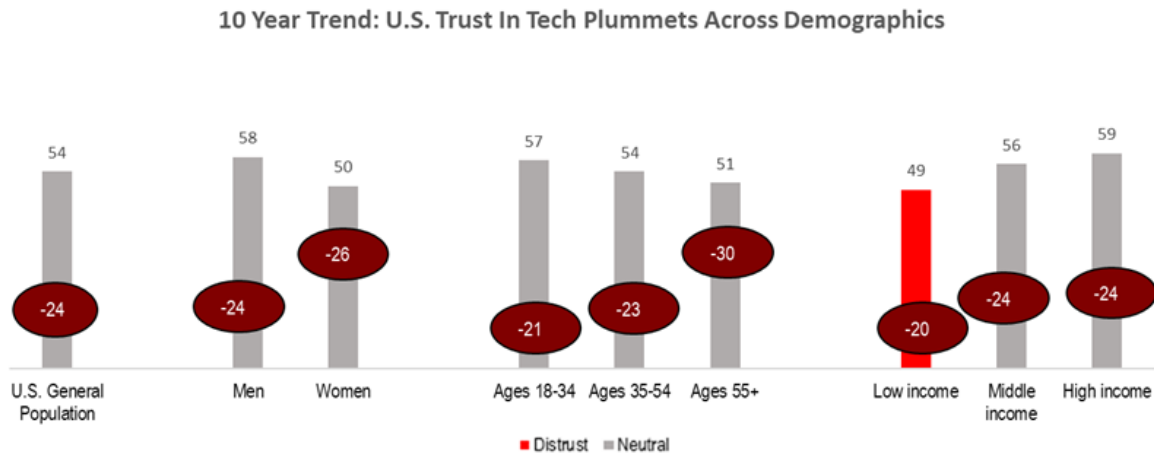


Source: OpenAI and CIBC World Markets Inc.

Intense Mistrust Of Social Media

Survey data from communications firm Edelman Public shows that trust in technology companies has trended up year-on-year in 2022, but declines by 4.3% when people associate technology with social media. This is likely driven by the role social media has played in spreading misinformation. The 10-year trend shows a 24% decline in trust in tech by the general U.S. population, with low-income individuals’ trust declining 20% over the 10-year period; 49% of the low-income individuals surveyed distrust technology.

Exhibit 2: 10-year Change In U.S. Trust In Tech, 2012 To 2022 (%)



Source: Edelman and CIBC World Markets Inc.

News Impacting Our Coverage

CGI Announces CGI Credit Studio

CGI announced the CGI Credit Studio, a cloud-native platform centralizing shared foundational services across the entire credit lifecycle. The release includes CACS X, CGI's next-generation debt-management solution. CGI Credit Studio reduces implementation timelines for customers to months while incorporating the latest compliance requirements.

OTEX Announces Senior Secured Notes Offering To Fund Micro Focus Acquisition

Open Text syndicated its first lien term loan facility due 2029 for US\$3.585B with the interest rate equal to adjusted term SOFR plus 3.5%. Upon closing, the acquisition-related bridge loan will be terminated undrawn and the previously announced US\$4.585B financing package for the Micro Focus acquisition will be finalized. The notes offering will close on December 1, 2022. Following the note closing, OTEX is expected to have long-term debt of US\$9.3B, with a weighted average interest rate of 5.88% and a weighted average maturity rate of six years.

Descartes Announces GSLS Customer Win

Descartes announced that GSLS, a cash management solutions provider, is using Descartes' cloud-based, route planning and optimization and mobile proof of delivery (POD) solutions.

