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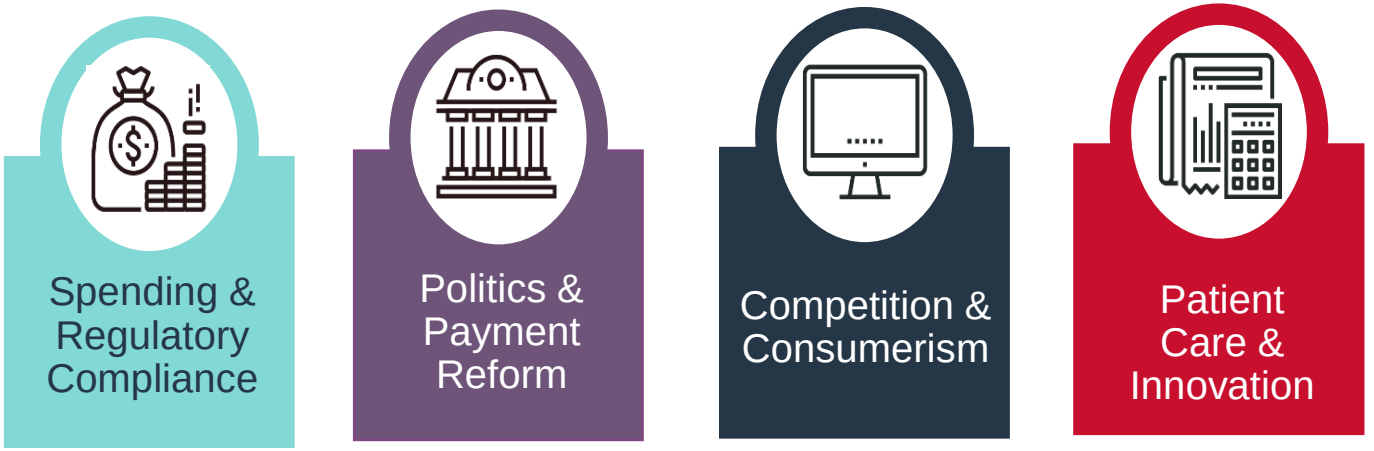
Hot Topics in Health Care: What's on the horizon

Health Care Market Changes

- Environment Facts:
  - The rate of change in health care is occurring at exponential levels and is not going to slow down anytime soon
  - Mergers, mergers, mergers
  - Competition in the market is fierce
  - Innovation

Challenges or Opportunities?

Current Challenges Facing Health Care Providers



Regulatory Changes | Revenue Recognition | Information Technology Costs | Opioid Crisis

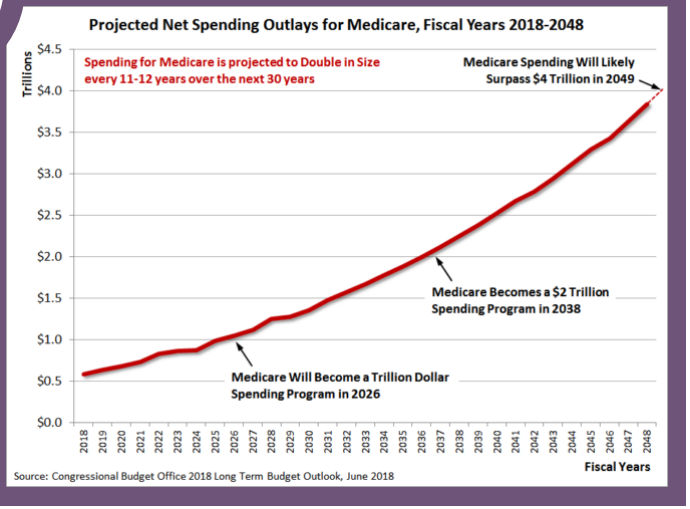
Physician and Allied Health Recruiting | 340b Drug Program | Mergers & Acquisitions

Cyber Risks/Ransomware | Protected Health Information | Payment Changes

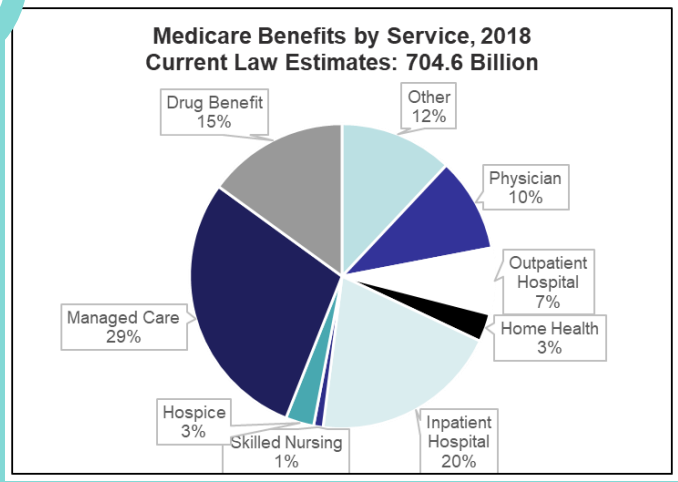
New Competitors in Marketplace | Population Health | Advanced Payment Models

Federal Spending & Medicare Benefits

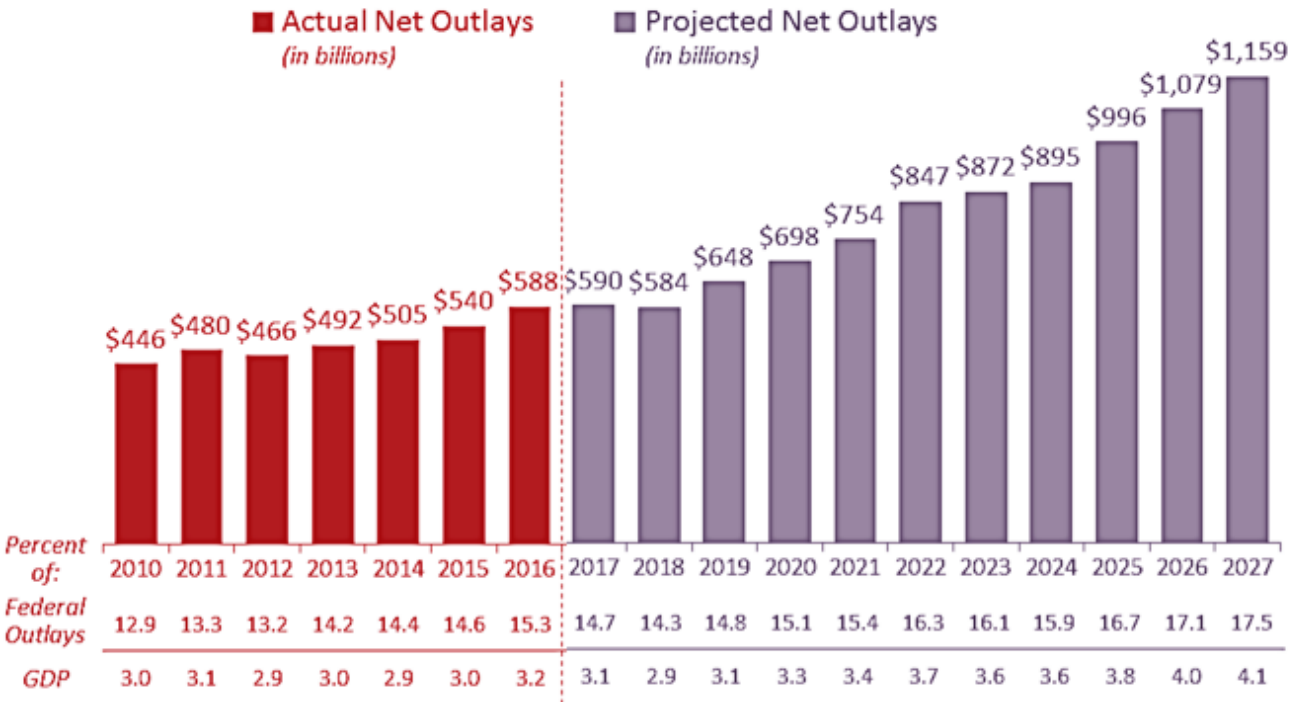
Federal Spending



Medicare Benefits



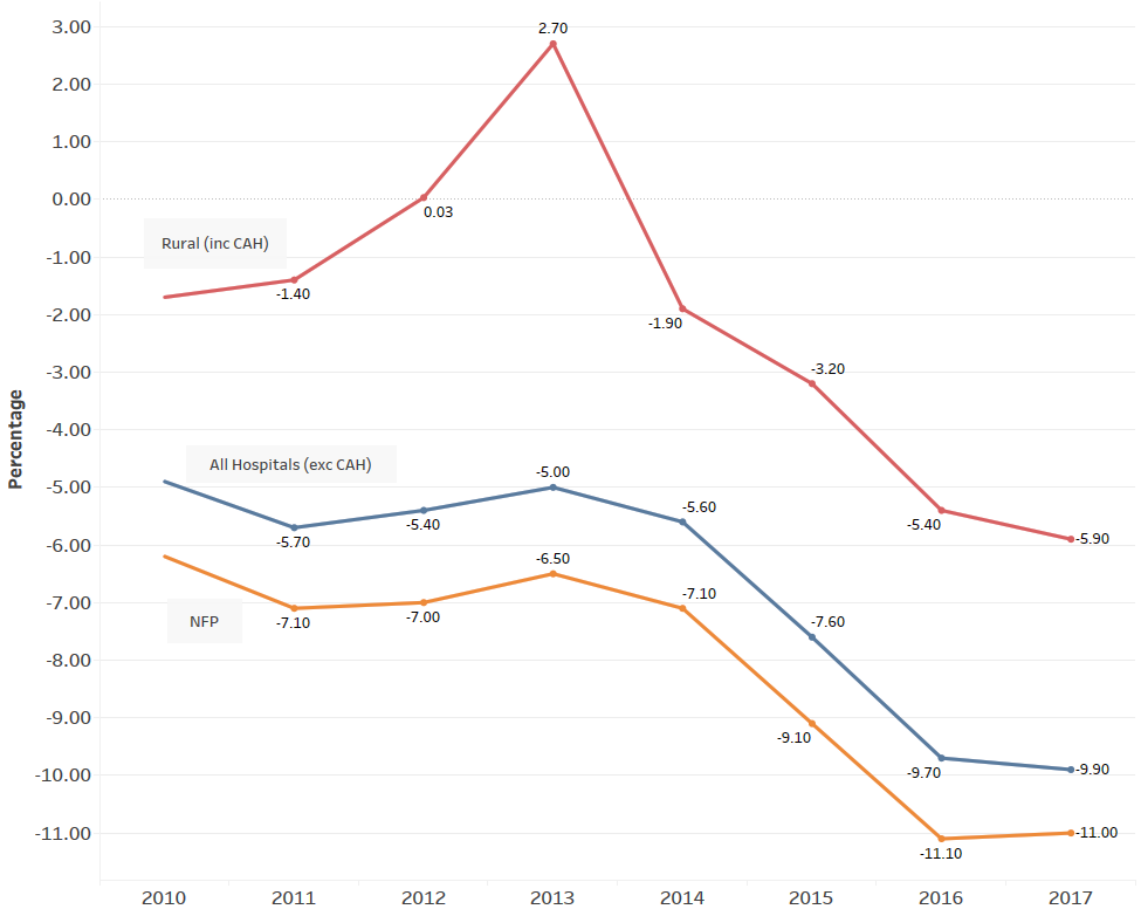
Actual & Projected Net Medicare Spending, 2010-2027



