Understanding Emerging Technologies

The Six Ds of Exponential Growth

Drivers of Exponential Growth

Gartner Hype-Cycle

Technology Adoption LifeCycle

Crossing the Chasm

Associated videos can be found at: http://pmf.video/jsc

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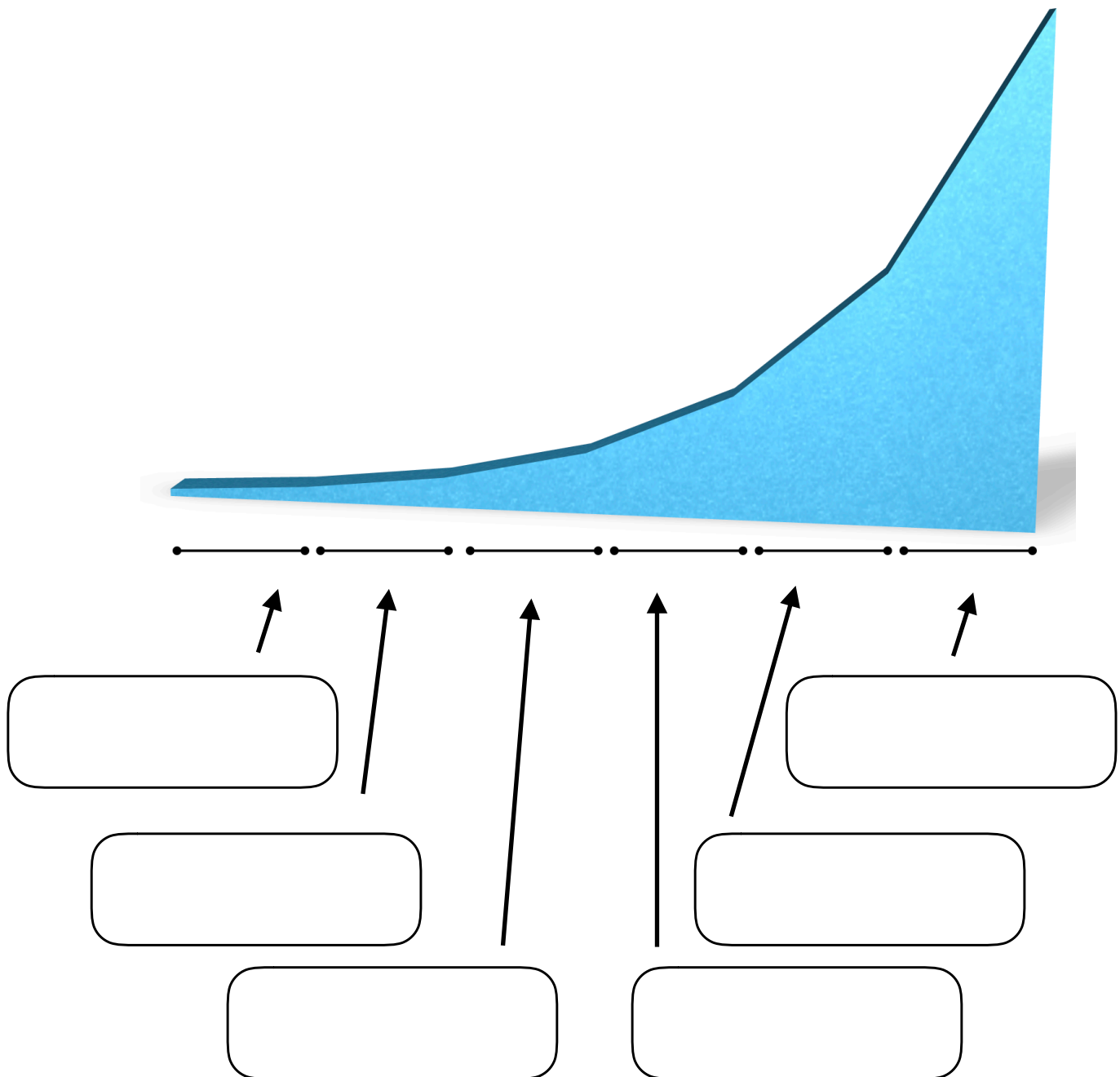
Part I: The Six Ds of Exponential Growth

Singularity
U N I V E R S I T Y

SU is think tank that offers educational programs and a business incubator focusing on scientific progress and "exponential" technologies. It was founded in 2008 by Peter Diamandis and Ray Kurzweil at the NASA Research Park in California—Wikipedia

"The Six Ds are a chain reaction of technological progression, a road map of rapid development that always leads to enormous upheaval and opportunity."
–Peter Diamandis and Steven Kotler, Bold.