Exhibit 3: CIBC Software/Services – Coverage Performance, 11/17/2021 - 11/17/2022

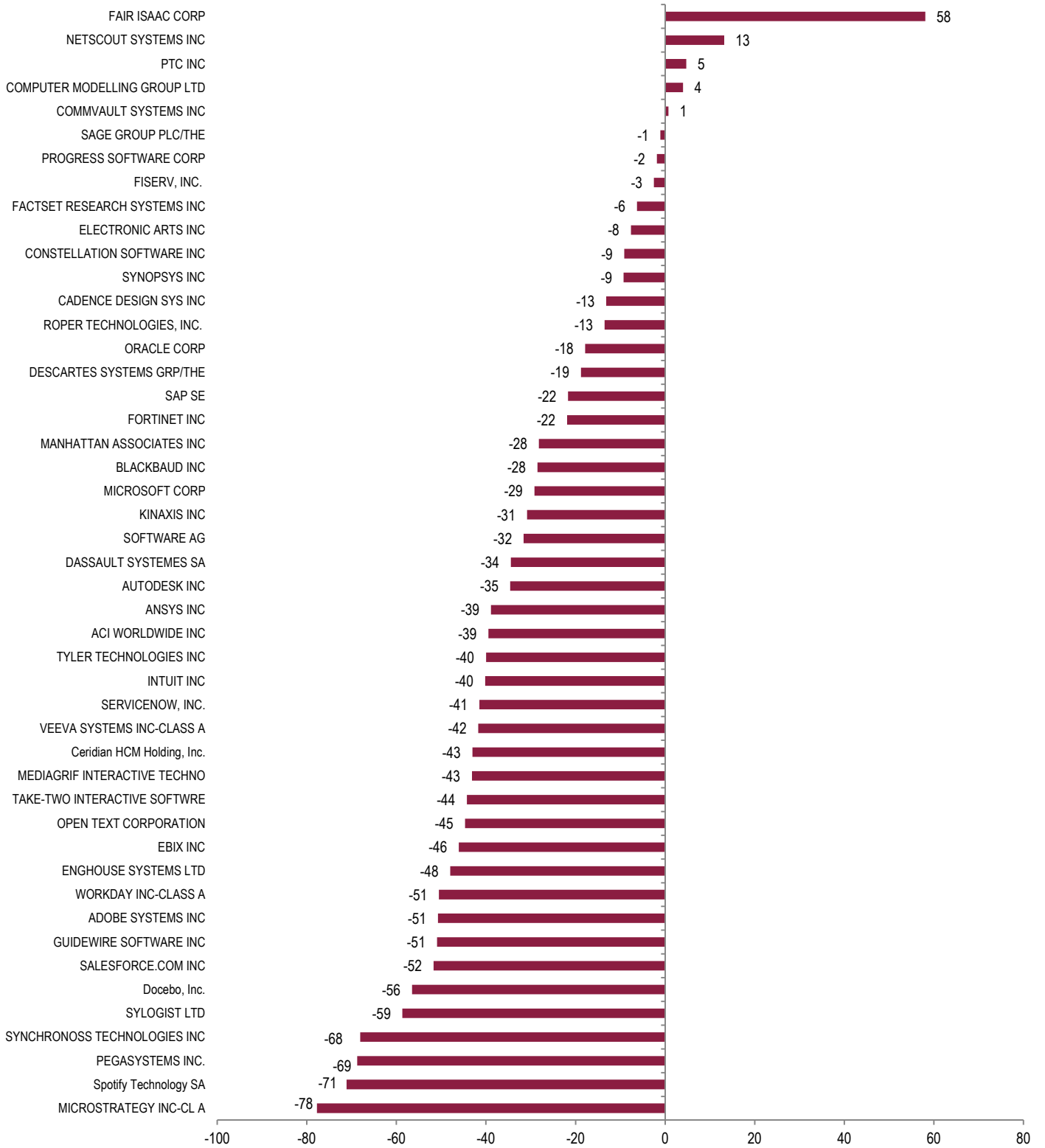
Software & Systems	Price	1 Week	1 Month	3 Month	6 Month	1 Year	YTD	52W High	52W Low
Constellation Software Inc	2,026.05	1.6	9.5	(6.8)	3.5	(9.1)	(13.7)	2385.80	1783.98
Descartes Systems	69.48	10.3	1.6	(3.2)	14.8	(23.2)	(16.0)	91.39	56.19
Enghouse Systems Limited	29.29	2.0	2.0	(11.6)	(12.7)	(48.0)	(39.5)	61.45	23.96
Open Text Corp	28.90	7.3	8.0	(26.5)	(23.9)	(44.7)	(39.1)	52.70	24.91
Kinaxis	153.82	10.2	6.5	(6.4)	8.6	(30.8)	(13.3)	229.98	119.48
Docebo, Inc.	41.70	30.5	5.8	(5.7)	(2.2)	(56.5)	(50.9)	102.57	31.66
Magnet Forensics	33.52	22.0	41.6	35.4	84.5	4.1	2.0	35.80	14.89
Q4 Inc.	2.94	(0.7)	(20.3)	(34.7)	(36.1)	NA	(65.4)	11.81	2.84
Average		10.4	6.8	(7.4)	4.6	(29.7)	(29.5)		

