Disruptive Innovation

Predicting the Future of Medicine

Edward G. Buckley, MD

Professor of Ophthalmology and Pediatrics
Vice Dean for Medical Education
Duke University Medical School
A Glimpse into the Future of Health Care

- Complains to friend – my right elbow is sore
- Friend suggests “NEW” machine at Drug Store. Just need urine sample
- Goes to store – pours in urine sample
- Computer diagnoses “tennis elbow”
- Advises using warm compresses and rest for 2 weeks
The Future of Health Care

Decides to Test this “new” Technology

Mixes:

- Tap water
- Stool from dog
- Daughter/wife urine
- Smashes walnuts with a hammer
- Takes mixture to drug store
The Future of Health Care

Computer analyzes mixture

Advises:

Your water is hard – use softener

Dog’s got worms – needs treatment

Daughter is using Cocaine – needs rehab

Wife’s pregnant – twins – not yours – get lawyer

And if you don’t stop hammering –

your elbow will never get better
What doctors do today…….
What doctors do ....

...combine intelligence, reason, understanding, and intuition in order to discern the likeliest path to a successful outcome...

Will we be needed in the future?
Why do organizations Fail?

Sears, JC Penny, Xerox, Digital Equipment, General Motors, RCA, Wal-Mart, Cannon, Dell, HP, Toyota, Sony

Bad management? Bureaucracy? Poor planning? Talented managers, strong products, Inadequate skills? No resources? first rate technical know how, deep pockets

Store Brands
Credit cards
Catalog retailing
Supply management
What Happened?

Why could they not respond to change?

Either……

1) The companies were *never* well managed

or

2) **Good management** was the reason they failed!

Was there something about the way they were run that sowed the seeds for eventual failure?
Best Business Practices

All these companies:

- Listened to their customers
- Invested in improvement technology
- Maximized return on investment
- Allocated resources for best returns

SO, why did these companies fail ???
Technology / Innovation

Labor
Materials
Capital
Energy
Information

Process

Outputs of Higher Value
Innovations

**Sustaining**
- Maintain rate of improvement
- Something more or better in the attributes they already have
- Make product or service better in ways which are *already* valued

**Desktop computers**

**Disruptive**
- Different attributes, cheaper, simpler
- Perform worse along one or two dimensions
- Doesn’t address next needs of *current* users

**Laptop computers**
Eventually the disruptive innovation “replaces” the sustaining one in that market.
Disruptive Innovations

*Enables*…

less skilled people
to do more conveniently,
in less expensive settings…..

Things that historically required….
expensive specialists
in centralized
inconvenient locations
Transistor Story
RCA

Performance

Current needs

$\downarrow$

Transistor

Transistor Story
RCA

Vacuum Tube TV
Big Radios

Portable TV’s

Pocket radios

Hearing aids

Time

Sony
Examples:  ???????
In retrospect, it seems obvious that the practice of driving to a store to rent a movie to watch at home was preordained to extinction. The surprise, and the business tragedy, is this: the company that delivers movies to 15 million doorsteps these days isn’t Blockbuster—the retail chain that once dominated the industry—but an upstart.

Blockbuster launched its own movie-by-mail service. So Blockbuster had more than enough time to adapt. Instead, its bosses hinted they could copy Netflix and crush the upstart. When that didn’t work, they could have smartly managed the demise, handing whatever money the firm made over to shareholders. Blockbuster didn’t do that either. It’s one Sept. 23, Blockbuster filed for bankruptcy, a few weeks shy of its 25th birthday.

For now, Blockbuster’s more than 9,000 stores will remain open. It has worked out a deal with lenders to wipe out most of its $1 billion debt. In return, these lenders will be Blockbuster’s new owners. Analysts estimate the company will have to close as many as two-thirds of its outlets, itselfs out of work. The bankruptcy will also create more vacant spaces in malls, adding to the woes of the last commercial real estate industry.

