Resiliency and Business Innovation

Embracing Change

Successful Transitions in the Post-COVID19 Environment

A Course for Support Practitioners

Lesson 2: Digital Transformation and Case Studies

June 16, 2021, 6:00pm-8:30 pm

Linton Wells II, J.P. Auffret, Robert Rogers

Puerto Rico Science, Technology & Research Trust

Center for Resilient and Sustainable Communities

ECHAR PA'LANTE

Overview for Entrepreneurs Support Practitioners' Course:

Embracing Change: Helping Senior Business Leaders and Academics Provide Mentoring and Teaching to Business Owners and Operators

Resiliency and Business Innovation

Introductions

Sponsored by: U.S. Economic Development Administration

Lucy Crespo, CEO

Puerto Rico Science, Technology & Research Trust

Annie Mustafá Ramos

Resiliency and Business Innovation

A program of the: Puerto Rico Science, Technology & Research Trust

Gilberto Guevara

Puerto Rico Science, Technology & Research Trust

Gloria Viscasillas Aponte

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George Mason University

Lin Wells, Ph.D.

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Course Overview

Embracing Change

Successful Transitions in the Post-COVID19 Environment

Linton Wells II, lwells9@gmu.edu, 202.436.6354

Lesson 1:
Overview and Introduction

(June 15)

- Changes in the international environment and their impacts on Puerto Rico
- Growing, expanding, and adapting a business under these conditions
  - Business clusters
- Introduce ideas about

  (a) growing a business

  (b) expanding products and services, and

  (c) adapting and pivoting in a post-COVID19 world (which must include a large measure of digital transformation)

Linton Wells II, lwells9@gmu.edu, 202.436.6354

Lesson 2:

“Embracing Change” and Time (June 16)

- **Continue developing ideas** about (a) growing a business, (b) expanding products and services, and (c) adapting and pivoting in a post-COVID19 world in light of **“Embracing Change” and the element of time and future uncertainty in business.**
- **Case studies in several business sectors**
- **Approaches to developing mentoring engagement and fostering strategic business insight.**

Linton Wells II, lwells9@gmu.edu, 202.436.6354

Lesson 3:

The importance of an effective, adaptable, business resilience plan, and keeping it up to date

(June 17)

- **Overview of Embracing Change**
  - Growing Your Business
  - Creating New Products and Services
  - Adapting & Pivoting
- **Case Study Methodology**
- **Craig's List – Test Case**
- **Case Study:** Chocolates El Rey (Growth Issues)
- **Case Study:** Concha y Toro (New Products and Services)
- **Case Study:** Infosys (Adapting & Pivoting)

Linton Wells II, lwells9@gmu.edu, 202.436.6354

Who Is Attending

Entrepreneurs Support Practitioners

Organizations Include: Universities, Financial Institutions, NGOs, Professional Associations, Businesses, Government, Philanthropic Organizations, Research Institutes

Sectors Include: Academia, Agriculture, Arts, Business Development, Childhood Development, Design and Fashion, Energy, Entrepreneurial Development, Finance, Healthcare, Human Resources, Law, Management Consulting, Manufacturing, Municipal Government, Philanthropy, Research and Development, Teaching and Education

Roles Include: Presidents, Executives, Board Directors, Entrepreneurial Consultants, Program Mangers and Directors, Professors, Attorneys, Administrators, Innovation Managers, Program Associates, Educators and Teachers, HR Consultants, Advocacy Focus Official, Management and Business Consultants, Researchers

Cities/Region Include: Aguadilla, Arroyo, Caguas, Canovanas, Carolina, Cidra, Coamo, Guayama, Guaynabo, Gurabo, Mayaguez, Penuelas, Ponce, Rincon, San German, San Juan, Trujillo Alto, Utuado, Vega Baja, Virginia

GEORGE MASON UNIVERSITY

Course Learning Outcomes (1)

By the end of the course, participants will have:

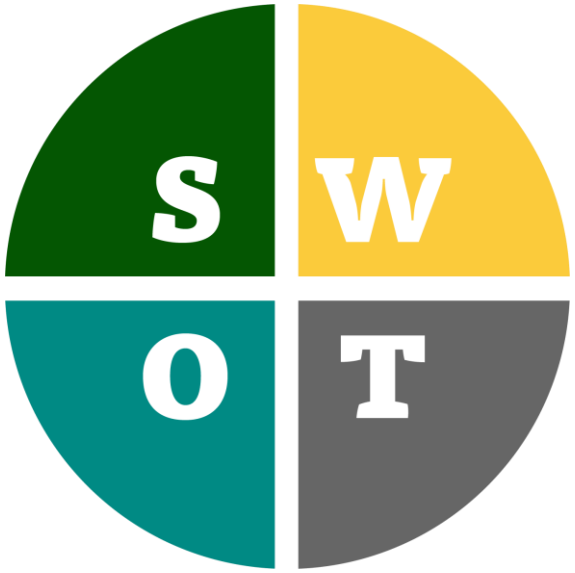
- An understanding of what changes in the international environment are expected in the next five years and how these will affect Puerto Rico.
- Been introduced into ideas about (a) growing a business, (b) expanding products and services, and (c) adapting and pivoting in a post-COVID19 world (which must include a large measure of digital transformation).
- Examined case studies in several business sectors
- Learned how to develop learning materials tailored to the business owners and operators you'll be teaching and mentoring, along with SWOT analyses (strengths, weaknesses, opportunities, threats). How to use these to engage with for mentoring and teaching.

Course Learning Outcomes (2)

And will be able to:

- Develop your own training and mentoring for separate sessions in Spanish that they would then teach to business owners and operators. Topics could include:
  - How would you know when it's necessary to pivot to a new business model, vice adapting what you've been doing? What might be some options?
  - How do you actually pivot?
  - What information would you ask of the owners in developing their decisions to adapt or pivot?
- The importance of an effective, adaptable, business resilience plan, and keeping it up to date.

Course Learning Outcomes (3)



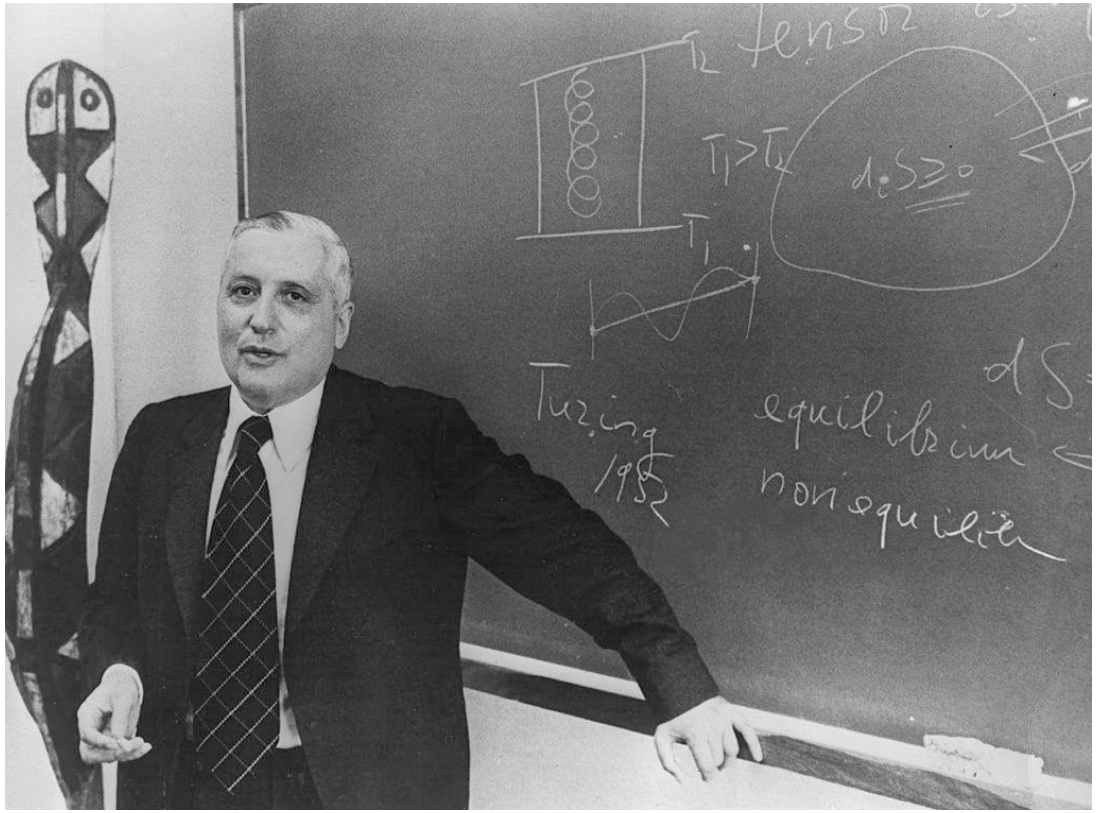
And have learned:

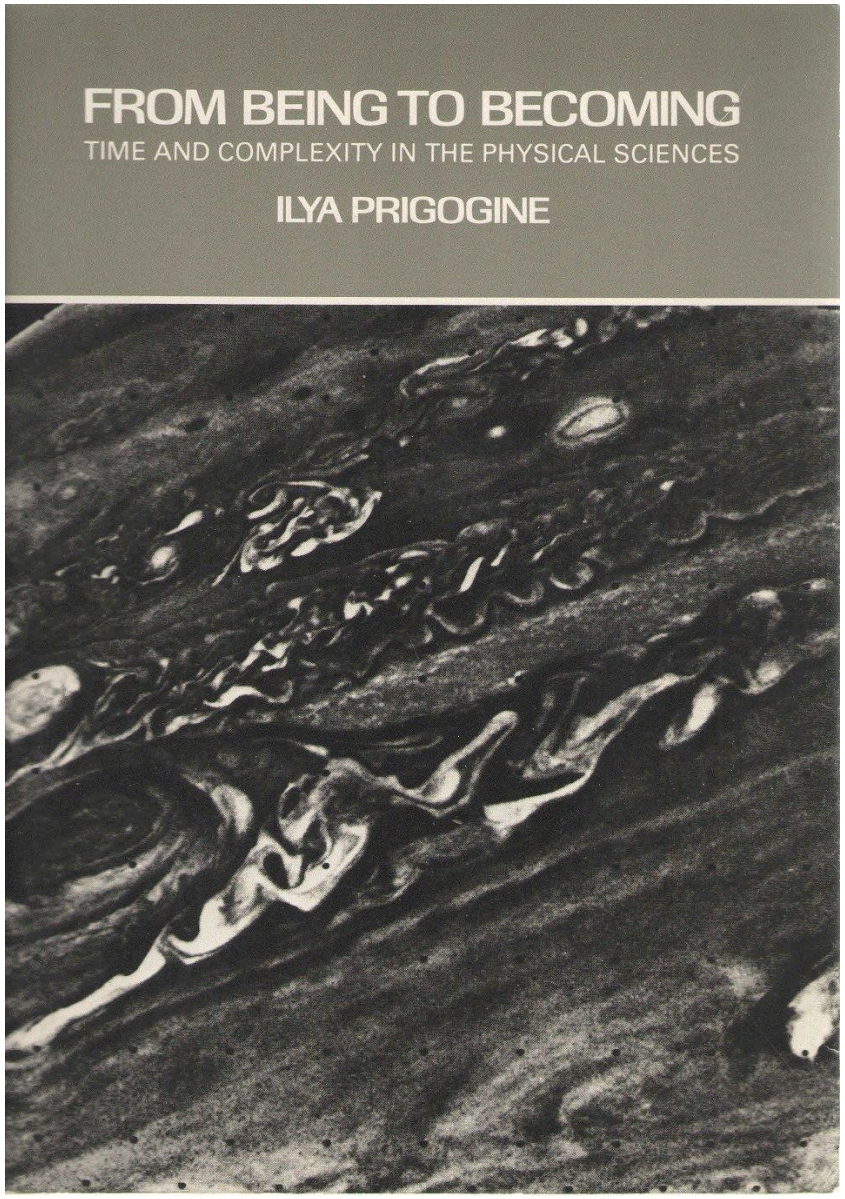
- What resources are available to small and medium businesses to help understand, and adapt to, pending changes in Puerto Rico, including special assets related to the post-COVID-19 environment
- The value of a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis in guiding choices

Today's Agenda

- "Embracing Change" and the Element of Time and Uncertain Futures in Business
- What Do You Have to Assume in Order for the Business to Be Successful?
- Hyperloop Transportation Technologies
- Delphi Method
- Uber Air
- Break
- Technology Readiness Levels
- Dialectical Approach to Strategy / Strategic Assumption Analysis
- Considerations of a Business Plan
- Rich Pictures

Ilya Prigogine - 1997 Nobel Prize in Chemistry





Source:
Barron's

Source:
Foreign Policy

24 Industries and Technologies That Will Shape the Post Virus World – CB Insights

Healthcare – Using data, wearables, and VR to make care more accessible

Telehealth technology; Continuous & remote diagnostics; Teletherapy; Virtual fitness & gyms; Senior care & ageing in place

Work – Sudden surge in remote work accelerates digital infrastructure

Telecommuting tech; Enterprise virtual reality & content

Manufacturing – 3D and automation technology boost industry's agility and flexibility

3D printing; industrial automation & robotics

Retail – Shopping goes even more online as grocery joins the e-commerce revolution

Online grocery; enhanced e-commerce

Customer Service – Customer experience goes virtual with conversational AI

Conversational AI / chatbots; cloud call centers

Finance – Demand for contactless options accelerates digital adoption

Contactless payments; branchless banking; parametric insurance

Security – Higher Internet usage and data generation lead to increased investment

Personal surveillance technology; distributed cybersecurity

Entertainment – "Real World" goes online with virtual reality and virtual events

Social online gaming; virtual events

Food services – Social distancing propels take-outs and deliveries to success

Restaurants & grocery delivery; cloud kitchens

Government
Office for Science

The Futures Toolkit

Tools for Futures Thinking and Foresight
Across UK Government

Edition 1.0
November 2017

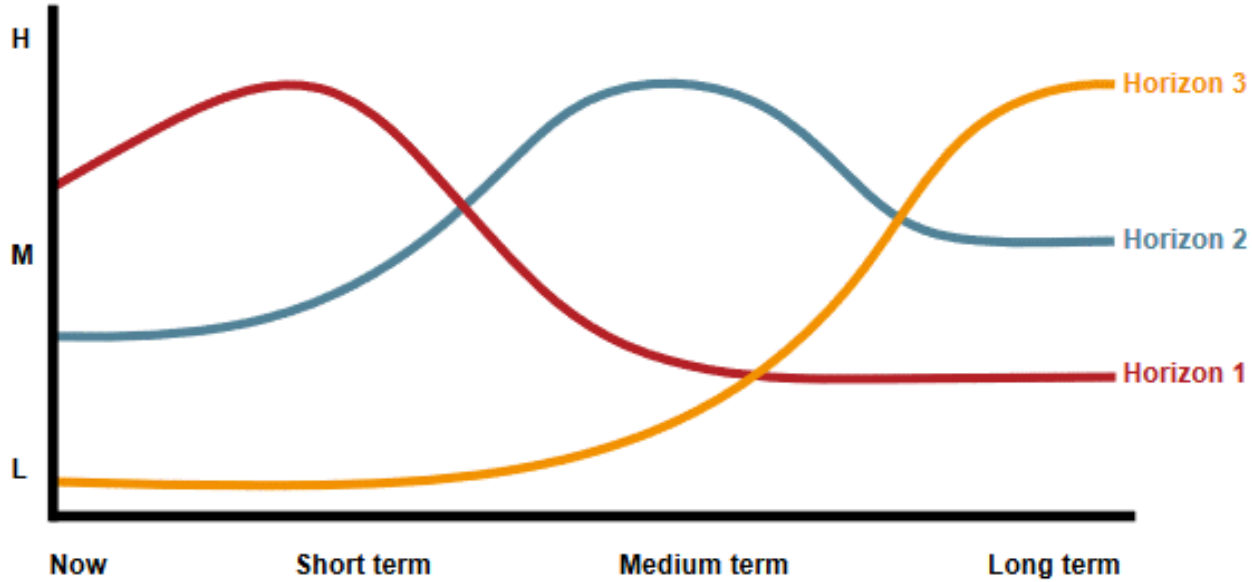


Figure 1: The three horizons model

Seven Questions (Shell)

- If you could speak to someone from 2030 who could tell you about the Puerto Rico Science, Technology and Research Trust and its entrepreneurship initiative, what would you ask?
- What is your vision for Puerto Rico Science, Technology and Research Trust and the initiative?
- What are the consequences if your vision is not realized?
- What needs to change to make your vision a reality?
- Looking back, are there particular lessons – successes, failures – from the last 10 years that we can learn from?
- What needs to be done now to make sure your vision is realized?
- If you had the power to make anything happen, is there anything else you would do?

What do you have to assume in order for the business / strategy to be successful?

