

# ENGINEERING CHANGE LAB

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**WORKSHOP 10 HARVEST  
FEBRUARY 2018**



# GROUND RULES

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- Be present
  - Keep confidences
  - Be open -> challenge assumptions
  - Both your own and others
  - Be inclusive
  - Use gender inclusive language
  - Need to have the conversations that really matter – the difficult conversations
  - Everyone has a voice
  - Notice who is in the room and who is not and think about who else we need to engage
  - Theme of ripples creating a movement
  - Follow us on #twitter
- @EngChangeLab** but no  
**#livetweeting** and please  
**#keepconfidences**



# SETTING THE STAGE

## DAY 1

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### Welcome & First Impressions

Our day started off with everyone introducing themselves and sharing their one word feeling for the day

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Our day started off with everyone introducing themselves and sharing their one word feeling for the day

Stewardship  
Relationships  
Collaboration  
technology  
Transformation  
Momentum  
Education  
Humanity  
Direction  
Network  
Disruptive  
Expression  
Potential  
Love  
Future  
Generativity  
Dream  
Accessibility  
Imagine  
Catchup  
Giraffe  
Improvement  
Disruption  
Expansion  
Innovation  
Opportunity  
Synergy  
Positive  
Leadership  
Analyse  
Culture  
Amplify  
Stakeholder  
Change  
Meerkat  
Inspire  
Clarity  
Research  
Posterity  
Understand  
Leverage  
Impact  
Teamwork  
Insight  
Imperative  
Transition  
Progress  
Learning  
Community  
Perspective

## Welcome Opening from Mark

Diversity and inclusion & perspectives from a diverse group key themes for workshop

Welcomes to all participants from various groups and acknowledgement of diverse inclusion

US Engineering Change Lab included – extending what’s being done in Canada into the US – potential in collaboration

# What folks are saying

*“The depth of our knowledge is so much more than when we began workshop 1”*

*“As leaders, we’re used to knowing the answers. But if we want to do our work well, we need to get used to not knowing the answers – be in the comfort of ambiguity”*

## Why Technological Stewardship

Presenter: Mark Abbott

### HIGHLIGHTS

- **Our next level of thinking is what does the higher level of potential look like?**
- Work of the ECL Strategy Team since the last workshop – exploring the contours of stewardship and understanding what that could mean
- If we do nothing, what will the impact be on technology?
- Can engineers be as good at shaping impact as we are at inventing
- Engineers have always responded first with public safety with our role shifting to responsibility to the environment, and now the role of technical steward
- How do we define technological stewardship?
- Are engineers losing control of technology?
- Engineering identity is going through an expansive disintegration – we need to let go of some of the ways we think about identity
- This is not the last but the beginning of the conversation
- **“What does technological stewardship mean to you?”**
- Leaning into longer-term learning
- How do we work with others because we can’t steward alone
- Things to think about: The unintended consequences of technology (ex. Bitcoin and energy use)
- Natural fear of technology and how it will change the world in a negative way. Stewardship is needed to dispel that
- It’s about looking after the impact of technology and ensuring it’s positive. The stewardship that I understand: looking after something.
- Being a non-engineering participant I see engineering in a different way. I see that someone from the outside might not take the same interpretation of the definition
- This is our work to do over the next day and a half! To make sure those inside and outside understand what we mean



# What folks are saying

*"We don't have to agree on the pace, but we have to all accept that there is change happening"*

*"We envision Canada's engineering community reaching its full potential by helping steward the application of science and technology to address the challenges of our time."*

*"Engineers have a unique and critical role [in technological stewardship]"*

*"Technology isn't just the cell phone in our pockets, but broadly as a complex interaction and a societal interface – an entire process"*

*"We need to let go of some of the ways we think of identity; Maybe we need to embrace [...] the non-binary"*

*"How much [technology] is being put to strategic purposes instead of at fast food locations"*

*"Stewardship means looking after something [...] but stewardship can mean looking after technology to make the most money out of it. Most people in this room know what that means [for society]"*

*"We can understand [the] ideas, but if the rest of the world doesn't, it won't matter"*

- Harvester Reflections
- High energy
- People want to share their ideas
- High level concepts, a lot of presenting, some people were a little disengaged (looking at phones)
- Discussion breakout much more lively, wide scope
- Discussions carried over into break
- Stewardship is protecting the technology we have today, but also being proactive in preparing for the technology that could arrive in the future
- Need to ensure technological stewardship definition and goals are understood by those both inside the engineering community and outside

## PROVOCATIONS

**Presenter: Bruce MacKay - Hatch**

**Regional Managing Director, WNA**

- Safety Notice: One hand on the handrail on stairs, no phones
- Hatch – consulting engineering company
- 4 main sectors: Mining, energy, infrastructure, digital (new!)
- Engineering services: from reactive → proactive group
- The projects we're doing now aren't in the easy places, they're in the hard places
- The world is expanding and the demands on technology are growing
- Clients are more literate when it comes to cost of projects
- Indigenous communities are consulted more now
- 90% of the world's data was gathered in the last 2 years – need a consolidated view to this data in many different forms
- Tools to pull data together are critical to save time and cost
- Technology like using drones to sample water improve safety and allow the collection of new types of data
- "Smarty Plants" Using data and technology to automate plants