From Steven Kotler, co-author of BOLD.

1. "A technology becomes _____ once it becomes

   _____. It becomes represented in ones and zeroes. Once that happens, it

   becomes an information-based technology and it hops on an _____

   growth curve."

Examples

2. "..It takes a while for [these technologies] to get up to speed.. And there's all this hype in

   the beginning and they fall into this _____ period and people kind of

   _____ them."

3. "The technologies then play a role in _____ established industries. "

Examples

4. "For example, once you could store digital images on a camera, film was totally

   _____. And suddenly nobody was buying roll film anymore. … So the

   _____ comes out of the equation."—Steven Kotler

5. "Think about all the 1980s or '90s technology that now come free with your cellphone.. You

   have your GPS locator, your encyclopedia, your radio and record player, your camera,

   video recorder, on and on and on, right. … the technology itself is

   _____. Nobody's going out and buying cameras anymore because it

   comes on your smartphone"

6. "These technologies themselves become cheaper and cheaper and cheaper. Cellphones

   are a classic example. Back in the '80s, these were a luxury technology that only the

   wealthiest could have and then it kind of slowly moved down the scale until where we are

   today. I mean 50 percent of the world ... [is] carrying a supercomputer in their pocket.

   That's how much these things have been _____. Access becomes

   available to _____."

Drivers of Exponential Growth

_____ and Moore's Law

Gordon Earle _____ (born January 3, 1929) is an American businessman and co-founder and Chairman Emeritus of Intel Corporation and the author of Moore's law.
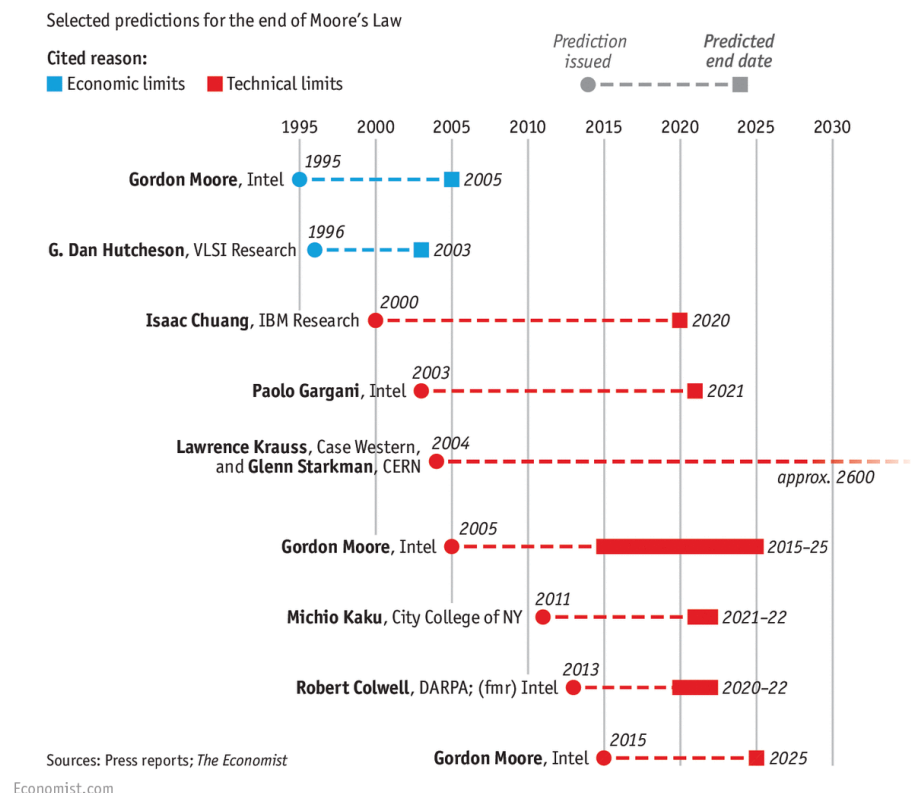-from wikipedia

"Moore's law" is the observation that, over the history of computing hardware, the number of transistors in a dense integrated circuit _____ approximately every _____ years.

