Resilience Reexamined: Reengineering How We do Business and Ensure Public Safety

Best-in-Class Case Study--Utah

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Goldratt Consulting

Member IISE Society for Health Systems

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LEADING HEALTHCARE IMPROVEMENT

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- **Mission**: Improve lives through better healthcare delivery

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  - Cultivate a community of healthcare improvement professionals that is passionate about making a difference
  - Foster innovative problem solving through systems thinking
  - Develop healthcare leaders, professionals, clinicians, and students
  - Influence leaders and decision makers on the future design of healthcare systems
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Webinars that Matter in the face of COVID-19

If you missed these timely, great Webinars, go to this link on the IISE Website and get to them.

30 Jan 2020: How to Design and Execute **Flow Workshops in Healthcare**—OSU University Hospital East Case Example (Scott Sink and Olivia Vance)

25 Feb 2020: Agile Principles and Methods to **Accelerate Critical Process Innovation** and Improvement—Joan Tafoya and Caitlyn Kenney

19 March 2020: **Creating Cultures** to Support Performance Excellence (crucial foundational element for surviving major disruptions!!) (David Poirier, President IISE)

**Engineering Management Systems to Ensure Survival and Success**

Navigating your Business Through the COVID-19 Crisis—7 April

Business Continuity Strategies and Tactics in Periods of Major Disruption—16 April

James A. Tompkins Ph.D.
Chairman, Tompkins International

david poirier, p.e.
CEO The Poirier Group

Engineering Management Systems to Ensure Survival and Success
The Role of Data and Information (Engineered Management Systems) in Periods of Major Disruption

Driving Benefits Realization Faster with Operational Analytics

Ben Amaba,
Global Chief Technology Officer
Data Analytics and AI Elite Team,
Industrial Manufacturing
IBM

Jared Frederici,
North American Program Lead,
The Poirier Group

A webinar recording will be made available after the session, follow up e-mail you will receive tomorrow.

Download the presentation **DURING** the Webinar, before it ends!! and request extra handouts after the webinar.

Questions? Type them in the CHAT window and we will answer as time permits.

Follow up questions are welcomed and contact information is provided at the end of the presentation.

And, the Recording and Presentation pdf will be available on IISE’s website for IISE members shortly after the webinar date—Training/Webinars/Performance Excellence. **Membership Has Privileges!!**

• Vinny is a Member of IISE and the Society for Health Systems.

• The State of Utah asked Goldratt to Project Manage the Covid Response effort. The Goldratt team is playing a role in putting together the strategy and implementing it. We are mainly focused on Data Analytics and Insights, Identifying, Testing and Tracing efforts in regards to Covid.

• In simpler terms, everyone from the state and Dept of Health still have their day jobs on top of this, so our main job is helping coordinate the efforts.
Resilience Reexamined:
Reengineering How We do Business and Ensure Public Safety
Agenda: Urgent Phase

- The Goal
- The Problem
- The Strategy
- Phase 2
- What’s Next?
What was the Conflict?

*Revitalize Utahn’s quality of life*

- Protect public safety health
  - Only way to shutdown is extreme social distancing
  - Hospital system will be overwhelmed & serious health consequences will result without shutting down
  - Broadly slowing down the spread is the only way to protect against the worst outcomes

- Bring back the economy
  - Only way to bring back economy is to allow normal human-to-human interactions

- Shut down

- Open up

Breaking the Conflict:

**What?** Adopt a surgical and agile approach to manage the virus spread. COVID-19 is not a short-term problem.

**How?** Set up an operational machine that utilizes information to address risk and hot spot emergence. Safely & gradually move towards the “new normal” by balancing public health impact with economic & social impact.
THE GOAL

To protect public health while bringing the economy back online and minimizing the damage to Utah’s quality of life.

