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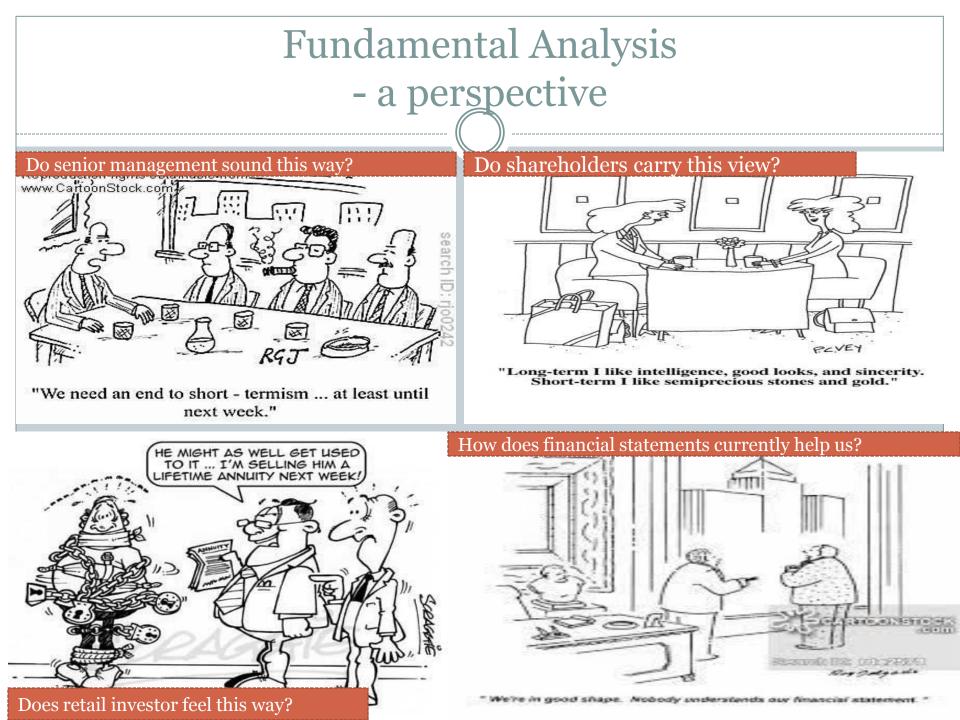
This presentation was made in August 2018 in Mumbai.

Fundamental Analysis - assessing financial health of a company

Presented at Seminar on Business Valuation, Mutual Funds and Alternative Investments – Beginner's Guide

> Organized by WIRC - ICAI

Presented by: CA R. Jayaprakash Mumbai



Mantra for Gauging Financial health

- Every business needs to be viewed in context of:
 - Economic cycle
 - Geography of operations
 - Industry
 - Business model as adopted by the company.
- For discerning investor's / finance professional the best starting points are:
 - Comparative studies with competitors financial position (domestic and global)
 - Comparative studies over time periods (if company has been operating over a number of years)
- The above studies would thrown variations / differences which would need to be explained by the operating management team. Whether such rationale appeals to the directors approach to business would depend on individuals experiences.

Lets pick two examples from our own experiences here – Joi (capex / opex & free calls & Flipkart

Understanding Financial Health of a business

What are indicators of financial health

- To understand Financial health of a business the following dimensions need to be studied:
 - Margins (ROCE, ROI, ROE)
 - Asset Utilization
 - Capital structure including liquidity analysis
 - Commitments and obligations (generally ignored in practice)
- Except for the 4th parameter Dupont Analysis covers interrelationship between various other parameters
 - ROE = Profit Margin (Profit/Sales) * Total Asset Turnover (Sales/Assets) * Equity Multiplier (Assets/Equity)