Although this trend has continued for more than half a century, "Moore's law" should be considered an observation or conjecture and _____ a _____ or natural _____. Sources in 2005 expected it to continue until at least 2015 or 2020.
-from wikipedia

Selected predictions for the end of Moore's Law

Cited reason:
■ Economic limits ■ Technical limits

Prediction issued ●----- Predicted end date ■

| | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 |

Gordon Moore, Intel — 1995 ● ---- ■ 2005

G. Dan Hutcheson, VLSI Research — 1996 ● ---- ■ 2003

Isaac Chuang, IBM Research — 2000 ● ----------- ■ 2020

Paolo Gargani, Intel — 2003 ● ----------- ■ 2021

Lawrence Krauss, Case Western, and **Glenn Starkman**, CERN — 2004 ● ------------------ approx. 2600

Gordon Moore, Intel — 2005 ● -------- ■ 2015–25

Michio Kaku, City College of NY — 2011 ● ---- ■ 2021–22

Robert Colwell, DARPA; (fmr) Intel — 2013 ● --- ■ 2020–22

Gordon Moore, Intel — 2015 ● --- ■ 2025

Sources: Press reports; _The Economist_

Economist.com

Far-out ways to extend Moore's Law

- _____ computing
- _____ computing
- _____ chip design

Why tech will continue its exponential growth (for at least a little bit) regardless of Moore's Law

FPGAs

A _____ -programmable _____ array (_____) is an integrated circuit designed to be configured by a customer or a designer after manufacturing – hence "field-programmable".
—wikipedia

Cloud Computing

The practice of using a network of remote servers _____ on the _____ to store, manage, and process data, rather than a _____ _____ or a personal computer. —wikipedia

