Ten Digital Health Tensions Provide Energy of Innovation

Powering us towards the medicine and healthcare of tomorrow

Dr. Chris Wasden
Executive Director
Our focus on high reliability and medical practices of the past are causing us to fail to innovate and adapt in a turbulent market.

Innovation research highlights the central role of tension.

Innovator are ambidextrous leaders who harness tension.

We have the greatest tension for innovation in world history.

Ambidextrous leaders must create and harness tensions.

We must apply Complexity Science to overcome our failure to innovate!
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We must apply Complexity Science to overcome our failure to innovate!
Tension between incrementally improving the status quo and disrupting it
Tension between adding new technologies and creating new business models of value creation
Tension in how you regard and manage failure

Lean Startup

Lean Scaled

Tension in how you regard and manage failure
Tension between nurturing the ugly baby and feeding the hungry beast

Ugly Baby

Creativity, Inc.

Hungry Beast
Experience and research indicates a huge difference in the way that established companies and startups deal with innovation.
Tension paradox is that all innovation is born at the edge of chaos but only succeeds by approaching the edge of equilibrium.
High reliability organizations struggle to innovate because of their fear of failure

Moto: “Failure is not an option”
If failure is not an option

Then neither is innovation
The problem is that lean six sigma discipline eliminates the raw materials of innovation – variation, interaction and selection.

Failing 3 times in 1 million attempts.
Innovation requires a different discipline that enables a mindful and efficient and effective way for fast, frequent, frugal failure.

Failing about 90% of the time.
Simplicity doesn’t precede complexity, it follows it.

Alan Perlis, First Recipient of the Turing Award in Computing
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Iconic digital innovative leaders are masters at harnessing tensions to power disruptive digital innovations.
Great innovation leaders create, enable and harness creative tension to power the innovation processes.

“My job as a leader is to create discord and to impose deadlines.”

Eric Schmidt, Chairman, Alphabet (Google)

These three process enable spontaneous order to emerge from chaos!
Is tension good or bad?
How would you answer these three tension questions:

• How many of you enjoy and seek out tensions?

• How many of you create tensions to get other people to act?

• How many of you think that we can eliminate tensions in our lives?
Innovative leaders create and harness tension as the energy source to power creativity, but ... 

What kind of tension do you harness?

**Maladaptive Tension**

- Fear and doubt
- Threats
- Reactive
- Belittling
- Mindless failure
- Emergent

- **Painful**
Innovative leaders create and harness tension as the energy source to power creativity, but ...

What kind of tension do you harness?

**Maladaptive Tension**
- Fear and doubt
- Threats
- Reactive
- Belittling
- Mindless failure
- Emergent
- Painful

**Adaptive Tension**
- Tweaks and modifications
- Incremental improvement
- Sustaining engineering
- Six sigma innovation
- Rewarding
- Planned, directed
- Predictable
Innovative leaders create and harness tension as the energy source to power creativity, but ...

What kind of tension do you harness?

<table>
<thead>
<tr>
<th>Maladaptive Tension</th>
<th>Adaptive Tension</th>
<th>Creative Tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fear and doubt</td>
<td>- Tweaks and modifications</td>
<td>- Radical and disruptive</td>
</tr>
<tr>
<td>- Threats</td>
<td>- Incremental improvement</td>
<td>- Free will, agency</td>
</tr>
<tr>
<td>- Reactive</td>
<td>- Sustaining engineering</td>
<td>- Transformative</td>
</tr>
<tr>
<td>- Belittling</td>
<td>- Six sigma innovation</td>
<td>- Powerful</td>
</tr>
<tr>
<td>- Mindless failure</td>
<td>- Rewarding</td>
<td>- Inspired by faith and hope</td>
</tr>
<tr>
<td>- Emergent</td>
<td>- Planned, directed</td>
<td>- Self-organizing</td>
</tr>
<tr>
<td>- Painful</td>
<td>- Predictable</td>
<td>- Possible</td>
</tr>
<tr>
<td>- Painful</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Predictable</td>
<td></td>
<td></td>
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</tbody>
</table>
These leaders apply the innovation cycle to create new sources of value.