Business Services	Price	1 Week	1 Month	3 Month	6 Month	1 Year	YTD	52W High	52W Low
CGI Group Inc	112.61	(1.1)	6.5	1.5	7.3	3.7	0.7	114.11	95.45
Converge Technologies	4.08	(0.5)	(40.6)	(41.5)	(43.0)	(65.5)	(62.5)	12.65	3.88
Softchoice Corporation	15.88	(11.0)	(17.4)	(28.1)	(20.3)	(36.2)	(25.6)	28.66	16.03
Telus International	26.87	1.3	(25.9)	(32.7)	(14.6)	(39.2)	(35.7)	45.54	25.55
Average		(2.8)	(19.4)	(25.2)	(17.7)	(34.3)	(30.8)		

Indices	Price	1 Week	1 Month	3 Month	6 Month	1 Year	YTD
S&P/TSX Composite Index	19,773.68	(1.1)	6.2	(2.0)	(3.5)	(8.7)	(6.8)
S&P 500 Index	3,913.86	(1.1)	6.4	(8.4)	(4.3)	(16.5)	(17.9)
S&P/TSX Software Index	135.70	0.6	10.1	(6.1)	(0.2)	(42.3)	(36.1)
S&P500 Software Index	3,831.03	(8.8)	(16.1)	(10.3)	(19.8)	(28.2)	(34.5)

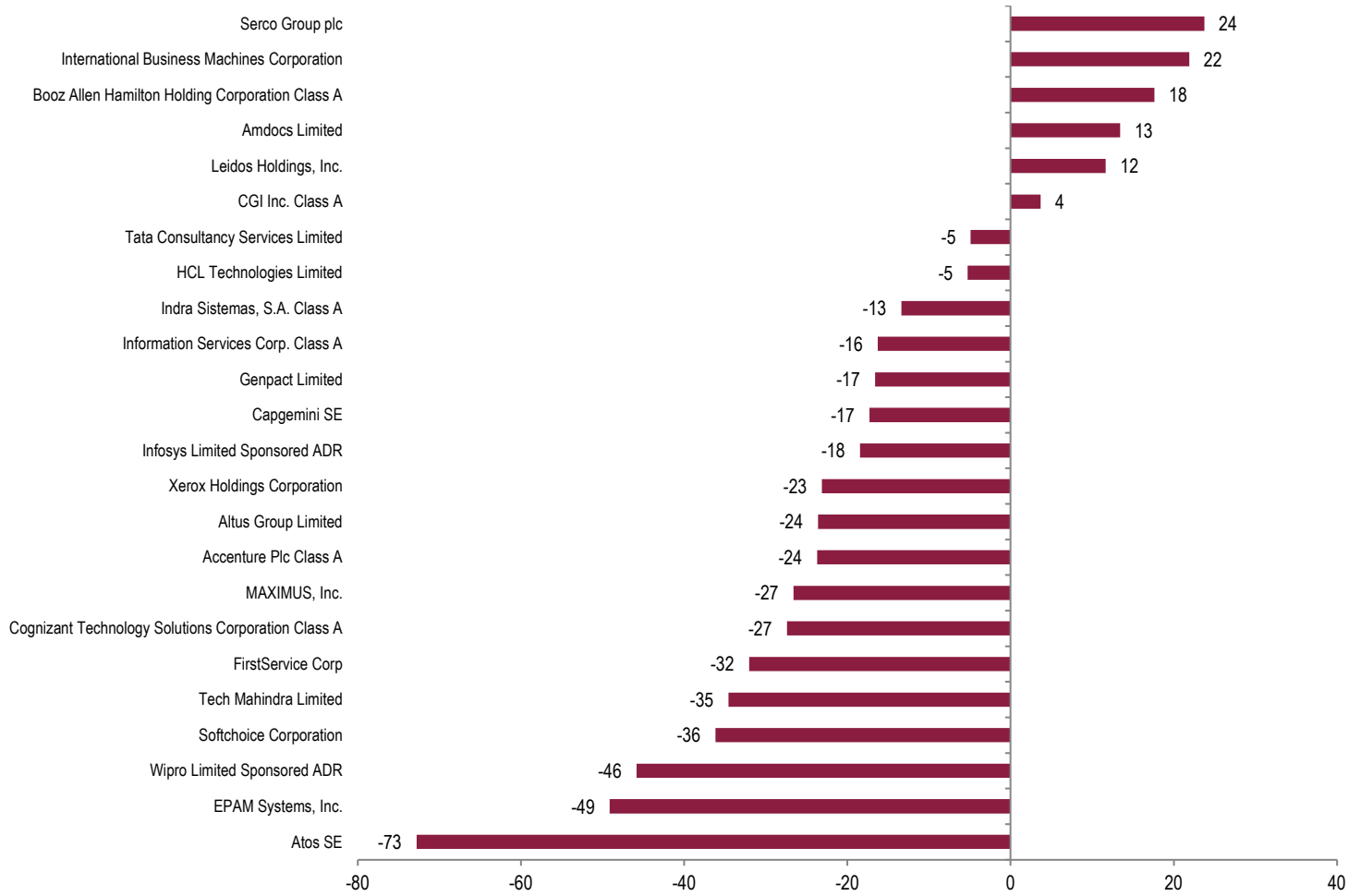
Source: FactSet and CIBC World Markets Inc.