# PROVOCATIONS

**Presenter: Emily Moore - Hatch**

**Managing Director, Innovation**

- We are living the transformations as an engineering firm
- Talking about positive change because the world is changing around us
- World is going digital, information is changing
- Shift from providing services (billable hours) to designing products/solutions and installing -
- technology has been packaged over time
- Now the focus is on selling OEM type equipment vs. building technology - multiple business
- models
- Technical expertise, business acumen (also need to understand client business), and
- teamwork (inclusion) are all critical
- Need to proactively look ahead of clients to develop new products/solutions to get ahead of the market
- Social understanding (environmental permitting and social impact considerations) -
- managing stakeholder relationship
- There is a need to diversify the workplace
- Also in terms of technological expertise
- Need "social scientists" (laughs from room)
- Technological stewardship won't be engineers doing everything, but engineers working with
- people from other disciplines to figure out how to deliver technology to the public, changes
- we need to make
- *"We are currently living in one of the fundamental shifts of humanity"*
- *"Not only are we moving in the technological revolution. We are being asked to move from*
- *products to solutions"*
- *"[This] really resonates with people, because they feel the change"*

**Presenter: Virginia Cullen - BGC**

**Chief Operating Officer**

First time she's sharing this story

Realized the importance of building a network of people and trust

Grew up with the lense that "feminine is weak" but realized that feminine is strong and opens doors

There's a whole feminine toolset to bring that I wasn't using

Defining leadership in terms of having positive influence in the world vs. "being big"

Importance of "soft skills"

How do we redirect brain power to problems that are useful

Using technology to bring indigenous knowledge into consideration as stakeholders

Finding ways to "get our knowledge out there" moving from client consulting into society

# PROVOCATIONS

Continued....

*"I got a lot of work done, but in the end it wasn't sustainable. I was miserable, I was burnt out"*

*"Redefining leadership as having a positive influence on the world"*

*"Humans are more complex than a piece of rock"*

*"We need to bring all of these diverse ways of thinking to solve these complex problems"*

*"We need technology to solve society's hardest problems right away"*

*"How do we redirect the brilliance to the [current] problems"*

*"Our knowledge will [one day] be seen as traditional knowledge in the forthcoming digital revolution"*

*"What is the work we're doing? How is it important in the broader picture? How do we move from the client-design paradigm?"*

**Presenter: Kyle Davy - ECL-USA**

**Consultant, Author**

How does technological stewardship play out in the future of consulting engineering?

Engineering firms would be given money to create a solution, and they [the companies] would take the money and revolutionize and innovate

*"Being a time seller is at risk"*

VUCA world: it's getting worse! And we're in the midst of it

With 4 industrial revolution AI is becoming a more common tool

Who vs what does the work

Shift away from doing work on site, to industrial, factory, controlled settings]

Ready for disruption

Moving to a "living firm" adopt stewardship, lead adaptive work, and drive change

*"Data is our work? In the past consulting engineering was our work"*

*"What does the work?" >>> AI*

*"[The clients] will be in the form of platform companies [e.g. Amazon, Google, etc.]"*

*"Going beyond problem solving to problem thinking"*

- **Discussion**

- **"I was going to build bridges, get my P. Eng., but now there's so many technologies and the traditional definition just doesn't cut it anymore**
- **"If clients think of engineers as putting a pipe in the road, it takes away from what engineers are"**
- **"Is there a way to go in the beginning with a blank slate? [...] Give the people [citizens of a town where a road is being built] a blank slate and see what they do [and what they want]"**

- Harvester Reflection - What Stood Out
- Diversity was a theme - should also think about how to deal with conflict and individuals having different opinions
- The definition of an engineer isn't simple anymore - from an association/university/accreditation standpoint, we need to broaden the sphere
- Notion of the living organization vs. dollars per hour stood out. Dollars/hour is a reflection of a lack of trust - trust is fundamental
- Clients don't think about sustainability (e.g. job sustainability on building a pipeline) as much as the engineers do.
- Listen to the clients problem, engineers should build the solution

## Complex Identities

Presenters:

Vanessa Raponi & Franz Newland

- EQ Canada overview: improving the state of diversity and inclusion in the engineering community → more on the slide
- Intersection of personal and professional
- Definition of an engineer is complex these days
- Different public and personal perceptions
- What is an engineer?
- Exclusionary, icons, teamwork - need to challenge ourselves to consider how we change the narrative to become stronger stewards and drive positive change
- Intersectionality of different personal identities (nationality, gender, ability, class...)
- How do we apply the concept of non-binary identity for diversity?
- Identity drawings to show the ways you view things in your heart and how you come across externally (express yourself to the world vs. feeling inside) to bring together personal with professional
- **Identity Drawings activity share-back:** →
- Noticed: People need help clearly defining who they are in their identity drawing
- Making the connection between travelling and culture and applying that to public transportation professional goals
- Not sustainable to separate personal and professional self
- Professional "basket weaver" weaving together silos
- Line between professional and personal is blurred
- Intersection of personal and professional is as a change agent
- Stopped defining self as "an engineer", instead "engineering is part of who I am"