Value-creating novelty

- Born of failure that creates pain
- Powered by tension
- Leads to growth

INNOVATION → GROWTH → FAILURE → PAIN → TENSION → INNOVATION
Joseph Schumpeter’s Theory of Creative Destruction says that new order spontaneously emerges from the failure of the old
Karl Weick’s Theory of Sensemaking says that we only learn and improve through experience failure and pain.
Rob Stone’s Theory of Strong Structuration describes how we must have create structures and practices to innovate.
Walter Buckleys’ Theory of Complex Adaptive Systems identifies “tension as the go” in all self organizing systems.
The difference between managers and innovative leaders is how they apply the innovation cycle and lifecycle.
The difference between managers and innovative leaders is how they apply the *innovation cycle and lifecycle*

Harness Creative Tension to change the world
The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore all progress depends on the unreasonable man.

George Bernard Shaw, author
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Exponential changes occurring in society are the leading indicators of emerging tensions
These tensions will create 200 centuries of change in just the 21st Century
These tensions power creative destruction that is decreasing the life of the S&P 500 to just 12 years.
The emergence of mobile technology has completely changed the landscape for greater convenience in healthcare.
The double exponential decline in genomic costs has led to an exponential increase in genetic tests - creating a new problem.
One of the largest emerging problems is making sense of the microbiome, which appears more important than the genome.
Healthcare organizations are drowning in data, much of which comes from new types of testing.
RFID and the IoT are exploding and will revolutionize global sourcing, requiring new capabilities.
IoT will be more disruptive than the internet to all aspects of business operations
Virtual reality is a new way of thinking and applying IoT in consumer, commercial and industrial applications.
And similar growth in augmented reality will enhance products, marketing and retailing.
IoT, Social Media, and Big Data are driving demand for analytics to predict, prevent, prescribe new behaviors.

Societal Problem

Data Scientist Jobs

Big Data Tools Jobs

Problem  Point of View  Proposition  Position  Product  Process/Plan  People/Partners  Possibilities  Promotion  Profit
Artificial Intelligence (AI) and chatbots are considered the next big thing to predict, prevent, and prescribe behaviors.

**Artificial Intelligence Revenue**

**Alexa Your Virtual Doctor**

Amazon Alexa Can Now Be Your Doctor

Just when you thought Amazon’s virtual assistant knew enough already, WebMD – the hypochondriac’s favorite website – has teamed up with the retail giant to give Alexa medical diagnosis capabilities.

The integration will allow Amazon Echo, Echo Dot and Fire TV users to ask Alexa basic health queries, such as “Alexa, ask WebMD what are the symptoms of a heart attack?”, or “Alexa, ask WebMD how to treat a sore throat.”
The growth of Uber and its expansion into new markets will likely disrupt other transportation services.
Drones represent an additional disruptive force in the global supply chain, but what about healthcare?
Automation, AI are further driving changes in Additive Manufacturing (aka 3D printing)

**Consumer & Commercial AM**

<table>
<thead>
<tr>
<th>Year</th>
<th>Consumer</th>
<th>Enterprise</th>
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</thead>
<tbody>
<tr>
<td>2012</td>
<td>100,000</td>
<td>50,000</td>
</tr>
<tr>
<td>2013</td>
<td>200,000</td>
<td>70,000</td>
</tr>
<tr>
<td>2014</td>
<td>300,000</td>
<td>90,000</td>
</tr>
<tr>
<td>2015</td>
<td>400,000</td>
<td>110,000</td>
</tr>
<tr>
<td>2016</td>
<td>500,000</td>
<td>130,000</td>
</tr>
<tr>
<td>2017</td>
<td>1,200,000</td>
<td>240,000</td>
</tr>
</tbody>
</table>

**Healthcare 3rd Largest Market**
We must abide the Law of Requisite Variety & Complexity

Variety in the External Environment = Variety in the Internal Environment

Organizations that fail to abide this law fail to survive

Are you living this law?
We must abide the Law of Requisite Variety & Complexity

Variety in the External Environment = Variety in the Internal Environment
We must abide the Law of Requisite Variety & Complexity

Variety in the External Environment = Variety in the Internal Environment
The test of a first-rate intelligence is the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function.

F. Scott Fitzgerald, author
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Life is like a ten-speed bicycle. Most of us have gears we never use.

Charles M. Schultz, cartoonist and author
We need to become ambidextrous to enable our people and organization to ride all kinds of cycles.

- **Mountain Bike**
  - Discovering
  - Failure 90%

- **Hybrid Bike**
  - Incubating

- **Road Bike**
  - Accelerating

- **Stationary Bike**
  - Scaling
  - Failure 3 in 1 M
The Law of Requisite Variety requires digital innovation – WE MUST BECOME MORE LIKE Amazon, Google, Apple
Original Sin of Healthcare – **Failure** to treat the consumer as customer – digital provides the tools to overcome failure but healthcare struggles due to Ten Tension of Digital Health
Money Tension – Requires new business models

Clinicians and health systems will only adopt Digital Health if they can make more money; yet the primary value of Digital Health is to improve the triple aim: better outcomes, greater access, affordable care (lower costs).
Money Tension

Billable online medical evaluations ("e-visits")
"E-visits" are defined in the CPT manual, and their billing and coding requirements can be found there. They are billable by primary care physicians (PCPs).