Exhibit 4: Software Stocks – Return Performance (%), 11/17/2021 - 11/17/2022



Source: FactSet and CIBC World Markets Inc.

Exhibit 5: Business Services Stocks – Return Performance (%), 11/17/2021 - 11/17/2022



Source: FactSet and CIBC World Markets Inc.

Exhibit 6: Software Stocks – Comp Table, 2021 - 2023E

	Enterprise Value (\$mlns.)	EV/S			EV/EBITDA			P/E		
		C21	C22E	C23E	C21	C22E	C23E	C21	C22E	C23E
Enterprise Application Software										
Constellation Software Inc.*	33,616	6.6x	5.1x	4.5x	22.2x	20.5x	17.7x	48.9x	27.6x	26.1x
BlackBerry Limited*	2,581	2.9x	3.8x	2.6x	>50	NEG	NEG	NEG	NEG	NEG
Sage Group plc	8,813	4.8x	4.4x	4.0x	21.3x	19.4x	17.0x	30.3x	29.7x	25.4x
Tyler Technologies, Inc.	14,570	9.2x	7.9x	7.3x	41.4x	30.6x	29.2x	>50	42.8x	41.9x
Roper Technologies, Inc.	52,825	9.1x	9.8x	8.9x	23.9x	24.0x	21.8x	41.2x	30.1x	26.6x
Enghouse Systems Limited	1,410	3.1x	3.4x	3.40x	8.7x	10.4x	10.3x	17.5x	22.2x	22.1x
Oracle Corporation	268,708	6.6x	5.8x	5.2x	14.4x	11.6x	10.6x	17.2x	15.9x	14.8x
SAP SE	135,753	4.9x	4.4x	4.1x	18.9x	15.8x	14.1x	24.2x	23.9x	19.8x
Enterprise Application Software Average		5.9x	5.6x	5.0x	21.5x	18.9x	17.3x	29.9x	27.5x	25.2x
Extended ERP										
Adobe Incorporated	152,552	9.7x	8.6x	7.8x	22.8x	17.5x	16.0x	33.0x	24.0x	21.3x
Open Text Corporation	10,586	3.1x	3.0x	2.9x	8.3x	8.7x	7.8x	9.1x	9.5x	8.4x
Manhattan Associates, Inc.	7,369	11.1x	9.8x	9.0x	>50	37.4x	34.1x	>50	49.8x	46.7x
Pegasystems Inc.	3,335	2.8x	2.6x	2.4x	NEG	>50	41.9x	NEG	>50	>50
Software AG	1,524	1.8x	1.6x	1.5x	9.8x	7.5x	6.7x	21.7x	16.3x	13.7x
Fiserv, Inc.	83,604	5.2x	5.0x	4.7x	15.1x	11.5x	10.7x	49.5x	15.2x	13.5x
Extended ERP Average		5.6x	5.1x	4.7x	14.0x	16.5x	19.5x	28.3x	23.0x	20.7x
Software As A Service										
Descartes Systems Group Inc.	5,711	13.4x	11.7x	10.5x	30.9x	26.6x	23.5x	>50	>50	>50
Kinaxis, Inc.*	3,044	12.1x	8.2x	7.4x	>50	41.2x	40.5x	>50	>50	>50
Docebo, Inc.*	819	7.9x	5.7x	4.3x	NEG	NEG	>50	NEG	>50	>50
Lightspeed Commerce Inc*	1,545	3.3x	2.2x	1.7x	NEG	NEG	NEG	NEG	NEG	NEG
Veeva Systems Inc Class A	26,251	17.9x	12.4x	10.8x	>50	31.3x	27.3x	>50	44.7x	40.4x
Shopify, Inc. Class A	36,826	8.0x	6.7x	5.5x	>50	NEG	>50	16.4x	NEG	>50
Q4 Inc*	52	0.9x	0.9x	0.9x	NEG	NEG	NEG	NEG	NEG	NEG
Magnet Forensics, Inc.*	913	13.0x	9.4x	7.0x	49.0x	>50	31.1x	>50	>50	>50
Ceridian HCM Holding, Inc.	11,121	10.9x	9.0x	7.7x	>50	47.4x	37.8x	NEG	>50	>50
ServiceNow, Inc.	80,006	13.6x	11.0x	9.0x	>50	35.5x	28.8x	>50	>50	43.9x
Workday, Inc. Class A	36,596	8.5x	6.0x	5.0x	>50	23.5x	19.2x	NEG	43.4x	34.4x
Software As A Service Average		10.0x	7.6x	6.4x	39.9x	34.2x	29.7x	16.4x	44.0x	39.6x
Infrastructure Vendors										
Microsoft Corporation	1,763,313	10.5x	8.6x	7.8x	21.8x	17.5x	15.9x	29.8x	25.6x	23.2x
Infrastructure Vendors Average		10.5x	8.6x	7.8x	21.8x	17.5x	15.9x	29.8x	25.6x	23.2x
Software Average		7.7x	6.4x	5.6x	22.0x	23.0x	22.0x	28.2x	28.1x	26.4x

*Share Price Converted to USD

Source: FactSet and CIBC World Markets Inc.