Balance Sheet

Financial Health of a business

as at 31* March 2017

is at 31* March 2017				(f in crores)
Particulars	Note No.	As at 31 ^e March 2007	As at 31* March 2016	As at 1* April 2015
ASSETS				
1 Non-Current Assets		and the second	1000	
(a) Property, Plant and Equipment	4	668.66	643.04	526.03
(b) Capital Work-In-Progress	4	126.57	151.68	218.28
(c) Goodwill	5	86.11	86.11	86.11
(d) Other Intangible Assets	5	154.80	187.41	192.11
(c) Financial Assets				
(i) Invatorna	6	440.23	533.89	429.50
(ii) Louna	9	4 40	709	7.0
(iii) Other Financial Assets	Sec. 1	17.28	10.98	13.0
(f) Current Tax Assets (net)	16	36.47	35.41	33.67
(a) Other Non-Carrent Assets	17	70.34	48.47	74.4
Total Non-Current Assets		1,679,86	1,704.03	1.581.30
Current Assets		1,010,000	1,104,104	- Specific and
(a) Inventorian	15	556.25	494.20	534.73
(b) Financial Assets				
(i) Investments	7	1.353.18	568.87	297.0
(ii) Trade Receivables	8	607.65	550.71	506.0
(iii) Cash and Cash Equivalents	13	45.80	66.15	43.5
(iv) Eark balances other than (iii) above	14	4.67	6.10	5.0
(v) Loans	10	18.45	15.53	14.9
(vi) Other Financial Asseta	12	5.00	4.14	3.51
(c) Other Current Assets	18	74.69	57.78	53.3
Total Current Assets	and the second s	2,665.72	1,762.98	1,458.54
			3,467.01	3,039.97
EQUITY AND LIABILITIES				
EQUITY				
(a) Equity Share Capital	19	\$1.27	51.27	51.2
(b) Other Equity	20	3,348.08	2,599.32	2,253.3
Total Equity		3,399.35	2,650.59	2,304.58
LIABILITIES				
1 Non-Current Liabilities				
(a) Financial Liabilities				
(i) Other Financial Liabilities	23	1.68	2.25	2.8
(b) Provisions	24	24.97	21.86	18.63
(c) Deferred Tax Liabilities (net)	(26)	83.63	75.36	51.3
Total Non-Current Liabilities		110.28	99.47	72.8
2 Correct Liabilities				
(a) Financial Liabilities				
(i) Borrowings	21	1000	1.12	5.78
(ii) Trade Payables	22	328.47	306.33	293.33
(iii) Other Financial Liabilities	27	365.66	300.82	284.5
(b) Other Current Liabilities	28	63.08	66.36	54.05
(c) Provisions	25	12.81	9.24	11.63
(d) Current Tax Liabilities (net)	. 29	15.93	13.08	13.08
Total Current Liabilities		785.95	716.95	662.40
TOTAL LIABILITIES		896.23	816.42	735.34
TOTAL EQUITY AND LIABILITIES		4,295.58	3,667.01	3,030.93
See accompanying notes to the financial statements	1 to 63			

Statement of Profit and Loss

for the year ended 314 March 2017

for the year ended 31" March 2017			(? in crores)
Particulars	Note No.	For the year ended 30 ⁴ March 2017	For the year ended 31 ⁴ March 2016
INCOME			
Revenue from Operations	30	5,298.65	5,063.06
Other Income	31	110.10	70.62
Total Income		5,408.75	5,133.68
EXPENSES			
Cost of Materials Consumed	32	2,025.82	2,059.51
Purchases of Stock-in-Trade		244.22	204.67
Changes in inventories of Finished Goods Work-in-Progress and Stock-in-Trade	33	(7.90)	18.04
Excise Duty on sale of goods		433.28	332.03
Employee Benefits Expense	34	507.45	457.16
Finance Costs	36	5.68	5.84
Depreciation and Amortisation Expense	36	90.24	87.82
Other Expenses	37	870.90	872.11
Total Expenses		4,169.69	4,037.18
Profit before Exceptional Items and Tax		1,239.06	1,096.50
Exceptional Items	38	94,34	27.00
Profit before Tax		1,144.72	1,069.50
Tax Expense			
Carrent Tax	48	362.66	298.77
Deferred Tax	48	8.27	24.01
Net Tax Expense		370.93	322.78
Profit for the year		773.79	746.72
Other Comprehensive Income			
Items that will not be reclassified to profit or loss			
Remeasurement of Defined Benefit Plan		(2.79)	(0.31)
Income tax relating to items that will not be reclassified to profit or loss	48	0.81	0.09
Total Other Comprehensive Loss		(1.98)	(0.22)
Total Comprehensive Income for the year		771.81	746.50
Earnings Per Equity Share:			
Basic (t)	43	15.09	14.57
Diluted (?)		15.09	14.56