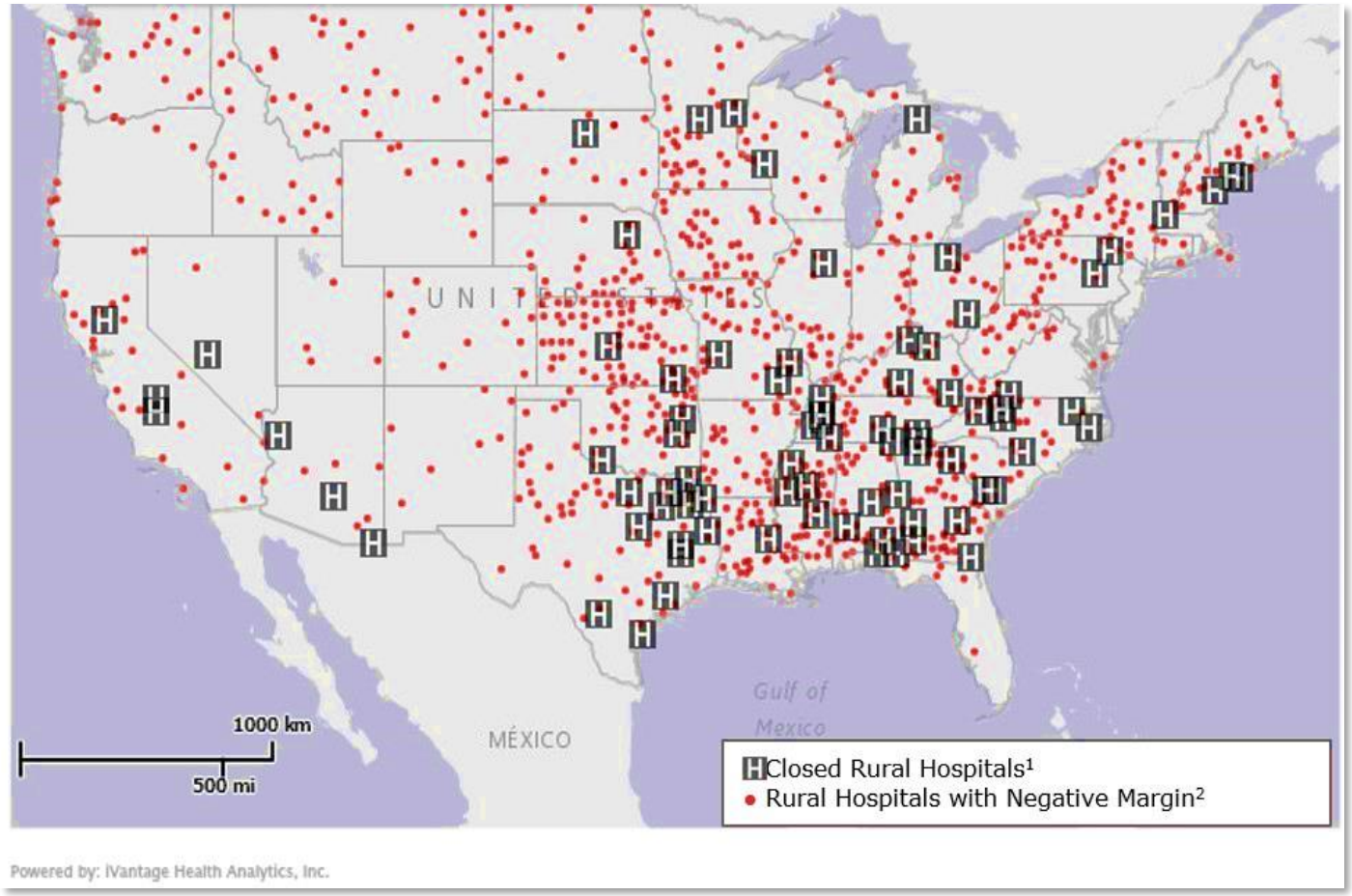
NOTE: All amounts are for federal fiscal years; amounts are in billions and consist of mandatory Medicare spending minus income from premiums and other offsetting receipts.

SOURCE: Congressional Budget Office, An Update to the Budget and Economic Outlook, 2017 to 2017 (June 2017).

Medicare Margins in U.S. Hospitals



Financial Viability of Hospitals in 2018



Financial Viability of Hospitals

Rural Hospitals

102 Rural hospital closures between January 2010 & March 2019

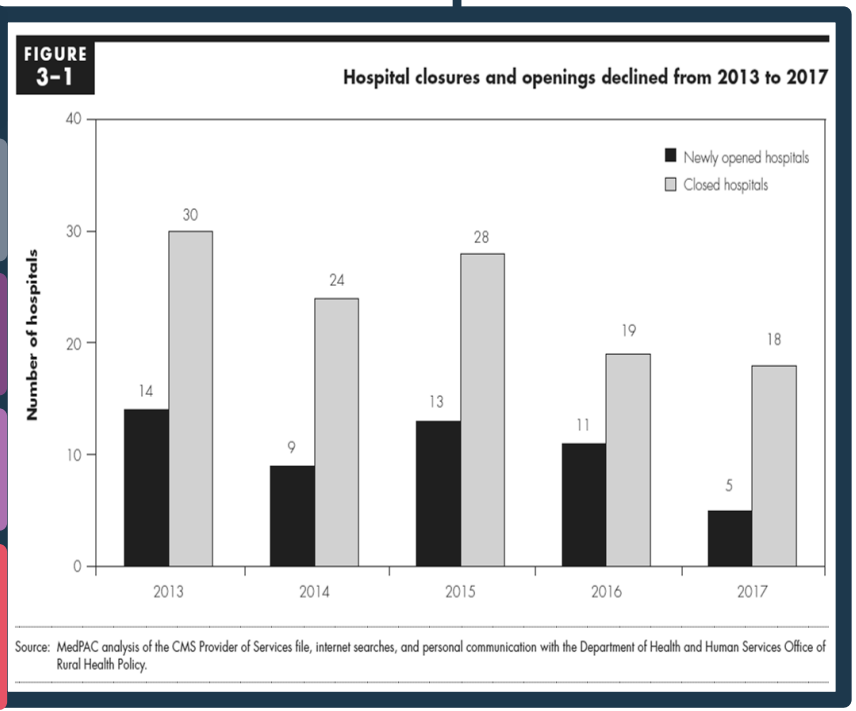
88 Percent increase of hospital closures in 2018

5 Hospital closures within first 11 weeks of 2019

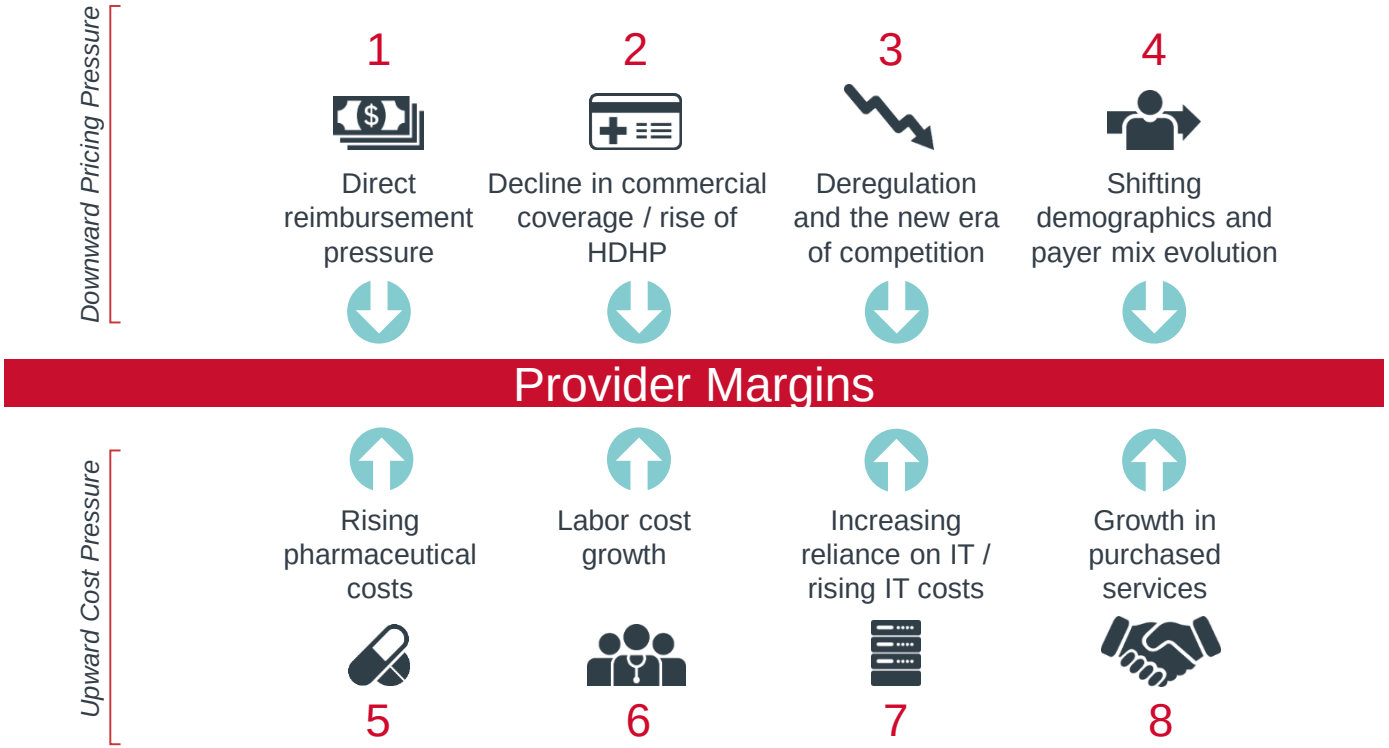
34 States with at least five rural hospitals at risk of closure