Exhibit 7: Business Services Stocks – Comp Table, 2021 - 2023E

	Enterprise Value (\$Mins.)	EV/EBITDA			P/E			EV/S		
		C21	C22E	C23E	C21	C22E	C23E	C21	C22E	C23E
Business & IT Services										
CGI Inc. Class A	29,887	12.1x	11.7x	11.1x	20.1x	18.4x	17.2x	2.4x	2.3x	2.2x
TELUS International (CDA), Inc.	6,204	11.5x	10.3x	9.0x	19.9x	17.0x	14.2x	2.8x	2.5x	2.2x
Accenture Plc Class A	184,603	19.2x	16.0x	15.1x	31.1x	26.0x	24.1x	3.7x	3.0x	2.8x
Booz Allen Hamilton	16,220	18.2x	16.4x	15.4x	23.9x	23.7x	21.7x	2.1x	1.8x	1.7x
CACI International Inc Class A	9,091	12.3x	13.6x	12.6x	16.5x	16.8x	15.9x	1.5x	1.4x	1.3x
DXC Technology Co.	9,906	4.9x	4.1x	4.1x	NEG	7.9x	6.4x	0.6x	0.7x	0.7x
Genpact Limited	8,962	13.9x	11.6x	10.4x	22.4x	15.7x	14.3x	2.2x	2.1x	1.9x
International Business Machines	177,683	13.2x	11.4x	11.4x	22.7x	15.8x	15.0x	3.1x	3.0x	2.9x
Atos SE	2,980	2.8x	3.1x	2.8x	NEG	>50	7.4x	0.3x	0.3x	0.3x
Capgemini SE	36,090	12.5x	10.2x	9.5x	26.8x	16.5x	15.2x	2.0x	1.7x	1.6x
Sopra Steria Group SA	4,145	7.8x	6.9x	6.4x	15.4x	10.3x	9.4x	0.9x	0.8x	0.8x
Converge Technology Solutions C	1,070	11.4x	7.9x	5.9x	46.7x	28.0x	22.2x	0.7x	0.4x	0.4x
Business & IT Services Average		11.7x	10.5x	9.8x	22.1x	16.8x	14.6x	2.0x	1.8x	1.7x
HR Outsourcing										
Ceridian HCM Holding, Inc.	11,121	>50	47.4x	37.8x	NEG	>50	>50	10.9x	9.0x	7.7x
Willis Towers Watson	25,602	11.5x	11.1x	10.3x	7.0x	17.1x	15.1x	2.8x	2.9x	2.8x
Aon Plc Class A	69,295	18.1x	17.4x	16.3x	>50	22.0x	19.9x	5.7x	5.6x	5.3x
Automatic Data Processing, Inc.	106,376	27.7x	23.1x	20.7x	41.4x	33.2x	29.4x	7.1x	6.2x	5.7x
Paychex, Inc.	42,275	25.6x	19.7x	18.3x	39.0x	29.5x	27.2x	10.4x	8.8x	8.2x
HR Outsourcing Average		20.7x	23.7x	20.7x	29.2x	25.4x	22.9x	7.4x	6.5x	5.9x
Information Services										
Broadridge Financial Solutions, Inc.	20,557	17.7x	15.7x	14.6x	30.6x	21.2x	19.6x	4.0x	3.5x	3.3x
Dye & Durham Ltd.	1,884	11.9x	11.9x	8.3x	>50	>50	22.0x	5.0x	3.3x	2.8x