- **99444**, Online medical evaluation - physician non-face-to-face E&M service to patient/guardian or health care provider not originating from a related E&M service provided within the previous 7 days.

Billable visits
The CPT manual defines billing and coding requirements for both the physician and the non-physician qualified health care provider* (QHP) telephone visit.

PCP codes
- **99441**, Telephone evaluation and management service by a physician or other qualified health care professional who may report E&M services provided to an established patient, parent or guardian not originating from a related assessment and management service provided within the previous 7 days nor leading to an assessment and management service or procedure within the next 24 hours or soonest available appointment; 5-10 minutes of medical discussion
- **99442**, Telephone services (see above), 11-20 minutes of medical discussion
- **99443**, Telephone services (see above), 21-30 minutes of medical discussion
Practice Tension – abandoning analog, outmoded practices

Digital Health must drive creative destruction of medicine and transform the practice of healthcare to one that uses fewer clinicians;

Pharma, medtech, payers and providers must lead this transformation by embedding workflow into their Digital Health solutions.
Roche, Qualcomm partner to monitor patients on blood thinners

By: Jonah Comstock | Jan 29, 2015  Tweet  64  Share  3  Share  32

Tags: anticoagulation meters | blood thinners | Qualcomm | Qualcomm Life | Qualcomm Life 2net | Roche | Roche Diagnostics | warfarin |

Less than a month after announcing its partnership with Novartis, Qualcomm is adding another big pharmaceutical company to its list of 2net partners: Roche, who will use Qualcomm Life’s 2net platform to capture patient data from connected devices, starting with anti-coagulation meters.

“This collaboration marks a significant milestone for Roche as we launch a new generation of point-of-care solutions that enable healthcare professionals to better keep in touch remotely with patients, whenever and wherever they are,” Jeremy Moss, senior vice president of Point of Care at Roche Professional Diagnostics said in a statement. “By combining Qualcomm Life’s leadership in powering connected health solutions with our point-of-care expertise, we are taking an important step forward to realize our connected care strategy; ultimately enabling physicians to improve the overall quality of life for patients.”
Engagement Tension – engaged in personal health behaviors

Consumers/patients need to be more engaged in making healthy decisions but less engaged in the health system;

Digital Health provides the platforms to enable new and better forms of engagement.
Engagement Tension

Improve patient engagement through social play

Strategy, design and development:

Find out how
Engagement Tension

SAMSUNG

400 Students
100 judges
81 universities
14 countries

$64,000 prize money
Adoption Tension – focus on those who are early adopters

Those that need Digital Healthcare the least are the most likely and willing to adopt it the fastest, while those that need it the most will be slow adopters;

Early adopters provide great tests cases to drive innovation and increase adoption among those with chronic disease.
Adoption Tension
Technology Tension – it’s NOT about technology but work flow

We have an over abundance of technologies but an unwillingness and inability of clinicians to use them;

Technology adoption must become as simple as writing a drug script and require no more thinking and effort from clinicians.
Technology Tension
Satisfaction Tension – consumers are demanding digital

Nearly every study and survey on Digital Health shows 70-85%+ consumer/patient satisfaction due to significantly better outcomes (shorter hospitalization, fewer admissions and readmissions);

Consumers must become the outspoken revolutionaries demanding Digital Health solutions.
Satisfaction Tension

1. Cost
   - 20% (20%) reduction in hospital admissions
   - 25% (14%) reduction in bed days of care

2. Convenience
   - 86% patient satisfaction

3. Confidence
   - 20-57% reduction in chronic disease care
   - 46% reduction in mortality

4. Compensation
   - 85+% reduction in cost of care, $1600 vs $13K PCP, $77K SNF

Why isn’t it malpractice to not use Digital Health?

UK NHS Whole System Demonstrator
Feedback Tension – admit there is NO feedback loop today

There currently is virtually no feedback loop in healthcare for the vast majority of consumers/patients;

Digital Health enables real time feedback, but rarely by the human clinician.
**Blood Pressure**

Blood Pressure Connect is a home monitoring program offered to patients by their primary care providers or specialists. The program gives patients and their care providers a way to keep track of their health data and collaborate on a care plan between office visits.