Processing Power as a _____ ! Not just about _____.
These platforms hide the _____ and details of the underlying _____ from users and applications by providing very simple graphical interface or API (Applications Programming Interface).
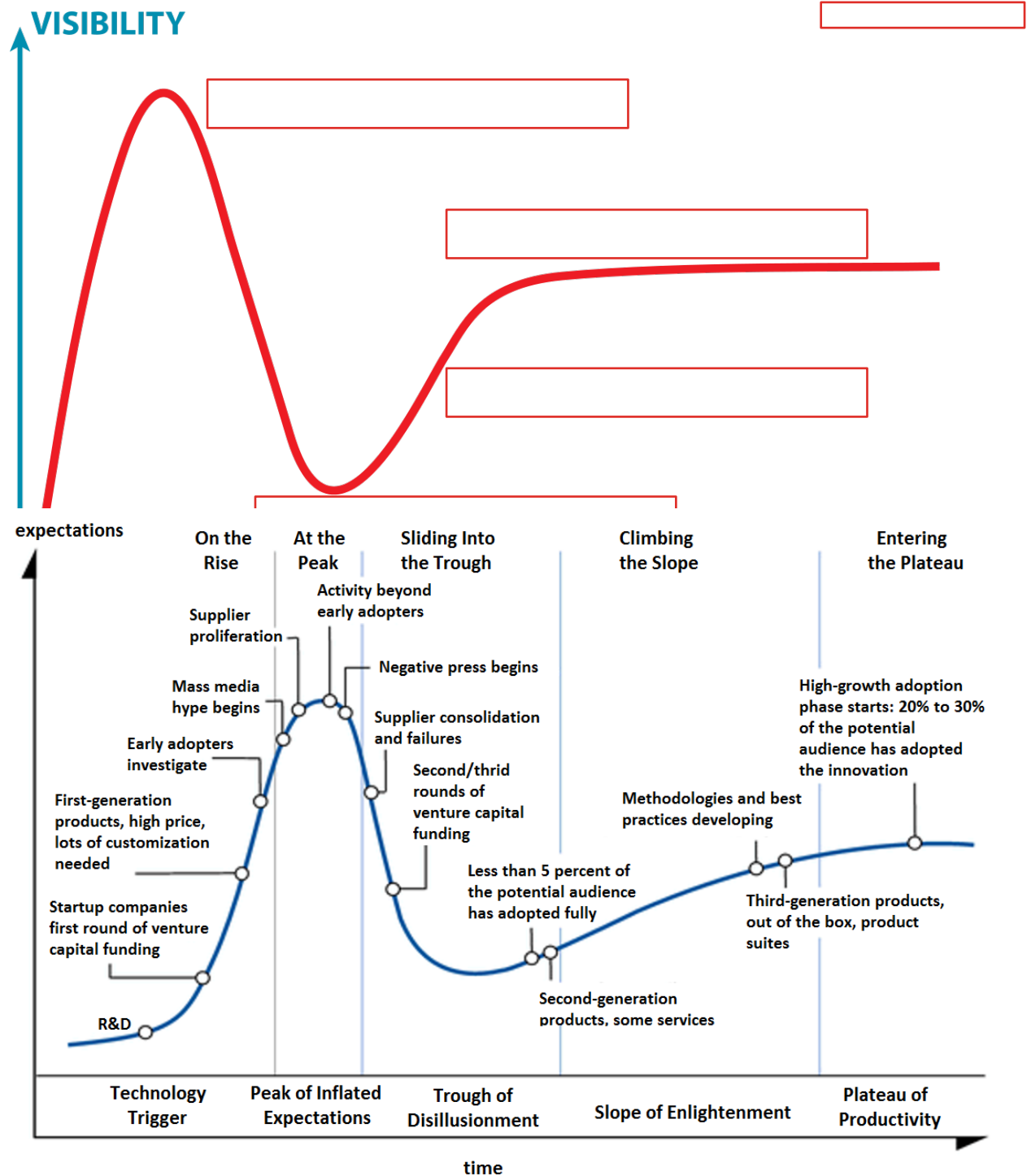_____ architecture.
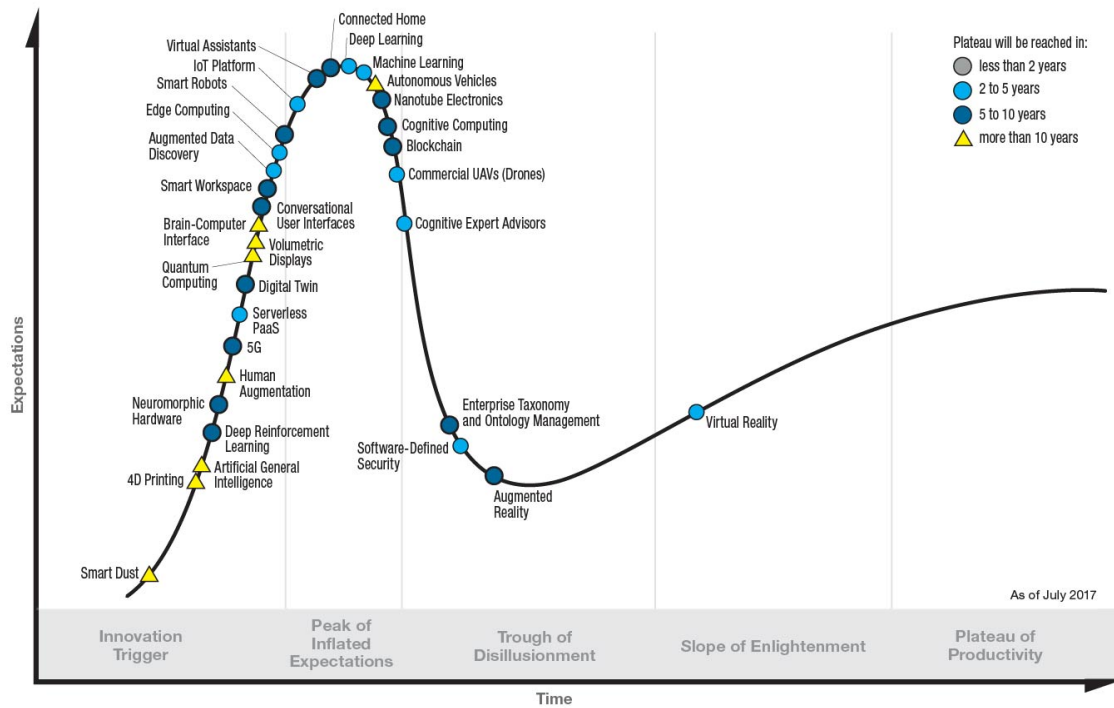Cloud services are reliable, relatively cheap.