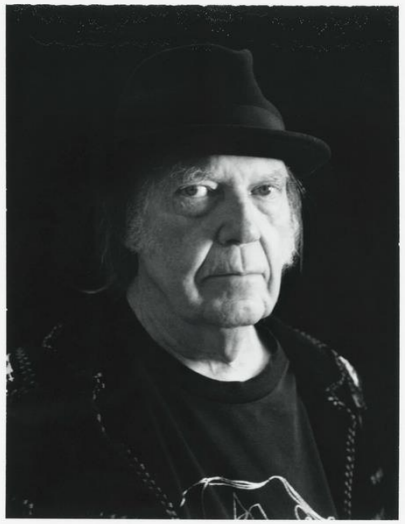
Project Better Place

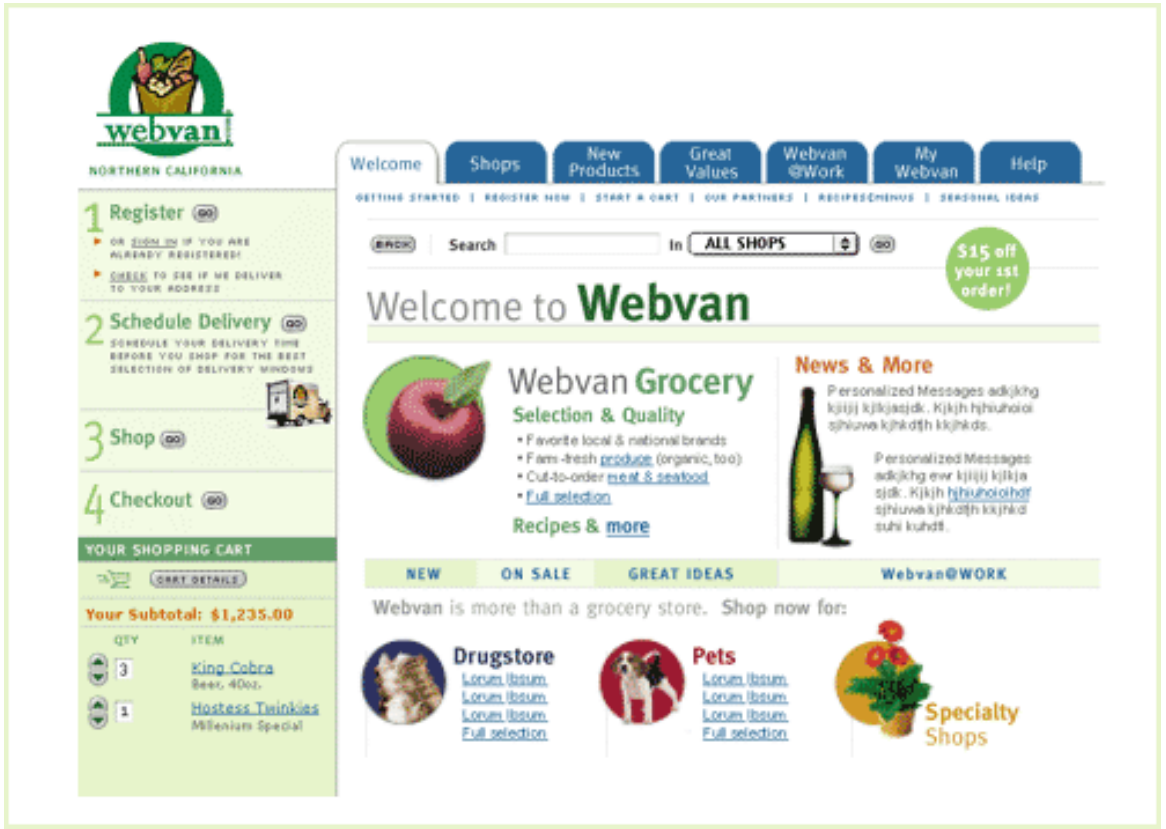
The New York Times Magazine

FEATURE

Neil Young's Lonely Quest to Save Music

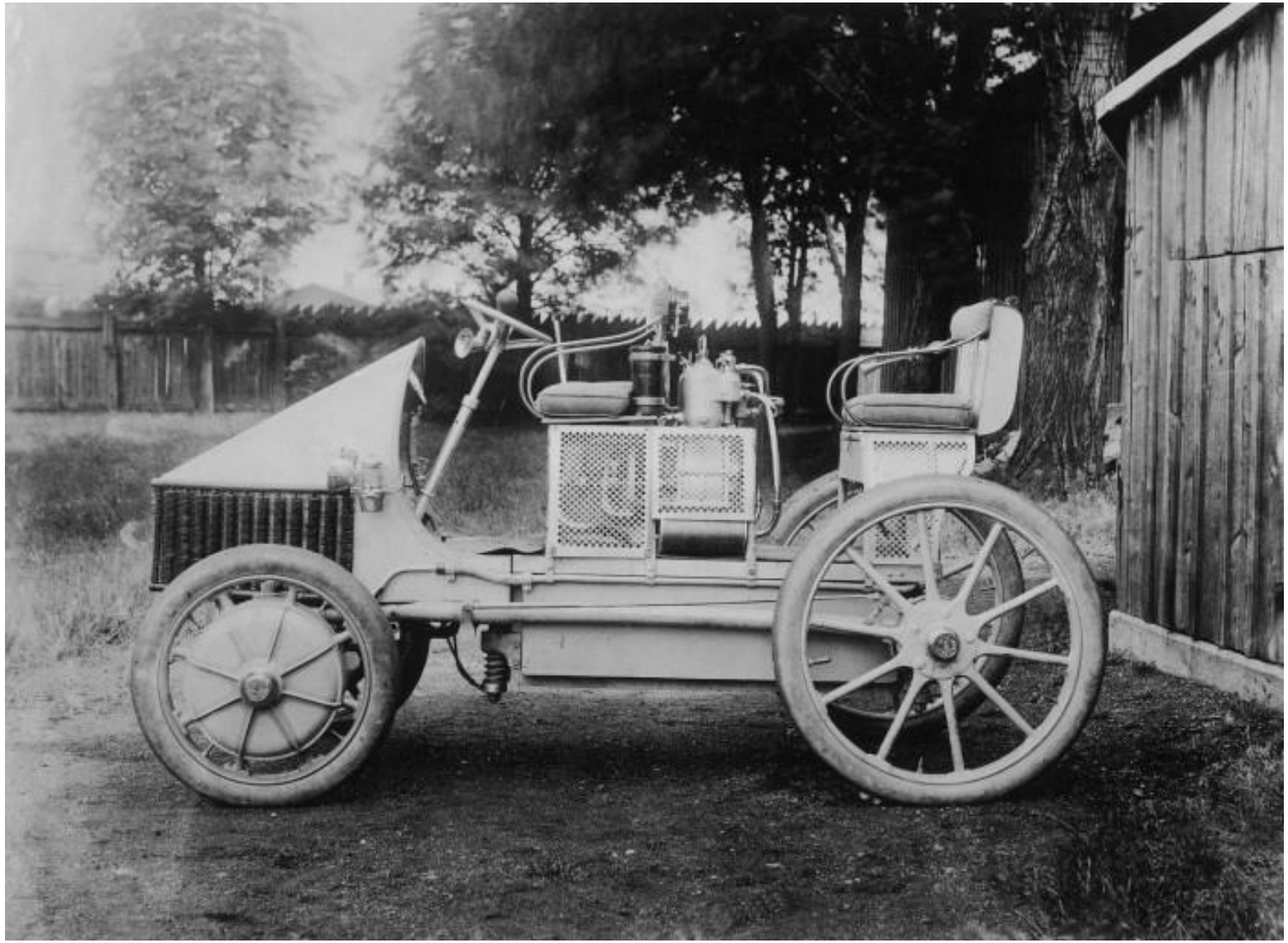
He says low-quality streaming is hurting our songs and our brains. Is he right?





Source: San Francisco Chronicle

Electric and Hybrid Cars



1901 Lohner Porsche Semper Vivus - Hemmings

About Omics

Omics Global Solutions (OGS) was born as a company whose objective is to be the platform for the development and commercialization of products related to OMICS sciences (proteomics, among others.) Associated with innovative projects that positively impact the lives of patients and medical professionals.

Located in Puerto Rico (USA), its first milestone is the development, manufacture and commercialization of a test based on recently discovered biomarkers, to identify the risk of developing Diabetic Nephropathy. **INNOVATIO ND2™**

Webvan Stock Price Closes 65% Above Initial Offering

By MATT RICHTEL NOV. 6, 1999

Webvan Group, an online grocer that has overcome several financial and regulatory obstacles, rolled ahead in its first day of public trading today to achieve a market value of $7.9 billion.

A month ago, Webvan, at the request of the Securities and Exchange Commission, agreed to postpone its scheduled stock offering because the company, in a conference call to select investors, had disclosed financial information that was not included in public documents.

The company was expected to post a loss of $65 million this year -- high even by the standards of Internet start-ups -- and has forecast operating losses for the "foreseeable future."

But neither problems with the S.E.C. nor loss projections have sunk Webvan, which has been the darling of an investment community intrigued by the promise of moving the grocery market to the Internet.

On Thursday night, Goldman, Sachs, the lead underwriter of the stock offering, raised the estimated price range to $13 to $15 a share, from $11 to $13. At $15 a share, Webvan received a capital infusion of $375 million.

On Friday, when public trading started, the stock rose as high as $34 and ended 65 percent above the offering price at $24.875. Percentage-wise, the

BUSINESS DAY

Online Grocer Webvan to File for Bankruptcy

By REUTERS JULY 9, 2001

Filed at 8:40 a.m. ET

PALO ALTO, Calif. (Reuters) - The online grocer Webvan Group Inc said today that it is closing down after a long struggle to stay in business.

In a press release, the company said it has ceased operations in all markets and intends to file for Chapter 11 bankruptcy protection.

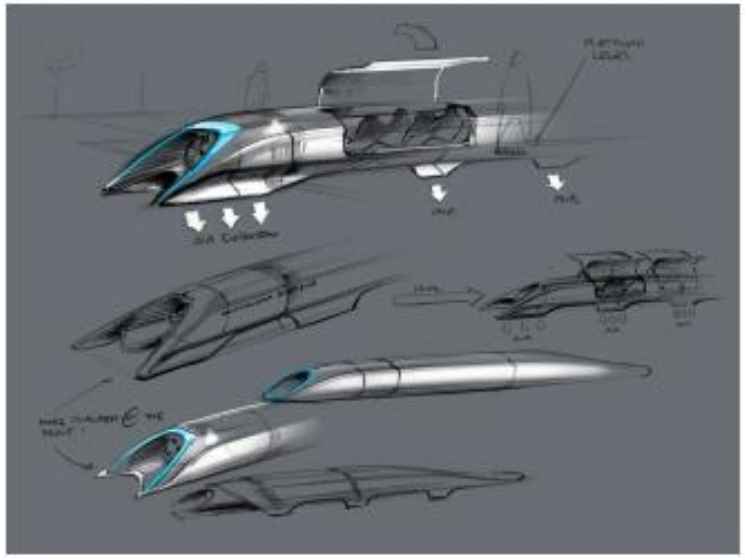
The company said it has no plans to resume operations and it will pursue an orderly wind down of its operations and sale of its assets and business.

"We took this action rather than continuing to operate with high losses and decreasing cash," Robert Swan, chief executive officer of Webvan, said in a statement. "Webvan has weathered numerous challenges, and in a different climate I believe that our business model would prove successful. At the end of the day, however, the clock has run out on us. I would like to thank our employees, loyal customers, and stockholders for their support."

Webvan made no secret in recent months that it was in a fight for its survival, and that its ability to stay in business was more in doubt the longer

Hyperloop Transportation Technologies

Hyperloop Alpha



Intro

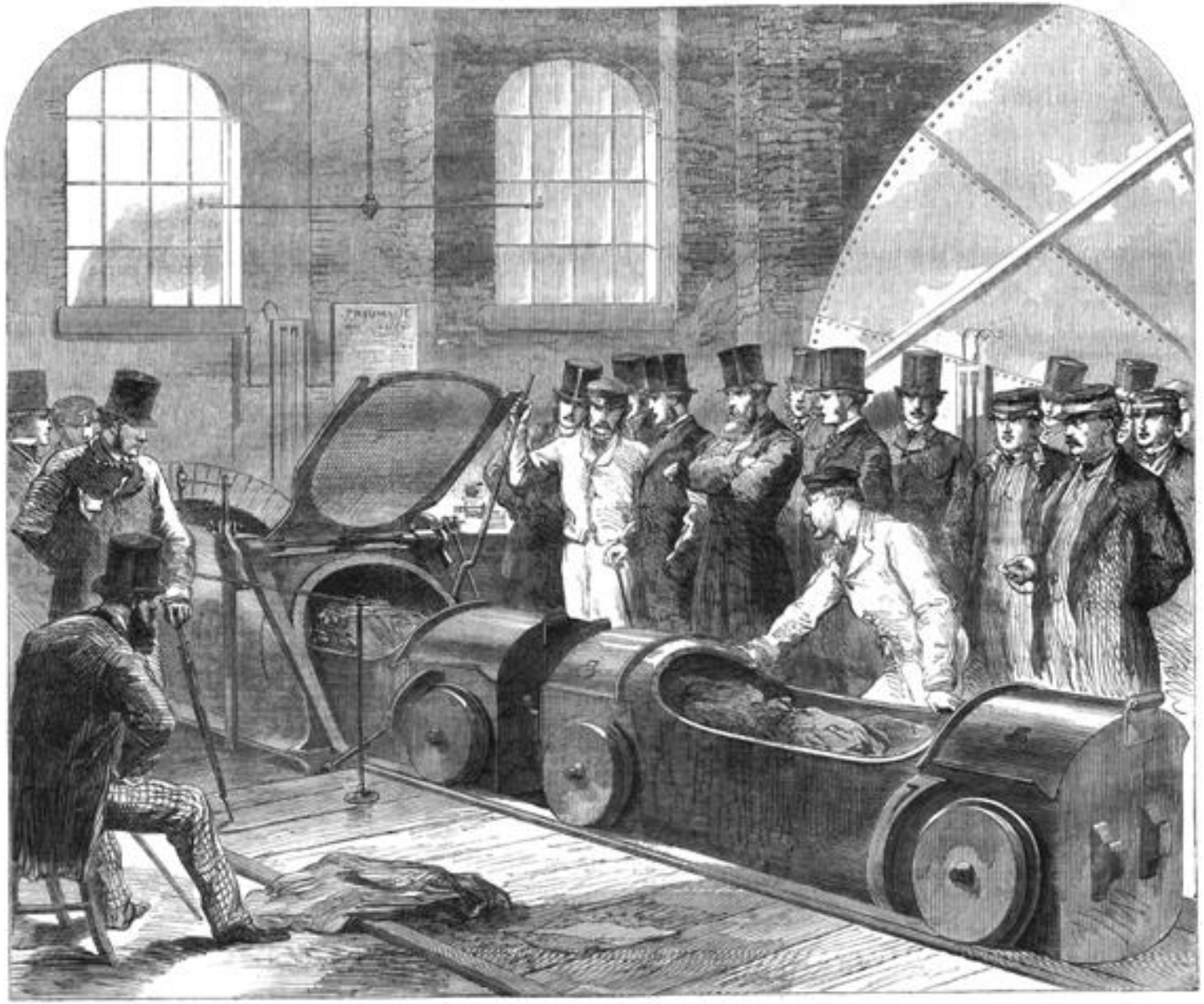
The first several pages will attempt to describe the design in everyday language, keeping numbers to a minimum and avoiding formulas and jargon. I apologize in advance for my loose use of language and imperfect analogies.

The second section is for those with a technical background. There are no doubt errors of various kinds and superior optimizations for elements of the system. Feedback would be most welcome - please send to hyperloop@spacex.com or hyperloop@teslamotors.com. I would like to thank my excellent compadres at both companies for their help in putting this together.