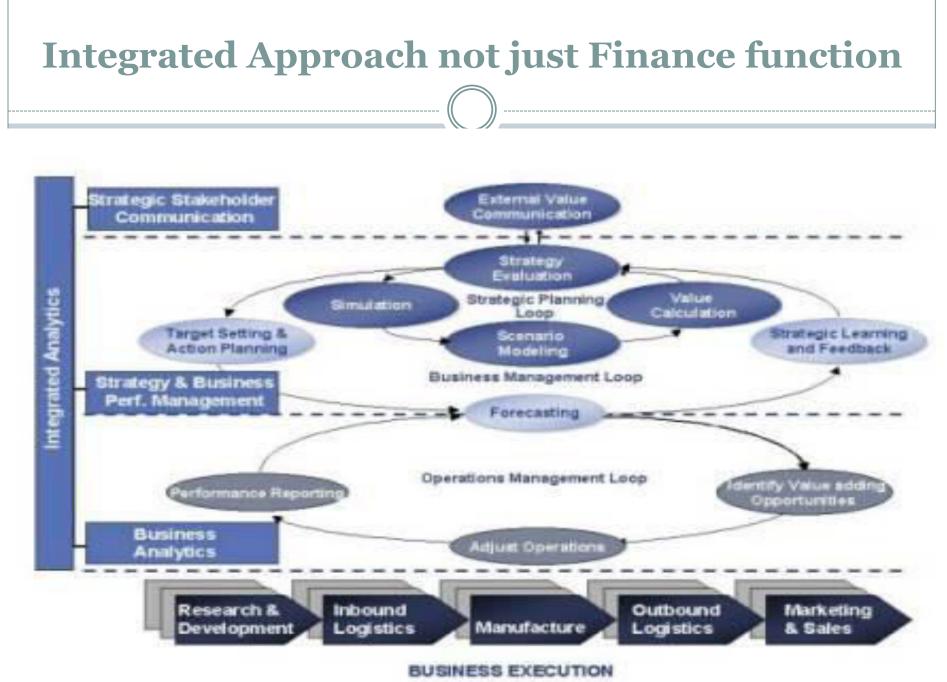
- 10 C

QUESTION?

How does this work in the modern business context wherein 70% "value" in intangibles



"Our employees are our greatest asset. I say we sell them."



Contraction of the second s

Summary points

Slide captures few important thoughts about the approach to fundamental analysis.

- Understanding a business in the context of economic environment it operates in.
- Similar businesses can operate with different model. Analysis has be to understanding imperative of these different models.
- Annual report (not financial statement) is the statement to be referred. The relevant number has to be chosen basis the decisions to be taken. One number (balance sheet number) doesn't fit all. Book value, market value, replacement value.
- The primary predicate is maximization of "ROE".
- The orientation should be "And-And" Short term & long term.
- The integrative approach to management should be visible.

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This presentation was made in August 2018 in Mumbai. Valuation of companies: Understanding the Value drivers

Presented at Seminar on Business Valuation, Mutual Funds and Alternative Investments – Beginner's Guide

> Organized by WIRC - ICAI

Presented by: CA R. Jayaprakash Mumbai Few quotable quotes for Finance professionals

Few jargons which raise red flag:

Pivoting Innovation Disruption Agility Scalable unit economics

Economic view

• Its not about return on capital but about return of capital

Philosophical view:

• Life is long enough to be experienced with patience rather than greed

Change in Narrative in 12 months

September 2015

- Flipkart USD 16 billion. Snapdeal USD 5 billion. Other Indian startups in the unicorn club include mobile advertising technology company InMobi (\$2.5 billion), taxi consolidator Olacabs (\$5 billion), mobile payments company Paytm (\$2billion), online restaurant guide Zomato (\$1 billion), online classifieds firm Quikr (\$1 billion) and data analytics outsourcing company Mu Sigma (\$1 billion). Promising candidates are Oyo Rooms (currently \$400 million), Bigbasket (\$400 million) and Grofers (\$100 million).
- "FOMO" driven valuation was very evident.

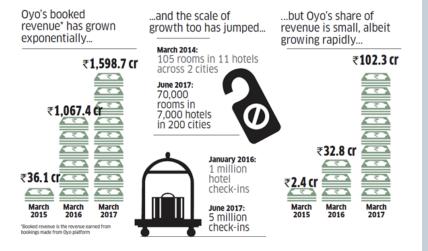
August 2016

- Flipkart USD 5.58 billion. Snapdeal USD 4 billion. Other Indian startups in the unicorn club include mobile advertising technology company InMobi (\$0.8 billion), taxi consolidator Olacabs (\$2.4 billion), mobile payments company Paytm (\$5billion), online restaurant guide Zomato (\$0.5 billion), online restaurant guide Zomato (\$0.5 billion), online classifieds firm Quikr (\$1 billion) and data analytics outsourcing company Mu Sigma (\$1 billion). Promising candidates are Oyo Rooms (currently \$400 million), Bigbasket (\$400 million) and Grofers (\$100 million).
- Cutting down on burn rates and Unit economics have to be visible. "There is a strong focus on capital efficiency and moats around the business."