Deluxe Corporation	2,277	6.2x	5.5x	5.6x	13.1x	4.7x	4.8x	1.1x	1.0x	1.0x
Information Services Corp	409	6.0x	6.3x	6.6x	11.0x	10.7x	11.2x	2.4x	2.1x	2.0x
Information Services Average		10.4x	9.9x	8.8x	18.2x	12.2x	14.4x	3.1x	2.5x	2.3x
Financial Services Technology										
Fidelity National Information Services	55,312	9.0x	8.8x	8.3x	>50	9.2x	9.0x	4.0x	3.8x	3.7x
Fiserv, Inc.	83,604	15.1x	11.5x	10.7x	49.5x	15.2x	13.5x	5.2x	5.0x	4.7x
Jack Henry & Associates, Inc.	13,427	19.3x	21.1x	19.2x	44.1x	36.8x	34.8x	7.6x	6.6x	6.2x
ACI Worldwide, Inc.	3,315	9.0x	8.9x	8.3x	19.0x	15.1x	16.0x	2.4x	2.4x	2.3x
Temenos AG	5,198	9.5x	14.3x	13.1x	24.4x	20.8x	19.0x	5.4x	5.4x	5.1x
Global Payments Inc.	36,716	10.1x	9.4x	8.8x	29.5x	10.4x	9.3x	4.3x	4.5x	4.3x
Financial Services Technology Average		12.0x	12.3x	11.4x	33.3x	17.9x	16.9x	4.8x	4.6x	4.4x
Diversified Real Estate Services										
Colliers International Group Inc.	4,852	8.9x	7.7x	7.1x	-10.2x	13.0x	12.7x	1.2x	1.1x	1.0x
Altus Group Limited	2,434	23.5x	22.2x	18.4x	26.7x	26.7x	29.2x	3.9x	3.9x	3.3x
CBRE Group, Inc. Class A	24,877	11.6x	8.6x	8.8x	13.5x	13.2x	13.5x	0.9x	0.8x	0.8x
Jones Lang LaSalle Incorporated	9,209	6.3x	7.0x	7.4x	8.4x	9.4x	9.5x	0.5x	0.4x	0.4x
Diversified Real Estate Services Average		12.6x	11.3x	10.5x	9.6x	15.5x	16.2x	1.6x	1.6x	1.4x
Software Focused IT Solutions/VARs										
Softchoice Corporation* USD	787	32.2x	9.6x	8.4x	NEG	19.4x	14.7x	3.0x	2.5x	2.3x
Softcat Plc*	2,387	14.2x	14.5x	13.5x	19.0x	19.4x	18.9x	6.4x	6.1x	5.5x
Crayon Group Holding ASA*	10,094	>50	>50	>50	>50	>50	>50	>50	23.8x	20.3x
Bytes Technology Group Plc*	912	18.7x	14.1x	12.5x	37.3x	19.3x	18.1x	NA	NA	NA
SoftwareONE Holding Ltd.*	1,418	8.6x	5.6x	4.9x	14.4x	15.3x	12.3x	6.8x	1.4x	1.2x
Bytes Technology Group Plc* Average		18.4x	10.9x	9.9x	23.6x	18.4x	16.0x	5.4x	8.4x	7.3x
Business Services Average		13.6x	12.8x	11.6x	22.8x	17.7x	16.4x	3.7x	3.8x	3.5x