*Continued....*

How do we bring our personal & professional identities into technological stewardship?  
Reflection on thinking about how to bring yourself into all you do, e.g., thinking about "is this the right thing to do?" - space and toy making examples shared  
How do I ensure that I come up with a framework to recognise my own blind spots?  
Use SDG (sustainable development goals) as lenses to view blind spots, but ensure you use the right one for each different interaction  
Where are we not engaging?  
Intersection exists within more than personal identity, but also when we work on engineering projects (intersection with SDG)  
EX. Vanessa about to enter toy industry, source of the labour for manufacturing, is the packaging environmentally friendly, and I going to be creating "girls toys" and "boys toys" that further reinforce traditional gender roles  
"Can we live the change lab every day?"  
"Chronic sense of imposter syndrome"

*"Engineers need to move from how do I do no harm, to how do I do the good I know I can do as an engineer"*

*"How were I to frame that [sending satellites for thousands of years into space] if I were to think [...] more than the engineer in myself?"*

*How do I turn this set of reflections of what I do as a steward to allow anyone to do technological stewardship*

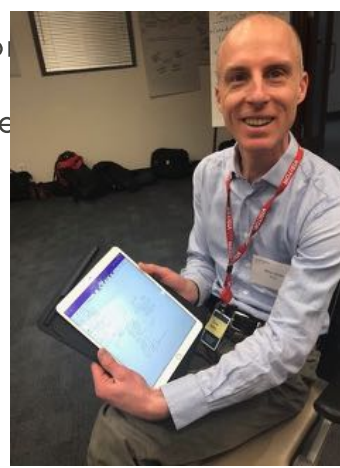
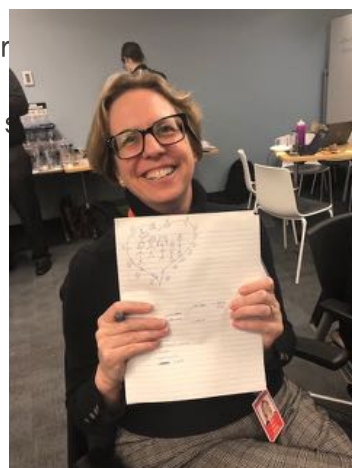
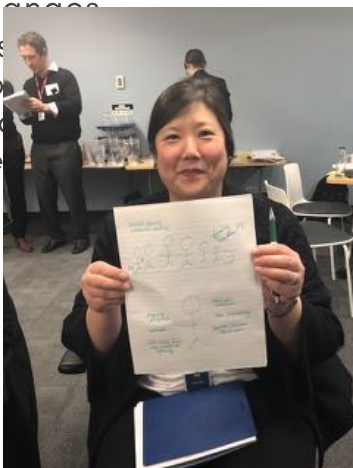
*"How do I bring more than that piece of me [engineer] to that task"*

*"There's always a risk I don't recognize my own blind spots"*

*"Thinking about engineering projects with a technology stewardship lens"*

### **Breakout Group & Discussion**

We can give these SDGs to our students doing capstone projects  
Capstone projects can become more than a cool technology, but rather a project to improve the world  
Look at more than the impacts of our project, but also how we do our project  
E.g. plastic cups at the workspace, driving around cars on site  
When the change comes from the middle, how do we get the ripple to go up AND down  
Climate change is taught a lot in school, so how do we expand the scope of what implications we look at (implications can mean SDGs)  
How do we teach how to act? TO often we know the problem but are unable to make large changes



# Pathways for Technological Stewardship

## Engineering Subsystems: POST SECONDARY

### What examples of technological stewardship are already happening in the system?

PEI is doing sustainable engineering to show how engineering can help the local and global community  
Design projects are being integrated with environmental and societal impacts  
Extra curricular groups such as EWB  
School are going outwards to help reach a greater community  
ElleHacks at York University for women  
York University experiential learning marks in ENG courses (thanks Dr. Andrew Maxwell)  
Offer credits for working on extra-curricular activities  
New grads are already impacting their workplaces

### What are the barriers to greater integration of technological stewardship into this sub-system?

Our technological stewardship is not organized, but exist in pieces and seeds  
We aren't being taught a lot about the technology in post-secondary  
Need to be taught about new technology  
CEAB is kinda cutting away at the extra programs  
CEAB does not allow flexibility to change how we teach our engineers  
Capstone's environmental and safety lessons are getting pushback from the students  
Enabler for some people, barrier for others  
Disconnect when students from different disciplines come together  
Too much to do for students to do their own learning (too many courses)  
There is no systematic way of bringing data on student education

### What ideas do you have for moving the needle towards technological stewardship in the system?

Embedding more into our current courses instead of creating new courses  
Not extra courses  
Have regulatory bodies to support this  
Students need to be taught the important of being a technological steward  
"Technology is both the problem [created], and the solution [to be created to solve the problem]"  
Must teach our students how technology can create the problem, but how we can also create solutions  
Greater integration of technology in all our classes  
DO NOT keep things separate

### If you could make progress on one of the 5 Tech Stewardship pathways in this subsystem, which is the most important, easiest, relevant etc one to push first?

## INTEGRATING THE SOCIETAL IMPLICATIONS OF TECHNOLOGY INTO OUR WORK

### REPORT BACK: What stood out as the two key headlines from the conversation?

*Recognize the achievement of students and 'get out of their way' to further encourage their involvement in being a technological steward*  
Integrating technological into our current courses and breaking down the barriers between each course to teach the effects of technological stewardship

# Pathways for Technological Stewardship

## Engineering Subsystems: **WORKPLACE**

### **What examples of technological stewardship are already happening in the system?**

Good amount of work in the mining industry, working with CMIC in making tech roadmaps.