1. Strong social distancing measures implemented
2. Infection rate reduced and businesses hurt
3. Pressure to ease social distancing policy
4. More people get infected
THE PROBLEM

• Current estimates project that for every one diagnosed case, there are approximately four infected people who go undiagnosed

Example: if yesterday we had 1,000 cases – this means that 4,000 additional persons are infected and undiagnosed
THE STRATEGY

The strategy is simple – to contain the virus, we must:

1. Detect those who remain undetected
2. Quarantine and treat before the virus is spread
3. Continually monitor and adjust social distancing protocols
TESTING, TREATMENT, TRACING

Point of Origin of the Infection

Identify, Test, Isolate

Where it may have spread to
MEASURES: THE CORE 4

- Transmission Rate
- Hospital Capacity Utilization
- Detect the Undetected
- Identify the Point of Exposure
**BUILD IT: 10 PARTS OF THE MACHINE**

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create data infrastructure (dashboard)</td>
<td>Populate data infrastructure with testing, survey, and app data</td>
</tr>
<tr>
<td>Provide performance targets, process measures, and regular reports to decision makers</td>
<td>Increase the number of individuals tested for COVID-19 (gain new approved testing methodologies, deploy mobile testing)</td>
</tr>
<tr>
<td>Identify requirements and needed resources for local county health dept. tracing efforts</td>
<td>Expand call centers</td>
</tr>
<tr>
<td>Agree and implement aggressive quarantine protocols</td>
<td>Increase supply chain of PPE &amp; medical supplies</td>
</tr>
<tr>
<td>Implement port of entry recommendations</td>
<td>Consider potential options for both businesses to conduct operations under strict health standards</td>
</tr>
</tbody>
</table>
THE COMPLETED MACHINE

1. Proactive Identification

2. Testing

3. Treatment
Stabilization Phase (Phase 2)

Whole state moved to orange

Most of state moved to yellow
How is Utah Doing?

<table>
<thead>
<tr>
<th>Positive Cases</th>
<th>Total Tests</th>
<th>Hospitalization</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>7384 Total COVID-19 Cases</td>
<td>174022 Total Reported People Tested</td>
<td>595 Total COVID-19 Hospitalizations</td>
<td>80 Total COVID-19 Deaths</td>
</tr>
<tr>
<td>4.2% of tested patients (positivity percentage)</td>
<td>126 tests per 100k people</td>
<td>8.5% of cases hospitalized</td>
<td>1.1% Mortality Rate</td>
</tr>
<tr>
<td>8th in the Nation in most Tests/Positive</td>
<td>8th in the Nation in tests/mil</td>
<td>2.8% of cases in the ICU</td>
<td>5th in the Nation fewest Deaths/Mil</td>
</tr>
<tr>
<td>3rd in the Nation fewest cases hospitalized</td>
<td></td>
<td>1st for fewest Deaths/Positive</td>
<td></td>
</tr>
</tbody>
</table>

Mortality Summary Statistics

The below table presents a variety of summary statistics about deaths associated with COVID-19 in Utah. The pre-existing conditions included are those on the “Risk Factors & Exposures” tab (cardiovascular, chronic pulmonary, diabetes, immunocompromised, chronic kidney, chronic liver, neurological, current smoking, former smoking, and other).

**High Risk:** at least 65 years of age and/or having at least one pre-existing condition.

<table>
<thead>
<tr>
<th>Mortality Summary Statistics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Deaths</td>
<td>80</td>
</tr>
<tr>
<td>% Mortality</td>
<td>1.1%</td>
</tr>
<tr>
<td>% Male/Female</td>
<td>52.5% / 47.5%</td>
</tr>
<tr>
<td>Average Age</td>
<td>73.2</td>
</tr>
<tr>
<td>Median Age</td>
<td>74</td>
</tr>
<tr>
<td>% 65+ Years</td>
<td>70%</td>
</tr>
<tr>
<td>% With at Least One Pre-Existing Condition</td>
<td>81.2%</td>
</tr>
<tr>
<td>% High Risk</td>
<td>95%</td>
</tr>
<tr>
<td>% Died in Hospital</td>
<td>65%</td>
</tr>
</tbody>
</table>
5 Focusing Steps

Step 1: Identify
- Speed: Ability to find exposed people & their source fast enough to limit the spread

Step 2: Exploit
- Increase the speed and focus of the system: assess > test > investigate > trace > quarantine > treat & recover

Step 3: Subordinate
- Triage the right people through the system & ensuring enough capacity exists to maintain speed through the system, especially in an outbreak

Step 4: Elevate
- Vaccine, treatment, additional resources, new testing & tracing methods, significant behavior change, new ways to work/live

Step 5: WARNING!! Do not allow inertia to become the system’s constraint.
What is Utah's Plan?