Developed by Partners Healthcare Connected Health and supported by Partners Population Health Management, Blood Pressure Connect is a turn-key service for clinical practices throughout the Partners network.

The program is being offered at primary care practices applying for NCQA recognition as patient-centered medical homes.

Using a home blood pressure monitor and a wireless communications device, patients transmit their blood pressure readings to their providers; the data can be viewed via the patients’ electronic medical record and the patient portal. Patients and their providers can view data based on time of day or, trends over time, and is displayed in easy-to-read graphs or charts.
Utilization Tension – increase productivity not activity

Nearly all studies of Digital Health show 20-40% reductions in health system utilization yet health systems in developed countries can’t figure out how to turn that into economic value.

Emerging markets and consumer driven systems are creating new Digital Health systems to leapfrog developed markets.
Utilization Tension

Modernized hospital structure... from appx. 80 to 50 units
Validation Tension – don’t wait for 10 years and everybody else

Despite a plethora of pilots and studies of Digital Health applications and use cases, we lack a systematic way to evaluate and validate which ones work and how effective they are; we need social and crowd sourced mechanisms to rapidly test and share Digital Health solutions and avoid *Pilotitis.*
Validation Tension
Behavior Change Tension – consumers have right digital behaviors

Digital Health’s value only really accrues by changing consumer/patient and clinician behaviors, yet clinicians lack any training in behavioral psychology, economics and change; Digital Health vendors must incorporate behavior change science into their solutions just as Google, Amazon, Facebook and Apple do in digital technology solutions.
Behavior Change Tension
Would this create tension in your organization? Could it be a creative tension? Could it be transformational?

How do we “Own the Disease” and increase market share by 5X, triple profits, and radically improve outcomes in five years?
5th place with 10% market share, -10% margins, ready to such down the business – Growth Hormone Therapy

Could we own the disease?
A digital health feedback loop dramatically improved results – willing to take risk
Molecular diagnostic mitigate risk, enabled greater risk taking and value creation through digital health
Nurses assisting practices provide better risk management with analog care to complement digital care – enhance clinician workflow

Molecular Dx screening IDs patients who would benefit from treatment

Wireless Easypod injection device records dosage data and transmits to clinicians

Nurse call center intervenes when notified by device of patient non-compliance

Clinical nurses in physician’s office assist in treating patient
Electronic medical records ensured digital health data capture, improved analytics, and measures of value creation.

**Molecular Dx**
Screening IDs patients who would benefit from treatment.

**Wireless Easypod**
Injection device records dosage data and transmits to clinicians.

**Nurse call center**
Intervenes when notified by device of patient non-compliance.

**Clinical nurses in physician's office**
Assist in treating patient.

**EHR**
Integrates patient information.
Owning the Disease through digital health enabled value-based payment and success

Innovation in the new healthcare paradigm

Molecular Dx screening IDs patients who would benefit from treatment
Wireless Easypod injection device records dosage data and transmits to clinicians
Nurse call center intervenes when notified by device of patient non-compliance
Clinical nurses in physician’s office assist in treating patient
EHR Integrates patient information
Value-based reporting to NHS demonstrates compliance and improved outcomes

Personalized Digital System-based Value driven

Market Share: 10% → 50%  Profits: -10% → 20%  Sales force: 20 → 0
Would this create tension in your organization? Could it be a creative tension? Could it be transformational?

How do we eliminate 50% of all clinical visits within 5 years?
Doctors Adamson and Bachman have shown the way in their 2010 research.
Largest study of its kind to test the idea of pushing more care to the home

2 years (2007-2009)
4,300 patients
56 clinicians in 4 locations
24 hour turn around
Portal technology
2,531 online visits
1,159 were billed
No marketing or promotion
There were two primary personas among these online patients, young moms and older daughters. 71% women
Monday 25%
Weekend 5%
8 AM to 4 PM

Working Mom

Working Daughter
40% of all problems were address WITHOUT an office visit – this was conservative – could easily have been 50%
... but did it make money?

11% just prescription refill
14% sent to the office for an appointment
Many seen in the office previous week or regular follow ups
What is the value of being able to see more patients in office?