Hatch associated with FIATECH, driving innovation for construction

In workplace, there is higher awareness for asset management (level of service, responsibility for infrastructure, adding value to the community)

Gibson's is doing this

Hatch is aggressively pursuing R&D tax credits to foster internal innovation

NSERC is funding brainstorming conversations

Working innovation with universities to drive R&D. We can see the practical implications of their research, so keeping the ties close is important

Connecting universities with the city, and the industry to find problems to solve

What are the barriers to greater integration of technological stewardship into this sub-system?

Cost+Exclusivity, engineering is isolated from the rest of society

Risk vs innovation

Profit over innovation

Profit over doing the right thing

Short term vs long term (benefits are too far into the future to convince people to implement)

Scarcity problem to have everyone work in something that they can engage with

Fear of technology of taking away, but has the potential to add opportunities

Intellectual property, unwillingness of companies to share technology

"Think and doodle time" on Hatch project are gone now, projects have become more lean. Cycles are being limited because the budget doesn't allow for them, project managers are forced to stop innovation way too soon.

### **What ideas do you have for moving the needle towards technological stewardship in the system?**

Using Canada Oil Sand Initiative as a model for IP sharing

Where else can solutions to specific problems be applied? How can we share that knowledge to broaden it to other projects?

Reframing risk. Doing nothing is a risk, need to realize innovation is the only way to move forward.

More partnerships to dilute risk

Hatch has tried many things to drive innovation. What works is when you have an application for the new development, have a client already invested in the idea.

Creating a good company culture and finding people who are passionate

Foster a culture that allows the "bubbling up" of innovation

### **If you could make progress on one of the 5 pathways in this subsystem, which is the most important to push first and why?**

All important, but societal implications especially. On business side, economics are the most important and societal implications are sidelined.

Company can be made to "look better" when they consider the society

It's easy for a company to say they support a core societal value, but how do they prove it?

# Pathways for Technological Stewardship

## Engineering Subsystems: **WORKPLACE** continued

### What pathway should we talk about that we didn't?

Business collaboration

Workshop with other companies, connecting academia & industry, to tie in the implications of the technology and drive it forward  
May be hard for company to understand the theory at first, but collaboration is an opportunity to apply knowledge already there on their applications

### Key Takeaways

Need to work to create partnerships to de-risk opportunities, share costs as well as benefits, share IP and collaborate  
External motivators is required for workplaces to consider technological stewardship  
policy support in the form of R&D tax credits, NSERC funding  
other funding  
Collaborating with educational systems  
Putting application to technological development from universities  
Leveraging existing frameworks  
Fostering a culture that allows for innovation to thrive  
Don't come in as an expert, come as a collaboration  
Collaboration timing need to be early, setting needs to be inclusive, need to focus on technological literacy of collaborators for proper engagement

## Engineering Subsystems: **POLICY&REGULATION**

### What are Examples of technological stewardship are already happening in the system?

Regulator, PEO → they're doing their job + w CEAB, the have societal impacts + graduate attributes, more PEO than CEAB, who push the agenda with accreditation  
I've heard, there are so many types of unconventional types of engineering, are not really well covered  
Recent grads, don't even consider getting PEng status, bc employers don't know what it is  
Issues of alignment & jobs that don't require a PEng, but they still apply engineering concepts + things they've learned in their degree  
Also industrial exception in Ontario  
Daughter expert in schema apps? , strayed so far away from Eng profession, seriously re-considering not wearing iron ring  
New categories of PEngs  
Self regulating practice, so technical stewardship could also have one  
So many disaffected engineers who are leaving the profession in droves, as the sense of engineering is no longer what they identify with (or maybe doesn't seem like a noble cause), tech stewardship may draw them back  
PEO has a code of conduct w/Harassment added to that after many years  
Corporate vs professional tension (book: revolt of the engineers?)  
Bigger changes in zeitgeist, new generation that's dissatisfaction, backlash on tech run wild (more appreciation for downsides of tech, e.g. Google + facebook starting to feel pressure)  
Maybe there is a right way to engage those companies to start changing  
E.g. russian meddling with facebook? Engineers only optimizing clicks, not looking at context and content



# Pathways for Technological Stewardship

## Engineering Subsystems: **POLICY&REGULATION** continued

### **What are the barriers to greater integration of technological stewardship into this sub-system?**

- Barriers with accreditation system, the reality doesn't favour non-traditional modes of instruction, would want to see more integrative learning
- Integrated learning = great for learning tech, systems approach needs systems learning
  - But doesn't account for accreditation
- Need to reach out to people beyond education system, technical stewardship leaders (eg. need a supportive environment for tech. stewardship)
- If a young person can say that their profession tell them to hold to certain standards + guidelines re: tech stewardship
  - Consequences, if you're not a tech stewardship, what's the point?
  - Companies seem to be there just to make money
- Endless issues with product, but , employees enjoy workplace enviro/people and income
  - A culture change with hiring, then won't see propagation
- Talking about living companies and communities, \$ =/= sole purpose of business, there are a multitude of stakeholders, depends on company leadership
- Roadblock is you can't dictate what people do with tech stewardship, it's a moving target
  - But it's a guideline
  - But it's enforceable
- Need to create a generation of engineers who see it as part of their role to be tech stewards
  - Think currently regulators are doing best you can
  - Societal impact + smartphone → writing addicting apps
  - Some people in our generation are already tech stewards