31 States with at least half of hospitals at risk considered essential to communities

All Hospitals

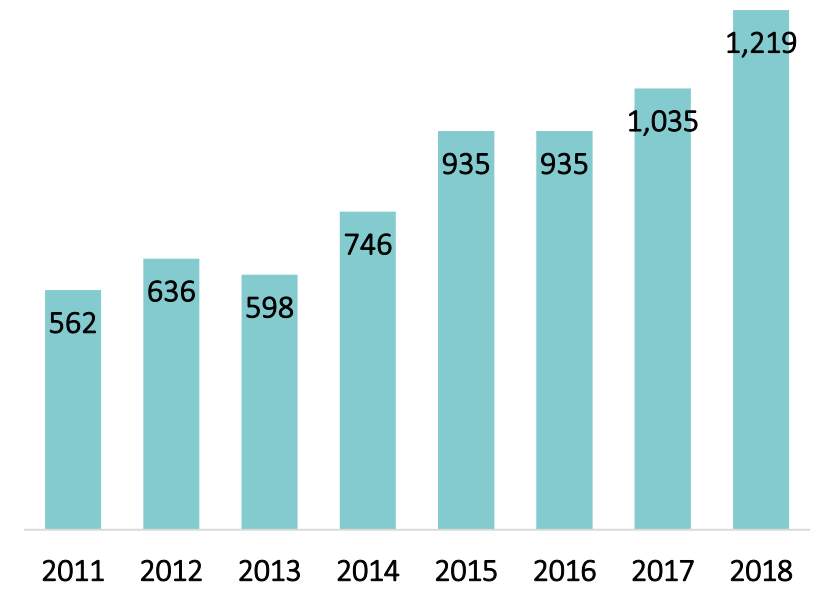


Eight Price and Cost Pressures Squeezing Margins

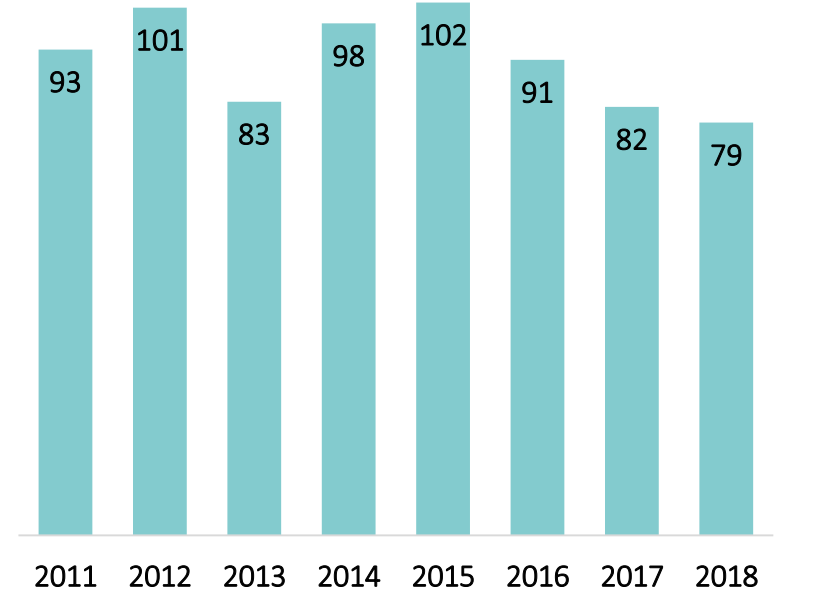


Current Industry Trends & Market Activity

Health Care Services Mergers & Acquisitions
Total Transactions by Year

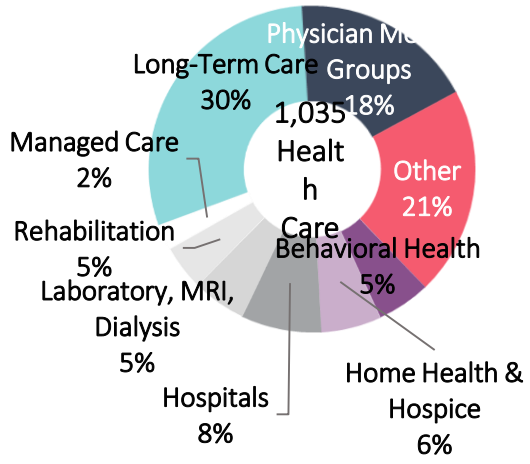


Hospital Mergers & Acquisitions
Total Transactions by Year

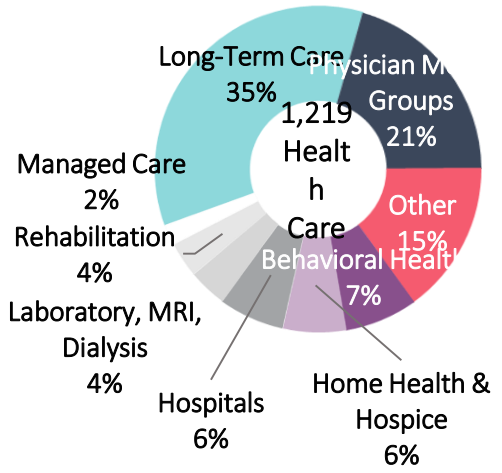


Health Care Deal Volume

2017 Health Care Services Deal Volume

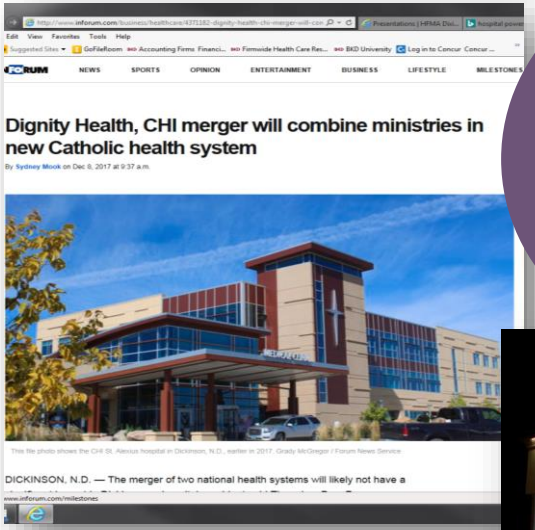


2018 Health Care Services Deal Volume



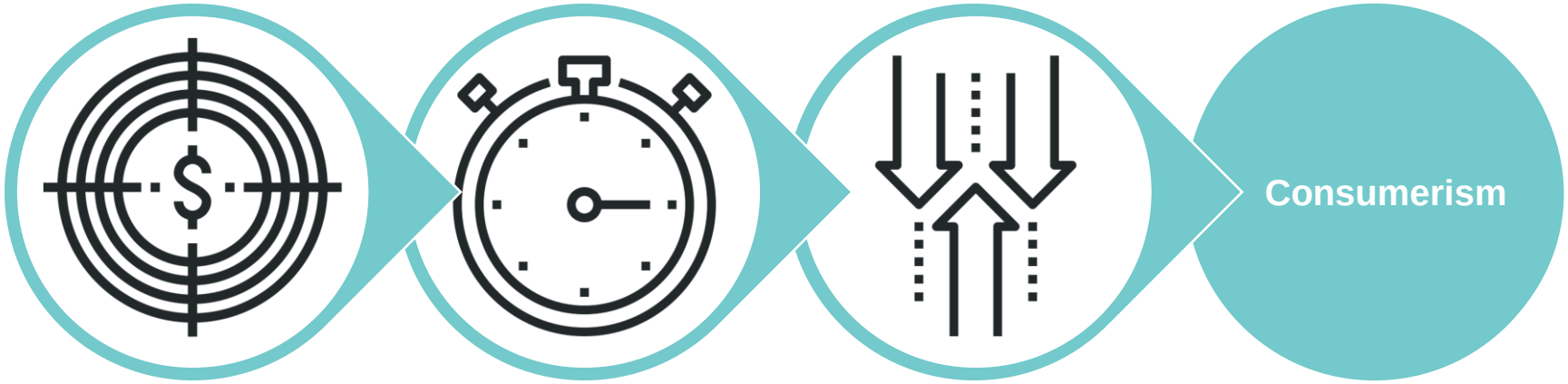
Mergers & Acquisitions

- Hospital & health systems consolidation
  - Strong with strong? Moderate? Weak?
  - Moderate with moderate?
  - Weak with?
- Insurers with
  - Insurers
  - Providers
- Physicians with
  - Physicians
  - Health system
  - Insurers
- Commercial business with
  - Insurers
  - Providers



CVS & Aetna say merger will improve your health care. Can they deliver?

Patient-Driven Consumerism



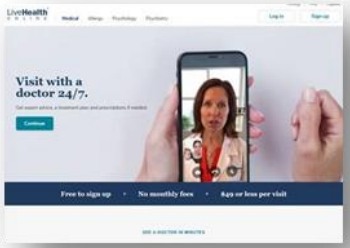
Patients are paying attention to cost & quality

Patients want convenience & timely service

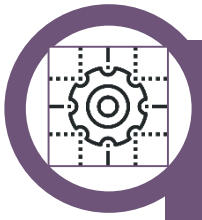
Disruptors to traditional care (Amazon, Berkshire Hathaway, JP Morgan)

Patient-Driven Consumerism

Access & Convenience



Patient Care & Innovation



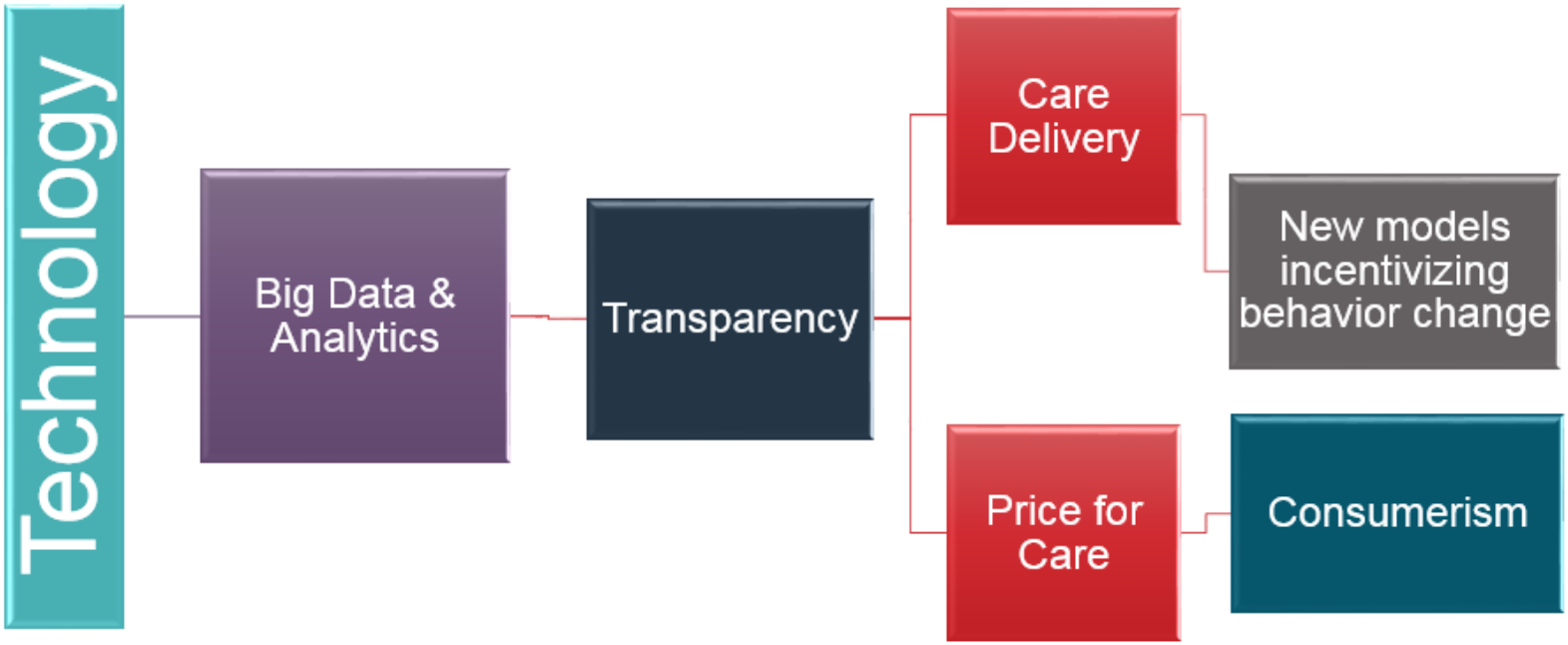
Information Technology

- Electronic medical record
- Mobile devices
- Internet health care

Capital Costs

- Hardware
- Software
- Human

Patient Care & Innovation



Patient Care & Innovation

- Innovation may be used to solve problems
- Innovative partners are being chosen strategically
- Big & small innovations

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Health Systems Strategic Considerations: Determining a trajectory for a stronger future

Approach to Strategic Considerations

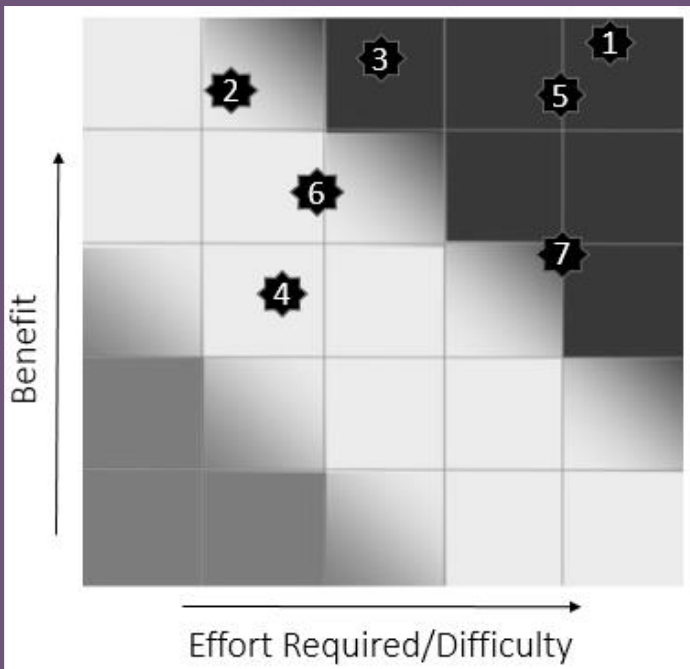
Clinically-Driven

- Focus on access & convenience (consumer-driven)
- Physician collaboration (share control)
- Develop “well-organized” provider network
  - Highly relevant in primary care, OP imaging, ASC/GI
  - Become efficient in managing acute patients
- Grow key service lines with sense of urgency
  - High Acuity IP, Trauma, Subspecialty Surgery
  - Freestanding OP Services

Professional Management

- Achieve benchmark financial performance (manage business)
  - Cost
  - Margin
- Monitor:
  - Market Share
  - Utilization (appropriateness)
  - Outcomes
- Provide culture of delivering differently better value

7 Areas of Focus to determine Trajectory



1. Manage Financial Performance
2. Monitor Market Share
3. Different/Better Value
4. Access/Convenience
5. Physician Shared Control
6. Well Organized Providers
7. Urgently Grow Services

Managing Financial Performance

Mapping Services Lines

Financial	Operational	Clinical
• MDC, DRG, APC, CPT • Cost Accounting • Revenue Cycle • Volume (Market dynamics)	• Supplies and Implants • Labor • Efficiency Measures • Alignment	• Case Management • Utilization Review • Clinical Pathways • Order Sets

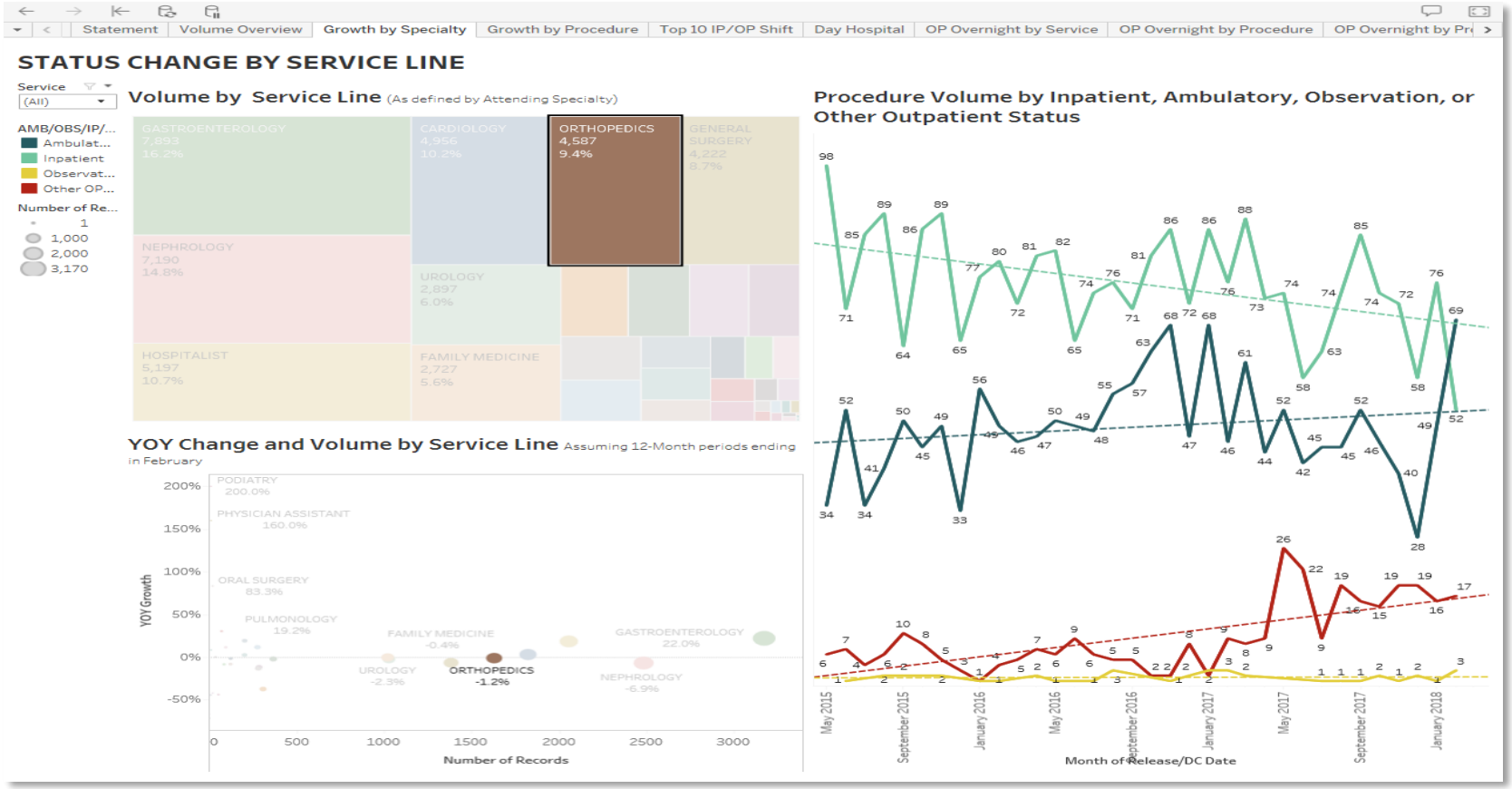
Profitability Reporting

Consistency, Collaboration, Communication

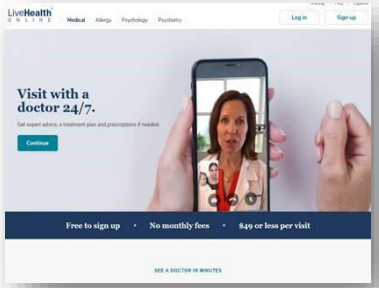
	Service Line 1	Service Line 2
Gross charges	71,857,000	41,794,000
Adjustments to Charges	(55,690,000)	(24,605,000)
Net Collections	16,167,000	17,189,000
Direct Costs	14,700,000	16,209,000
Contribution Margin	1,467,000	980,000
% Net Collections to Gross	23%	41%
% of Cont Margin to Net Coll	9%	6%