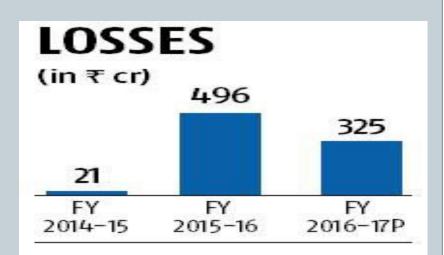
Impact of SoftBank and Softbank Vision fund on the current narrative

Examining value – OYO rooms

Oyo in Numbers



		Amount in (₹)
Note 17	Year Ended	Year Ended
Operating Expenses	March 31, 2015	March 31, 2014
Minimum Guarantee	3,61,98,948.20	0.00
Inventory of Properties	1,04,05,873.75	0.00
Commission Expense	57,88,440,75	14,89,070.93
Property related Expenses	62,15,950.00	0.00
Minimum Tariff Loss	30,18,470.85	0.00
Consumables	23,83,509.93	0.00
Photography Expenses	21,93,064.00	7,500.00
Credit card charges	1,68,255.53	9,944.10
Payment Gateway Charges	82,686.94	0.00
	6,64,55,199.95	15,06,515.03



Total funding raised – USD 450 million (INR 2700 crores approx)

Re-examining value - Flipkart

March 2017 numbers

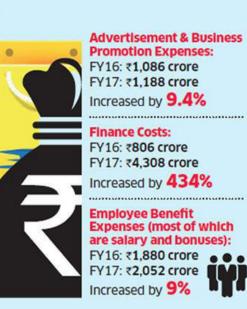
Mixed Bag

Revenue: FY16: ₹15,403 crore FY17: ₹19,854 crore Increased by 29%

Loss: FY16: ₹5,223 crore FY17: ₹8,771 crore

Increased by 68%

Cash in Hand fell by 13% to **₹3,579 crore** Investments in Mutual Funds/Bonds fell sharply by 78% to **₹1,114 crore**



To put the number in perspective:

- Value ascribed by walmart – INR 117,000 crores approx.
- Snapdeal in the same period had revenues of INR 900 crores and total expenses of about INR 3200 crores. Employee cost of INR 600 crores.

"SoftBank's capital campaign continued this week on the news that the firm's Vision Fund is deploying \$300 million into dogwalking startup Wag."



What is driving the business world?

Traditional view of "Value drivers"

Value Drivers are characteristics of a business that either reduce the risk associated with owning the business or enhance the prospect that the business will grow significantly in the future.

There are many items that create value including:

proprietary technology, market position, brand name, diverse product lines, and patented products. The items common to all industries, which drive up value ("Value Drivers") include:

- A stable, motivated management team *(spice jet)*
- Operating systems that improve sustainability of cash flows (*Amazon*)
- A solid, diversified customer base *(Marriot)*
- Facility appearance consistent with asking price (?)
- A realistic growth strategy (??)
- Effective financial controls (???)
- Good and improving cash flow (????)

Examining value drivers in current context

Facebook & whatsapp

- Whatsapp acquired for USD 19 billion by FB.
- The deal was finalized at \$19 billion, which includes \$4 billion in cash, about \$12 billion worth of Facebook shares and the remaining \$3 billion as restricted stocks.
- Restricted stock units to WhatsApp employees represented 7.9% of Facebook's shares.

Google & Deepmind

- Deepmind was acquired by google in 2014 for USD 600 million.
- The company is yet to generate any significant revenues.
- Could be construed as a failure when one cursorily examines the transaction.
- It is still given lot of autonomy under the new Alphabet / google configuration? What is the value driver?

Discuss – covenants are also value drivers for a company:

- 1. Covenant around non compete
- 2. Covenant around buy back clause
- 3. Convertible covenant

Value drivers examined

Quick views on each of the situations mentioned in this slide.

Discuss this in context of :

- Life cycle-
 - Young Growth business
 - Growth companies
 - Mature Companies
 - Declining & distressed companies

Special Situations:

- Financial services company
- Cyclical / commodity companies
- Intangibles play in company

The next few slides are to share with participants some view on how valuation is examined in context of the start up / venture capital.



Few additional thoughts on capturing value drivers in startup environment

How do we address?

Established business have predict-ability of cashflows

When the business is nascent or in the ideation stage, valuation becomes a difficult proposition.

Few approaches often used are described in this slide.

All these approaches get refined with every incremental deal.

Valuation Approach	Principle / drivers
Berkus	Based on assessment of 5 key success factors
Risk factor summation	based on a base value adjusted for 12 standard risk factors
Scorecard	weighted average value adjusted for similar companies
Comparable transaction	based on rule of 3 with a KPI from similar company
discounted cash flow	Sum of present value of future cash flows
Scenario Analysis	weighted average of 3 valuation scenarios
Venture capital	based on ROI expected by investor

BERKUS Method

The Berkus Method is meant for pre-revenue startups.

Most often "prerevenue" valuation to a start-up that has potential of reaching over \$20 million in revenues within five years will be dependant on the 5 parameters.