Background

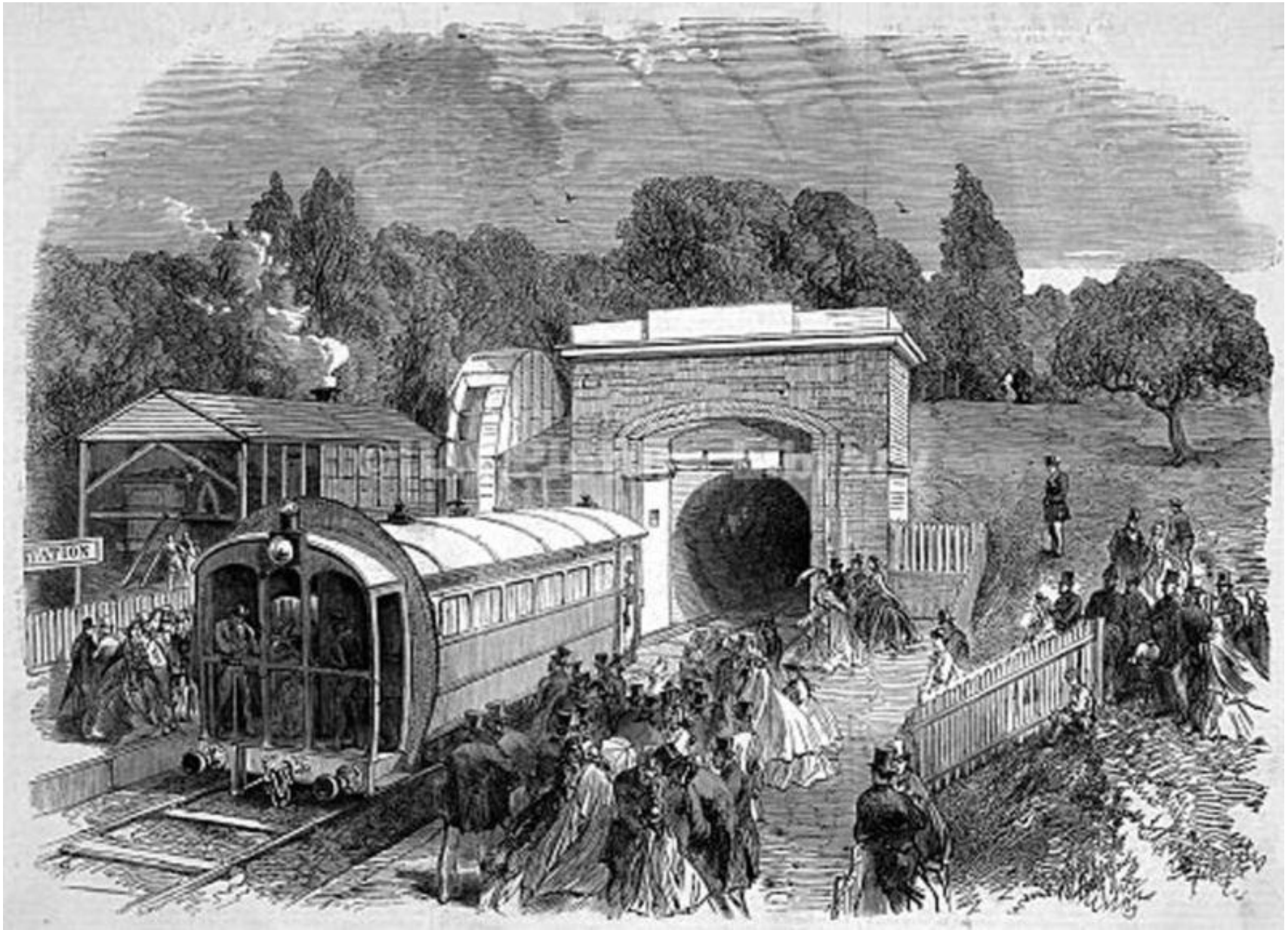
When the California "high speed" rail was approved, I was quite disappointed, as I know many others were too. How could it be that the home of Silicon Valley and JPL - doing incredible things like indexing all the world's knowledge and putting rovers on Mars - would build a bullet train that is both one of the most expensive per mile and one of the slowest in the world? Note, I am

Hyperloop Alpha paper, Elon Musk, Tesla and SpaceX, 2013

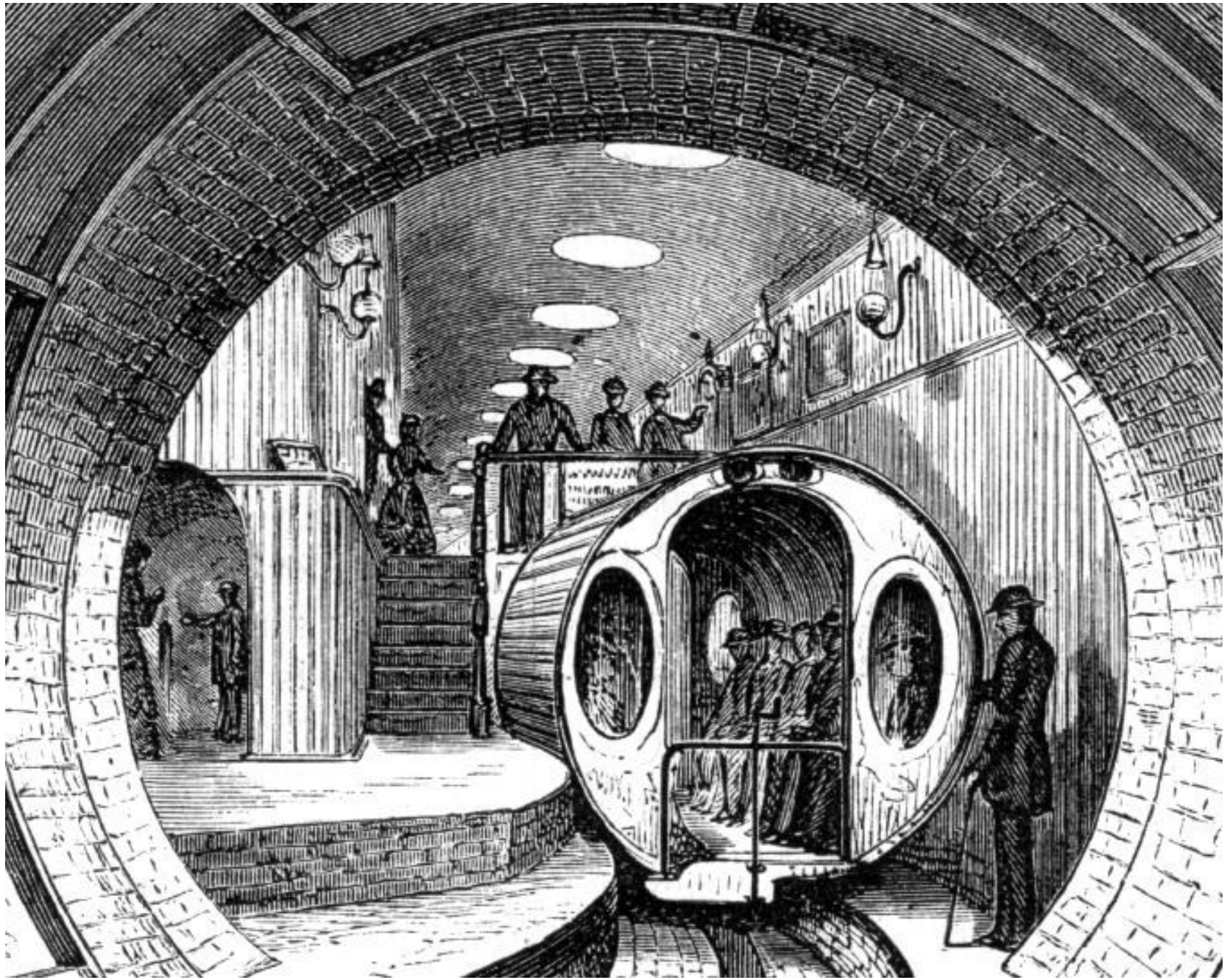


FIRST DESPATCH OF MAIL-BAGS THROUGH THE PNEUMATIC TUBE FROM THE DISTRICT OFFICE IN EVERSHOLT-STREET TO EUSTON STATION.—SEE PAGE 317.

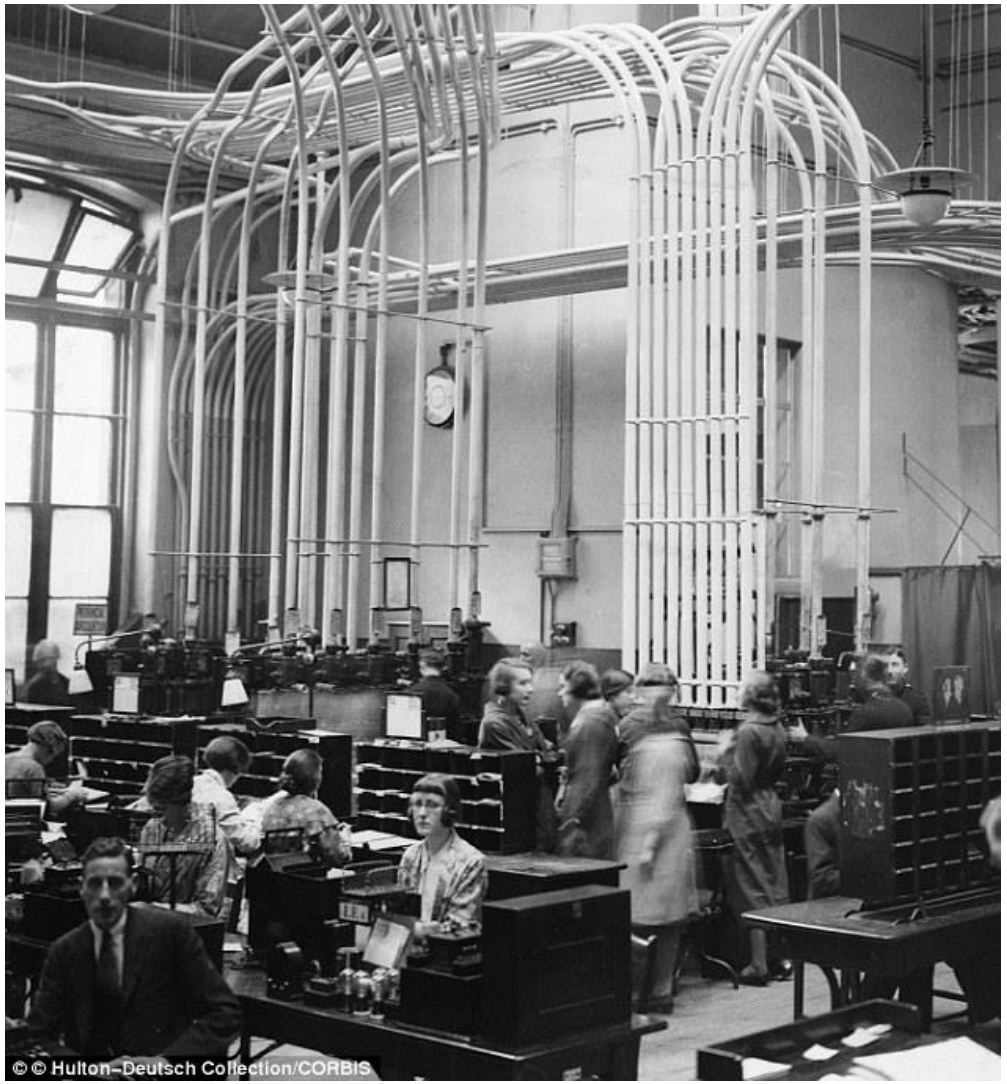
Pneumatic Mail
System London 1863



Crystal Palace
Pneumatic Railway - 1864



Beach Pneumatic
Transit – 1870 (Columbia)

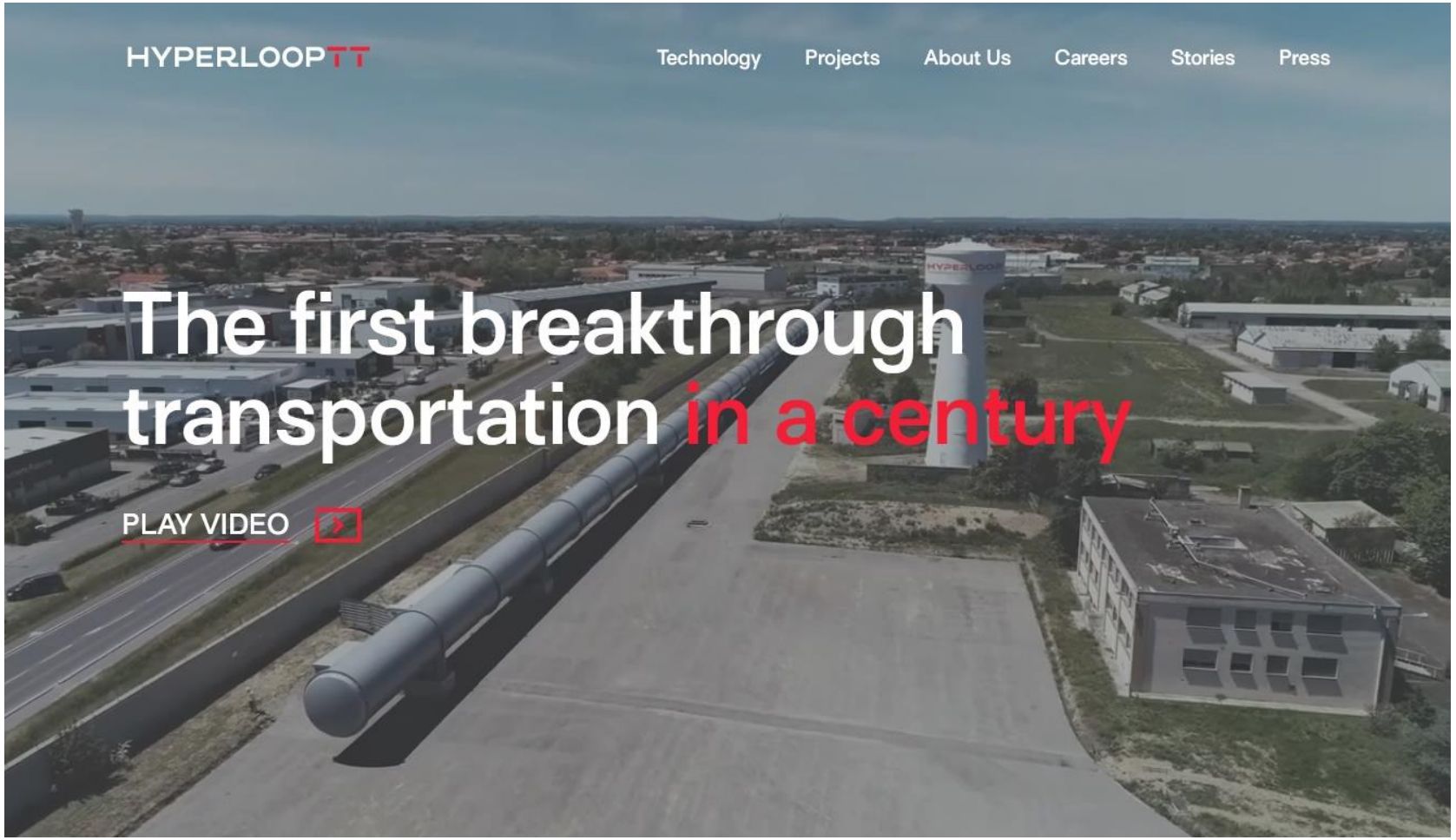


U.S. Post Office, New York

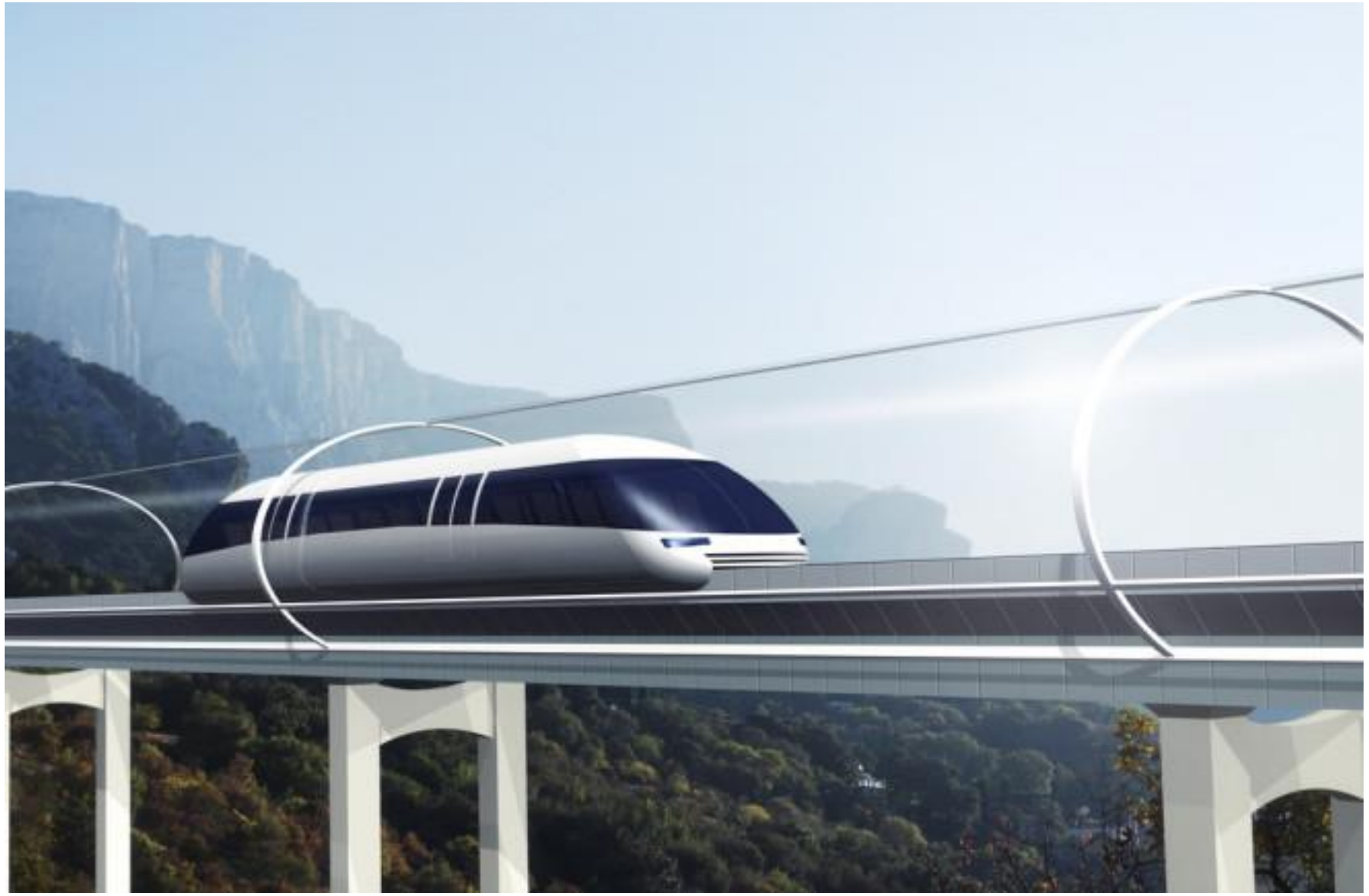
New York Life Insurance

https://vitalvegas.com/elon-musks-tunnel-project-is-underway-at-las-vegas-convention-center/

Hyperloop Transportation Technologies



“Ecosystem supported by crowd powered platform”