### **What ideas do you have for moving the needle towards technological stewardship in the system?**

- There are a group of people who are lost? With their way, the 70% of not-Peng Eng grads, are still working in society and are not captured by PEO despite grad from accredited programs
  - How to embrace those who choose to wear iron ring but not practice.
    - OSPE accepts non professional engineers
- Civ eng by trade but worked in sales at IBM, but gave up PEng bc cost and little benefits
  - How do you keep people in the fold?
  - What are the consequences of not being a tech steward?
- Establish a guideline with teeth re: being a tech steward, and have it be part of accreditation
  - Audit not just licensed engineers auditing, but also other stakeholder groups
    - People do complain against engineering, lose license
    - Could we make tech stewardship part of that?
- Would be hard to do in USA, bc of major pushback from engineers + economy

# Pathways for Technological Stewardship

## Engineering Subsystems: K-12

### Questions

Who is taking a lead already in this space? What can we point toward?  
Why is improving how the engineering community does work in this important? Which audience needs convincing?  
Are you and/or your organization working on this? If so, how?  
What is one thing you could do to move the needle on this particular theme from your position in the system?

### Discussion

K-12 discussion from diversity group:

Reaching out to younger people with STEM is a critical step  
Engaging young women and getting them excited about designing and building things with their hands vs. being prescriptive about what engineering is  
Involving parents is important to drive knowledge of what engineering really is

K-12 discussion from technical literacy group:

Need understanding of incremental knowledge  
Involving parents in activities is important (including elderly)

Didn't talk previously about economic impacts of technical literacy in K-12 - results in terms of national economy

Need to develop a program for tech knowledge development through the continuum of learning

Students are struggling in first year (connecting disciplines and applying math specifically) de to disconnect on what has already been taught

Deeper knowledge base isn't consistently there for all first year students

Perceptions that only the smart kids can do math, programming, etc. are a barrier  
Physics specifically is an issue

More women than men leave engineering because 2 year physics is a challenge

Confidence is possibly a barrier for girls as "we are scaring the girls"

Enrolment of girls in traditional boys' activities needs to be more prescriptive (example of girls and boys playing soccer - if only boys are playing, girls aren't joining in)

When the interpretation of being prescriptive creates a scenario where one group is disadvantaged, that is a problem too

We're doing isolated random things, but it's not systematic. Need to create a strategy and program - start with transformation mapping and define drivers/influencers

Build maps/overlaps of a plan for where we want to go

### Key Takeaway: Systematic Limitations

Need to create a strategy and program - start with transformation mapping and define drivers/influencers

Build maps/overlaps of a plan for where we want to go

# UPDATES FROM THE ECL PORTFOLIO OF INITIATIVES

## An Update on the Diversity & Culture Initiative: Boeing Pilot Program

Erica Lee Garcia & Marion Huber

### Overview of Initiative (Erica Lee Garcia)

- Team came up with ideas on what it would take to change the status quo from a diversity and cultural standpoint at Boeing
- 3 Diversity metaphors: - 1. Floodgates, 2. Cultivate, 3. Recalibrate
- Liked all three, so they all become a pillar of our strategy
- Floodgates are for the system (Backed by evidence)
- Cultivate is for the under represented
- Recalibrate for the incumbents who can make change
- Need to take the insights held at the research level into the front lines to cause breakthroughs in 3 subsystems: K-12, engineering students and faculty, operations/industry
- Looking at diversity: Classic iceberg metaphor
- Let's not just look at representation, let's look deeper

- Boeing Pilot Program (Marion Huber)
- Boeing got involved 2 labs ago
- Boeing has relatively balanced gender balance across the company, but predominantly white males in engineering group
- Need to take research and bring it into Boeing and pilot a diversity initiative
- 5 key areas to focus on: diversity council, recruitment, leadership, workplace policy, workplace culture
- Representation matters because if people see someone like them in leadership roles, they are more likely to see themselves in those roles in the future
- Be more visible and have Boeing be represented at career fairs, targeting female specifically.
- Opening up screening criteria, not necessarily hiring based on demographic
- Resulted in more diverse female applications. 5/12 new hires are females
- Erica: thought we would wait until May-June to see tangible results from this initiative, but hiring already happened. Really positive sign of the initiative and experience working with Boeing
- Great results from what was learned from the lab
- Erica: excited by the results, looking to continue initiative with the funding secured from last lab. This is a good example of the lab in action

## INITIATIVES continued

### National Initiative on Capacity Building and Knowledge-creation in Engineering Leadership (NICKEL)

#### Mike Klassen

More activity in universities on engineering leadership than we know about

No best practices, universities don't know what each other are doing

Craving a connection

Annual conference for university representatives at end of August to collaborate and share knowledge

Started UofT but wanted to broaden ownership, and have done so now

Now more in-depth and looking at experiential educations

Not just about the curriculum content, but also how to influence department chairs, deans, understanding how to resource what is shared in the conference