*Software Focused IT Solutions/VARs uses EV/GP metric.

Source: FactSet and CIBC World Markets Inc.

Exhibit 8: SaaS Stocks – Comp Table, 2021 - 2023E

	LTM Revenue	LTM FCF	NTM Revenue	NTM FCF	LTM Rule	NTM Rule	Enterprise Value (\$MM)	EV/S		
	Growth	Margin	Growth	Margin	Of 40	Of 40		C21	C22E	C23E
Tier 1 SaaS (Rule of 40 > 60)										
Zoom Video Communications	18%	31%	6%	27%	49%	33%	17,065	6.4x	3.9x	3.9x
CrowdStrike Holdings, Inc.	61%	30%	44%	28%	91%	72%	34,483	39.4x	15.9x	15.9x
Shopify, Inc.	30%	1%	21%	-9%	31%	12%	21,454	4.7x	3.9x	3.9x
Zscaler, Inc.	62%	24%	38%	22%	86%	60%	20,433	30.4x	16.2x	16.2x
Lightspeed POS, Inc.	101%	-19%	34%	-5%	82%	29%	1,658	7.5x	2.4x	2.4x
DocuSign, Inc.	30%	20%	11%	15%	51%	27%	9,184	6.3x	3.8x	3.8x
Veeva Systems Inc	20%	38%	15%	37%	58%	52%	22,602	15.4x	10.7x	10.7x
Atlassian Corp. Plc	34%	27%	29%	22%	61%	50%	51,703	24.7x	16.2x	16.2x
Twilio, Inc.	51%	-6%	28%	-2%	45%	26%	8,239	2.9x	2.1x	2.1x
ServiceNow, Inc.	28%	31%	23%	30%	58%	53%	73,470	12.5x	10.0x	10.0x
HubSpot, Inc.	42%	16%	23%	12%	58%	35%	12,274	9.4x	7.2x	7.2x
Tier 1 SaaS (Rule of 40 > 60) Average								14.5x	8.4x	8.4x