Once a company crosses pre-revenue stage, this approach would be inappropriate to apply

- The premise is that it establishes a ceiling of USD 2.5 million
- Every element of business adds additional comfort and thereby better valuation.

If Exists:	Add to Company Value up to:
Sound Idea (basic value)	\$1/2 million
Prototype (<i>reducing technolo gy risk</i>)	\$1/2 million
Quality Management Team (<i>reducing execution</i> <i>risk)</i>	\$1/2 million
Strategic relationships (<i>reducing</i> <i>market risk)</i>	\$1/2 million
Product Rollout or Sales (<i>reducing production</i> <i>risk)</i>	\$1/2 million

Risk Factor summation

Refined and evolved version of Berkus model

The base value is the value of similar businesses in similar geography. This is the most tricky part of the approach.

The premium or discount is generally in multiples of an amount based on high or low risk rating.

The Risk Factor Summation Method

INITIAL VALUE

1	. MANAGEMENT RISK	Very low	+\$500,000	\$2,000,000
2	2. STAGE OF THE BUSINESS	Normal		
111	B. LEGISLATION/POLITICAL RISK	Normal		
4	MANUFACTURING RISK	Normal		
5	5. SALES AND MANUFACTURING RISK	Normal		
e	5. FUNDING/CAPITAL RAISING RISK	Normal		
7	COMPETITION RISK	Very high	-\$500,000	\$1,500,000
8	B. TECHNOLOGY RISK	Low	+\$250,000	\$1,750,000
9	9. LITIGATION RISK	Very low	+\$500,000	\$2,250,000
1	.0. INTERNATIONAL RISK	Normal		
1	1. REPUTATION RISK	Very low	+\$500,000	\$2,750,000
1	2. POTENTIAL LUCRATIVE EXIT	Normal		

BOX VALUATION

\$1,500,000

Scorecard Valuation

Some criteria's used for evaluation:

2.

3.

4.

INITIAL VALUE

BOX VALUATION

MULTIPLIER

Management (30%), Size of opportunity (25%), Product or Service (10%), Sales channels (10%), Stage of business (10%) and

Other factors (15%)

Weight is arrived based on what is expected out of similar business and Vs. Average project is the readiness of the project being evaluated vs other projects.

The Scorecard	Valuation metho	d
	Weight	vs. average project
TEAM CAPACITY	40%	125%
PRODUCT/TECHNOLOGY READINESS	30%	100%
MARKET SIZE	20%	15%
COMPETITION	10%	75%

\$1,500,000

\$1,760,250

117,5%



Comparable transaction method

Similar to PE / PBV / Evby EBITDA

Monthly Recurring Revenue (Saas), HR headcount (Interim), Number of outlets (Retail), Patent filed (Medtech/Biotech), Weekly Active Users or WAU (Messengers)

BOX VALUATION BASED ON

The Comparable Transactions Method

	Sold for	Revenue multiple	WAU multiple
SIMILAR BOX #1	\$957	3,0 x	2,3 x
SIMILAR BOX #2	\$647	3,3 x	6,4 x
SIMILAR BOX #3	\$327	1,9 x	1,5 x
SIMILAR BOX #4	\$737	5,4 x	0,2 x
SIMILAR BOX #5	\$6,248	8,6 x	5,7 x
SIMILAR BOX #6	\$39,087	7,3 x	4 x
SIMILAR BOX #7	\$6,576	12,1 x	31 x
SIMILAR BOX #8	\$4,258	8,3 x	3,5 x
SIMILAR BOX #9	\$3,798	3,4 x	1,1 x

	Revenue	WAU
MY BOX INDICATORS	\$900	1,000
WEIGHTED AVERAGE MULTIPLES	7,6	6,7



\$685

\$6,736

The next slide is to share with participants some view on how emerging technologies would disrupt the market.

This slide is a summary of a study conducted by techforesight.com

The presenter is not supporting or ascribing to the ideas proposed herein.