Great thing that came out of last years workshops is people have taken the tools we have them and used them in their classrooms

McGill has built a parallel program to NICKEL

How can we bring more schools into this

Goal: in three years, every single Canadian university will have a framework in place to leverage and recognize engineering leadership opportunities

### Clear Pathways K-12

#### Rebecca White

- K-12 engineering advocacy
- Been thinking about the work that has been done, now moving towards how to amplify the impacts of the initiative
- Taking advantage of the outcomes of today's K-12 breakout
- Ready to go into the deeper level now with this initiative, will be helpful having the Ministry of Education cohort here
- Thinking big! "School of the future"
- DDSB is our sandbox - they are ready to implement what we recommend

### Canadian Engineering Education Challenge (CEEC)

#### Steve Mattucci

- Looking at specifically how we are training our engineers, through collaboration across universities
- Being here at ECL is a tangible product of our initiatives



## INITIATIVES continued

### Global Engineering Initiative

#### Arlene Williams

- The GEC (Global Engineering Certificate) has existed before with EWB, but has been brought to the lab now
- Came into the lab to help “evolve engineering”
- Arlene’s role is to think about the program, is it working, is it achieving its goals, has there been analysis done on it
- Conclusions: Goals set are wonderful, getting students to be involved in advocacy of their education and see the change they want to see, but the right implementation framework isn’t in place
- Therefore, considering a different implementation
- Want to shift towards a different way to engage students but achieve the same goals
- Want to pilot a change lab at CFES congress (implemented this January)
- Half-day workshop
- Great feedback from students, CFES execs
- Want to bridge out to find next steps from data collected, tangible action items directly from the students
- Excited about new partnership with CFES

### ECL CALGARY

#### Lindsay Mitchell

- Bringing new voices to the lab, see what interest there is in Calgary  
Wanted to look at it through the lens of what the lab could do for Calgary and Alberta  
Hackathon/ideation lab: opportunity to take real engineering problem, build a diverse team and spend time trying to solve it  
Want to do this at Suncor, to problem-solve their deep technological challenges  
Been testing what the lab can look like on a regional level



# END of DAY 1 - Check Out

What's your one word for how you are feeling now?



# DAY 2

## Check in What's getting clearer to you now?

The power of ripples vs. the power of projects

A lot of energy around K-12

The work affects the next generation

Need to walk through the woods and start throwing rocks in other ponds

Staying open to the fact that there are things we haven't thought about yet

There was support in the room to fill in the holes in the assumptions

Concept of stewardship - qualifying the approach to engineering leadership vs. stewardship as not being 2 separate topics

Process of influence that starts with self

How the next generation perceives the importance of this work will be interesting

Formulate opinions today vs. impulsive contributors





# Introduction to Agile Strategy

## Liz Nilsen

- **Introduction to Strategic Doing**

- Finding a way to make the system move is finding new solutions – It is a complex problem
- The theory of change – co-initiating, co-sensing, presencing, co-creating, co-evolving
- Strategic doing – enables loose networks
- We need new tools to move beyond the existing trajectory of engineering
- It will be a transition from hierarchy to a world of networks and an iterative processes of thinking and doing, thinking and doing...
- Networks need to be managed differently than a hierarchy
- Strategic planning depends on a lot of communication and doesn't work any more – 70% of plans fail
- When the number of people and assets in networks increases we can do bigger things
- What could we do?, what should we do?, what will we do? drive the commitments we will make together
- Real life examples of the number of strategic doing rules being used consistently and driving success (e.g., improving engineering programs)
- Strategy answers 2 questions: where are we going, and how will we get there

- **The 10 Rules of Strategic Doing**

- It is important to feel psychologically safe when you share opinions and ideas
- Appreciative questions/inquiry is important to keep energy high and keep others engaged.
- Develop strategic questions
- Messy room >> “How would your life be if your room was always clean?”
- Think about assets in buckets: physical, skills, social, capital
- Pathfinder project should be possible to complete in about 4 months
- Keep expectations modest and book the next meeting before you get up from the table
- Setting up metrics is critical – this can be difficult, but you don't necessarily need to go back to the metrics. It's more about driving the right conversation

- **Activity – Experimenting on the rules**

- People are able to understand the concept of an appreciative question, but the key words they need are on the tip of their tongue
- Using metaphors is helpful to create appreciative question
- Ask questions you would if you were in the positive position
- Imagine the environment of a student-oriented paradigm shift
- The appreciative questions end up being longer and more full of content than the original questions.
- Good simulation, but could be improved if we did it ourselves
- Missing definitions of physical, social, capital and skill assets; but overall helps us understand our different assets
- How do we identify our own assets?
- People really wanted to create their own action items from the experiment that are relevant to their own problems and their own organization.



# What Folks are Saying

- Quotes

"We are not trying to fix old system. You're never going to fix old systems, sufficiently. We're trying to create what's next."

"New networks can move older assets to new opportunities"

"Tremendous progress where the overhead projector was the biggest innovation"

"Find the questions that people say 'Yeah I would like to spend a couple hours talking about'"

"If it's not audacious enough, people won't want to invest"

"We believe in doing, not just talking"

"We are going through a tremendous transformation from thinking in hierarchies to living in a world of networks"

"Networks need to be managed very different from hierarchies, but the way that we have learned to manage things is designed for hierarchies"

"70% of strategic plans fail"

"If we focus on talking about problems, people disengage. If we can re-frame our conversation about opportunity, people are more inspired."