Goal:
1. Proactively protect those most at-risk
2. Pick the right people to send through the system
3. Go through 1 to 11 as fast as possible!

“The Machine”
- Triage & assessment
- Robust testing strategy
- Contact tracing investigations
- Quarantine & isolation

Intelligence Portal
- Randomized field testing
- Data-driven decision making & measures
- Global learnings applied to Utah
- Feedback loop mechanism
  - collect, analyze, and further instruct the machine

System Map
Stabilization Phase

Goal:
1. Proactively protect those most at-risk
2. Pick the right people to send through the system
3. Go through 1 to 11 as fast as possible!

“The Machine”
1. Triage & assessment
2. Robust testing strategy
3. Contact tracing investigations
4. Quarantine & isolation

Intelligence Portal
1. Randomized field testing
2. Data-driven decision making & measures
3. Global learnings applied to Utah
4. Feedback loop mechanism:
   - collects, analyzes, and further instructs & focuses the machine
Operational Dashboard
Operational Dashboard & Decision Making

- Core 4 Measures & Readiness Criteria
  - Key Measure
  - Leading Indicator
  - Informative Measures x2
- Process Measures & Targets
- Economic & Social Indicators

In every color of guidance, high-risk individuals operate under specific instructions issued by the Utah Department of Health.
Four Core Metrics

Guiding Decisions

Hospital Capacity – This is a measure of Intensive Care Unit (ICU) utilization so that COVID-19 patients do not overwhelm hospital capacity. The state's goal in moving from moderate level of risk to a low level of risk is to be below 60% ICU capacity for 14 consecutive days. Utah's ICU capacity has been at or below 60% for more than 21 consecutive days.
Utah’s ranks in covid-19 response

• Utah ranks 5th lowest in deaths per million
• 9th highest number of tests administered
• 78% of cases were exposed through known contacts
• Lowest number of deaths per total confirmed cases
• For March, 9.5% unemployment claims. National unemployment claims ~ 20%
• 3% of COVID-19 cases come from LTCF. National average > 10%.
  – Additionally, the risk of dying in a LTCF from COVID in Utah is approximately 10 times less
HERO Project
Overview: Health & Economic Recovery Outreach (HERO) Project

**BACKGROUND**
- “True viral prevalence” unidentified by state testing
  - Conventional testing is aimed at detecting active symptomatic cases
  - Inactive/asymptomatic cases go undetected, skewing data towards identified cases
  - No insight to infection variance across differing populations
- Infection outcomes (including mortality rate) & potential hotspots remain unknown

**OBJECTIVES**
- Understand COVID-19 viral prevalence, outcomes & impact across the state & within population subsets

**APPROACH**
- Operate a statewide, randomized testing study to determine Utah’s true viral prevalence *(Phase 1)*
- Operate an ongoing, targeted study to determine virus prevalence, outcomes & impact within population subsets *(Phase 2)*
Research & Insights
Insight 1: At Risk Populations

Race/Ethnicity:

Globally: Black/African American: 13% of US population, 28.2% of positive cases

Locally: Hispanic/Latino: 14.2% of Utah’s population, 37.3% of all cases.