Closing remarks – Whats in store for future

TABLE OF DISRUPTIVE TECHNOLOGIES

HIGH De Ps Da El Co Qt Digital fostprint Personal digital Ruman head Hunten cloning & de-e Unition Distributed autoro-Space poter powe Space elmators Pulş immerses Artificial We can't talk about 91 DF 92 **RF** 93 HB 94 HE 95 DE 94 97 SP. 98 DE ... F# 100 Ph Ci le Conversational machine interfaces Life-expectant algorithms Singleaph Ratiania a All advisors & decision -making machines Alboard man Insightly shalls Factory photomethesis Transformer Inchronization Telepath 82 85 SP 89 81 M Œ 83 SP 84 EA DE 86 EA 67 SP 88 HA 90 HA Qs Rd Cp 55 Gv Planeian-acale specificación Male preprietor **DNA delle signage** Genetic vaccines Guartern sale Reaction/age drive Implantable phones a-tapping Cognitive prosidentice Data uploading se. 72 М 73 DE 74 HA 75 76 77 Œ 78 HA 79 HA 80 SP Gh Rs Хх Bh Wh Ak Me Em Predictive game-based Automated Autonamous rebelis Errolizate ware Renancid as Ruman blo-hacking Internet of 014 Though control machine interfaced Orean reading Whole Earth hallhcars BURGET. michin sidualization knowledge 61 DE 62 EÅ 63 BA 64 45 М 66 HA 67 Œ 68 м 69 HA 70 DE Sw Pb Sd Sh Md Et Mm _a Self-writing Peer-to-pear entring Uniong personal perior designation Ranel colonization Shape-shifting Maga-acal A Program des allocation and some in an i fan i na Andrea & Instantion space travel 51 9 52 EÅ 53 DE 64 90 55 54 м 57 Œ 58 HA 59 HA 60 Sf Se Bs Dt B Mc Fü Mr Un Madical Interders Smart flooring& Disgradic toilete Smarthenerge gride Algel Sto-foels Human-orga Artificial human blocd substitute Nev materials Fusion powe Self-reconfiguring 41 **DE** 42 Œ 43 DE --45 -44 -47 100 48 **12** 49 - 28 50 SP Pa Fp A٧ Ap Sr Le 10 ۲đ Distributed ledger Swarm reballes A-dimensional Zers-point many Precision Autoremos Infantion deciding Crore Insight Autonomous pamengeraitzrait 20-printing offeed & pharmaceuticals 37 30 33 35 34 39 40 31 **DE** 84 34 11 RA. FA. 38 144 98 -sp Sc Ro Rq Wa Rc Eb Bo Be As Cm Smart controls and appliances Delivery robote & placements of choice a Resource . Water harvesting Broadcasting of elaciticity Bis-plastics Beatt-powered propulation Roboliz care Cultured mask Aufonomous ships - & submarines **CP** М 22 Œ -CD 24 EA 25 26 -27 cp 28 29 30 SP 23 124 Pn So Wt Pe Fi Cr Ac Εh Mh Crystocurrencies. Concentraled solar power **Predicine** solicing Micro-scale ambient energy harvesting Althornewind furbines Anter companione Matalic hydrogen energy storage Strati diazme & Polistich eating buildings Foto fields 12 14 15 17 en. 18 æ 20 DE сp 13 DE 14 M HA SP Cc Bi Px Dw We Sn Va Am Deep coast wind larms Computerioe & clothing mart nege int Vertical agr Winlamenergy Galloon-powered Pevend d ubous Vatuum-lube Scram at Asietaid mining 8 interes of DE 2 . a 5 HA DE 8 ۰ 10 SP

A dashboard of 100 wonderful, weird (and possibly worrying) ways the world might change in the foreseeable future.

IUSI most major wite-makers

36 Airbus (France), Boeing (US)

37 Estilate Liscard, NASA (US)

39 Stratagys (US), Autodeak (US)

Group (US/Telean), Scaradu (US)

43 Flowsky (Japan), Scanado (US)

Innovations (US), Alcendi (US)

IBMIUSI, ImmIUS

50 Feste Germany

(Selfariand)

40 Intel (US)

62 IBM (US)

Parmade USI, Jay ATTUS

57 MODGIUSI, Darea (US)

42 Stanwood Hotels (US), MariCane (Finland) Scanelytics (US), Putureshape (Sermany)

38 SRI International (US)

60 NASA (US)

26 Amazon (US), Google/Alphabet (US), Philipa (Neiherlanda), Samaung (South Korea), Dyson Miala (Germany), (Robot (US)

35 Goode/Alphabet (US), Amegon (US), Filmtev (US)

41 Basi Leal Technologies (US), Dynamical Biomarkers

46 Tesla (US), ABB (Switzerland), Siemens (Germany)

45 Synthetic Genomica/BoonMobil (US), Global Alga-

46 Organievo (US), Envision 180 (Germany), RegentiU (Swiperland), Cellink (Sweden), Seriph Robotics (US)

47 Hb02 Therapeutica (SouthAfrica), Bioepace (US)

49 ITER (EU/ Prance), Tokamak Energy (UK), Alphaber/

Google¹Tri Alpha Energy (US), General Ruson (Danada), Helion Energy (US), Lodkheed Martin (US)

61 Israel Devolution Enterprises Technologies (Israel) Accions (Spain), Fluence Corporation (US)

62 Microsoft (US), Google/Alphabet (US), Open Al (US)

64 Gingko Blowarks (US), US Naval Research Laboratory

55 Open Utility (UN/Netherlands), Power Ledger (Australia), L03 energy (US), Energy Web Foundation

(US), USArmy Research Lab (US), Darpa (US)

