Innovation 4.0
Flavor of the month: Digitization. Or is it?
Digitization will *wipe out* many industries.
For example banking.
Revolutions start at the extremes.
E.g. African banking, security, credit, insurance, jobmarket.
Digitization will revolutionize many industries.
For example agriculture.
The agriculture revolution is in full swing.

- Fixed wing drone survey
- Copter drone spray
- Weeding robots...

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Overtaking solutions which just didn’t cut it.

... stomping weeds

... overdosing weeds

... zapping pests.
Software does not break rock, real things and real people do.

Luckily.
In mining, the digital revolution is a given. Differentiation will come from other places.

- You won’t be able to play if you don’t digitize.
- If you don’t do digital, you don’t survive.
- It is not a differentiator, but a hygiene factor.
- So- digital won’t give you the revolution, but it might enable it.
What if disruption comes from everywhere at once? Let’s have a look at the automotive industry.
1. Autonomous and networked cars.

- Networking a car is a scary proposition
2. Increasing fuel type diversity.

- Gasoline
- Diesel
- Liquid Gas Fuels
- Hybrid
- Alternative Fuels
- HCCI
- Fuel Generator Electric
- Fuel Cell Electric
- Battery Electric
- Electric
- Hybrid/Plug-In Electric
- H₂ / CₓH₂+2x Combustion

Years:
- 2000
- 2020
- 2040

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The situation is very confusing.
3. Other technology.
Innovation happens at the speed of trust.
Where is the autonomous car headed?

2014 2016 2018 2020 2022

Assistance Automated HAC Autonomous

Drive safe Look good In control Set course Lounge

Driver assistance systems:
- ABS
- Cruise Control
- Blind Spot Warning

Driving automation systems:
- Stability Systems
- Adaptive Cruise Control

Automated driving systems:
- Auto Parking
- Lane Tracking

Automated decision systems:
- Road Training
- Highway Cruise
- City Mode

Autonomous decision systems:
- Point-to-Point
- All In

Remaining Topics:
- Moral
- Legal
- Customary

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What is the difference to mining?

- Trained professionals on closed circuit
- You are in control of the track and how it is equipped
- You can make and enforce the rules people are following

Your goals are completely different:
- Efficiency and revenue
- Speed and continuity
- Capex and opex
How to avoid getting old.

Innovation

Reached vision

Gained traction

Replaced by new curve

Time
Symptoms of a novice organization, a few examples.

- You complain that you are not getting what you need
- Effort put into fixing symptoms, not rethinking causes
- Fear to say truth, too much politics
  - Loyalty over honesty, belongingness over capability
- Innovation metrics expected to meet ops standards
  - Purchasing dictates cost cutting
  - Exploration gets the funds, not innovation with better ROI, less risk
- Motivation is not there to change
### Why Innovation Implementation fails.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change management</td>
<td>High</td>
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<tr>
<td>Budget</td>
<td>Medium</td>
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<tr>
<td>Technology integration</td>
<td>Medium</td>
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<tr>
<td>Impatience</td>
<td>Medium</td>
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<tr>
<td>Unforeseen impacts</td>
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<tr>
<td>Technology maturity</td>
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<tr>
<td>Project complexity</td>
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<tr>
<td>Insufficient benefits</td>
<td>Medium</td>
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<tr>
<td>Skills</td>
<td>Medium</td>
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<tr>
<td>Schedule</td>
<td>Low</td>
</tr>
<tr>
<td>Partner relationships</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Mining world:**

- 700+ responses
- Over 2/3 C-level and board

Innovation State of Play 2016

www.innovationstateofplay.com

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What will disrupt mining?

- The usual - energy, water, sustainability, social acceptability etc.
- Replacement by alternative materials
- Production by other means
- New technologies that do not require what you produce
- Mining elsewhere
So good luck!

roby.stancel@govci.com
+49 176 3544 1765