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>% of Total Utah Population</th>
<th># in Population</th>
<th>Case Count</th>
<th>% of Cases</th>
<th>Case Rate / 100,000 Population</th>
<th>Hospitalizations</th>
<th>Hospitalization Rate / 1,000 Cases</th>
<th>Case as % of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian/Alaska Native</td>
<td>2.3%</td>
<td>73,737</td>
<td>157</td>
<td>2.7%</td>
<td>217.9</td>
<td>20</td>
<td>127.4</td>
<td>0.21%</td>
</tr>
<tr>
<td>Asian</td>
<td>3.8%</td>
<td>121,826</td>
<td>132</td>
<td>2.3%</td>
<td>111.1</td>
<td>11</td>
<td>83.3</td>
<td>0.11%</td>
</tr>
<tr>
<td>Black/African American</td>
<td>2.1%</td>
<td>67,325</td>
<td>147</td>
<td>2.6%</td>
<td>219.4</td>
<td>14</td>
<td>95.2</td>
<td>0.22%</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>14.2%</td>
<td>455,246</td>
<td>2136</td>
<td>37.3%</td>
<td>474.4</td>
<td>161</td>
<td>75.4</td>
<td>0.47%</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>1.6%</td>
<td>51,295</td>
<td>158</td>
<td>2.8%</td>
<td>315.4</td>
<td>19</td>
<td>120.3</td>
<td>0.31%</td>
</tr>
<tr>
<td>White alone, not Hispanic or Latino</td>
<td>78.0%</td>
<td>2,500,647</td>
<td>2338</td>
<td>40.8%</td>
<td>94.8</td>
<td>223</td>
<td>95.4</td>
<td>0.09%</td>
</tr>
<tr>
<td>Other race</td>
<td></td>
<td></td>
<td>606</td>
<td>10.6%</td>
<td>---</td>
<td>42</td>
<td>69.3</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
<td>611</td>
<td>10.7%</td>
<td>---</td>
<td>22</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Statewide</td>
<td></td>
<td></td>
<td>3,270,077</td>
<td>---</td>
<td>181.1</td>
<td>476</td>
<td>83.2</td>
<td>0.18%</td>
</tr>
</tbody>
</table>
Insight 1: At Risk Populations
Comorbidities

Globally: Found 15 pre-existing conditions/comorbidities
Locally: Found 4 with statistically significantly increased odds for hospitalization in Utah.

Table 1. Hospitalization Rate of COVID Cases by Age and Existence of Condition.

<table>
<thead>
<tr>
<th>Age</th>
<th>With No Condition</th>
<th>With Any Known Condition</th>
<th>With 2+ Known Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td>2.1%</td>
<td>6.2%</td>
<td>15.8%</td>
</tr>
<tr>
<td>25-44</td>
<td>4.7%</td>
<td>14.9%</td>
<td>21.2%</td>
</tr>
<tr>
<td>45-64</td>
<td>8.6%</td>
<td>29.5%</td>
<td>42.4%</td>
</tr>
<tr>
<td>65+</td>
<td>21.3%</td>
<td>36.8%</td>
<td>42.2%</td>
</tr>
</tbody>
</table>

Table 2. Hospitalization Rate by Age by Type of Condition.

<table>
<thead>
<tr>
<th>Age</th>
<th>Cardiovascular Disease</th>
<th>Diabetes</th>
<th>Immuno-compromised</th>
<th>Kidney Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-44</td>
<td>30.3%</td>
<td>33.8%</td>
<td>10.8%</td>
<td>20.0%</td>
</tr>
<tr>
<td>45-64</td>
<td>35.5%</td>
<td>39.6%</td>
<td>28.8%</td>
<td>57.1%</td>
</tr>
<tr>
<td>65+</td>
<td>42.4%</td>
<td>43.4%</td>
<td>44.2%</td>
<td>66.7%</td>
</tr>
</tbody>
</table>
Insight 1: At Risk Populations
Long Term Care Facilities

Globally:
• About 1/3 of Covid-19 deaths were residents of LTCFs.

Locally:
• Utah has a total of 80 deaths; 31 have been residents of LTCFs (nearly 40%).
• 300 facilities; 108 have been infected.

Recommendations completed:
• Tiered Testing Strategy for LTCFs drafted.
• A map and data regarding positive cases in LTCFs is now posted for the public.
What’s the Current State?