50 Space X/Elon Muek (US), Blue Origin (US), Virgin Galactic (UK), Rocket Lab (US), Axiom Space (US)

69 Space X (US), UAE Mara Masion (UAE), NA SA (US)

61 Kite Pharma/Graad Sciences (US), 23andMe (US), Phenogen Sciences (US), Regeneron (US), Verlies Genetics (US)

63 Intuitive Surgical (US), Verb Surgical/Alphabet/Johneon & Johnson (US), DeVinci Surgery (US)

with employ companies and sign-ope in periodiar the

reach Alchardela richard Rosendred

Spacell, (Israel), Firely Aerospace (US)

53 Open Utility/Essent (UK/Netherlands) Khowelays (China)

54 Kenami Cara Liapani Mitadau (UK)

Example of organizations active in each area

- 1 Mont (South Korea), Abena Nava (Denmark) Slemare Secon (Spain
- 2 Sistel (Nerway), Siemena (Germany), Volturn (US),
- UMaine (US) 3 Green Scies Vertical Farme (US), Alero Farme (US), Vec Farme (Germany), Urban Crop Solutione (Belgium
- & Withicity (US), Powermail (Israel), Apple/ Power By Proc.
- (US), Qualcomm (US), Moja Mobility (US), Maper (US) Fultan Innevation (US)
- 6 Google/Alphabet (US)
- ReWelk (US), Rec Bionics (US), SulW/US Bionics (US), Ekep Bignics [US] Lockheet Martin [US]
- 7 Goode/Alphabet (US), Sameung (Koreal, Hepskin (Canada) Owlat (US), Kernedo Tech (Canada), Shitiwaar (US), Lachal (India), OM Signal (Canada)
- The Boring Company/Elon Musk (US), China Aerospace Science and Industry Corporation (China)
- Reaction Engines (UK), NA SA (US), Beeing (US), Lockheed Martin (US), Airbus (France)
- 10 Deep Space Industries (US), Planelary Resources (US), Made in Space (US)
- 11 Bitcoin (Japan), Ripple (US), Litecoin (US)
- 12 Selamaseve (US), Asengoe (Spain), North China Power Engineering (China), Shanghai Electric (Chi Zhajiang Supton Selar (China), NWEPDI (China)
- 13 PredPol (USI, BOM Universe (USI)
- 14 Pavegen (UN), EDEEN (Dhina)
- 15 Google/Alphabet (US), Joby Energy (US), Altaeroe (US), Otegen (Italy), Enerkite (Germany)
- 16 Pullairing (US), Amazin (US), Alphabet/Google (US), Nintendo Japani, Invisible Giritriand/BoyIntend (US)
- 17 NASA (US)
- 18 Alphabet/Verily (US), Amagon (US), Yugy (US) **Dreysight Benetil**
- 19 Elegant Embellishments (Germany), Nova (Spain),
- Studio Ropergaarde (Netherlands), Prosolve 37(e Germany
- 20 Deti (UK), Boxing (US)
- France), Care-o-bel (Germany), Riken/Sumitomo Rike Listen) Maritald Robotca [US]
- 22 Amazon (US), Google/Alphabet (US), Philipe
- 24 Wing/Alphabel (US), Starship Technologies (UK),
- 25 Laides (US), Beeing (US), Rolls Royce (UK)
- 26 Jouratura (US), Waterpetitie (UK)
- 27 Permalulion (US) Sun to Water (US)
- 28 Powercast (US)

- 31 Everladger (UK), Stampery (Spain), Brickblock (Sermany), Stock it (Sermany)

* Time is defined as ubiquity or mainstream use not invention

68 StaTeg (UK), Grindhouse Webeesr (US), Dangerous Things (US), see also The Sysborg Project and the 32 Blue River Technology (US), Hortau (Canada) 33 GoodeWarro (US), Valage (US), Nida Automotive Cyborg Foundation