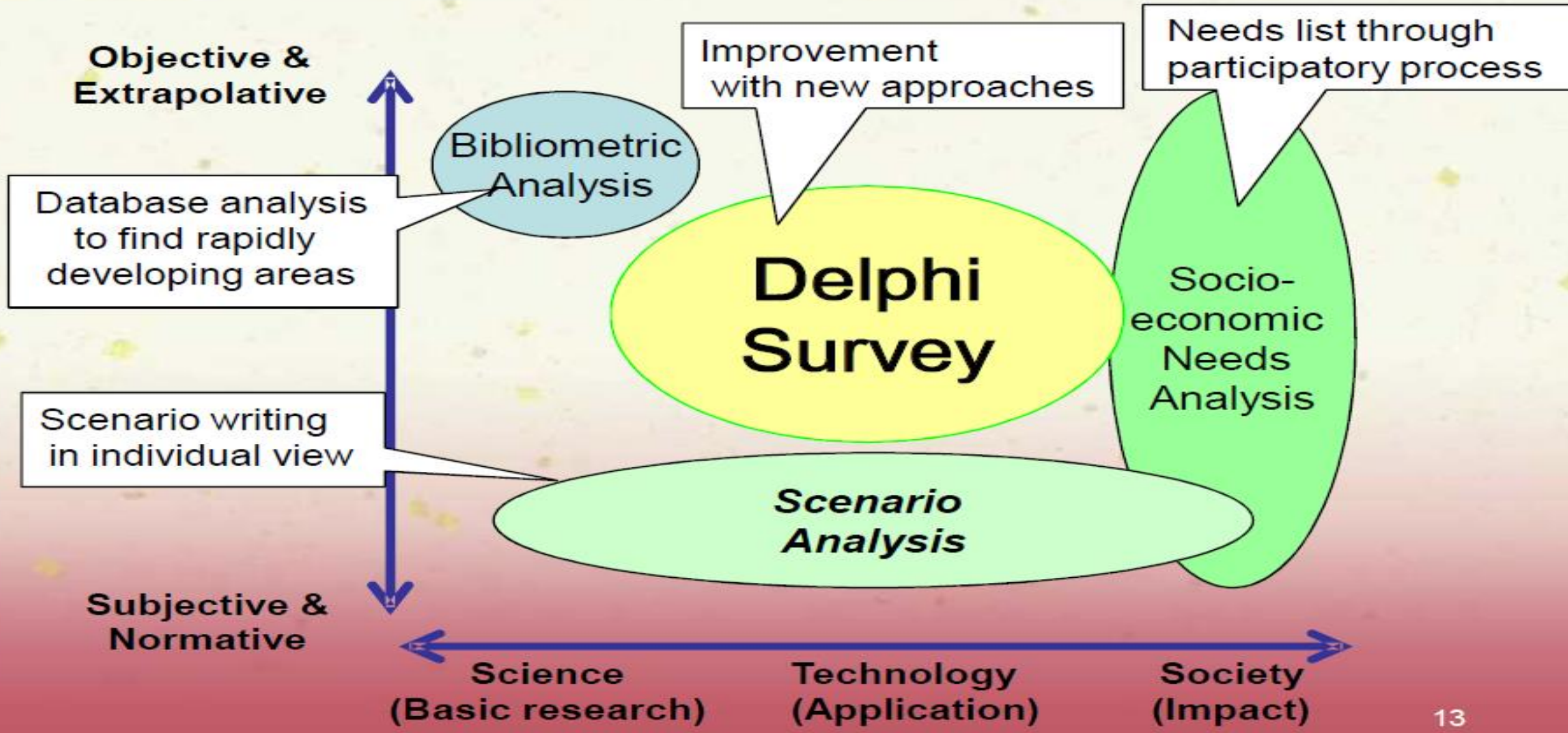


Source – Discover Magazine / Andrei I., Shutterstock

Dephi Method

Strategic Technologies for the Army of the 21st Century (Published 1993; Review 2008)

8th Foresight survey Multi-methodology Foresight



NISTEP REPORT No.140

A report on study supported by Special Coordination Funds for Promoting Science and Technology, FY2009

The 9th Science and Technology Foresight
-Contribution of Science and Technology to Future Society-

The 9th Delphi Survey

(Summary)

March 2010

Science and Technology Foresight Center

National Institute of Science and Technology Policy

Panel 4:

Medical technology to contribute to healthy lifestyles of the nation's people using IT, etc.

Implementation of the questionnaires

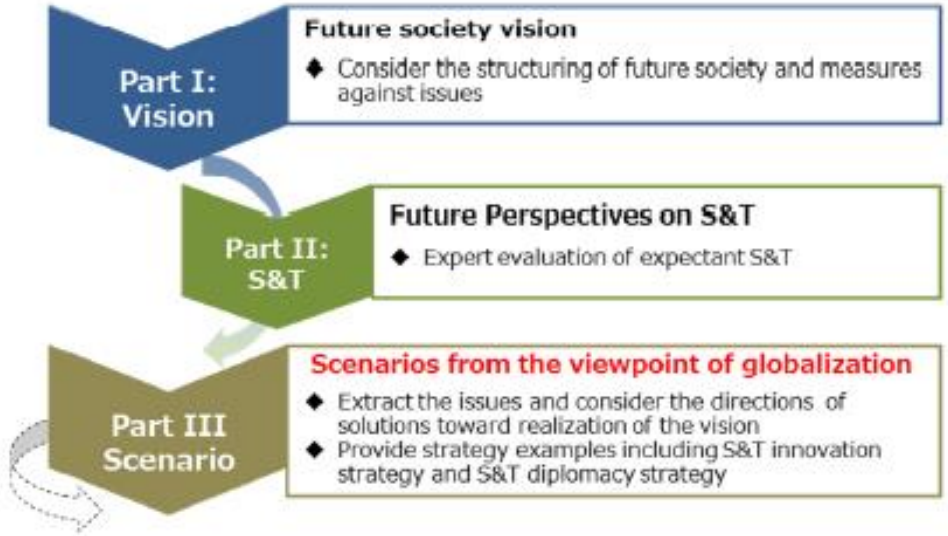
	Sent	Returned (response rate)
<1st Round>	243	191 (79%)
<2nd Round>	191	164 (86%)

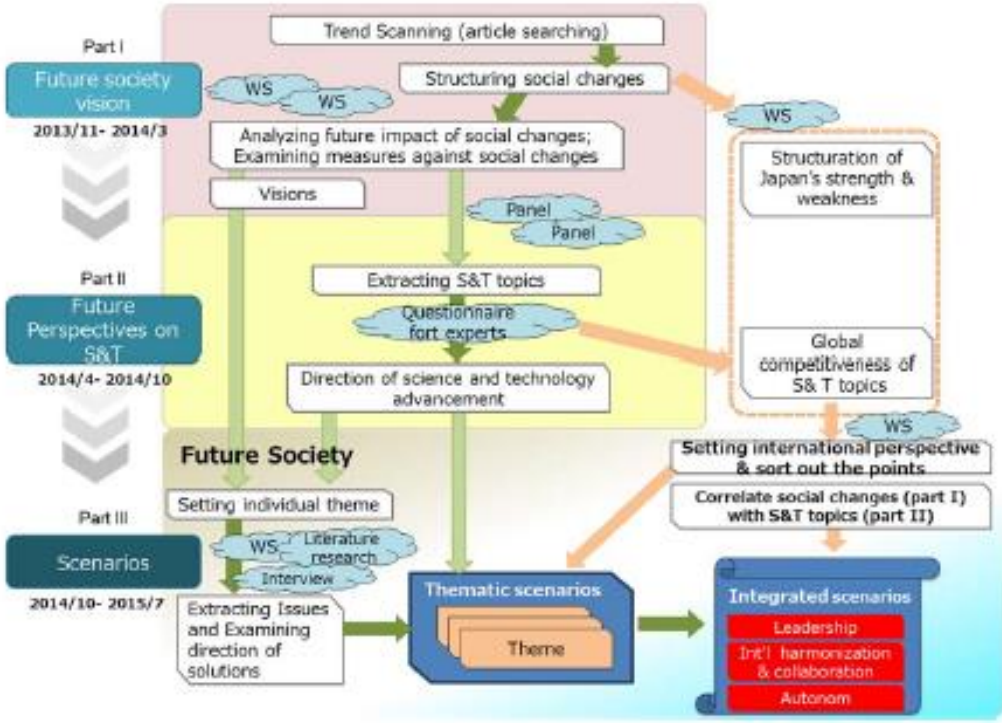
Sex	Male	143	Affiliation	Private enterprise	14
	Female	21		University	118
	N.A.	0		Research Institute	18
generation	20's	0		Association	4
	30's	12		Others	10
	40's	23		N.A.	0
	50's	86	Job category	R&D	109
	60's	36		Others	54
	70's and over	7		N.A.	1
	N.A.	0		Total	164

Survey items

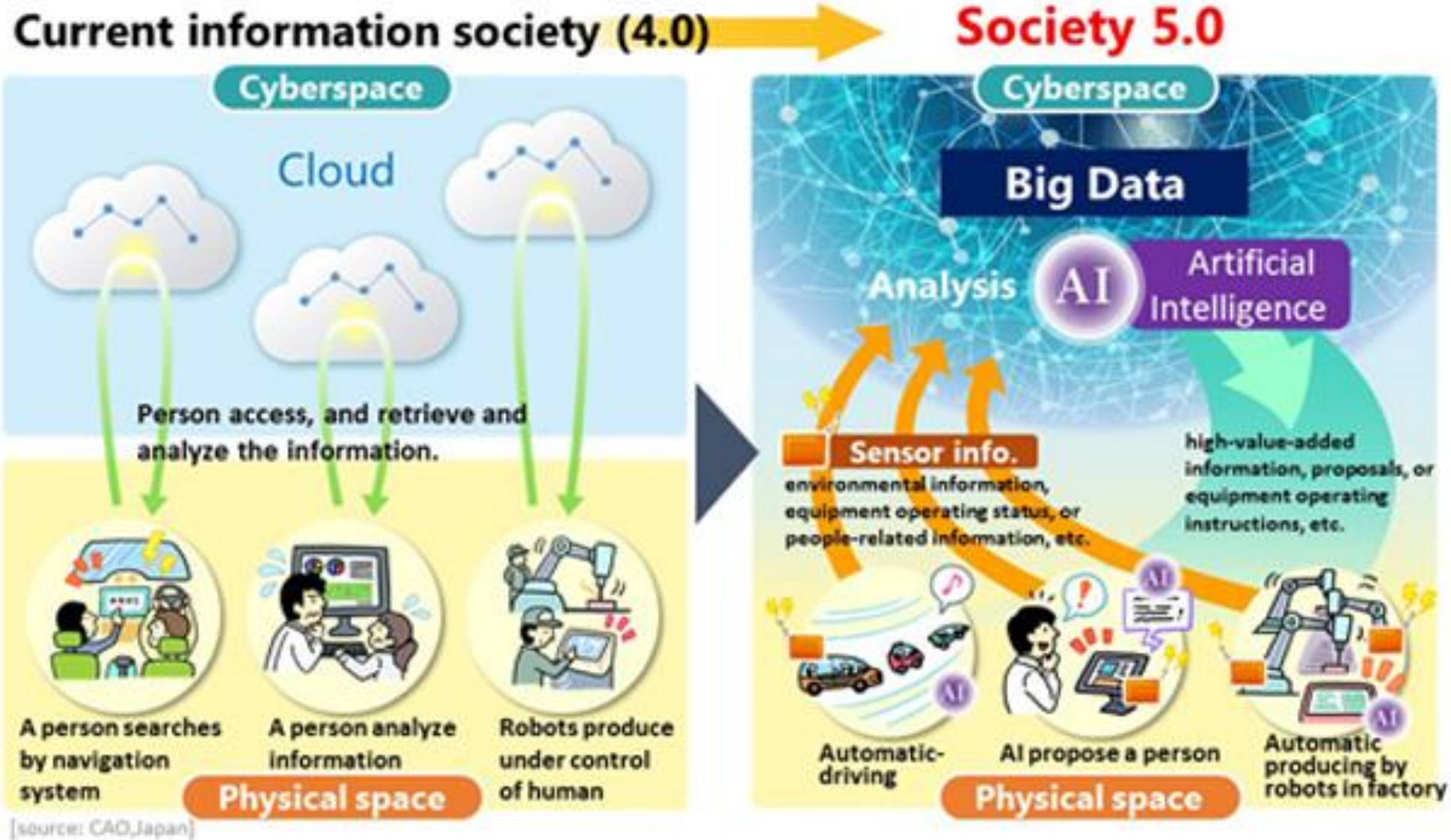
A: Medical treatment aiming at safety and security
B: Creation of new medical technology
C: Development of predictive and preventive medicine
D: New regulatory science for medical treatments
E: Expansion of medical treatment to the social system

Area	Topic number	Topic	Round	Responses	Degree of expertise (%)				Importance (%)				Forecasted time of technological realization (to be realized somewhere in the world)							Sectors that will pave the way to technological realization (%)					Forecasted time of social realization (To become applicable/widely used in Japan)						Sectors that will pave the way to social realization (%)					
					High	Moderate	Low	None	Important for Japan and the rest of the world	Especially important for Japan	Especially important for the world	Low importance/priority	Already realized	2011-2015	2016-2020	2021-2030	2031-2040	2041-	will not be realized	don't know	University	Public research organization	Private enterprise	Collaboration of multiple sectors	Others	2011-2015	2016-2020	2021-2030	2031-2040	2041-	will not be realized	don't know	University	Public research organization	Private enterprise	Government	Collaboration of multiple sectors	Others
Medical treatment aiming at safety and security	1	Stroke rehabilitation based on the prediction of functional prognosis.	1	120	25	27	48	-	68	37	1	4							1	8	67	40	18	47	2						1	8	38	27	27	28	42	2
			2	111	23	24	53	-	88	30	0	4							1	2	68	45	13	48	0						1	3	38	30	28	17	55	0
			E	26	100	0	0	-	88	12	0	0							0	0	68	38	19	85	0						0	0	48	38	19	15	58	0
	2	Preventive rehabilitation to slow the progression of intractable diseases such as progressive neuromuscular disease.	1	103	20	31	49	-	81	10	1	8							2	9	64	55	15	39	8						4	12	42	37	23	27	39	5
			2	98	20	28	52	-	84	8	0	8							1	6	70	51	14	38	3						2	5	51	38	19	17	49	2
			E	18	100	0	0	-	90	5	0	5							0	0	68	47	16	53	5						0	0	47	37	5	21	53	5
	3	A nano-machine that inactivates viruses at a molecular level.	1	90	7	31	62	-	89	2	1	8							8	12	73	51	28	22	11						8	18	42	35	41	17	32	10
			2	84	6	27	67	-	94	0	1	6							4	7	76	41	27	22	7						4	7	68	38	43	12	34	4
			E	5	100	0	0	-	80	0	0	20							20	0	80	20	20	0	0						20	0	20	20	40	20	40	0
	4	Development of pharmacotherapy based on the systematic comprehension of the conditions of chronic diseases (systems for drug discovery).	1	87	11	34	55	-	90	8	1	3							1	11	64	48	45	30	8						2	12	38	34	58	13	33	3
			2	82	11	32	57	-	94	2	1	3							1	9	71	43	40	29	4						2	9	47	34	58	4	33	1
			E	10	100	0	0	-	100	0	0	0							0	0	60	20	30	60	0						0	0	20	20	80	0	20	0
	5	Understanding the mechanisms for human diseases by establishing evolutionary medicine.	1	86	7	32	61	-	81	0	4	15							0	22	79	62	8	16	12												
			2	83	7	24	69	-	74	3	3	20							1	17	85	44	4	18	10												
			E	6	100	0	0	-	100	0	0	0							0	0	83	17	0	17	0												
	6	Assay of drug resistance of cancers.	1	86	14	34	52	-	90	1	5	4							1	6	83	64	39	28	9						1	8	45	42	48	14	24	9
			2	89	11	35	54	-	97	1	1	1							1	2	73	53	41	22	3						1	3	52	45	58	9	24	8
			E	10	100	0	0	-	90	0	0	10							10	0	70	40	50	20	0						10	0	40	60	60	0	10	0
	7	Immunological therapy with high specificity and long-term effects against the target infections.	1	82	12	34	54	-	88	1	8	2							0	7	68	57	37	22	12						1	8	47	42	43	16	24	10
			2	86	9	39	52	-	96	0	4	1							0	4	73	56	42	21	7						1	8	67	42	67	8	19	7
			E	8	100	0	0	-	100	0	0	0							0	0	38	38	38	25	0						0	0	25	38	50	0	38	0
	8	Technology capable of controlling specific immunological responses following transplantation of hematopoietic stem cells (allografts).	1	81	9	30	61	-	90	3	1	6							1	8	85	53	23	18	9						3	8	67	41	34	8	27	8
			2	77	8	34	58	-	96	1	0	4							0	3	88	48	24	14	5						1	3	78	41	37	5	20	4





10th Science and Technology Foresight - NISTEP



[source: CAO,Japan]

Exercise Topics (Question – Where Will Technology Adoption Be in the U.S. in Ten Years)

- Smart Home
- Autonomous Vehicles
- AI
- Robotics
- Blockchain
- Augmented Reality

Delphi Technology Forecasting Methodology

- Moderators develop open ended questions to help in framing the subject (identify trends and uncertainties)
- “List five factors that will impact the adoption of electric cars on the U.S. in the next ten years”
- Experts answer anonymously

Delphi Technology Forecasting Methodology

- Moderators develop structured questionnaire (based on the open ended questions responses) with experts ranking likelihoods (for example scale of 1 – 7; agree not at all to fully agree) and providing comments

- “60% of cars in the U.S. will be electric in ten years”

Delphi Technology Forecasting Methodology

- Moderators summarize results back to experts, reframe questions and ask if experts would like to change responses

- Move towards consensus

Uber Air and CES 2021

https://www.uber.com/us/en/elevate/
https://www.youtube.com/watch?v=F2mfrctxrTE

UBER Elevate

Fast-Forwarding to a Future of On-Demand Urban Air Transportation

October 27, 2016

Dallas – Fort Worth, Texas
"Urban Re-Vision“, BOKA Powell, Dallas

Bell Nexus


hollywood
CES®
2021

Samsung JetBot 90 AI

“Samsung's new JetBot 90 AI robot vacuum cleaner using object recognition technology to identify and classify objects in your home, and find the best cleaning path while avoiding cables and small objects. It also empties its own trash bin at its charging station, so you don't have to. JetBot's camera also lets it double as a home security device when paired with Samsung's SmartThings app.”