Monitoring Market
Status Change

*Provided by BKD Outcomes Compass™

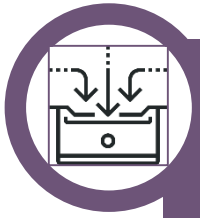


Patient-Driven Consumerism
Different/Better Value: Access & Convenience



Case Study: Different/Better Value, Access, Physician Shared Control, Physician Well Organized

Poor Patient & Provider Experience: Elective Orthopedic Surgery



Factors

- Patients experience: Elective patients rooming with trauma, declining outcomes & quality
- Provider experience: Waiting at 5 pm & beyond to complete cases, expanding service line
- Market leader but declining
- Different value desired – elective care focus while serving trauma & fracture care

Results

- Financial improvement:
  - LOS decreased, OR utilization, labor cost declined
  - Supply & implant cost decline (collaboration of physician group)
- Happy Patients = Happy Physicians
- New JV for system, led to other financial JV's & affiliations (rehab, wound care)
- Market leader resurgence

Case Study

- Surgery is a cost center, no longer top revenue driver
- Focus on manageable cost
  - Consistent
  - Continual
  - Collaborative
- Internal disruption to stay relevant

AREA	FINANCIAL OPPORTUNITY
Revenue/Coding/Charge Capture	$1,136,000
Supply Cost – Pricing	$1,685,000
Supply Cost – Variation	$1,296,000
Surgery KPI – 1st case "on-time starts"	$82,000
Surgery KPI – Room turnover time	$279,000
Labor Cost	$1,800,00
Length of Stay	$1,367,000
Total	**$7,645,000**

Targeting Operational Trends – Data Driven

Community Hospital	Data is FY end 12/31						
Bed Size: 210 Licensed, STAC	PE 12/31/17	3 yr Change	1 yr Change				
OP Rev (Net pt. rev)	$54,793,295	-10.8%	-13.9%	Last yr NOI%	Other income	Net income	Last yr Net%
NOI	-$29,227,079	-934.6%	-124.2%	-53.3%	$18,865,600	-$10,361,479.00	-14.1%
Salaries	$31,713,281	-3.3%	-14.8%				
Contract labor	$142,550	-83.3%	.88.7	LABOR Cost Opportunity			
Total Fringe Benefits	$338,715	-97.1%	-17.6%	RANGE		DIFFERENCE	ROI
Total Labor cost	$32,194,546			$24,656,983	$35,615,642		
Labor Ratio	58.8%	-20.0%	-4.0%	45%	65%	14%	$ 7,537,563
FTE's	690						
				SUPPLY Cost Opportunity			
				RANGE		DIFFERENCE	ROI
Total Med/Surg Cost	$10,137,202	-23.6%	4.0%	$6,575,195.40	$13,698,323.75		
Supply Ratio	18.5%			12%	25%	6.5%	$ 3,562,007

Labor Productivity Comparative Benchmarking

DEPARTMENT BENCHMARKING
COMPARATIVE ANALYSIS
Calendar Year 2018

DEPT	Department Name	Unit of Service	UOS Volume	Total Productive Hours	Total Paid Hours	Total Productive Hours Per UOS	Benchmark	Paid Low FTE Variance	Paid High FTE Variance	Total Paid FTE
1000	Med/Surg	Equivalent Pt Days	3,395	42,276.49	46,880.34	12.453	9.865	2.3	4.7	22.5
1025	Swing Bed Services	IP Days	191				9.865	(0.5)	(1.0)	
	Total Med/ Surg & Swing Bed			42,276.49	46,880.34			1.8	3.7	22.5
1100	ICU	Equivalent Pt Days	1,132	22,680.28	25,421.47	20.036	20.110	(0.0)	(0.0)	12.2
1200	Women's Center	Equivalent Pt Days	543	23,255.82	26,215.85	42.828	9.458	4.9	9.8	12.6
1225	Nursery Service	IP Days	444				4.709	(0.6)	(1.1)	
1250	Labor Service	Deliveries	216				18.307	(1.1)	(2.1)	
1275	Delivery Service	Deliveries								
	Total OB Services			23,255.82	26,215.85			3.3	6.5	12.6
1300	BHU	IP Days	1,453	27,913.79	30,824.69	19.211	10.720	3.3	6.6	14.8
1400	Respiratory Care	Treatments	16,461	9,949.50	11,500.44	0.604	0.789	(0.8)	(1.7)	5.5
1450	EKG	Tests	2,604				0.420	(0.3)	(0.6)	
	Total Respiratory Care & EKG			9,949.50	11,500.44			(1.1)	(2.3)	5.5
1500	Ambulatory Care	Procedures	1,835	9,769.78	10,778.03	5.324	2.430	1.4	2.8	5.2
1650	Recovery Service	Cases	1,863				2.500	(1.3)	(2.5)	
	Total Ambulatory Care			9,769.78	10,778.03			0.1	0.3	5.2
1600	Surgery	Cases	2,075	21,089.02	23,750.57	10.163	9.260	0.5	1.0	11.4
1700	Emergency Room	Visits	11,528	32,563.61	35,762.89	2.825	2.230	1.8	3.6	17.2

Top Opportunity Departments

DEPT NO.	DEPARTMENT NAME	VARIANCE LOW FTE	VARIANCE HIGH FTE	TOTAL PAID FTE
4700	Housekeeping	5.8	11.5	22.8
3900	Patient Reg	4.6	9.2	12.1
3000	Nursing Admin	3.9	7.9	11.2
1300	BHU	3.3	6.6	14.8
1200/25/50/75	Total OB Services	3.2	6.5	12.6
2500	Home Health	2.6	5.1	8.9
3500	Administration	2.2	4.4	7.7
3800	Patient Accounting	2.0	4.1	10.8
1900/1950	Total Laboratory & Blood Bank	2.0	4.0	12.7
4800	Laundry	1.9	3.7	6.7
1000/1025	Total Med/ Surg & Swing Bed	1.8	3.7	22.5
1700	Emergency Room	1.8	3.6	17.2
3600	HIM	1.5	2.9	12.2
2300	PT	1.4	2.8	9.9
4400	Materials Mgmt	1.3	2.7	5.5
3100	QM/PI	1.2	2.3	4.3
4100	HR	1.1	2.2	4.0
3700	Accounting	1.0	2.0	4.8
	TOTAL	42.5	85.3	200.8

Top Financial Variance Departments

DEPT NO.	DEPARTMENT NAME	Total Paid FTE	Avg Annual Salary Expense	FTE OPPORTUNITY RANGE		FINANCIAL RANGE OF OPPORTUNITY	
3000	Nursing Admin	11.2	$ 100,793	3.9	7.9	$ 393,092	$ 796,262
1200	Total OB Services	12.6	$ 73,511	3.2	6.5	$ 235,235	$ 477,821
2500	Home Health	8.9	$ 76,806	2.6	5.1	$ 197,004	$ 394,008
1300	BHU	14.8	$ 57,357	3.3	6.6	$ 189,278	$ 375,695
4700	Housekeeping	22.8	$ 28,984	5.8	11.5	$ 167,153	$ 334,306
3900	Patient Reg	12.1	$ 33,821	4.6	9.2	$ 155,576	$ 311,153
1700	Emergency Room	17.2	$ 75,226	1.8	3.6	$ 136,162	$ 272,325
1900	Total Laboratory & Blood Bank	12.7	$ 63,492	2.0	4.0	$ 128,390	$ 256,780
1000	Total Med/ Surg & Swing Bed	22.5	$ 63,367	1.8	3.7	$ 116,559	$ 233,119
2300	PT	9.9	$ 72,965	1.4	2.8	$ 101,971	$ 203,941
3100	QM/PI	4.3	$ 67,025	1.2	2.3	$ 80,429	$ 154,156
3800	Patient Accounting	10.8	$ 39,678	2.0	4.1	$ 79,356	$ 162,680
3700	Accounting	4.8	$ 77,803	1.0	2.0	$ 77,803	$ 155,606
3600	HIM	12.2	$ 48,796	1.5	2.9	$ 73,194	$ 141,509
4100	HR	4.0	$ 55,631	1.1	2.2	$ 61,994	$ 123,987
4400	Materials Mgmt	5.5	$ 41,012	1.3	2.7	$ 53,316	$ 110,732
4800	Laundry	6.7	$ 26,064	1.9	3.7	$ 48,274	$ 96,549
	TOTAL	**193.1**		**40.4**	**80.9**	**$ 2,294,787**	**$ 4,600,629**

Internal Trajectory: Labor Reporting

Bi-Weekly Productivity Report													
Pay Periods 6/24/2018 - 9/15/2018													
DEPT NUMBER	DEPARTMENT NAME	UNIT OF SERVICE	VOLUME	PROD HOURS	PAID HOURS	PROD HRS PER UOS	PROD HRS PER UOS STANDARD	REQUIRED HOURS	PROD FTE VAR	PERF PER CENT	YTD PROD HOURS	YTD REQUIRED HOURS	YTD PROD FTE VAR
60000	NURSING ADMIN	Adj Discharges	2,628	1,985	2,319	0.76	0.844	2,218	-0.5	111.8%	1,985	2,218	-0.5
60200	3N MEDICAL	Equiv Patient Days	1,295	11,982	12,933	9.25	10.315	13,361	-2.9	111.5%	11,982	13,361	-2.9
60300	2W SURGICAL	Equiv Patient Days	720	8,345	9,375	11.60	9.865	7,099	2.6	85.1%	8,345	7,099	2.6
60325	GERI-PSYCH	Equiv Patient Days	775	9,458	9,958	12.20	12.822	9,937	-1.0	105.1%	9,458	9,937	-1.0
60350	OB - combine with 60370	Equiv Patient Days	296	2,091	2,458	7.06	9.458	2,800	-1.5	133.9%	2,091	2,800	-1.5
60360	LABOR & DELIVERY	Deliveries	134	7,205	7,657	53.64	39.116	5,254	4.1	72.9%	7,205	5,254	4.1
60365	NURSERY	Equiv Patient Days	269	237	240	0.88	0.679	183	0.1	77.1%	237	183	0.1
	OB Total	**N/A**	**699**	**9,533**	**10,355**	**13.63**		**8,237**	**2.7**	**86.4%**	**9,533**	**8,237**	**2.7**
60380	NUR PEDI	Equiv Patient Days											
60400	ICU	Equiv Patient Days	591	11,482	12,473	19.42	20.395	12,057	-1.2	105.0%	11,482	12,057	-1.2
60550	REHAB NURSING	Patient days	208	3,359	3,795	16.15	13.149	2,735	1.3	81.4%	3,359	2,735	1.3
60650	RN EXTERN NUR FLOAT POOL												
61700	SURGERY	Cases	497	9,719	10,719	19.56	11.411	5,671	8.4	58.4%	9,719	5,671	8.4
61720	RECOVERY	Cases	497	1,289	1,489	2.59	2.500	1,243	0.1	96.4%	1,289	1,243	0.1
61760	PRE-OP	Cases	497	1,871	2,225	3.76	2.678	1,331	1.1	71.1%	1,871	1,331	1.1

Internal Trajectory:
Management Span of Control Benchmarking

Benchmark Level	Benchmark: FTE's	# at Benchmark
Executive, Community	70th%tile	1
	10th%tile	2
	<10th%tile	3
Manager, Community	70th%tile	1
	40th%tile	1
	30th%tile	1
	20th%tile	1
	10th%tile	1
	<10th%tile	23
Supervisor, Community	10th%tile	1
	<10th%tile	16

Sourced from: Advisory Board – HR Advisor Center: 2017 Span of Control Benchmarks