- 67 Alphabet/Google Genomics (US), Amazon (US), Illumina (US) Oxford Nanopore Technologies/Metrichor (UK)
- 68 CTRL-Labe (USI, Emotiv (USI, Neuralink (USI, maybe Burghask (US
- of No exemple found
- 78 Improbable (UK
- 71 European Organization for Astronomical Research in the Southern Herrisphere (European conscribute of 16 countries
- 72 No exemple found
- 73 Epicenter (Seeden) and Three Square Market 32M (US) are cides
- 74 No example found
- 75 Telet Bloedence (US
- June Therapeutica (US
- 77 Alphabe//Google (US), KETS (UK), IDQ (Switzerland), Inata (Danada
- 78 Derpe (US)
- 79 Kernel (US), Neuralink/Elon Musik (US), 2005 Initiative (Russia), Darpa (US), General Electric/Braingala (US), possibly Facebook (US
- As NATA (15) Cannas (15)
- 48 For example Variableck by Surrey NanoSystems (UN) 81 Apple IUSI Amagon IUSI: Alphabel/Gopple IUSI Microsoft (US)
 - 62 No exemple found as da lusi
 - 66 Lockheed Martin (US), Ginatiù (UK), Besion Dynamica/Solibank (US/Japan
 - as weeter fusil Peter fusil LV fusi
 - 84 Deep Knowledge Ventures (Hong Kong), Tielo (Finland)
 - 67 BAE Systems (UK), Tayola (Japan), NB. Big difference between splitsl carroullage and bending light to make things disappear
 - 64 Breakthrough Energy (US), RIPE (US), Joint Centre for Antificial Photosynthesis (US)
 - 89 SENS Research Foundation (US), Methuselah Foundation/Peter Trial (US)
 - 98 Facebook (US), Neuralink/Elen Musk (US)
 - 91 Suicide Machine (Netherlands), Just Delete Me (US) 92 No example found
 - 93 Turth Advanced Neuromodulation Group (Italy)
 - 96 Scoam (South Kereal) Revie and Restore (US
 - 95 No exemple found
 - 96 Rebeam (US), Salaren Corp (US)
 - 97 Thoth Technology (Canada)
 - 98 Improteble (UK), HelloVR (US), Magic Leep (US), Microsoft (US), See also Mind Mage (US), Pacebook US and possibly Apple (US)
 - 99 Descriptiv Alshabay Googla (US III AT I DATE WE CAN'T DAY

Enanging are parely illusinging and do not constitute any form of recommendation, validation or investment advice. Also note that landscape is confineally changing as breakeninglesse th cavitan. Them will also underbiedly be errors and minipidgements, so please use a bit of common series. Tech Foresight Pyce 8 Has to contact up to congretabilities, critician as or hay an tenchour address is techtomological impactive too can also www.techforesight.com

+ LATER The Small Print Constant and constanting Sinhard Melana and Asso Constal almperial Tech Romaight, Thanka are due to Gaty Lee, Simon Indemana, Thomas Heinis, Stephen Breen, Perior Childs, Maria Jameson Nik Rohwada, Roberto Tratta & Int Campbell. Cirialipher Holey, Thin Claireir, Guide Cupani, Gerard Gorman, Fran Giollani, Lewrence Writeley, and the Science Communication

states at imperial College for their involution assistant

100 at best periodicals

30 NASA (US)





Whose Technologies: Fringe science & technology. Defined as highly improbable, but not actually impossible. Worth watching. tron 3. Distant future 20 years + (Explore). Hortzon 2: Near future 16-20 years hence (Experiment). Hortz on 1: Happening now (Execute).

How to read entries Abbreviation of technology Sn-Smart napples _____ Description of technology DE ____Theme ISee rext right - Exemples See right hand panel

TIME* .

Themes broad themes, which are:

Dete Ecosystems

5A Extreme Autometion

HA Human Augmentation

HI Human-Machine Interactiona

SP Smart Planet

Each of the 100 technologies has been subjectively categorised according to five

The purpose of this publication is to make indefiduals and mitholicing future meets along to make people think.

21 Softbank (Japan), AIST (Japan), Blue Freg Robetice

(Netherlands), Sameung (South Konse), Dyson (UK), Miele (Sermany), Robot (US)

- 23 Impossible Rods (US), Memphis Meste (US), Super Mest Remail, Rinkes Foods (US), New Harvest (US)
- Volocopier (Germany), etteng (Chine), Pieggio (Itely

- 29 NatureWorks (US), Gruppo MAIP (Italy), Genomatics (US), Green Dut Bioplastics (US)

66 IBM (US), Toyota (Japan), Mimoaya (Japan),

It is a mattern of prediction and previous ten interched to attinuitate

considered where accessing potential impact, expectable the wider

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Hast importantly, the technologies highlighted on this table appa-without any discussion of moralism which links on.

hologies alway a minamber that "will great power comes great

General@speaking no lechrology should be used unless if in an condition and with potentially discussion

second in the second

preside the Parch Revolution

debate, but be seen that other elements also all always be

65 Realbeits (US), True Companion (US

ranging from Solderman DeSpeck, Toda Charthill Reservational Version I (Unit), London, January 2018.

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The presentation is intended only to serve as reference point and cannot substitute studied opinions on specific matters. All opinions and interpretations expressed are that of the presenter. ICAI does not endorse or ascribe to the views / opinions / interpretations.

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