Alarm.com Touchless Video Doorbell

“Alarm.com's Touchless Video Doorbell is designed for the coronavirus age -- instead of pushing a button, the doorbell uses video analytics to detect when someone has arrived at your doorstep, letting you talk to them through an app with the built-in camera and microphone.”

Brondell Pro Sanitizing Air Purifier

“CES featured lots of air purifiers this year, but Brondell's new Pro Sanitizing Air Purifier stands out from the crowd because of how much it can do. It includes HEPA filtration, a disinfecting UV lamp, a nanocrystalline filter and a plasma generator, plus a prefilter, covering most airborne irritants and contagions you'd find in your house. The company says that it has been certified to capture and eliminate more than 99.9% of airborne coronavirus particles within 15 minutes. ”

Samsung Smart Trainer

“Samsung's Smart Trainer debuted at CES 2021. Part of the Samsung Health app, the Smart Trainer feature allows you to connect a webcam and app on your TV screen to track your workouts and offer guided personal training at home.”

Nobi Fall-sensing Lamp

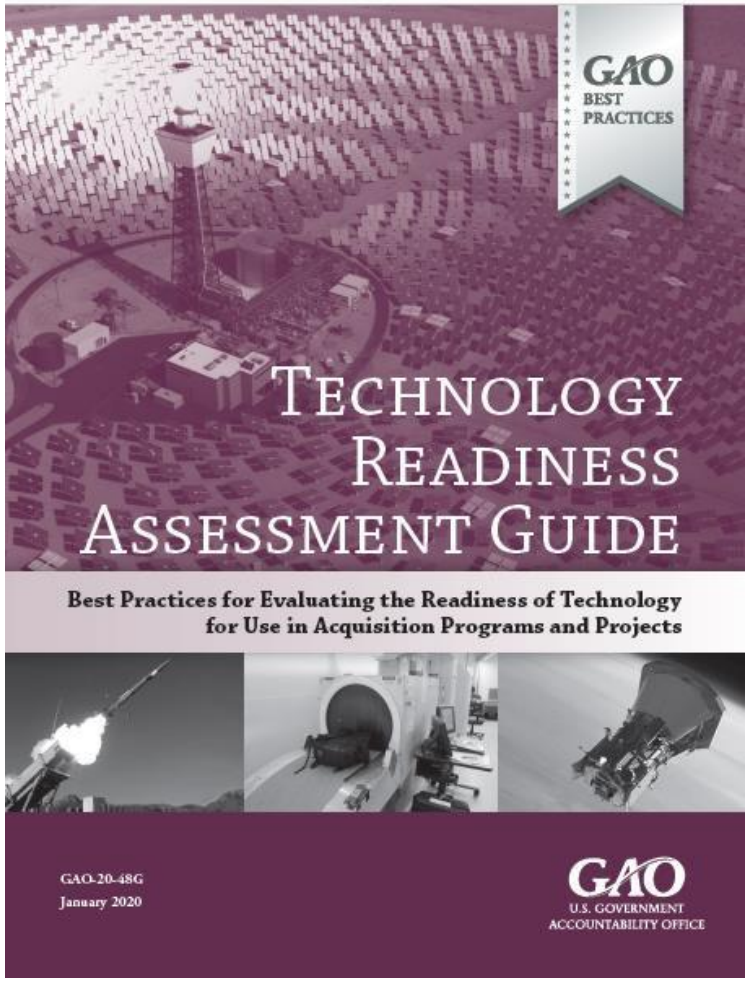
"The Nobi is a ceiling lamp packed with sensors meant to help older adults live independently for longer. It can detect falls and send out alerts to get help quickly, but also tries to prevent falls by monitoring activity and providing reminders. "

Technology Readiness

Case Study 2: Immature Technologies Increase Risk, an Example from DOD, cited in GAO-08-408

Before its cancellation in 2011, the Future Combat Systems—composed from 14 weapon systems and an advanced information network—was the centerpiece of the Army's effort to transition to a lighter, more agile, and more capable combat force. In March 2008, GAO reported that 42 out of the program's 44 critical technologies had not reached maturity halfway through its development schedule and budget at five years and $12 billion in spending. Major technical challenges, the Army's acquisition strategy, and the cost of the program, as well as insufficient oversight and review, all contributed to its subsequent cancellation.

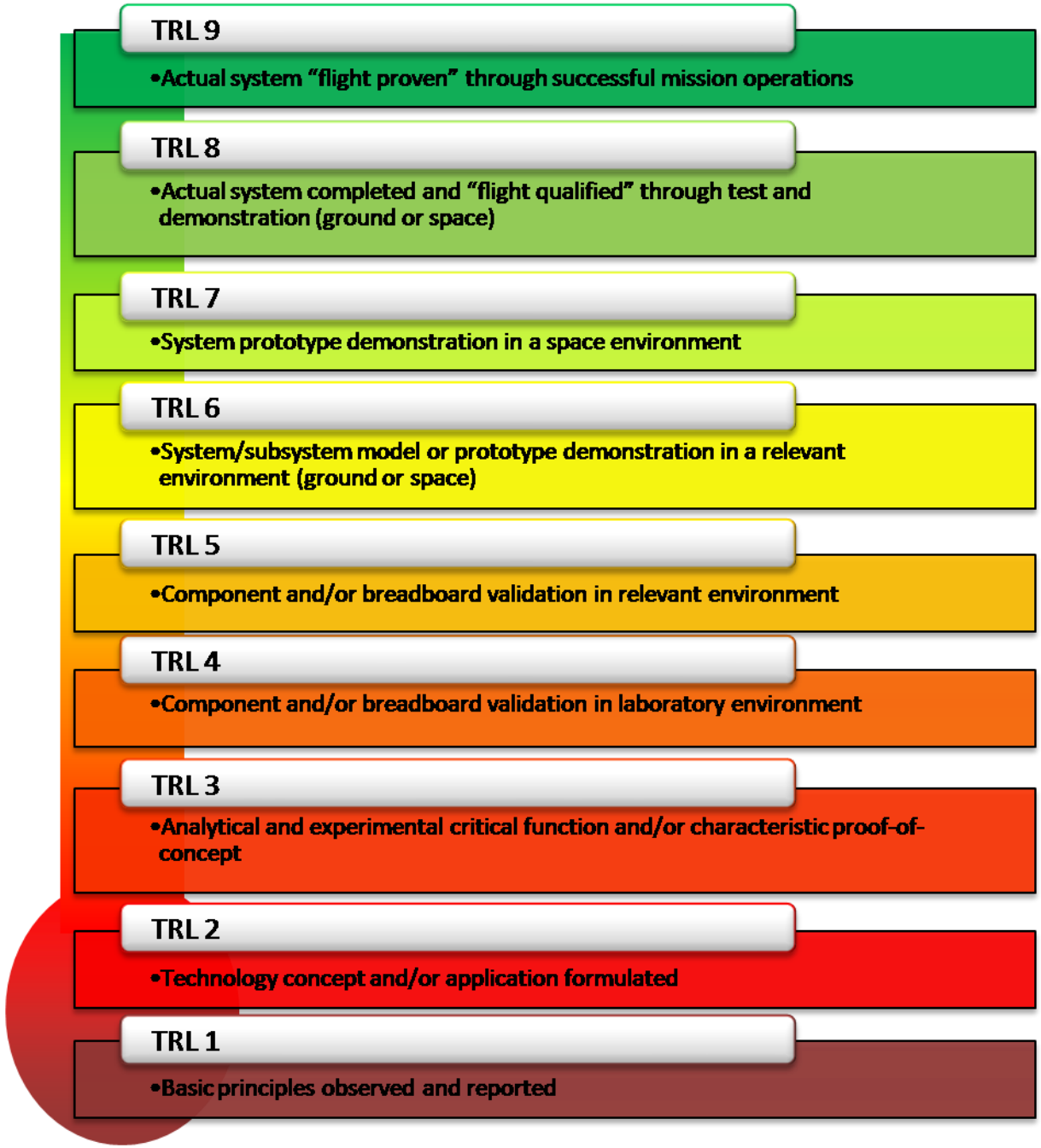
GAO, *Defense Acquisitions: 2009 Is a Critical Juncture for the Army's Future Combat System*, GAO-08-408 (Washington, D.C.: March 7, 2008).



Case Study 4: Space Programs Often Underestimate Costs, an Example from DOD, cited in GAO-07-96

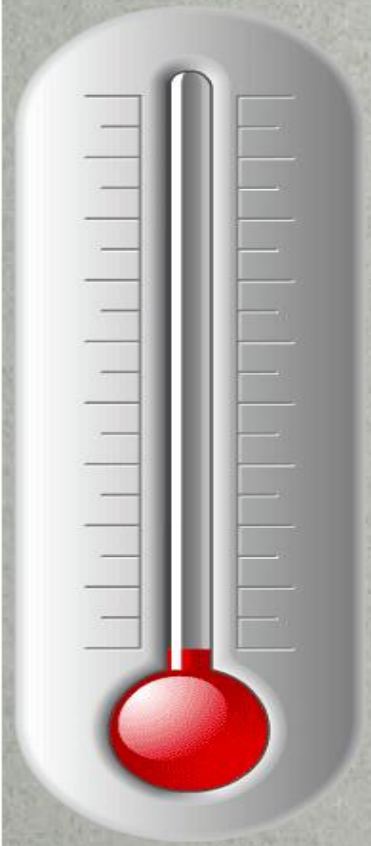
Costs for DOD space acquisitions have been consistently underestimated over the past several decades—sometimes by billions of dollars. In 2006, GAO reported that cost growth in DOD space programs was largely caused by initiating programs before determining whether requirements were achievable within available resources. Unrealistic cost estimates resulted in shifting funds to and from programs, which also exacerbated agencywide space acquisition problems. For example, on the National Polar-orbiting Operational Environmental Satellite System program, DOD and the Department of Commerce committed to the development and production of satellites before the technology was mature—only 1 of 14 critical technologies was mature at program initiation, and 1 technology was found to be less mature after the contractor conducted more verification testing. The combination of optimistic cost estimates with immature technology resulted in cost increases and schedule delays. GAO recommended that DOD, among other things, require officials to document and justify the differences between program cost estimates and independent cost estimates. GAO also recommended that, to better ensure investment decisions for space programs, estimates could be updated as major events occur within a program that might have a material impact on cost, such as budget reductions, integration problems, and hardware and software quality problems.

GAO, *Space Acquisitions: DOD Needs to Take More Action to Address Unrealistic Initial Cost Estimates of Space Systems*, GAO-07-96 (Washington, D.C.: Nov. 17, 2006).



Technology Readiness Levels - NASA

NASA Technology Readiness Levels



TRL 9
TRL 8
TRL 7
TRL 6
TRL 5
TRL 4
TRL 3
TRL 2
TRL 1

Click "TRL 1" to start

→ FUTURE LAUNCHERS PREPARATORY PROGRAMME

From lab...

...to launch

"technology push"

"system pull"

Concept studies

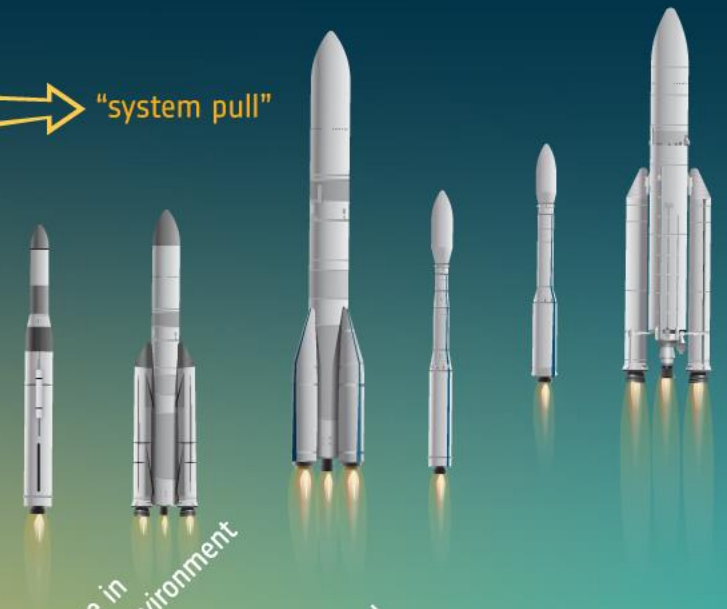
Generic technology tests

Integrated demonstrators

Themis

Prometheus

ETID



1 Basic principles observed

2 Preliminary concept of application

3 Experimental proof of function

4 Component functional verification

5 Component critical functions in relevant environment

6 System critical functions in relevant environment

7 Performance in operational environment

8 Flight qualified

9 Flight proven

BASIC RESEARCH

"GAP BETWEEN DISCOVERY & APPLICATION"

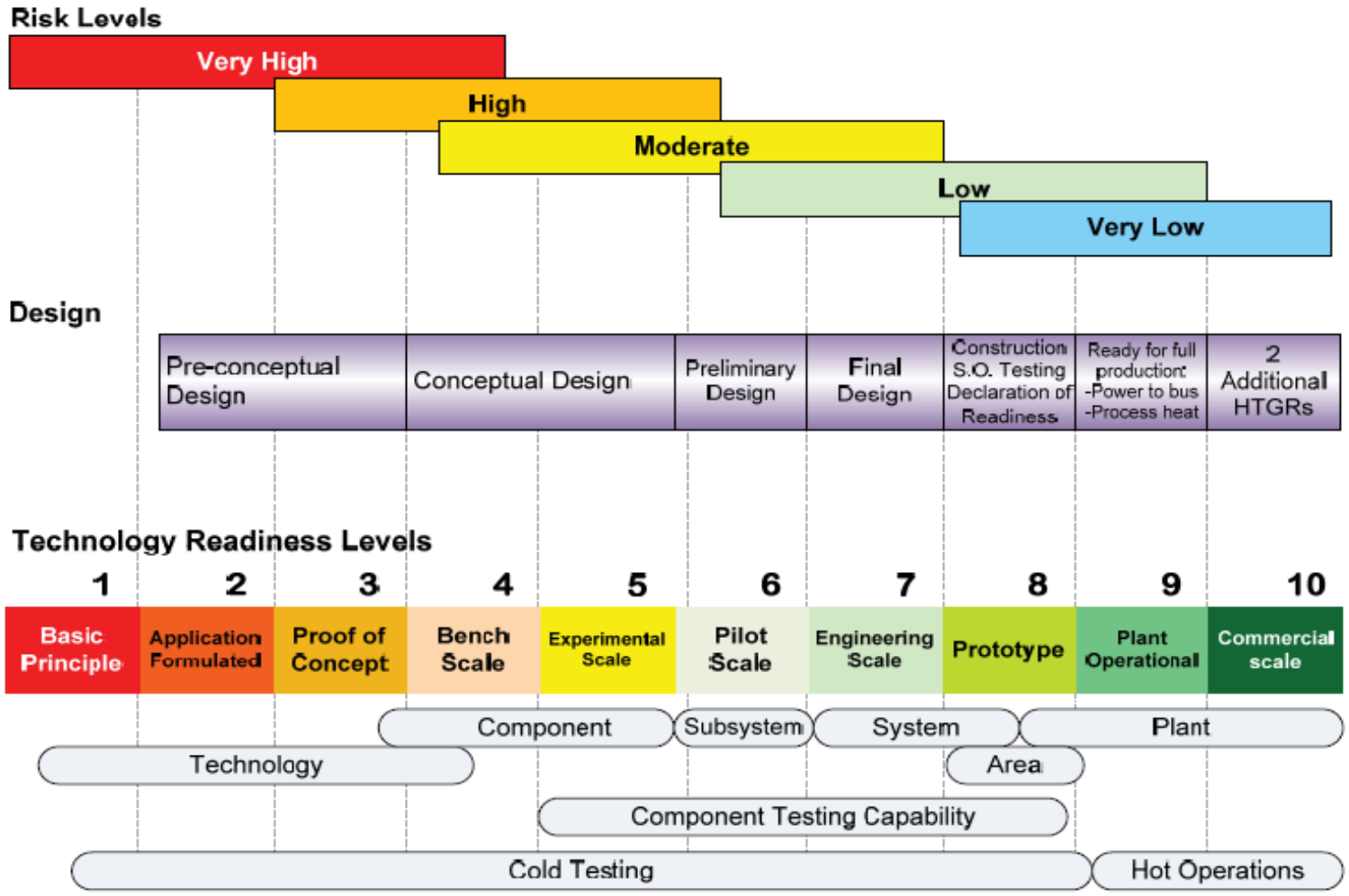
DEVELOPMENT

TECHNOLOGY READINESS LEVEL

#Space19plus

Space19+

Next Generation Nuclear Plant - INL



International Journal of Technology Assessment in Health Care, 34:5 (2018), 464–475.

doi:10.1017/S0266462318000557

Assessment

SUITABILITY OF CURRENT EVALUATION FRAMEWORKS FOR USE IN THE HEALTH TECHNOLOGY ASSESSMENT OF MOBILE MEDICAL APPLICATIONS: A SYSTEMATIC REVIEW

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Rebecca Tooher
School of Public Health, University of Adelaide

Tracy Merlin
Adelaide Health Technology (AHTA), School of Public Health, The University of Adelaide

Objectives: To identify and appraise existing evaluation frameworks for mobile medical applications (MMA) and determine their suitability for use in health technology assessment (HTA) of these technologies.
Methods: Systematic searches were conducted of seven bibliographic databases to identify literature published between 2008 and 2016 on MMA evaluation frameworks. Frameworks were eligible if they were used to evaluate at least one of the HTA domains of effectiveness, safety, and/or cost and cost-effectiveness of an MMA. After inclusion, the frameworks were reviewed to determine the number and extent to which other elements of an HTA were addressed by the framework.
Results: A total of forty-five frameworks were identified that assessed MMAs. All frameworks assessed whether the app was effective. Of the thirty-four frameworks that examined safety, only seven overtly evaluated potential harms from the MMA (e.g., the impact of inaccurate information). Only one framework explicitly considered a comparator. Technology specific domains were sporadically addressed.
Conclusion: None of the evaluation frameworks could be used, unaltered, to guide the HTA of MMAs. To use these frameworks in HTA they would need to identify relevant comparators, improve assessments of harms and consider the ongoing effect of software updates on the safety and effectiveness of MMAs. Attention should also be paid to ethical issues, such as data privacy, and technology specific characteristics. **Implications:** Existing MMA evaluation frameworks are not suitable for use in HTA. Further research is needed before an MMA evaluation framework can be developed that will adequately inform policy makers.