Internal Trajectory:
Supply & Implant Price Benchmarking

BKD Workpaper

Supply Benchmarking Tool: Neurosurgery and Vascular Surgical Specialty Supplies

Vendor ID [1]	Vendor Item Description [1]	Total Qty [1]	Total PO [1]	Category Name [2]	UOM [2]	Current Price [1]	PriceGuide Low [3]	Variance to Low [4]	Aggressive Potential Opportunity to PriceGuide Low [5]	Conservative Potential Opportunity to 25th Percentile [8]	Minimum Potential Opportunity to Median [11]	Potential Opportunity to 75th Percentile [14]	Potential Opportunity to High [17]	National Usage [18]	National Spend [19]	Member Interest [20]
10271.00	CRT-D VIVA QUAD XT DTBA1Q1	4	$73,000.00	Defibrillator/Cardioverte	EA	$ 18,700.00	$12,000.00	$6,700.00	$26,800.00	$11,344.00	$6,372.00	$1,800.00		153	$2,670,734.93	186
32798	ICD-DUAL VIGILANT EL DR DF4 = D233	10	$154,050.00	Defibrillator/Cardioverte	EA	$ 15,405.00	$9,118.00	$6,287.00	$62,870.00	$62,870.00	$29,050.00	$13,570.00		93	$1,266,159.00	22
14853	IMPELLA CP PUMP SET 13FR=0048-0003	28	$695,000.00	Circulatory Assist Units C	EA	$ 25,000.00	$20,000.00	$5,000.00	$140,000.00					5356	$133,863,685.99	376
10271	CRT-D VIVA QUAD S DTBB1Q1	17	$287,300.00	Defibrillator/Cardioverte	EA	$ 16,900.00	$12,500.00	$4,400.00	$74,800.00	$28,900.00	$7,650.00			48	$798,370.00	20
10271	ICD EVERA DR D1 = DDBC3D1	13	$153,400.00	Defibrillator/Cardioverte	EA	$ 11,800.00	$8,200.00	$3,600.00	$46,800.00	$8,307.00	$455.00			151	$1,747,660.32	36
10271	ICD EVERA DR D4 = DDBC3D4	4	$47,200.00	Defibrillator/Cardioverte	EA	$ 11,800.00	$8,200.00	$3,600.00	$14,400.00	$1,740.00				36	$395,940.16	16
10271	ICD EVERA VR D1 = DVBC3D1	13	$136,500.00	Defibrillator/Cardioverte	EA	$ 10,500.00	$7,500.00	$3,000.00	$39,000.00	$6,513.00				40	$460,505.50	16
16006	SEALANT DURASEAL SPINE 5ML = 206520	5	$24,101.02	Dura Mater Implants	BX	$ 4,900.25	$2,515.80	$2,384.45	$11,922.25	$4,966.05	$882.40			2478	$11,358,617.81	257
31532	HANDPIECE BIPOLAR LONG ATRICURE 3/B	1	$8,760.00	Clamps Surgical Vascular	BX	$ 8,760.00	$6,600.00	$2,160.00	$2,160.00	$960.00	$510.00	$360.00		655	$5,240,620.80	135
16006	SEALANT DURASEAL 5 ML 5/BX	12	$58,803.00	Dura Mater Implants	BX	$ 4,900.25	$2,757.30	$2,142.95	$25,715.40	$8,181.60				2369	$10,878,359.79	278
45779	PROTEKDUO KIT - DL31 = 5720-3118	4	$74,000.00	Unknown	EA	$ 18,500.00	$16,500.00	$2,000.00	$8,000.00					102	$1,929,000.00	19
10066	VALVE PROGRAMMABLE W/RT ANGLE	2	$11,201.56	Valves Hydrocephalic	EA	$ 5,600.78	$3,669.28	$1,931.50	$3,863.00	$2,567.96	$1,779.00	$1,292.48	$409.56	36	$160,522.86	9
32798	LEAD RELIANCE G DF4 0293	78	$303,576.00	Leads Implantable Defibr	EA	$ 3,892.00	$2,100.00	$1,792.00	$139,776.00	$92,976.00	$69,576.00	$34,476.00		543	$1,679,599.59	72
13906	LEAD SPECIFY MRI 2X8 65CM 977C265	4	$23,120.00	Stimulators	EA	$ 5,780.00	$4,000.00	$1,780.00	$7,120.00	$1,920.00	$40.00			164	$941,437.52	79
16006	VALVE HAKIM PROGRAMMABLE CHPVSG	1	$5,600.78	Unknown	EA	$ 5,600.78	$3,915.90	$1,684.88	$1,684.88	$1,684.88	$312.70			33	$174,197.73	11
10271	GEN MODEL VEDR01	19	$59,869.00	Pacemakers Cardiac Impl	EA	$ 3,151.00	$1,500.00	$1,651.00	$31,369.00	$12,369.00	$8,189.00	$3,515.00		212	$560,581.48	40
16006	SEALANT DURASEAL SPINE 3ML = 206320	2	$8,771.28	Dura Mater Implants	BX	$ 4,385.64	$2,864.00	$1,521.64	$3,043.28	$1,384.50				385	$1,762,509.12	61
10271	LEAD MODEL 6935M 62CM	51	$184,110.00	Leads Pacemaker Implant	EA	$ 3,610.00	$2,100.00	$1,510.00	$77,010.00	$24,225.00	$15,810.00			2769	$9,219,345.72	231
13397	NAVX SE PATCH KIT = EN0020-P	42	$252,000.00	Unknown	BX	$ 6,000.00	$4,500.00	$1,500.00	$63,000.00	$52,500.00	$31,500.00	$1,050.00		460	$2,497,877.50	62
34735	GEN SPECTRA WAVEWRITER IPG=SC-1060A	5	$92,300.00	Stimulators Electrical Spi	EA	$ 18,500.00	$17,000.00	$1,500.00	$7,500.00	$5,000.00	$1,000.00			75	$1,367,696.80	21
10011	VALVE HEART EPIC MITRAL 27MM	1	$4,586.00	Prostheses Cardiac Valve	EA	$ 4,586.00	$3,100.00	$1,486.00	$1,486.00	$686.00	$86.00			362	$1,676,089.50	104
						GRAND TOTAL - POTENTIAL SAVINGS			$2,672,364	$1,132,582	$466,[illegible]	$103,944	$6,673			

Supply Cost Trajectory

	Aggressive	Conservative	Minimum
Neuro/Vascular	$ 2,672,364	$ 1,132,582	$ 466,810
Spine	$ 1,139,927	$ 736,539	$ 523,858
Other	$ 970,730	$ 762,168	$ 695,207
Grand Total	**$ 4,783,020**	**$ 2,631,290**	**$ 1,685,874**

Sourced from ECRI Benchmarking Data and purchase order detail from UH

Supply Cost: Variation of Top Procedures

Supply/implant variation opportunity based on total cost	Procedure	Count of Cases	Total Supply-Implant Cost	Average Supply-Implant Cost	Max Supply-Implant Cost	Min Supply-Implant Cost	Std Dev Supply-Implant Cost
Spine Top 9	Posterior Lumbar Interbody Fusion (Plif) - 2 Levels [1071324]	60	$1,410,918.70	$23,913.88	$38,461.71	$9,543.61	$5,257.60
	Posterior Lumbar Interbody Fusion (Plif) - 3 Levels [1071325]	36	$1,173,985.98	$32,610.72	$46,784.29	$19,859.81	$4,842.11
	Posterior Lumbar Interbody Fusion (Plif) - 1 Level [1071323]	50	$802,521.34	$16,377.99	$30,248.16	$6,886.78	$6,705.39
	Anterior Cervical Diskectomy With Plating Or Fusion - 2 Levels [1070067]	123	$776,431.85	$6,579.93	$10,260.76	$3,904.90	$1,200.45
	Transforaminal Lumbar Interbody Fusion (Tlif) - 1 Level [1071849]	57	$658,766.50	$11,977.57	$23,129.30	$2,391.92	$3,291.00
	Laminectomy Lumbar Fusion [1071026]	55	$476,836.82	$8,669.76	$19,378.03	$5,590.71	$2,749.94
	Anterior Cervical Diskectomy With Plating Or Fusion - 1 Level [1070066]	100	$438,104.13	$4,470.45	$6,272.56	$3,337.79	$547.34
	Posterior Lumbar Interbody Fusion - 4 Levels [1072357]	11	$416,058.39	$37,823.49	$48,474.25	$21,993.12	$7,052.36
	Posterior Cervical Fusion [1071320]	29	$393,221.68	$13,559.37	$23,576.16	$7,304.31	$4,855.61
Vascular Top 2	Exposure And Cutdown Of Femoral Artery [1072398], Repair Of Common Femoral Artery [1072399], Transcatheter Aortic Valve Replacement - Percutaneous Femoral Approach [1072598], Tavr Rescue Procedure (psb) [1072356], Cardiopulmonary Bypass (psb) [1070316]	65	$2,263,968.84	$34,830.29	$40,427.83	$33,203.72	$1,094.88
	Endovascular Aaa Repair [1070565]	18	$364,260.48	$20,236.69	$37,399.52	$8,552.95	$7,278.16

Sourced from SYUS/PeriOP Insight, using UH provided data

Supply Cost: Variation Opportunity

Procedure Description	# of Cases	Min - Implant Cost	Max - Implant Cost	Variance [1]	Variance applied to # of Cases [2]	Capture of Savings 15%	Capture of Savings 30%
Posterior Lumbar Interbody Fusion (Plif) - 2 levels	60	$ 9,544	$ 38,462	$ 28,918	$ 1,735,086	$ 260,262.90	$ 520,526
Posterior Lumbar Interbody Fusion (Plif) - 3 levels	36	$ 19,860	$ 46,784	$ 26,924	$ 969,281	$ 145,392	$ 290,784
Posterior Lumbar Interbody Fusion (Plif) - 1 level	50	$ 6,887	$ 30,248	$ 23,361	$ 1,168,069	$ 175,210	$ 350,421
Anterior Cervical Diskectomy With Plating Or Fusion - 2 levels	123	$ 3,905	$ 10,261	$ 6,356	$ 781,771	$ 117,266	$ 234,531
Transforaminal Lumbar Interbody Fusion (Tlif) - 1 level	57	$ 2,392	$ 23,129	$ 20,737	$ 1,182,031	$ 177,305	$ 354,609
Laminectomy Lumbar Fusion	55	$ 5,591	$ 19,378	$ 13,787	$ 758,303	$ 113,745	$ 227,491
Anterior Cervical Diskectomy With Plating Or Fusion - 1 level	100	$ 3,338	$ 6,273	$ 2,935	$ 293,477	$ 44,022	$ 88,043
Posterior Lumbar Interbody Fusion - 4 levels	11	$ 21,993	$ 48,474	$ 26,481	$ 291,292	$ 43,694	$ 87,388
Posterior Cervical Fusion	29	$ 7,304	$ 23,576	$ 16,272	$ 471,884	$ 70,783	$ 141,565
Exposure and cutdown of Femoral Artery, Repair of Common Femoral Artery, TAVR-Percutaneous Femoral Approach, TAVR Rescue Procedure (psb), Cardiopulmonary Bypass	65	$ 33,204	$ 40,428	$ 7,224	$ 469,567	$ 70,435	$ 140,870
Endovascular Aaa Repair	18	$ 8,553	$ 37,400	$ 28,847	$ 519,238	$ 77,886	$ 155,771
		Grand Total - Savings Potential				**$ 1,296,000**	**$ 2,592,000**

[1] Variance = Max Implant Cost - Min Implant Cost

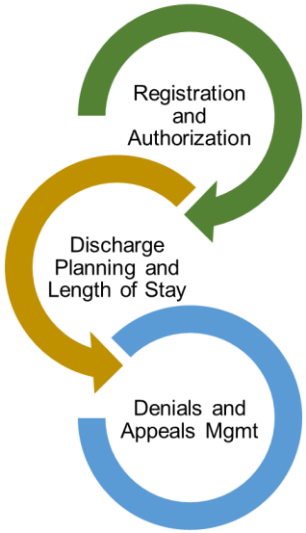
[2] Variance applied to # of Cases = Variance * # of Cases

15% 15% * Variance applied to # of Cases, to assume 15% savings capture

30% 30% * Variance applied to # of Cases, to assume 30% savings capture

Sourced from SYUS/PeriOP Insight, using UH provided data

Coordination of Care-Key Touchpoints



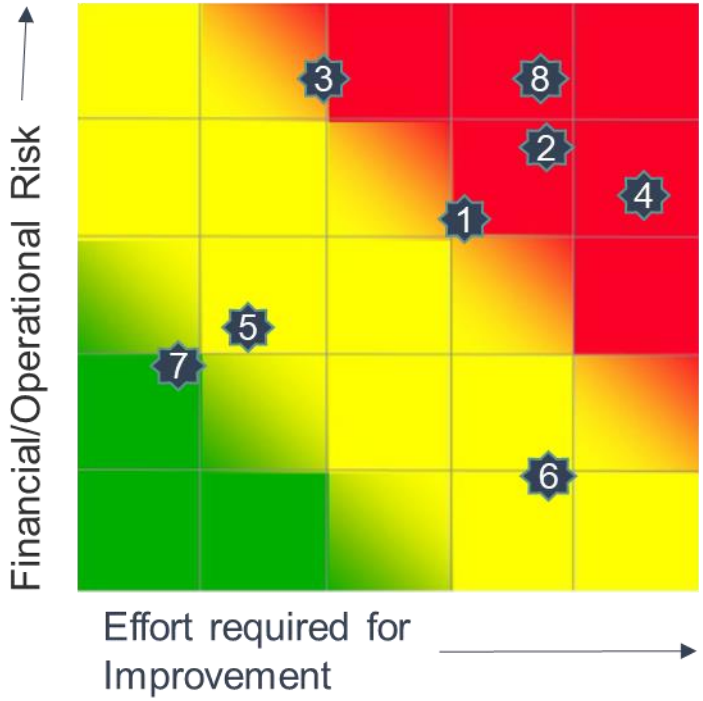
- **Registration and Pre-authorization**
- **Medical Necessity and Documentation**
- **Knowing the "Rules"**