Dramatically _____ _____ to _____

Gartner Hype-Cycle

VISIBILITY

expectations

On the Rise

At the Peak

Sliding Into the Trough

Climbing the Slope

Entering the Plateau

Activity beyond early adopters

Supplier proliferation

Negative press begins

Mass media hype begins

Supplier consolidation and failures

Early adopters investigate

Second/thrid rounds of venture capital funding

First-generation products, high price, lots of customization needed

High-growth adoption phase starts: 20% to 30% of the potential audience has adopted the innovation

Less than 5 percent of the potential audience has adopted fully

Methodologies and best practices developing

Startup companies first round of venture capital funding

Third-generation products, out of the box, product suites

R&D

Second-generation products, some services

| Technology Trigger | Peak of Inflated Expectations | Trough of Disillusionment | Slope of Enlightenment | Plateau of Productivity |

time

Gartner Hype Cycle for Emerging Technologies, 2017

Plateau will be reached in:
- less than 2 years
- 2 to 5 years
- 5 to 10 years
- more than 10 years

Connected Home
Deep Learning
Virtual Assistants
IoT Platform
Machine Learning
Smart Robots
Autonomous Vehicles
Nanotube Electronics
Edge Computing
Augmented Data Discovery
Cognitive Computing
Blockchain
Smart Workspace
Commercial UAVs (Drones)
Conversational User Interfaces
Brain-Computer Interface
Volumetric Displays
Quantum Computing
Cognitive Expert Advisors
Digital Twin
Serverless PaaS
5G
Human Augmentation
Neuromorphic Hardware
Deep Reinforcement Learning
Enterprise Taxonomy and Ontology Management
Virtual Reality
Software-Defined Security
4D Printing
Artificial General Intelligence
Augmented Reality
Smart Dust

Expectations

As of July 2017

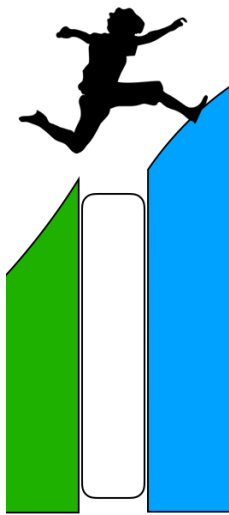| Innovation Trigger | Peak of Inflated Expectations | Trough of Disillusionment | Slope of Enlightenment | Plateau of Productivity |

Time

Technology Adoption LifeCycle

The technology adoption lifecycle is a sociological model that describes the _____ or acceptance of a _____ or _____, according to the demographic and psychological characteristics of defined adopter groups.
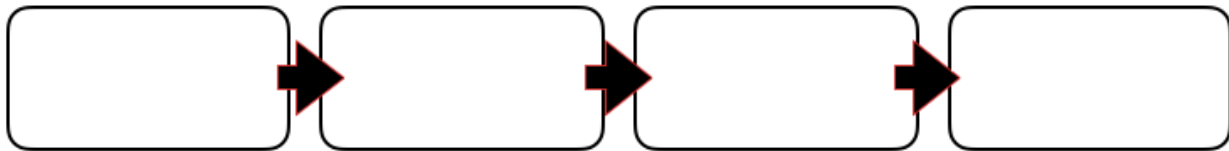
—wikipedia

Crossing the Chasm

It is not _____ to Market, but the _____ to Cross the _____ who wins.

Many startups never cross this Chasm, regardless of the adoption of the technology

Here's how a startup typically works:

Innovations are about finding _____, not _____ _____

No entrepreneur fails because they couldn't _____ _____ _____. They fail because _____ _____ _____ _____ _____ what they built.

Here's how a startup should work:

END