Keywords: Technology assessment, Health policy/standards, Mobile health, Mobile applications

Mobile health (mHealth) has the potential to change health systems and how care is delivered (1). One form of mHealth is mobile medical applications (MMAs) also known as 'apps'. These are a type of software available for mobile platforms (e.g., smartphone, tablet, smartwatch) (1). In a medical context, MMAs may be used by patients to self-manage and/or screen medical conditions, rather than presenting at hospitals or clinics for additional appointments. MMAs may also allow for medical practitioners and/or allied health workers to remotely monitor, screen and manage their patients (2;3).

A potential barrier to the successful integration of MMAs into health systems is that many come at a cost to the patient, or require in-app purchases, which some patients are unable to afford. While some MMAs may have a negligible costs—and thus will not warrant public funding—others may require subscriptions or come with accessories, such as wearables and implantable devices. Furthermore, medical practitioners and allied health workers that use MMA-based services during a clinical encounter are often unable to claim reimbursement for the interpretation of MMA output or for treatment guided by MMA results.

Health management organizations (HMO) in the United States have reimbursed some MMAs since 2013 (4). Similarly, since 2014, private health insurers have reimbursed specific MMAs in Germany (5;6). It is unclear how these apps were selected for reimbursement, although this may have depended on whether the MMA was approved by the relevant regulatory authority (e.g., the United States Food and Drug Administration [FDA]).

Countries with tax funded universal healthcare like Australia and Great Britain currently do not reimburse the use of MMAs. However, the National Institute for Health Care Excellence (NICE) in Britain is currently investigating ways to assess MMAs and provide guidance on their use (7;8). If the use of MMAs becomes routine in clinical consultations, MMA-guided care will need to be formally assessed.

The authors thank David Tamblyn for assisting in the trialing and testing of the standardization tool. Magdalena Moshi is a recipient of an *Australian Government Research Training Program Scholarship*.

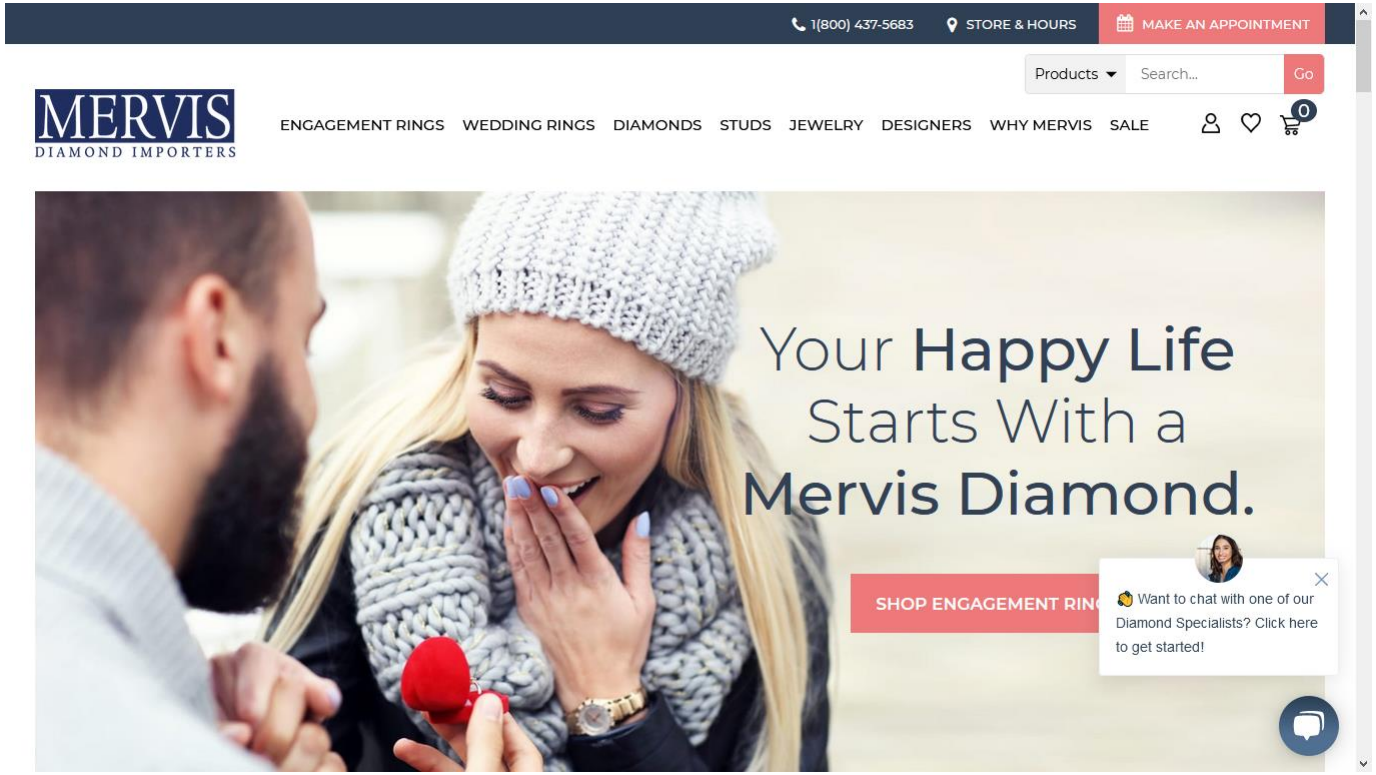
Dialectical Approach to Strategy / Strategic Assumption Analysis

A Dialectical Approach to Technology Assessment and Strategy - Assumption Surfacing

- Generate a series of assumptions about each stakeholder:
  - What must I assume about this stakeholder and its future behavior in order for the strategy to be effective?
- Include both plausible and implausible assumptions to ensure complete coverage
- Support each assumption with data
- Build the best possible case

A Dialectical Approach to Technology Assessment and Strategy - Assumption Negation

- Generate counter-assumptions
  - Negate each assumption and reformulate as a counter-assumption
  - A counter-assumption is a statement that negates the spirit of the original assumption
  - Wherever possible counterassumptions should be stated in affirmative
  - Drop implausible counterassumptions
  - Support each counterassumption with data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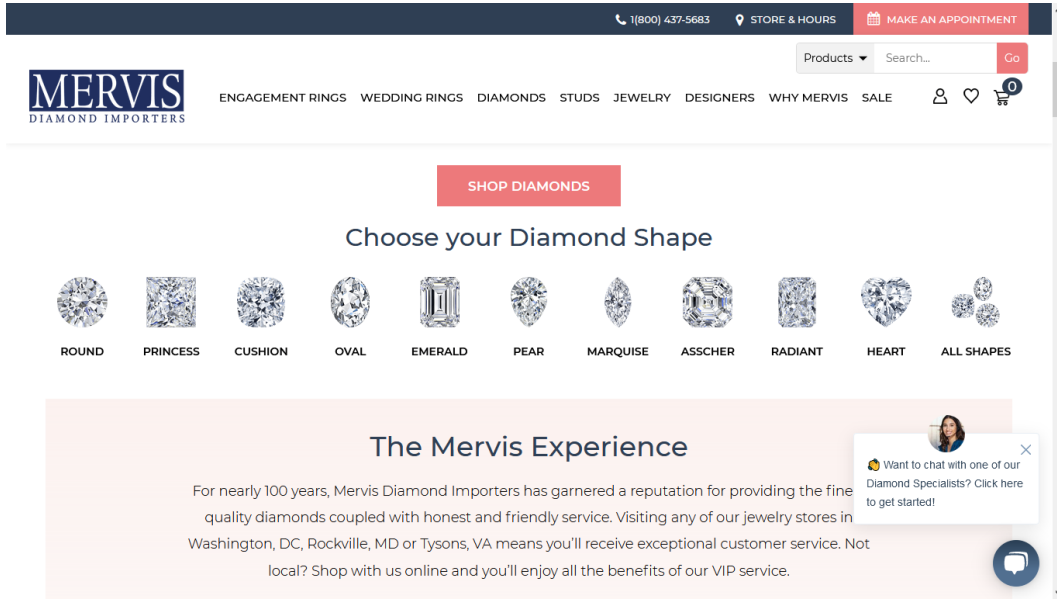
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PEAR
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RADIANT
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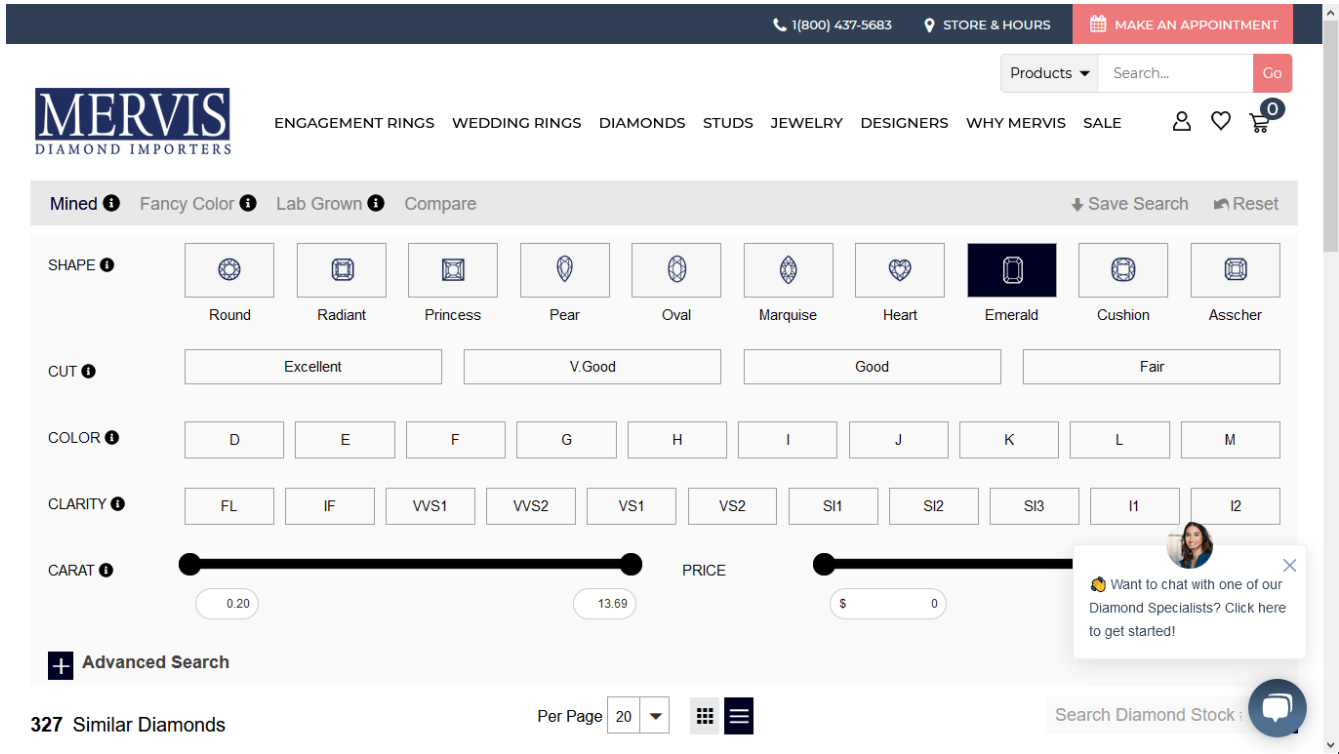
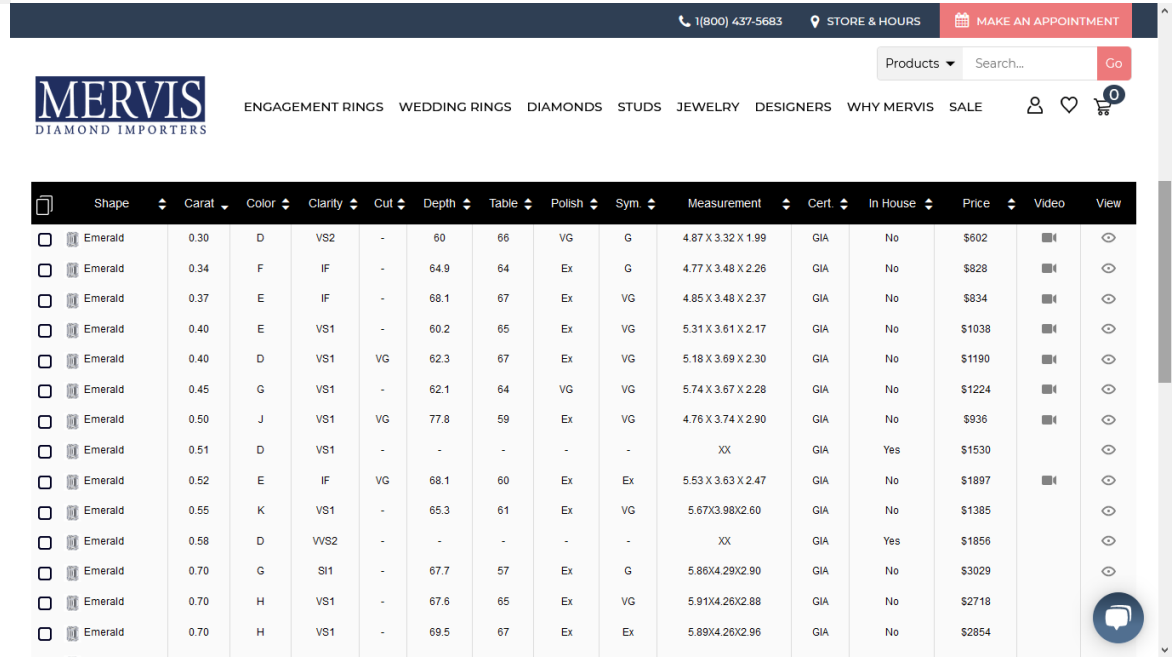




Shape	Carat	Color	Clarity	Cut	Depth	Table	Polish	Sym.	Measurement	Cert.	In House	Price	Video	View
Emerald	0.30	D	VS2	-	60	66	VG	G	4.87 X 3.32 X 1.99	GIA	No	$602		
Emerald	0.34	F	IF	-	64.9	64	Ex	G	4.77 X 3.48 X 2.26	GIA	No	$828		
Emerald	0.37	E	IF	-	68.1	67	Ex	VG	4.85 X 3.48 X 2.37	GIA	No	$834		
Emerald	0.40	E	VS1	-	60.2	65	Ex	VG	5.31 X 3.61 X 2.17	GIA	No	$1038		
Emerald	0.40	D	VS1	VG	62.3	67	Ex	VG	5.18 X 3.69 X 2.30	GIA	No	$1190		
Emerald	0.45	G	VS1	-	62.1	64	VG	VG	5.74 X 3.67 X 2.28	GIA	No	$1224		
Emerald	0.50	J	VS1	VG	77.8	59	Ex	VG	4.76 X 3.74 X 2.90	GIA	No	$936		
Emerald	0.51	D	VS1	-	-	-	-	-	XX	GIA	Yes	$1530		
Emerald	0.52	E	IF	VG	68.1	60	Ex	Ex	5.53 X 3.63 X 2.47	GIA	No	$1897		
Emerald	0.55	K	VS1	-	65.3	61	Ex	VG	5.67X3.98X2.60	GIA	No	$1385		
Emerald	0.58	D	VVS2	-	-	-	-	-	XX	GIA	Yes	$1856		
Emerald	0.70	G	SI1	-	67.7	57	Ex	G	5.86X4.29X2.90	GIA	No	$3029		
Emerald	0.70	H	VS1	-	67.6	65	Ex	VG	5.91X4.26X2.88	GIA	No	$2718		
Emerald	0.70	H	VS1	-	69.5	67	Ex	Ex	5.89X4.26X2.96	GIA	No	$2854		

Mentoring and the Business Plans

Business Plans

- An important aspect of career progression and entrepreneurship
- Combines insights, knowledge and what someone is capable of in a single document
- Starts with idea and ends with numbers – from a story to pure fiction

Business Plan Questions

- Develop your proposal considering:
  - What is the problem you're trying to solve?
  - Why do you believe that the problem is important (and the opportunity really big)?
  - What is your proposed solution and why is it real and doable?
  - What is the market opportunity and who are the target customers?
  - Who are the current competitors and how are they doing? Who are potential future competitors?
  - What is the customer value proposition of your solution and advantages compared to alternatives?
  - What does a very rough sketch of the financials look like? (cost to develop, pricing etc).
  - Summary and Assumptions – What do you have to assume in order for the strategy to be successful? Why is this effort promising?