- **Effectively Planning for Surgical Patients**
- **Length of Stay Management w/Proactive Discharge Planning**
- **Readmission Prevention**
- **Handling Concurrent Denials**

- **After Discharge, "Dealing with the Denial"**
- **Effective Appeals Strategy**
- **Feedback Loop with Contracting and Payors**

Performance Heat Map

AREA
1. Financial Reporting/Data
2. Revenue/Coding/Charge Capture
3. Supply Cost – Pricing
4. Supply Cost – Variation
5. Surgery KPI – 1st case "on-time starts"
6. Surgery KPI – Room turnover time
7. Labor Cost
8. Length of Stay



Targeting Operational Trends – Date Driven

Community Hospital	Data is FY end 12/31						
Bed Size: 210 Licensed, STAC	PE 12/31/17	3 yr Change	1 yr Change				
OP Rev (Net pt. rev)	$54,793,295	-10.8%	-13.9%	Last yr NOI%	Other income	Net income	Last yr Net%
NOI	-$29,227,079	-934.6%	-124.2%	-53.3%	$18,865,600	-$10,361,479.00	-14.1%
Salaries	$31,713,281	-3.3%	-14.8%				
Contract labor	$142,550	-83.3%	.88.7	LABOR Cost Opportunity			
Total Fringe Benefits	$338,715	-97.1%	-17.6%	RANGE		DIFFERENCE	ROI
Total Labor cost	$32,194,546			$24,656,983	$35,615,642		
Labor Ratio	58.8%	-20.0%	-4.0%	45%	65%	14%	$ 7,537,563
FTE's	690						
				SUPPLY Cost Opportunity			
				RANGE		DIFFERENCE	ROI
Total Med/Surg Cost	$10,137,202	-23.6%	4.0%	$6,575,195.40	$13,698,323.75		
Supply Ratio	18.5%			12%	25%	6.5%	$ 3,562,007

Understanding Your Position

Evaluate Readiness for Your Environment

- Financially
- Readiness for health care disruptors
  - Look in the mirror
- Assessing opportunities for collaboration & innovation
  - Are you developing innovative health care solutions?
  - Do you go it alone?

BKD

CPAs & Advisors

Blockchain's Potential Disruption to Health Care

Today's Agenda

- Emerging technologies
- What is blockchain
- Examples of blockchain technology

89%

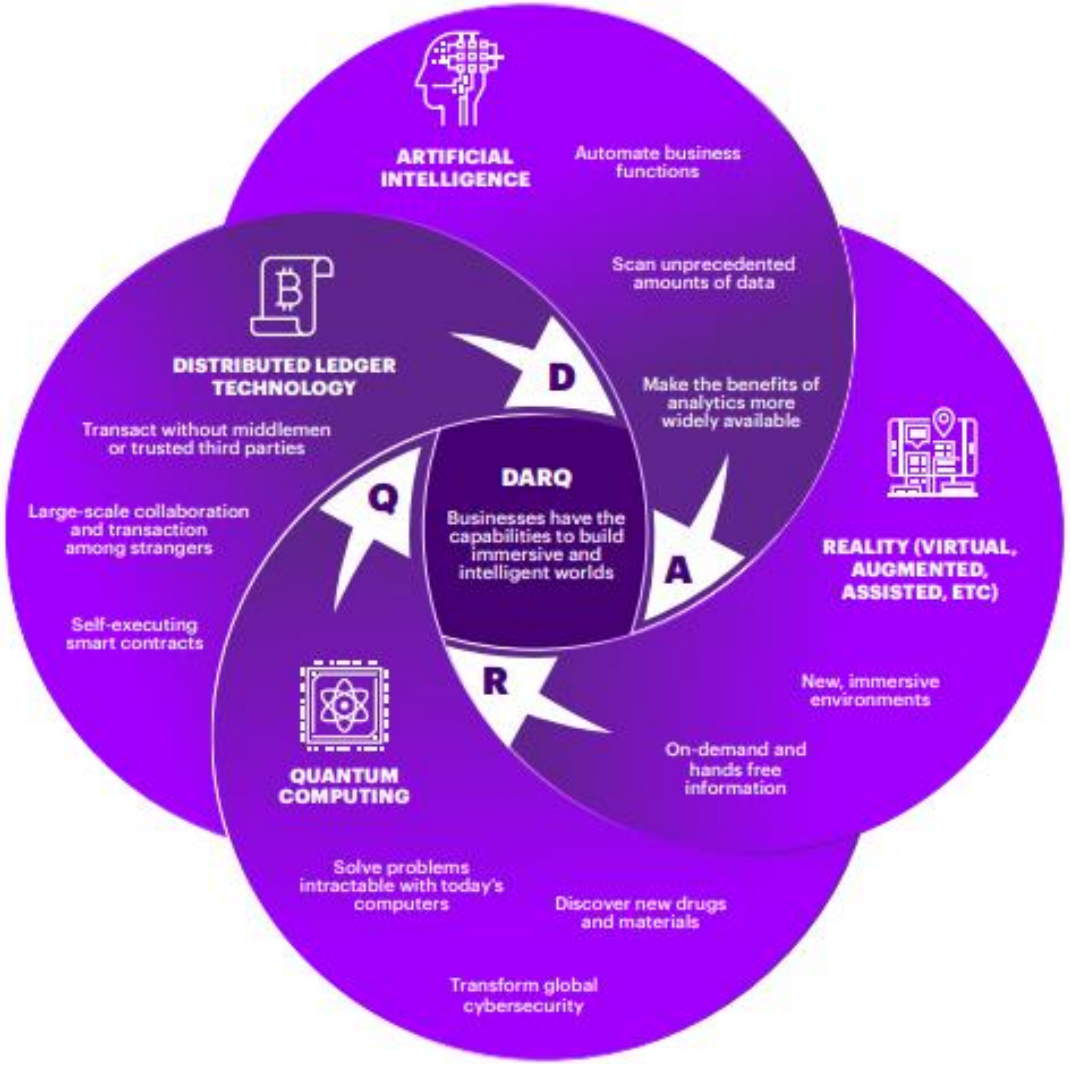
of healthcare executives are currently experimenting with one or more DARQ technologies.

68%

of healthcare executives believe the combination of DARQ technologies will have a "transformational" or "extensive" impact on their organization over the next three years.

Source: www.accenture.com/insights/health

Emerging Technologies - What is DARQ?

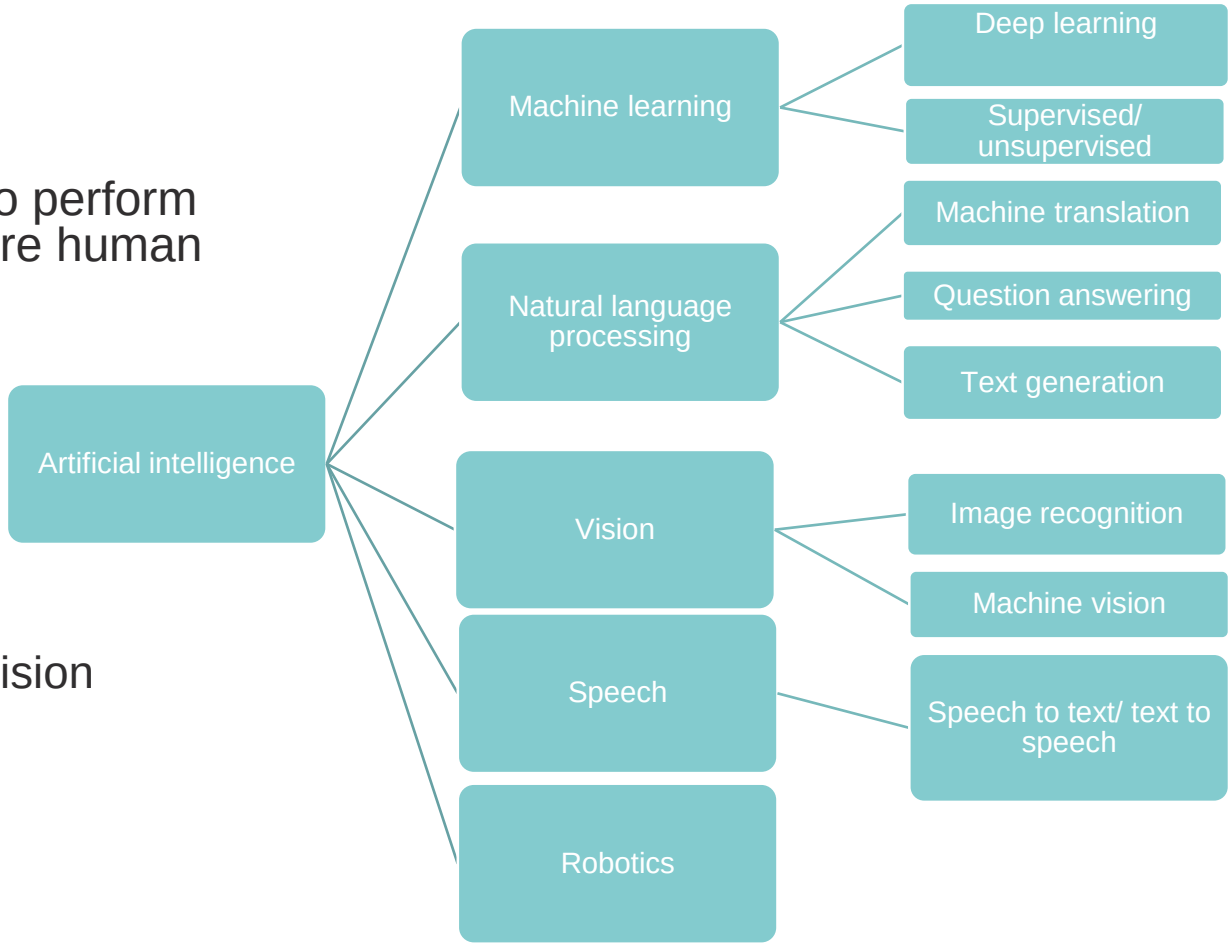


Source: www.accenture.com/insights/health

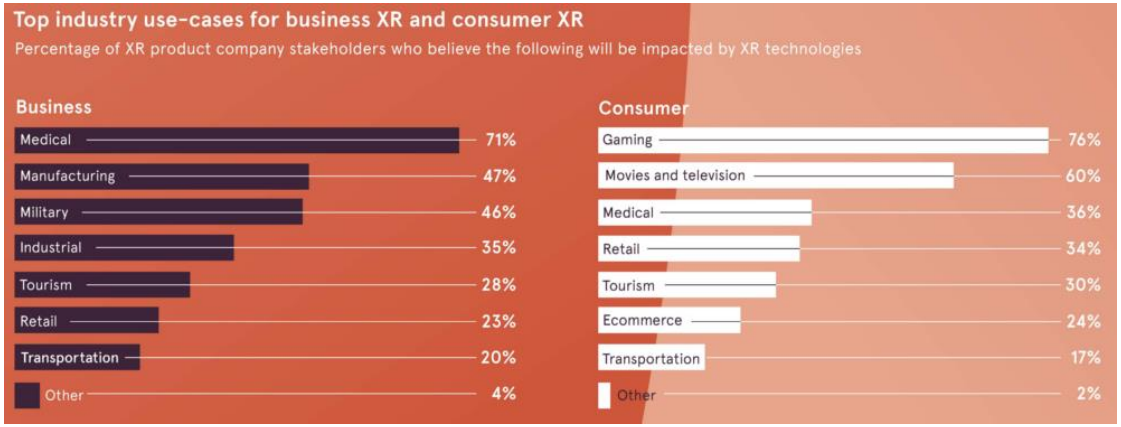
Artificial Intelligence

What is AI?

- Programing computers to perform tasks that normally require human intelligence such as
  - Visual perception
  - Speech recognition
  - Decision-making
- Cognitive computing
  - Programming for decision making
  - Algorithmic thinking



Reality



What is Reality?

Virtual Reality

Virtual Reality (VR) applications use headsets to fully immerse users in a computer-simulated reality. These headsets generate realistic sounds and images, engaging all five senses to create an interactive virtual world.

Augmented Reality

Augmented Reality (AR) is not a new reality, but a layer on top of your existing one. Rather than immersing users, AR relies on a device – usually the camera in your phone or tablet – to overlay digital graphics and sounds into a real-world environment. Pokémon Go and Snapchat filters are commonplace examples of this kind of technology.