"Imagine if each of our organizations embraced the idea that engineers can be leaders in stewarding technology for society's benefit."

"The magic happens when you can connect assets together, in ways you've never thought about before."

"Before you get up from the table, set your next meeting."

"If you can get down to the level of measurable things, then you know you are talking about the same thing. It's about having this deep, understanding of a shared conversation."



# Strategic Doing Cohorts

## Reconvening Presentations

### **COHORT: MORE ENGINEERS ON BOARDS**

**FRAMING QUESTION:** *WHAT WOULD IT LOOK LIKE IF ENGINEERS SERVED IN GREATER INFLUENTIAL POSITIONS WITHIN SOCIETY?*

#### STRATEGIC GOALS

ENGINEERS HAVE LIMITED ABILITY TO USE COMMUNICATION TO INFLUENCE AREAS WHERE THEY WOULD WANT MORE INFLUENCE

ENGINEER MORE DO-ERS THAN STEWARDS, WHY IS THAT?

TAKING ENGINEERS BEYOND DO-ERS AND INTO LARGER LEADERSHIP ROLES

#### PROJECTS/BIG EASYS

LOOK WITHIN OWN ORGANIZATIONS, REVIEW BARRIERS, STRATEGIC GOALS

HOW CAN WE MAKE THIS AN UBIQUITOUS EFFORT IN ORGANIZATIONS

WHAT PARTNERS DO WE NEED TO ENGAGE WITH

#### QUESTIONS

WHAT ABOUT ON NGO BOARDS?

WHAT DOES IT TAKE TO GET ON BOARDS?

FINDING DIFFERENT PATHWAYS

LOOK THROUGH AND BROADEN INVITATIONS TO ECL

### **COHORT: MUNICIPAL STEWARDSHIP**

**FRAMING QUESTION:** *WHAT IF ALL LEVELS OF GOVERNMENT FULFILLED THEIR RESPONSIBILITY TO ACHIEVE MUNICIPAL SUSTAINABILITY?*

#### STRATEGIC GOALS

BUILD VALUE AND OUTCOMES WITH MUNICIPAL FOCUS

#### PROJECTS

GATHER PERSPECTIVE FROM OUTSIDE THE LAB, REFRAME PERSPECTIVE, EXTERNAL GROUP TALKING ABOUT ENGINEERING PROCUREMENT, STARTED BY WATERTAP (GOAL OF GROWING AND SUPPORTING ONTARIO WATER SECTOR, ADOPTION AND ROLE OF INNOVATIVE TECHNOLOGY)

NEXT 30/30 SEND FEEDBACK TO GROUP IN MARCH, VALIDATE AFTER, NEXT MEETING MAY 1

#### QUESTIONS/SUGGESTIONS

DAN HOSEN FROM EWB HAS VERY RELEVANT EXPERIENCE ON TOPIC

HOW CAN WE INVITE MORE PEOPLE INTO THIS CONVERSATION?

A CHALLENGE. WAS REASON FOR REFRAMING THE QUESTION TO TALK ABOUT MUNICIPALITY, AND NOT ON PROCUREMENT

# Strategic Doing Cohorts

## Reconvening Presentations *continued*

### **COHORT: CEEC**

**FRAMING QUESTION** *WHAT WOULD ENGINEERING EDUCATION LOOK LIKE IF IT PREPARED LEARNERS TO SHAPE THE FUTURE OF CANADA & THE WORLD?*

### **STRATEGIC GOALS**

A FOUNDATIONAL UNDERSTANDING OF ENGINEERING EDUCATION LANDSCAP

TAKING INVENTORY OF CURRENT INITIATIVES THROUGH GUIDED QUESTIONS

ESTABLISH A NETWORK COMMITTED TO SHAPING AND SUSTAINING THE FUTURE OF CANADIAN ENGINEERING EDUCATION

→ EMPLOYER SURVEY, "STATE OF THE NETWORK" (INVOLVED ORGANIZATIONS, CONCEPT MAP)

**NEXT MEETING:** MONTHLY CEEC CALL **TEAM:** CORE MEMBERS AND FLUID MEMBERS

### **QUESTIONS**

HAVE YOU CONSIDERED A SYSTEM TO MAINTAIN A FLOW OF INFORMATION?

STATE OF NETWORK WILL CONTAIN WHO'S INVOLVED, HOW THEY'RE CONNECTED, AND HOW THE FUTURE OF THE NETWORK WOULD OPERATE?

### **COHORT: FLOODGATES (DIVERSITY & INCLUSION INITIATIVE)**

### **STRATEGIC GOALS & PROJECTS**

### **CONNECTING DIVERSITY ORGANIZATIONS TOGETHER**

WANT CURRENT NETWORKS IN THE EDI SPACE TO NETWORK AND LEVERAGE EACH OTHER. SHARE INFORMATION, AMPLIFY WHAT EACH OTHER ARE DOING. 30 DAYS: CREATING AN INVENTORY OF WHAT'S OUT THERE SO THEY CAN FIGURE OUT WHERE TO GO

### **JOB ADS FOR BOEING**

IMPROVE NUMBER AND TYPES OF PEOPLE WHO APPLY, MAKES ADS MORE INCLUSIVE. WANT EVERYONE TO BE ABLE TO SEE THEMSELVES IN ALL ROLES. USE ONLINE TOOL ON JOB ADS TO SEE IF ANY EASY THINGS TO DO TO MAKE BETTER. AT YORK TOOK AN HOUR TO IMPROVE JOBS ADS SCORE ENORMOUSLY.