*Despite good progress, good trends and ability to move most of the state to yellow…*

- “The Machine” is working, but not scaled up to the anticipated level
  - Low numbers & doing well, so did not need to get as tactical as anticipated

- Currently at a cross-roads... What is the end goal? Where should the machine focus?
  - Bring the transmission rate to 0.0 → squash the spread by getting super tactical despite low numbers
  - Accept a transmission rate around 1.0 → manage the spread/risk, protect high-risk pops & hospital capacity
Healthy Together Mobile App
Jeff and Sarah don't know each other, but Healthy Together's app with Bluetooth and location tracing services securely records a potential exposure event.
Healthy Together

- Assessments and Schedule a test
- Test Results
- Investigator Portal
- Communication
- Business Portal
What’s Next?
What was the Conflict?

Revitalize Utahn’s quality of life

Protect public health

Shut down

Bring back the economy

Open up

- Only way to shutdown is extreme social distancing
- Hospital system will be overwhelmed & serious health consequences will result without shutting down
- Broadly slowing down the spread is the only way to protect against the worst outcomes

- Only way to bring back economy is to allow normal human-to-human interactions
5 Focusing Steps: For Businesses

Step 1: Identify  Human-to-human interaction limitations to protect health

Step 2: Exploit  Improve flow & throughput of every human-to-human interaction

Step 3: Subordinate  Shift staggering, working hours, re-organize seating areas, appointments, full-kit interactions (order ahead of time), new offerings that don’t require the constraint (take out, pick up orders)

Step 4: Elevate  Add space, seating, new business model completely

Step 5: WARNING!! Do not allow inertia to become the system’s constraint.
Holistic Approach to Opening up a Business

Making the business safe
- Sanitation
- Social distancing
- Protecting high-risk
- Assessing, testing and tracing

Improving flow
- Shift staggering & working hours
- Re-organize seating areas
- Appointments
- Full-kit interactions (order ahead of time)
- New offerings that don’t require the constraint (take out, pick up orders)

Innovation around business model
- New offerings
- Changes to operations
- Changes to pricing
- Adopting the change
Final Thoughts

“I apologize for writing a five-page letter; I didn’t have time to write a one-page letter”
You can download the deck (handouts) 
You will receive an e-mail tomorrow with link to recording. 
You can go to this IISE link soon and get deck and recording. 
Pioneering and Engineering a New World

Jim Dobson
Senior Manager, Business Planning & Industrial Engineering
Walt Disney Parks, Experiences, and Products

Rescheduled due to Logmein Audio Failure Mode.
Now 16 June 11-12 EDT
https://attendee.gotowebinar.com/register/5384715667845858320
Upcoming Webinars that Matter

Service Systems Engineering Outstanding Innovations (IBM, Beijing Tongren Hospital, Chick-fil-A, and Mayo Clinic)

- **TUE, JUL 7, 2020**: 11:00 AM - 12:00 PM EDT

**PANELISTS**
Vitali Prabhu / Aly Megahed / Kathryn Zavala / David Reid / Xiaolei Xie

**Registration URL**
https://attendee.gotowebinar.com/register/8367755558460814772

Professor Prabhu from Penn State will moderate for 10 minute, TedTalk style executive summaries from the four Finalists for IIE’s Prestigious Outstanding Service Systems Engineering Award. (Chick-fil-A, IBM Research in AI, Beijing Tongren Hospital, and Mayo Clinic)

Risk Management and Resilience Engineering for Supply Chains

- **THU, JUL 23, 2020**: 11:00 AM - 12:00 PM EDT

**PANELISTS**
Deb Narayanan / Mike Sherwin

Mike Sherwin from IIE’s Logistics & Supply Chain Division and ISE at University of Pittsburgh and Jon Carmona from the Poirier Group will share insights and methods for making Supply Chains more Resilient.
IISE’s Annual Conference

Attend our Performance Excellence Track

Membership Has Privileges—Consider joining IISE?  
Customer and Member Satisfaction and Feedback Survey

Resilience Reexamined: Reengineering How We do Business and Ensure Public Safety

Vinny Monteiro
The Goldratt Consulting Group
and
IISE Society for Health Systems

You can download the deck (handouts)
You will receive an e-mail tomorrow with link to recording.
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Thank You!

You will be receiving an e-mail tomorrow that will include a link to the recording of the session today.

Contact us for More Info:

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