A Good Business Plan

- Credible
- Compelling
- Plausible
- A Good Story

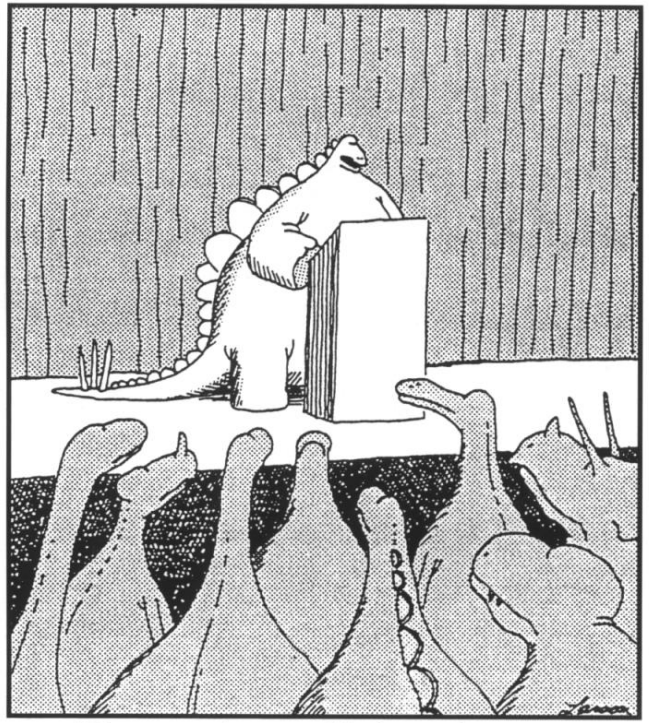
Understand the Environment

Source:

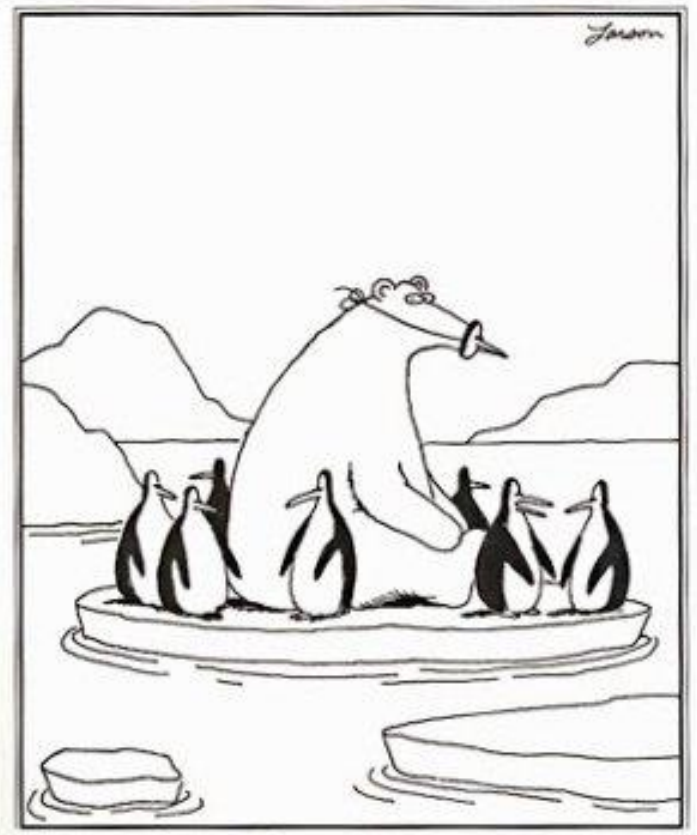
http://www.androidgame365.com/puzzle/4441-dino-island.html

Understand the Environment

For some reason, these new birds didn't seem as interested in William's bird seed.

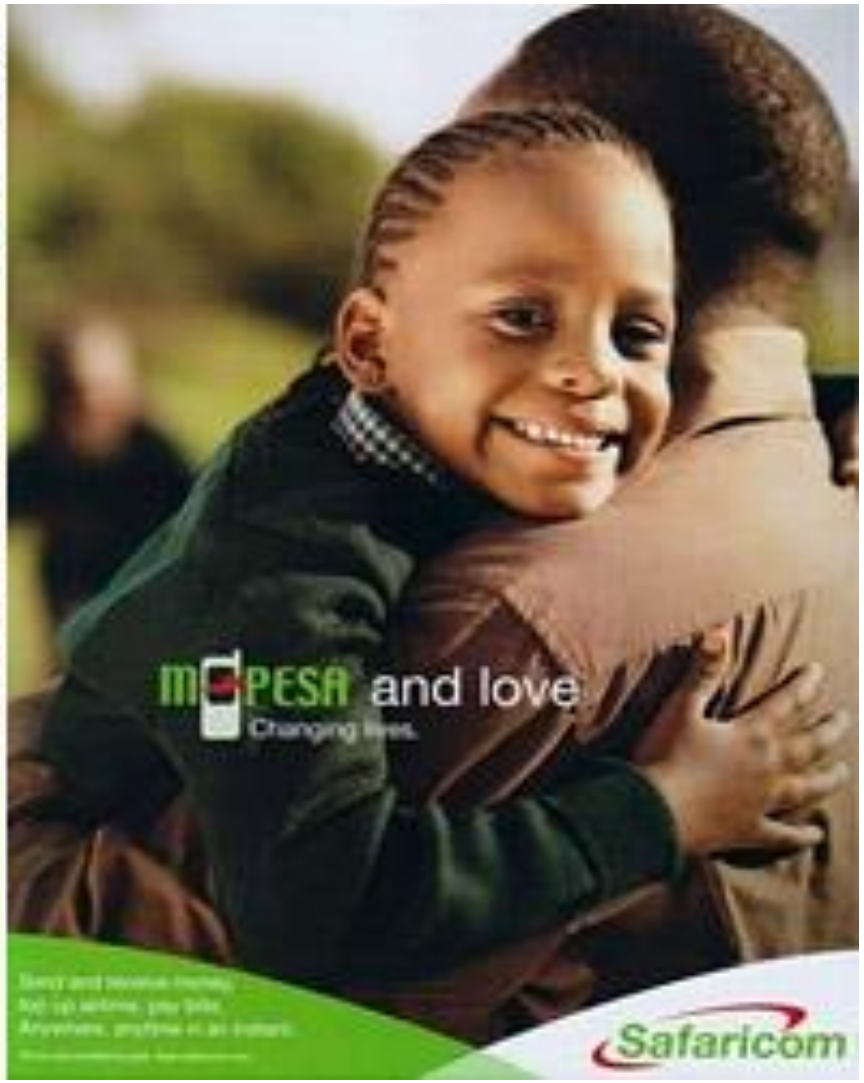


"The picture's pretty bleak, gentlemen. … The world's climates are changing, the mammals are taking over, and we all have a brain about the size of a walnut."



"And now Edgar's gone. … Something's going on around here."

What is the Problem?



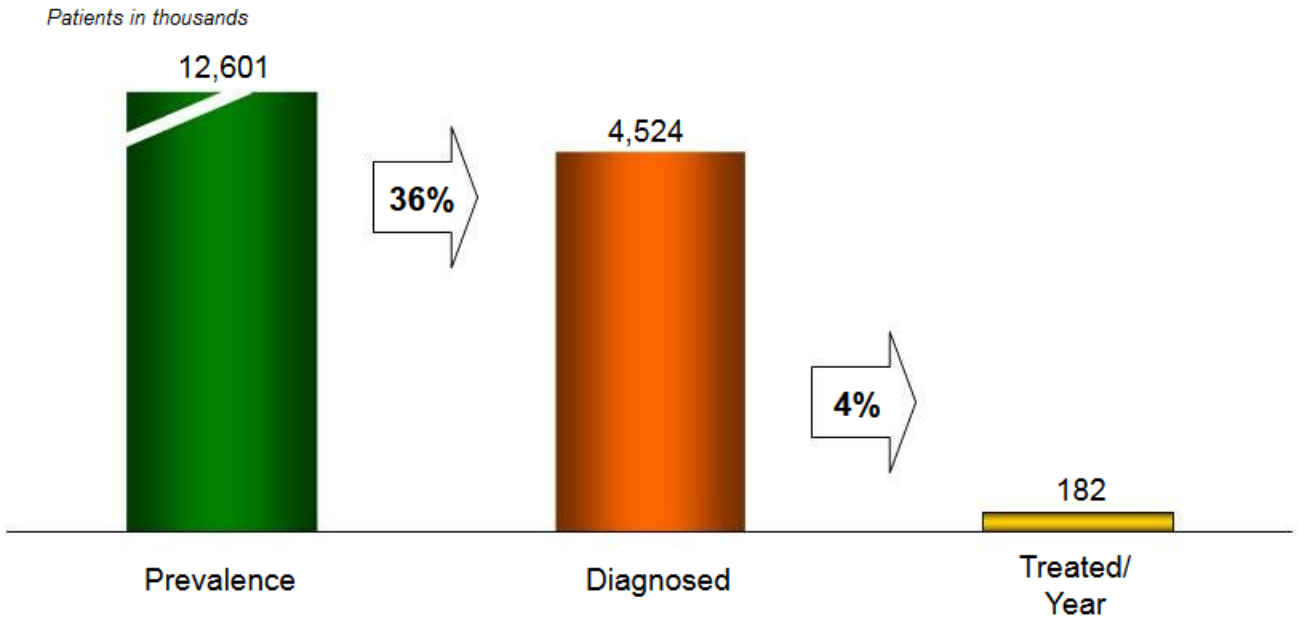
Source:

World Bank

How Large is the Opportunity?

HCV: A Significant Unmet Medical Need

Over 12 Million Infected Individuals in Major Markets(1) with Fewer than 200,000 Treated per Year



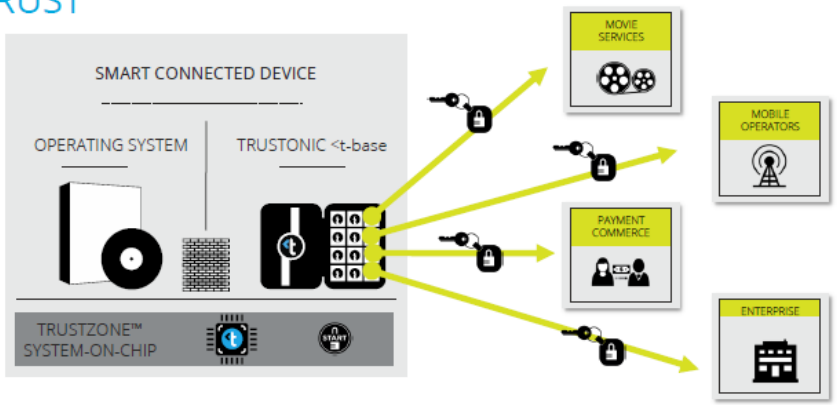
1. Major markets include US, EU-5, Japan, Australia, Austria, Brazil, Denmark, Finland, Greece, Ireland, Norway, Poland, Portugal, Sweden, Switzerland, Turkey, Canada

Sources:
Prevalence – KantarHealth Core-5 EU epidemiology analysis (2010), NHANES (1999-2006), Armstrong (2004), Hepatology, 40(4:S1):176a, Chak (2011), Liver Intl., 8, 1090-1101, Cornberg (2011), Liver Intl., 31 (s2), 31-60, Kershenobich (2011), Liver Intl., 31 (s2), 18-29
Diagnosed – KantarHealth Core-5 EU epidemiology analysis (2010), Armstrong (2004) Hepatology, 40(4:S1):176a, Culver (2000), Transfusion 40:1176
Treated – IMS MIDAS (2004 – 2009), Synovate chart audits (2007), Roche and Schering Plough annual reports (2009)

GILEAD

Fundamentals

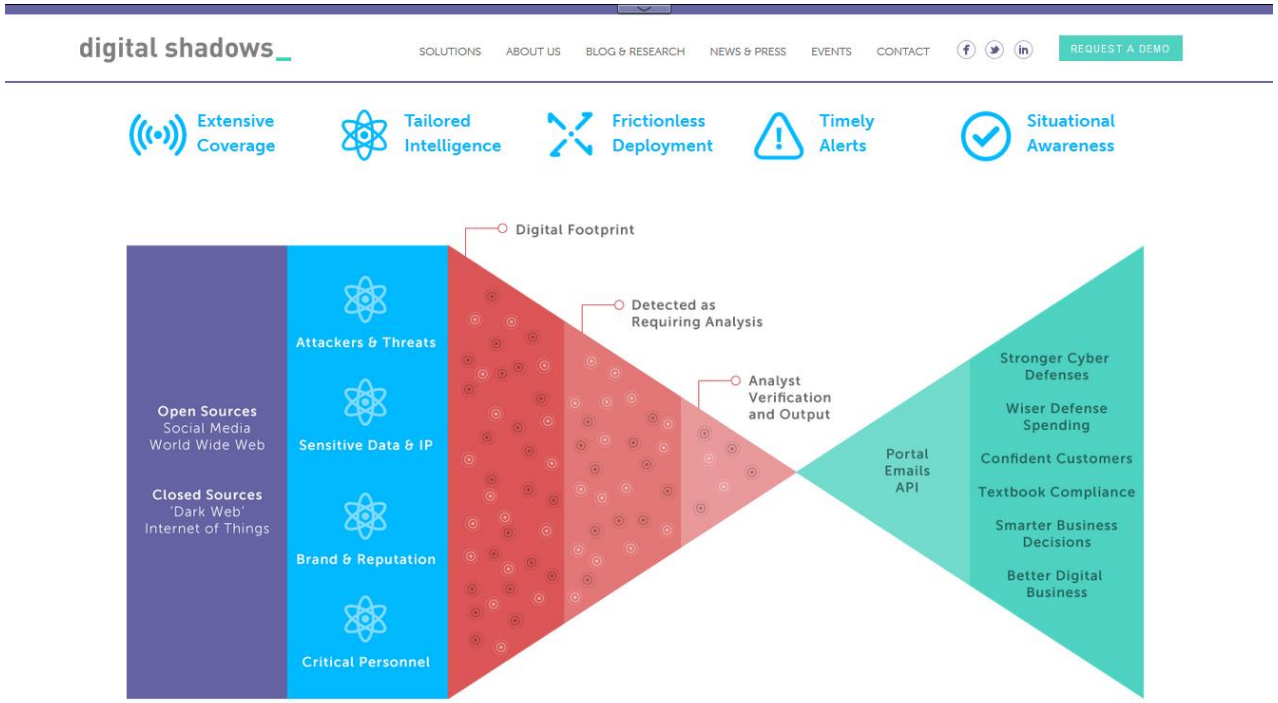
Trustonic turns devices into *trusted devices* by implementing a Trusted Execution Environment (TEE) and provides ACCESS to service providers in need of TRUST