Mixed Reality

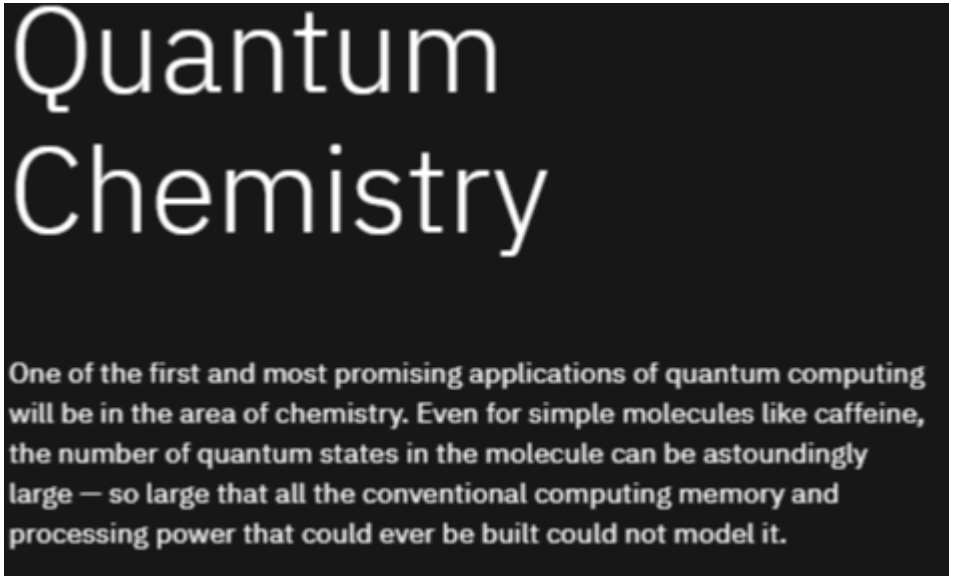
Mixed Reality (MR) lies somewhere in between VR and AR. It blends real and virtual worlds to create complex environments where physical and digital elements can interact in real time. Like AR, it overlays synthetic content in a real-world environment; and like VR, this content is interactive, and users can manipulate the digital objects in their physical space.

With their Spectator View, Microsoft has used MR as a complement to their HoloLens AR product. The Spectator View app offers users a third-party perspective of a HoloLens user and their AR content in real time.

Extended Reality

Extended Reality (XR) is the umbrella term used for VR, AR, and MR, as well as all future realities such technology might bring. XR covers the full spectrum of real and virtual environments.

Quantum Computing



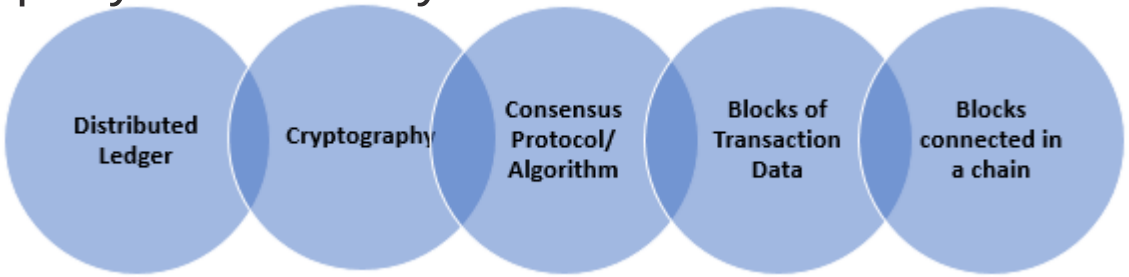
A New Kind of Computing

- We experience the benefits of classical computing every day. However, there are challenges that today's systems will never be able to solve. For problems above a certain size and complexity, we don't have enough computational power on Earth to tackle them.
- To stand a chance at solving some of these problems, we need a new kind of computing. Universal quantum computers leverage the quantum mechanical phenomena of superposition and entanglement to create states that scale exponentially with number of qubits, or quantum bits.

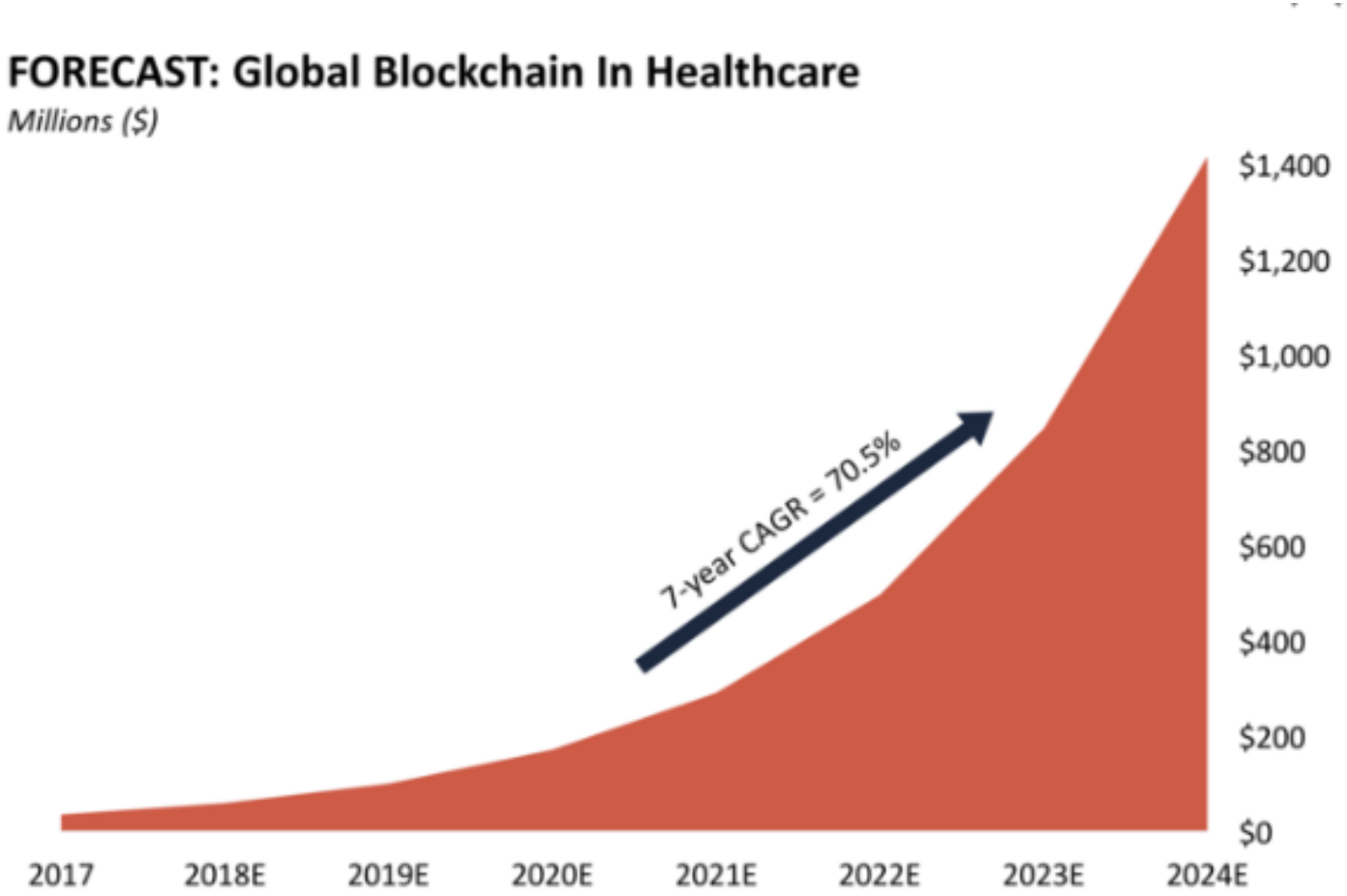
Blockchain & Distributed Ledger Technology

- Blockchain is a shared, distributed digital ledger on which transactions are chronologically recorded in a cooperative and tamper-free manner
- One of the best and simplest explanations compares it to a spreadsheet that gets duplicated multiple times across a network of computers, which is designed to regularly update the spreadsheet
- Blockchain has the ability to confirm transactions with out the next of a trusted third-party intermediary

In 2008 a person or group of persons using the pseudonym "**Satoshi Nakamoto**" published a white paper about Bitcoin which introduced Blockchain as the distributed leger used to house Bitcoin.



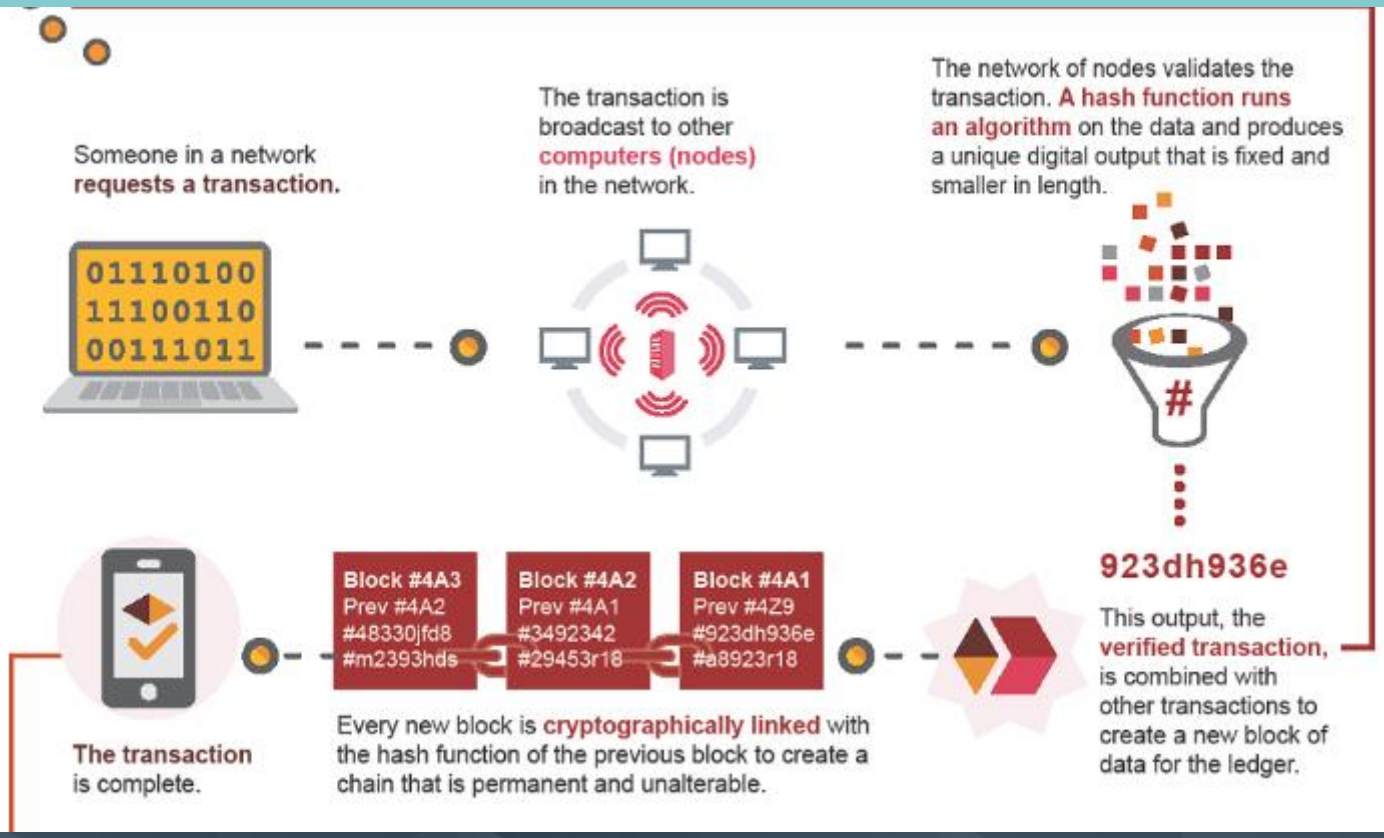
Why Care About Blockchain?



Source: Zion Market Research 2018

How a Blockchain Works

A blockchain is a decentralized virtual ledger of transactions. Blockchain validates and records transactions that are then organized into blocks and arranged in a chain, which is linked and validated with cryptography. This method makes it possible to prove that a file existed in a particular version at a given time without having to reveal the data in the file. This also means that a blockchain will log and timestamp every single change to the ledger.