	LTM Revenue	LTM FCF	NTM Revenue	NTM FCF	LTM Rule	NTM Rule	Enterprise Value (\$MM)	EV/S		
	Growth	Margin	Growth	Margin	Of 40	Of 40		C21E	C22E	C23E
Tier 2 SaaS (Rule of 40 b/w 40-60)										
Docebo, Inc.	50%	-2%	36%	-4%	48%	32%	667	6.4x	4.6x	3.4x
Qualys, Inc.	17%	40%	18%	36%	56%	55%	4,676	11.3x	9.6x	9.6x
Descartes Systems	20%	37%	10%	37%	57%	47%	5,491	12.9x	11.2x	10.1x
Avalara Inc	33%	3%	21%	3%	36%	24%	7,674	11.0x	8.9x	8.9x
Five9, Inc.	34%	-4%	23%	7%	30%	30%	4,187	6.9x	5.3x	5.3x
Dropbox, Inc.	11%	33%	6%	34%	44%	40%	7,819	3.6x	3.4x	3.4x
Wix.com Ltd.	16%	-1%	8%	3%	15%	11%	3,860	3.0x	2.8x	2.8x
Workday, Inc.	22%	21%	19%	20%	43%	39%	35,298	8.2x	5.8x	5.8x
VMware, Inc.	7%	24%	6%	29%	31%	35%	55,088	4.7x	4.1x	4.1x
Tier 2 SaaS (Rule of 40 b/w 40-60) Average								7.6x	6.2x	5.9x

	LTM Revenue	LTM FCF	NTM Revenue	NTM FCF	LTM Rule	NTM Rule	Enterprise Value (\$MM)	EV/S		
	Growth	Margin	Growth	Margin	Of 40	Of 40		C21E	C22E	C23E
Tier 3 SaaS (Rule of 40 b/w 28-40)										
BlackLine, Inc.	22%	8%	22%	6%	30%	28%	3,478	8.2x	6.6x	6.6x
Zendesk, Inc.	30%	12%	21%	14%	42%	35%	9,606	7.2x	5.7x	5.7x
MongoDB, Inc.	54%	-2%	25%	2%	52%	27%	11,902	20.2x	10.1x	10.1x
LivePerson, Inc.	19%	-27%	5%	-4%	-8%	1%	739	1.6x	1.4x	1.4x
Rapid7 Inc.	33%	5%	23%	11%	38%	34%	3,050	5.7x	4.4x	4.4x
Paylocity Holding Corp.	34%	16%	28%	15%	50%	43%	12,387	19.5x	12.7x	12.7x
Q2 Holdings, Inc.	18%	0%	18%	3%	18%	21%	1,951	3.9x	3.4x	3.4x
Akamai Technologies, Inc.	7%	24%	3%	21%	31%	24%	14,245	4.1x	4.0x	4.0x
Tier 3 SaaS (Rule of 40 b/w 28-40) Average								8.8x	6.0x	6.0x

	LTM Revenue	LTM FCF	NTM Revenue	NTM FCF	LTM Rule	NTM Rule	Enterprise Value (\$MM)	EV/S		
	Growth	Margin	Growth	Margin	Of 40	Of 40		C21E	C22E	C23E
Tier 4 SaaS (Rule of 40 <28)										
RingCentral, Inc.	33%	8%	22%	9%	40%	31%	4,349	2.7x	2.2x	2.2x
Teradata Corporation	-3%	19%	-3%	23%	16%	20%	3,017	1.6x	1.7x	1.7x
Zuora, Inc.	15%	4%	13%	0%	19%	13%	718	2.4x	1.8x	1.8x
New Relic, Inc.	20%	3%	17%	1%	23%	18%	3,263	4.9x	3.7x	3.7x
Kinaxis, Inc.	35%	7%	22%	9%	42%	31%	2,514	10.0x	7.0x	6.2x
Yext, Inc.	8%	3%	3%	-1%	11%	2%	405	1.1x	1.0x	1.0x
Splunk Inc.	26%	7%	21%	14%	33%	35%	12,758	5.7x	3.8x	3.8x
Tier 4 SaaS (Rule of 40 <28) Average								4.1x	3.0x	2.9x

SaaS Average								9.3x	6.2x	6.1x
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Source: Company reports, FactSet and CIBC World Markets Inc.

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Neutral	NT	Stock is expected to perform in line with similar stocks in the coverage universe during the next 12-18 months.
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