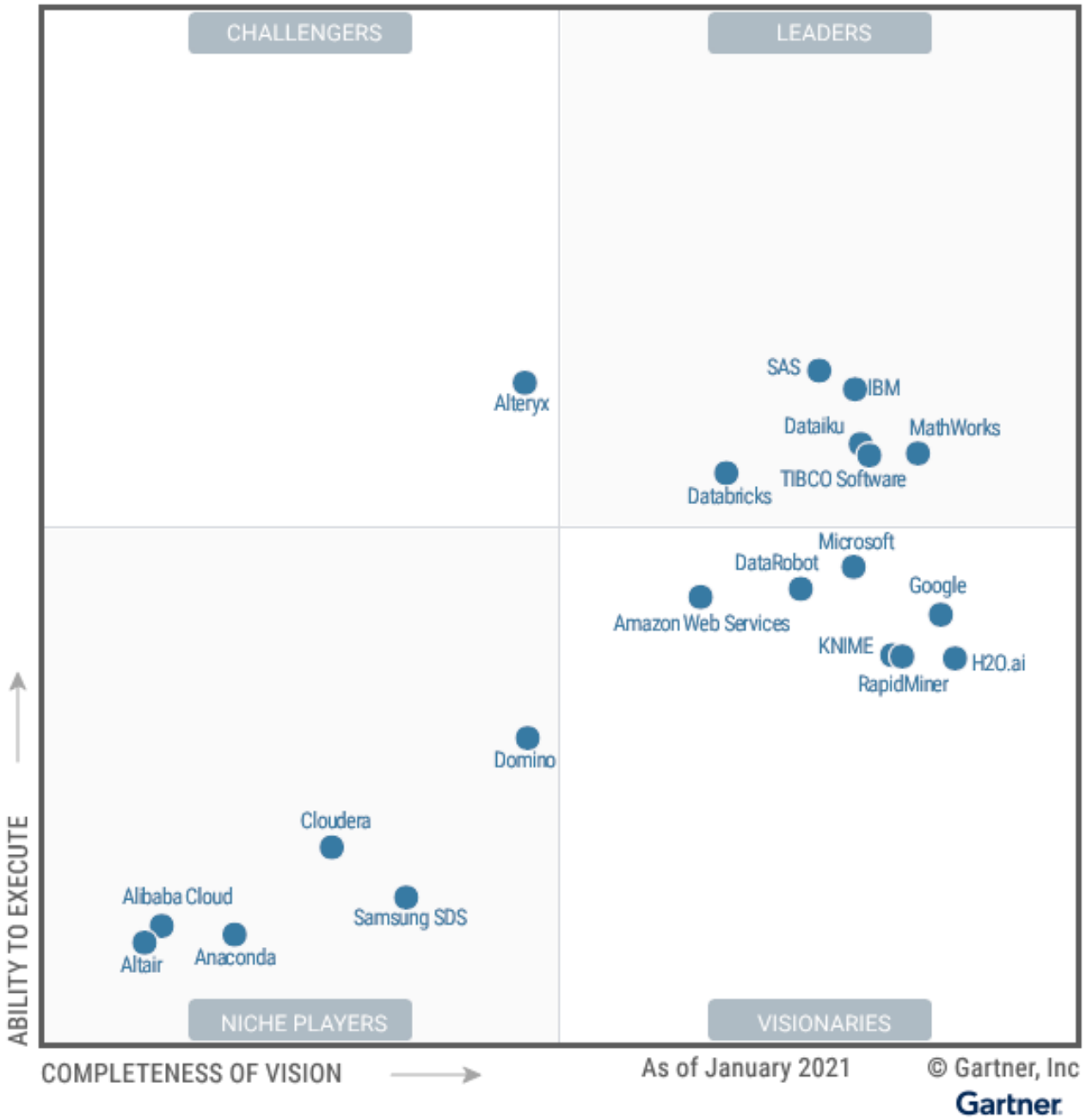


Empowers our PARTNERS to make *richer*, *simpler*, *safer* services

TRUSTONIC

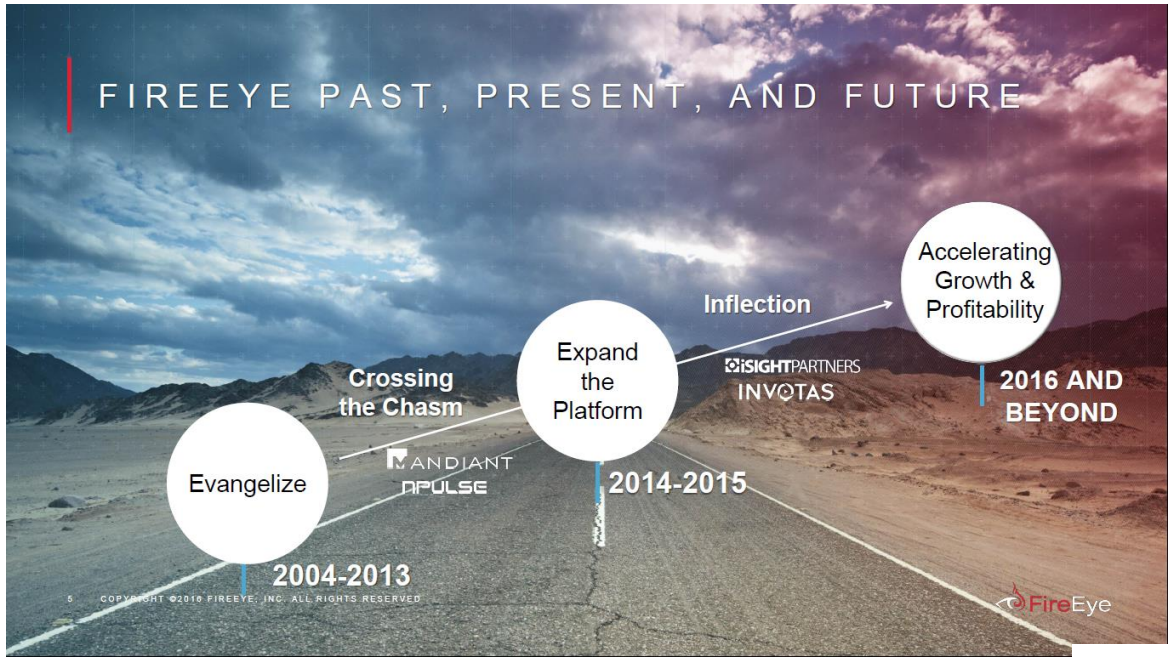
What is the Solution?





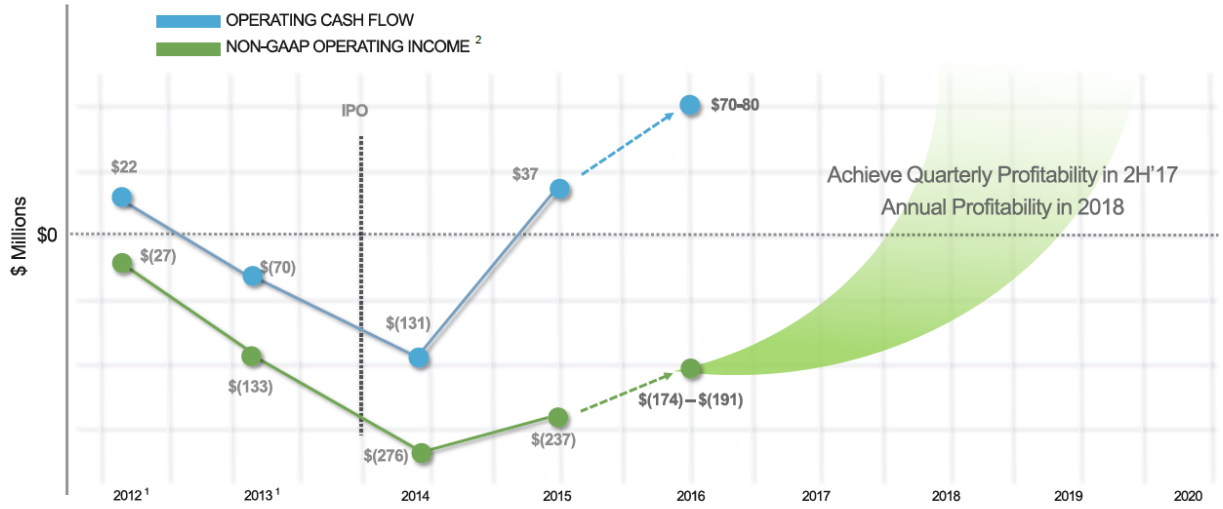
How are Others Solving and What Are Your Advantages?

Data Science and Machine Learning Platforms



What Are the Financials?

Path to Profitability



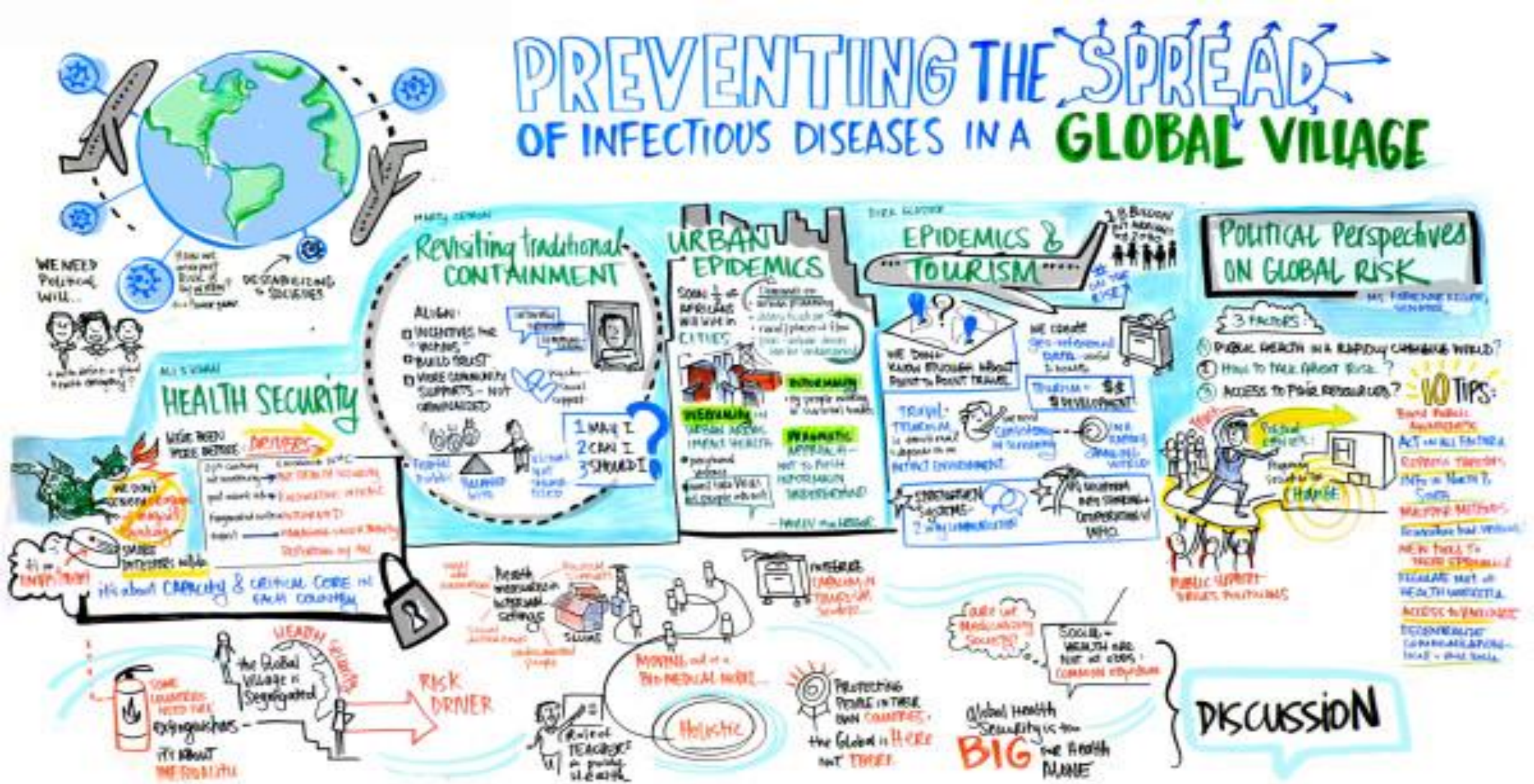
1. 2012 and 2013 exclude Mandiant.
2. Non-GAAP. See Appendix for a reconciliation to comparable GAAP measures. A reconciliation of non-GAAP measures to corresponding GAAP measures is not available on a forward looking basis.

FireEye

Rich Pictures

David Nabarro, Anticipating Emerging Infections, World Health Organization, 2015

ANTICIPATING EMERGING INFECTIOUS DISEASE EPIDEMICS



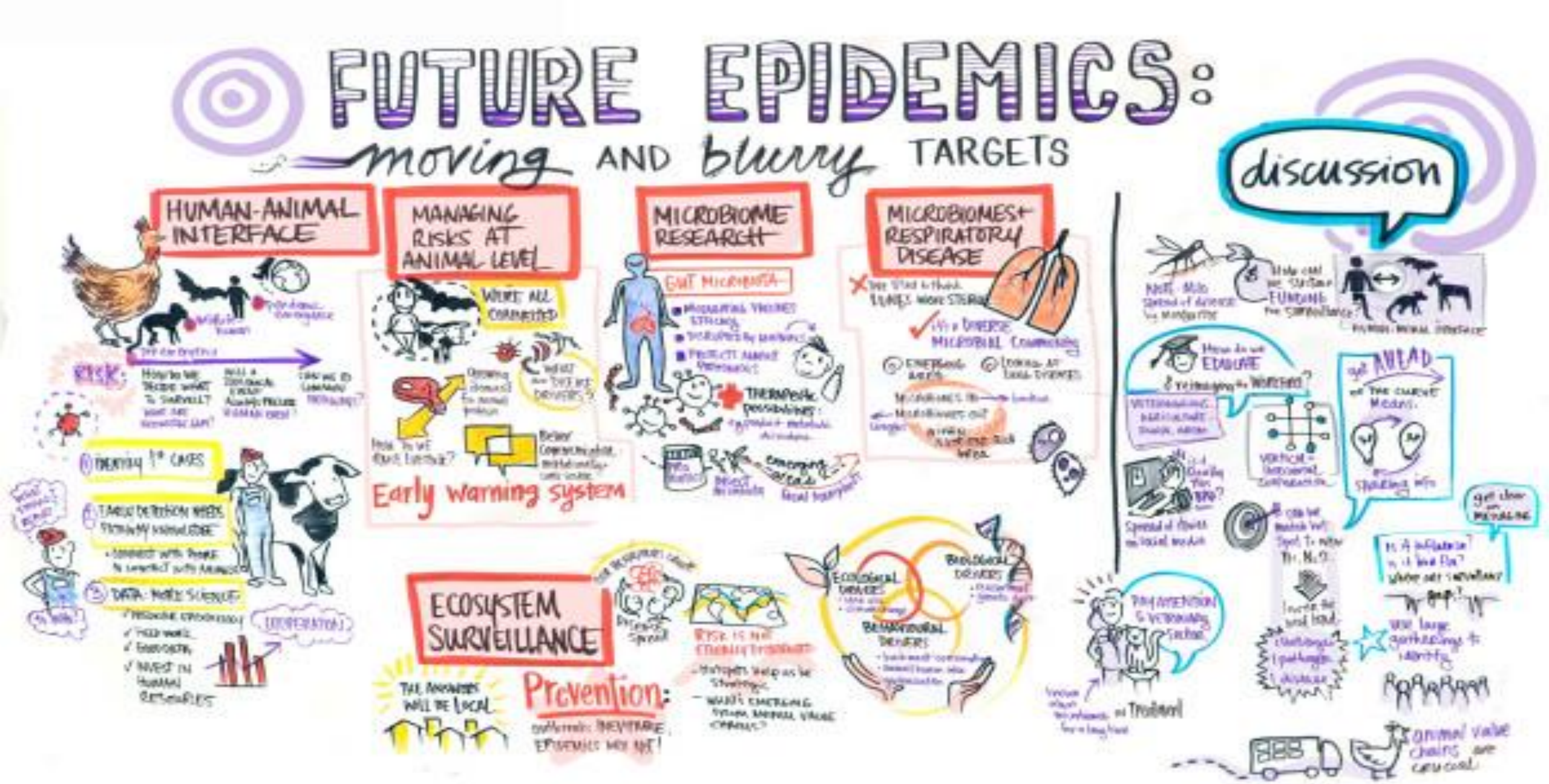
World Health Organization

Anticipating emerging infectious disease epidemics: an informal consultation
1-2 December 2015, Geneva

drawn live graphic recording | Drawing Change

FUTURE EPIDEMICS:

moving AND blurry TARGETS



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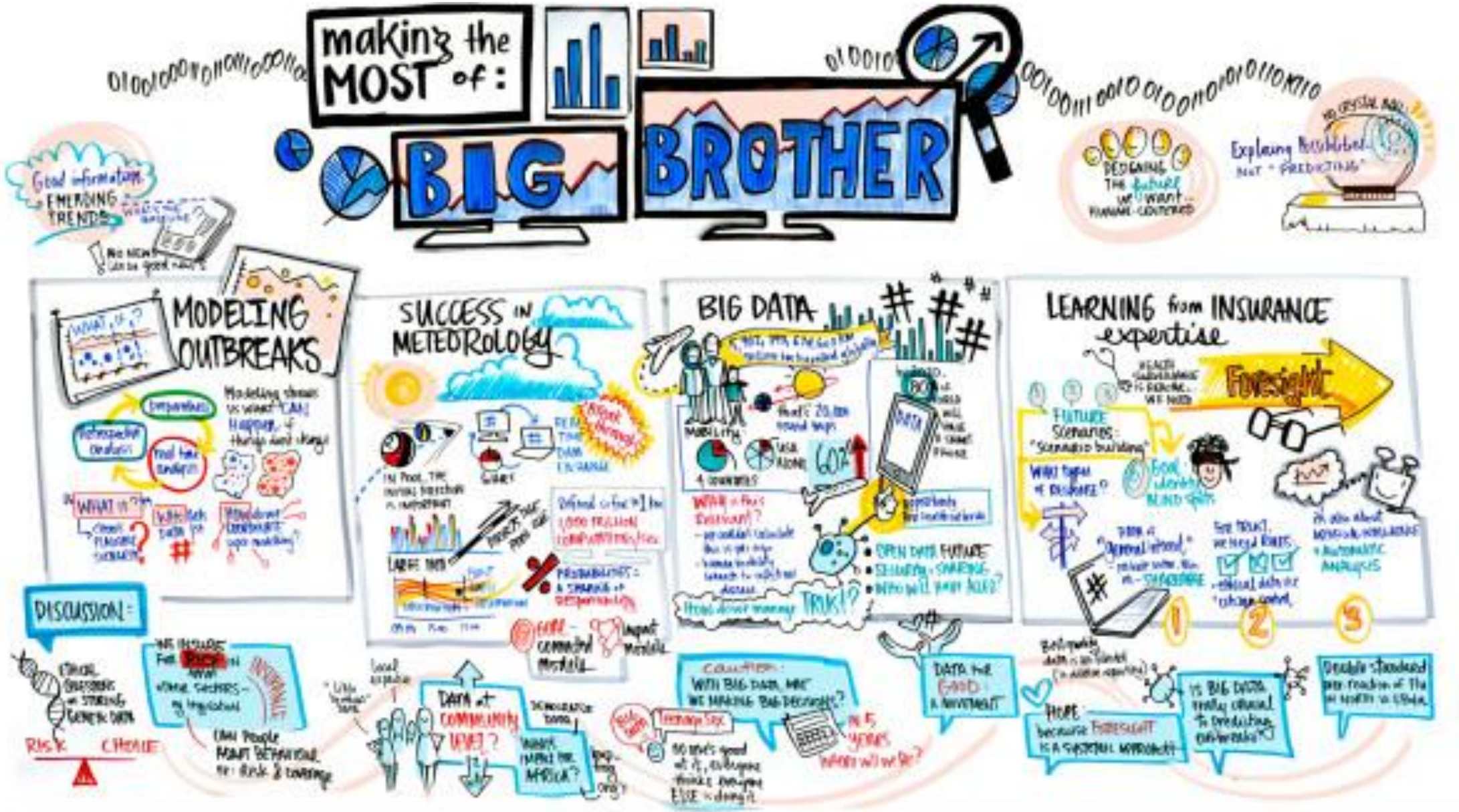

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Science & TECHNOLOGY

OPPORTUNITIES & CHALLENGES

World Health Organization

Anticipating emerging infectious disease epidemics: an informal consultation
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Thank You.

J.P. Auffret

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