Bankruptcy could finally give Blockbuster the chance to provide movie customers not only through stores but also via vending machines—it currently has 6,630 DVD dispensers—by making
Cardiac Bypass Surgery

Performance

Angioplasty

Cardiology

Time

Cardiac Bypass Surgery

Angioplasty

Surgery
Portable Ultrasound
Retinal / Optic Nerve Evaluation

Performance

Time

- OCT
- SD OCT
- 3D OCT
- FA
- Auto VF
Moore's Law
The Fifth Paradigm

Logarithmic Plot

Calculations per Second per $1,000

Year


Electromechanical Relay Vacuum Tube Transistor Integrated Circuit
Computing Power

1. The accelerating pace of change...
   - Agricultural Revolution: 8,000 years
   - Industrial Revolution: 120 years
   - Lightbulb: 90 years
   - Moon landing: 22 years
   - World Wide Web: 9 years
   - Human genome sequenced

2. ...and exponential growth in computing power...
   Computer technology, shown here climbing dramatically by powers of 10, is now progressing more each hour than it did in its entire first 90 years.

3. ...will lead to the Singularity
   - Apple II
   - UNIVAC I
   - Colossus
   - Analytical engine
   - Holistic information

COMPUTER RANKINGS
- By calculations per second per $1,000
Nano Technology

Cancer cell

Chemo “Nano” Attacks cell

Cell dies
Stem Cells
Creating a Heart
Disruptions of Health Care Professions

- Complexity of diagnosis and treatment

- Performance that patients need or can use

- Self-care
- Nurse practitioners
- Primary care and family practice physicians
- Scientific progress and subspecialist physicians
Example: Sore Throat
“Hairy cell” Leukemia
Innovation is going to enable health care to be delivered by:

• Less expensive individuals
• Doing more sophisticated things
• In less expensive settings
Scientists develop eyeglasses app

MIT researchers create cheap, accurate prescriptions for smartphone
Disruptions of Health Care Institutions

- Complexity of diagnosis and treatment
  - Scientific Progress
  - General teaching hospitals
  - Outpatient clinics and focused-care centers
  - In-office care
  - In-home care

Performance that patients need or can use

Time
MinuteClinic services help you get better and stay well.

MinuteClinic walk-in medical clinics are staffed by nurse practitioners and physician assistants who provide treatment for common family illnesses and injuries, administer vaccinations, conduct physicals and wellness screenings, and offer monitoring for chronic conditions.

Our practitioners can:

- Diagnose, treat and write prescriptions for common family illnesses such as strep throat, bladder infections, pink eye and infections of the ears, nose and throat
- Provide common vaccinations for flu, pneumonia, pertussis, and hepatitis, among others
- Treat minor wounds, abrasions, joint sprains and skin conditions such as poison ivy, ringworm and acne
- Provide a wide range of wellness services, including sports and camp physicals, smoking cessation and TB testing
- Offer routine lab tests, instant results and education for those with diabetes, high cholesterol, high blood pressure or asthma
Welcome to Ambulatory Surgery Center

A more private, convenient and cost-effective alternative to a hospital environment, Springfield Clinic’s Ambulatory Surgery & Endoscopy Center is excited to bring the premiere provider of outpatient surgical and procedures in Central Illinois, offering treatments in a fully accredited facility.

TheASC
rooms are
accredited

Patients
are
equipped
elderly, b

Our patients
are
significant
Combine
provide for

Specialties:

- Colon/Rectal Surgery
- General Surgery
- Gynecology
- Neurology
- Plastic & Reconstructive Surgery
- Ophthalmology
- Orthopedics
- Otolaryngology/Ears, Nose & Throat
- Urology
- Gastroenterology
- Oculoplastic Surgery
- Podiatry
- Vascular Surgery
Cataract Surgery – India style
We are not the only ones..........
The hockey strategy……..
The future as seen from the past ........
Final comment

You got to be very careful because……

if you don’t know where you are going,

you might not get there !!