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TABLE 2. Billings for Patients Without Mayo Clinic Insurance (n=448)

<table>
<thead>
<tr>
<th>Billed</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>236 (52.7)</td>
</tr>
<tr>
<td>Insurance/patient</td>
<td>145 (32.4)</td>
</tr>
<tr>
<td>Medicare</td>
<td></td>
</tr>
<tr>
<td>Not billed</td>
<td>29 (6.5)</td>
</tr>
<tr>
<td>Billed</td>
<td>14 (3.1)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>24 (5.4)</td>
</tr>
</tbody>
</table>
Dr. Erin Clark in Maternal and Fetal Medicine at the University of Utah wants to cut maternal visits by 50%
For nearly 30 years we have been trying to cut the number of visits in half

1989: U.S. Department of Health and Human Services
Caring for our Future: The Content of Prenatal Care
Report of the Public Health Expert Panel on the Content of Prenatal Care

Proposed reduced frequency prenatal schedule for low-risk parous women based on the timing of specific events and tests that occur in pregnancy.

- Reduced recommended visits from 14 to 8.
Dr. Clark ran a clinical study with 200 women to test the idea of cutting visits by 50%

**ENROLLMENT**
- Eligible Patients Approached, n=466
- Randomized, n=200

**DECLINED PARTICIPATION**
- Declined participation, n=266 (57%)

**ALLOCATION**
- Allocated to Traditional Prenatal Care Arm, n=100
- Allocated to Remote Prenatal Care Arm, n=100

**WITHDRAWN**
- Withdrawn, n=4
  - Switched insurance/provider, n=3
  - Pregnancy loss prior to 16 weeks, n=1

**ANALYSIS**
- Analyzed, n=96
- Analyzed, n=91

**WITHDRAWN**
- Withdrawn, n=9
  - Technical issues, n=4
  - Switched insurance/provider, n=4
  - Pregnancy loss prior to 16 weeks, n=1
She used digital health devices and applications
She found no meaningful difference in outcomes

<table>
<thead>
<tr>
<th></th>
<th>Traditional (N=96)</th>
<th>Remote (N=91)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational Age at Delivery, wks</td>
<td>39.4</td>
<td>39.4</td>
</tr>
<tr>
<td>Preterm Birth</td>
<td>7 (7.3%)</td>
<td>4 (4.4%)</td>
</tr>
<tr>
<td>Induction of Labor</td>
<td>39 (40.6%)</td>
<td>41 (45.1%)</td>
</tr>
<tr>
<td>Cesarean Delivery</td>
<td>12 (12.5%)</td>
<td>9 (9.9%)</td>
</tr>
<tr>
<td>Birth Weight, gms</td>
<td>3427</td>
<td>3345</td>
</tr>
<tr>
<td>IUGR</td>
<td>3 (3.1%)</td>
<td>1 (1.1%)</td>
</tr>
<tr>
<td>Fetal Demise</td>
<td>1 (1%)</td>
<td>1 (1.1%)</td>
</tr>
</tbody>
</table>
She found patients were just as satisfied
Patients were very happy with digital health remote monitoring.

I am satisfied with remote prenatal care for monitoring my health during pregnancy.
There were many reasons they liked and preferred it to traditional prenatal care

What are the 3 most important reasons you liked receiving remote prenatal care?

- Time Savings
- Convenience
- Cost Savings
- Feel More Empowered / Involved
- More Focused Time with Provider
- Other
They nearly all preferred a mix of digital and analog health.
What happens if you harness creative tension to Own the Disease or cut visits by 50% in 5 years?

By applying Complexity Science to innovate you enable spontaneous order to emerge!
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I thought of that while I was riding my bicycle.

Albert Einstein, on coming up with the Theory of Relativity
Physics has struggled to unify the world of the big and the small ... much like organizations do today

If quantum mechanics hasn’t profoundly shocked you, you haven’t understood it yet.
(Niels Bohr)

Quantum mechanics is very worthy of regard. But an inner voice tells me that this is not yet the right track. The theory yields much, but it hardly brings us closer to the Old One’s secrets. I, in any case, am convinced that He does not play dice.
(Albert Einstein)

small probable uncertain free will radical

BIG PREDICTABLE CERTAIN CONSTRAINED INCREMENTAL

Tension
String theory has emerged as a crazy idea of how harnessing tension unifies both big and small in Complex Adaptive Systems.

Vibrating strings at various tensions to deliver specific frequencies look to be the foundation for all existence and unify General Relativity and Quantum Physics.

Strings  Quarks  Electrons  Atoms  Molecules
Leptons  Protons  Neutrons  Hadrons  

104
Is a theory of tensions and complexity crazy enough?

“We are all agreed that your theory is crazy. The question that divides us is whether it is crazy enough to have a chance of being correct.”

Niels Bohr