Source: https://usblogs.pwc.com/emerging-technology/blockchain-validation-infographic

Blockchain Myth vs. Reality

	Myth	Reality	
1	Blockchain is Bitcoin	Bitcoin is just one crypto-currency application of blockchain	Blockchain technology can be used and configured for many other applications
2	Blockchain is better than traditional databases	Blockchain's advantages come with significant technical trade-offs that mean traditional databases often still perform better	Blockchain is particularly valuable in low-trust environments where participants can't trade directly or lack an intermediary
3	Blockchain is immutable or tamper-proof	Blockchain data structure is append only, so data can't be removed	Blockchain could be tampered with if >50% of the network-computing power is controlled and all previous transactions are rewritten—which is largely impractical
4	Blockchain is 100% secure	Blockchain uses immutable data structures, such as protected cryptography	Overall blockchain system security depends on the adjacent applications—which have been attacked and breached
5	Blockchain is a "truth machine"	Blockchain can verify all transactions and data entirely contained on and native to blockchain (eg, Bitcoin)	Blockchain cannot assess whether an external input is accurate or "truthful"—this applies to all off-chain assets and data digitally represented on blockchain

Source: www.mckinsey.com/business-functions/digital-mckinsey/our-insights/blockchain-beyond-the-hype-what-is-the-strategic-business-value

Blockchain

Pros

- Distributed - Highly resistant to technical failures and malicious attacks
- Resistant – Difficult to move or change
- Trustless System – Negates the risk of trusting a single organization and therefore reduces the overall costs and transaction fees by cutting out intermediaries and third parties

Cons

- 51% attacks – If control of the network hazing power is over 50%
- Data modification – Once data is added to the blockchain it is very difficult to modify
- Private keys – If the private key is lost essentially the data or asset owned is also lost without ability to recover
- Inefficient – A lot of extra work is performed using proof of work
- Storage – Blockchain ledgers can grow very large over time which requires extra storage even without a central database

Potential Uses of Blockchain

Record keeping: storage of static information

Transactions: registry of tradeable information

1 Static registry

- Distributed database for storing reference data

Example

- Land title
- Food safety and origin
- Patent

2 Identity

- Distributed database with identity-related information
- Particular case of static registry treated as a separate group of use cases due to extensive set of identity-specific use cases

Example

- Identity fraud
- Civil-registry and identity records
- Voting

3 Smart contracts

- Set of conditions recorded on a blockchain triggering automated, self-executing actions when these predefined conditions are met

Example

- Insurance-claim payout
- Cash-equity trading
- New-music release

4 Dynamic registry

- Dynamic distributed database that updates as assets are exchanged on the digital platform

Example

- Fractional investing
- Drug supply chain

5 Payments infrastructure

- Dynamic distributed database that updates as cash or cryptocurrency payments are made among participants

Example

- Cross-border peer-to-peer payment
- Insurance claim

6 Other

- Use case composed of several of the previous groups
- Standalone use case not fitting any of the previous categories

Example

- Initial coin offering
- Blockchain as a service

Source: www.mckinsey.com/business-functions/digital-mckinsey/our-insights/blockchain-beyond-the-hype-what-is-the-strategic-business-value

Some Well Known Blockchain Companies

1. Enterprise Ethereum Alliance
2. BankChain
3. Post Trade Distributed Ledger
4. R3
5. Trusted IoT Alliance
6. Blockchain Insurance Industry Initiative (B3i)
7. China Ledger
8. ISITC Europe Blockchain
9. Japan Exchange Group
10. Marco Polo Network
11. Mobility Open Blockchain Initiative (MOBI)
12. Financial Blockchain Shenzhen Consortium
13. FundChain
14. Global Shipping Business Network
15. Hashed Health Collective
16. We.Trade

How Other Industries Are Already Using Blockchain

In May, FedEx CEO Fred Smith said that blockchain is “the next frontier that’s going to completely change worldwide supply chains.” In February, FedEx joined the Blockchain in Transport Alliance (BiTA), a focus group whose members include rail operator BNSF, JD Logistics, and GE Transportation.

Blockchain Technology in Health Care

synaptic Health Alliance

Synaptic's first project seeks to determine if applying blockchain technology can help ensure the most current information about healthcare providers is available in the provider directories maintained by health insurers.

Federal regulations require insurers to maintain directories that contain up-to-date demographic information about physicians and other providers, such as name, address, specialty and phone number. Typically, each insurer maintains its own directory, which can be a time-consuming and expensive endeavor. If the information in these directories is inaccurate, it can delay claim and payment processing and can lead to fines from the Centers for Medicare and Medicaid Services (CMS). Roughly $2.1 billion is spent annually across the healthcare system chasing and maintaining provider data. Still, a review completed last year by CMS found that 52 percent of provider directory locations listed had at least one inaccuracy.

This pilot will examine how sharing data across healthcare organizations on blockchain technology can improve data accuracy, streamline administration, reduce costs, and improve access to care.

7 FOUNDING MEMBERS, 1 GOAL

aetna · Ascension · Humana. · MultiPlan. · OPTUM · Quest Diagnostics · UnitedHealthcare

Source: www.synaptichealthalliance.com/project

Blockchain Technology in Health Care

PROFESSIONAL CREDENTIALS EXCHANGE

WHO WE SERVE

- HEALTHCARE DELIVERY SYSTEMS
- OUTPATIENT CLINICS& TELEHEALTH PROVIDERS
- PAYERS
- ACTIVE PRACTITIONERS & GROUPS

WHY PROFESSIONAL CREDENTIALS EXCHANGE?

- Expedite practitioner onboarding cycle time
- Reduce revenue forfeitures
- Provide timely updates to practitioner data and accurate directory data
- Simplify the credential gathering and verification process
- Eliminate redundant work, while improving coordination and concurrency of data

OUR PARTNERS

SPECTRUM HEALTH
Hardenbergh Group
accenture High performance. Delivered.
HealthLink DIMENSIONS Empowered Healthcare Intelligence
WellCare Get more from your Medicare
Texas Hospital Association Endorsed Partner
National Government Services

A new business model for accelerated credentialing. Our solution forms an exchange providing members with both access to verified credentials information and a means for contributing verified information for other members to acquire. Exchange members can define the specific data, artifacts, rules, and validation checks for the various types of employees (e.g., physicians, nurses, AHPs) requiring credentials for their organization.

HASHED HEALTH

Source: www.hashedhealth.com/consortia

Blockchain Technology in Health Care

Health Utility Network

Summary: Aetna, Anthem, Health Care Service Corporation, IBM, PNC, Cigna and Sentara are collaborating to create a blockchain backed network to improve transparency and interoperability among participants in the healthcare industry. IBM and its partners plan to reduce administrative errors and friction through the application of a blockchain. Healthcare information will be exchanged more securely and efficiently which should help enhance patient care and reduce unnecessary costs and redundant information transfer.

"We are committed to improving the healthcare consumer experience and making our healthcare system work more effectively," said Claus Jensen, chief technology officer at Aetna, a CVS Health business. "Through the application of blockchain technology, we'll work to improve data accuracy for providers, regulators, and other stakeholders, and give our members more control over their own data."

"At Anthem, we recognize the importance of driving change that will simplify the healthcare system for all Americans," said Rajeev Ronanki, Chief Digital Officer of Anthem, Inc. "We view Blockchain as an enabler for establishing trust. Timely access to medical information has been a stumbling block for creating a seamless consumer experience. With a trusted foundation based on transparency and cryptography, we will provide a faster, safer and more secure way to exchange medical information to transform the consumer healthcare experience."

"HCSC is continuously exploring how technology and data can improve the lives of our members by reducing fragmentation of information and connecting parts of the health care system," said Steve Betts, senior vice president and chief information officer, HCSC. "We are proud to be part of this collaboration focused on enhancing technical knowledge, understanding capabilities and unlocking the possibilities to drive quality, affordable care."

"Blockchain's unique attributes make it suitable for large networks of members to quickly exchange sensitive data in a permissioned, controlled, and transparent way," said Lori Steele, general manager for Healthcare and Life Sciences for IBM. "The fact that these major healthcare players have come together to collaborate indicates the value they see in working together to explore new models that we think could drive more efficiency in the healthcare system and ultimately improve the patient experience."

"This collaboration will enable healthcare-related data and business transactions to occur in way that addresses market demands for transparency and security, while making it easier for the patient, payer and provider to handle payments" said Chris Ward, head of product, PNC Treasury Management. "Using this technology, we can remove friction, duplication, and administrative costs that continue to plague the industry."

Source: www.hashedhealth.com/consortia

Blockchain Technology in Health Care

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Blockchain: An Industry Disruptor? NASCO Consents.

In 2018, blockchain bubbled to the top of the list for most organizations in regard to technologies and innovations that have an impact on business models and technology landscapes. NASCO, like most organizations with an innovation program, conducted research, evaluated platforms and performed simple tests to better understand this new technology. After a successful proof of concept, we established a consortium to explore, with our team of technologists and partners, the industry-leading activities we could initiate using this new technology.

Blockchain is based upon a distributed ledger, and it's beneficial for networks of participants who have agreed to an operating and security model that eliminates transactional friction and enables trust between the parties. Unlike most transactional environments today, in a blockchain solution, no one party owns centralized control of the data; therefore, participants must agree on formats and protocols to participate. This technology has been proven effective in the finance and supply chain fields.

Blockchain as a technology is not a solution for a single organization — its value increases with the size of its integrated network. So, we began working with our Blue partners to examine how blockchain could help transform our already strong collective business network into an efficient, real-time, secure, trustable ecosystem that would benefit us all. We completed an intensive exercise to establish that ecosystem and pressure test a number of potentially valuable business opportunities as blockchain solutions.

In the summer of 2018, NASCO collaborated with Blue Cross and Blue Shield of Massachusetts (BCBSMA), Blue Cross Blue Shield of Michigan and Horizon Healthcare Services, Inc. to form a consortium focused on delivering breakthrough technologies for the healthcare industry. The consortium, aptly named Coalesce Health Alliance (Coalesce), initially focused on evaluating the application of blockchain to improve the efficiency and accuracy of member healthcare claim accumulations across entities within the Blues ecosystem.

Coalesce has begun executing an Alpha Pilot project to demonstrate a basic distributed accumulators blockchain solution in a private cloud environment. This Alpha Pilot project's goal is to address the challenges we have all experienced in managing member accumulations — not being able to accurately identify members across entities, working with stale or incomplete data and running into inconsistent integration formats — to ultimately increase operational efficiencies and improve the member experience.

Interest in Coalesce has increased since the introduction of the Alpha Pilot project, as several other Blue plans are now participating in the consortium's advisory groups to evaluate the potential business value for their health plans. Additionally, BCBSMA was instrumental in bringing Express Scripts to Coalesce, marking the involvement of the first of what will be many integrated benefit manager partners in the consortium. Once the Alpha Pilot project is complete in late Q1 2019, the Coalesce Health Alliance Steering Committee will review the project and determine how it will progress forward.

We're only at the beginning of our journey of testing traditional notions and transforming healthcare through innovative solutions, but we're excited about the possibilities, and we're grateful to be part of a consortium of partners who are imagining the future of healthcare with us.

Source: www.nasco.com

Blockchain Technology in Health Care

REMEDICHAIN

THE FEDEX INSTITUTE OF TECHNOLOGY PARTNERED WITH PHARMACY TO USE BLOCKCHAIN TO HELP CANCER PATIENTS GET MEDICINES

Across the nation, over $100 billion worth of medication is destroyed each year.

REMEDICHAIN accepts donated prescription medication and puts it in the hands of patients who would not otherwise afford it.

Remedichain is developing a blockchain solution to address the financial and environmental problems of prescription waste.

Our Solution

How does blockchain provide access to medication? In its broadest terms, blockchain offers end-to-end traceability and visibility from the point of origin along the whole supply chain, which allows users to trace single product items within a case. Capitalizing on this new frontier in logistics, Remedichain intends to use blockchain as a means to retrieve unused, high-value medications from patients and pass them on to economically disadvantaged patients who would not be able to regularly afford them. Blockchain's transparent, secure and immutable ledger allows for a safe and confidential distribution of medical information.

Source: www.remedichain.com

Blockchain Technology in Health Care

Pilot Participants

- AmerisourceBergen
- Amgen
- APhA (consulting role)
- Cardinal Health
- Center for Supply Chain Studies
- Chronicled
- Dermira
- Endo
- Fedex
- FFF Enterprises
- Genentech
- Gilead
- GS1
- GSK
- Inmar
- Lilly
- Maxor
- McKesson
- Novartis
- Pfizer
- Sanofi
- Vaxserve
- Walgreens
- Walmart

The focus of the MediLedger pilot will be on the DSCSA requirements related to the interoperable, electronic tracing of products at the package level. Specifically, we will focus on the enhanced requirements for package-level tracing and verification that go into effect in 2023. Working Group ApproachOur working group brings together key thought leaders in DSCSA and across various Life Science companies to determine what blockchain could provide in terms of improved solutions for industry.

Source: www.mediledger.com

Blockchain Technology in Health Care

MELLODDY

(**M**achine **L**earning **L**edger **O**rchestration for **D**rug **D**iscovery) project which aims, for the first time, to use machine learning methods on the chemical libraries of 10 pharma companies and to develop a platform creating more accurate models to predict which compounds could be promising in the later stages of drug discovery and development.

MELLODDY aims to train machine learning models across multi-partner datasets while ensuring privacy preservation of both the data and the models by developing a platform using federated learning. The MELLODDY platform uses Amazon Web Services technologies in order to execute Machine Learning algorithms from academic partners on a large scale. The data never leaves the owner's infrastructure and only non-sensitive models are exchanged. A central dispatcher allows each partner to share a common model to be consolidated collectively. To provide full traceability of the operations, the platform is based on a private blockchain. This means that a ledger will be distributed across all contributing pharma partners in such a way that there is no central authority. The platform guarantees by design that partners keep control and visibility over their own private data. Since there is no central authority, any communication between the dispatcher and a ledger needs to be approved by all partners before one can proceed. Like a bank statement, the ledger holds a log of all activities and can be requested after a federated run. The MELLODDY platform is designed to prevent the leaking of proprietary information from one data set to another or through one model to another while at the same time boosting the predictive performance and applicability domain of the models by leveraging all available data.

The MELLODDY consortium consists of 17 partners:

- 10 pharmaceutical companies: Amgen, Astellas, AstraZeneca, Bayer, Boehringer Ingelheim, GSK, Janssen Pharmaceutica NV, Merck KgaA, Novartis, and Institut de Recherches Servier
- 2 academic universities: KU Leuven, Budapesti Muszaki es Gazdasagtudomanyi Egyetem
- 4 subject matter experts: Owkin, Substra Foundation, Loodse, Iktos
- 1 large AI computing company: NVIDIA

Source: www.janssen.com

Questions?

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Thank You!

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