### **DIVERSITY ACROSS ALL THE LAB INITIATIVES**

INTEGRATION ACROSS ALL ASPECTS, MEMBERS, AND SECRETARIAT. COMMUNICATIONS ON HOW THEY CAN HELP, IE THIS IS WHAT WE DID FOR BOEING NOW WE CAN DO IT. WORK ON AN INCLUSION TOOL TO ADOPT NEXT LAB. ASK QUESTIONS THAT REFLECT INWARDS. STRATEGIC MAPPING PROCESS OF THE LAB, THIS WORK HAS BEEN THE FOUNDATION FOR IT. DIVERSITY AS A CROSS-CUTTING THEME.

# Strategic Doing Cohorts

## Reconvening Presentations *continued*

### COHORT: FLOODGATES (DIVERSITY & INCLUSION INITIATIVE) CONTINUED

#### STRATEGIC GOALS & PROJECTS CONTINUED

##### COMMUNICATIONS STRATEGY

FOLLOW US ON #TWITTER @ECLDIVINC. BRANDING: CURRENTLY LOOKING TO CREATE LOGOS FOR 3 PILLARS. DISMANTLE UNCONSCIOUS BIAS, WE DON'T KNOW WHAT TO DO YET EXCEPT TO ADMIT IT. WANT TO CREATE TOOLS THAT CAN BE SHARED AND KNOWN. GOING TO WORK ON AN OUTLINE

### COHORT: STUDENT ENGAGEMENT

**FRAMING QUESTION:** *WHAT WOULD IT LOOK LIKE FOR STUDENTS TO BE ACTIVE LEADERS OF TECH STEW?*

#### STRATEGIC GOALS & PROJECTS

WENT THROUGH THE ASSETS WE HAVE AS STUDENT ORGS, THE ECL AND WHAT PROFS CAN BRING TO THE TABLE. THEN HAD IDEAS AND PROJECTS WE LOOKED AT TACKLING. AN EXTENSIVE LIST BECAUSE WE ADDRESS MANY AREAS. SEVERAL SEPARATE THINGS MORE THAN WE ORIGINALLY THOUGHTS. NEM IS THE MONTH OF MARCH, RUNNING SOCIAL MEDIA CAMPAIGNS AND WANT TO ADDRESS THE ECL IN OUR CAMPAIGNS WITH THE CFES GIVEN OUR NEW PARTNERSHIP AND TO INCREASE STUDENT PARTNERSHIP. ALSO ADDRESS TECH STEW IN SOME POSTS. FOR THE FUTURE, TECH STEW DAY IN NEM. THREE DIFFERENT WORKSHOP TECHNIQUES WILL BE DEVELOPED FOR STUDENTS AND EDUCATIONS. INTRO TO TS, MINI-LAB EXPERIENCES, AND TRAIN/TRAINER SESSIONS SO ATTENDEES HAVE TANGIBLE TOOLS TO BRING BACK TO THEIR SOCIETIES. ALSO WANT TO WORK ON INTEGRATING ECL INTO THE REGIONAL ORGANIZATIONS TO REACH A BROADER NETWORK OF STUDENTS.

NEXT MEETING: MARCH 26TH.

### COHORT: HATCH

**FRAMING QUESTION:** *WHAT WOULD HATCH LOOK LIKE IF PEOPLE TRUST OUR COMMITMENT TO MISSION AND VISION.?*

#### STRATEGIC GOALS

WANT TO MOVE NEEDLE ON TRUST, FIRST STEP IS MANAGER ENGAGEMENT. EMPLOYEES WISH THEY WOULD HAVE ALREADY SEEN IMPROVEMENTS FROM LAST EMPLOYEE SURVEY.

NEXT MEETING GOING TO MEET MONDAY (IN 2 DAYS) THEN WEEK AFTER MANAGERS WILL MEET TO HAVE A DISCUSSION AND GET THEIR FEEDBACK ON ENGAGEMENT, THEN THE NEXT WEEK. HATCH COHORT PLUS SOME OUTSIDE FOLKS.

# Strategic Doing Cohorts

## Reconvening Presentations *continued*

### COHORT: HATCH CONTINUED

#### QUESTIONS/DISCUSSION

THE LAB WAS HELPFUL FOR GAINING INSIGHT AND USING THIS MODEL FOR EVALUATING WHAT NEEDED TO BE DONE. WANT TO REINFORCE THAT THEY ARE COMMITTED TO THIS JOURNEY. WOULD BE HELPFUL FOR HATCH TO DOCUMENT WHAT THEY DO AND SHARE FOR OTHERS. HOPING TO LEARN THE BARRIERS THAT THE MANAGERS FACE COMMUNICATING TO THEIR TEAMS. NOT ALL ARE BORN TO BE THE MANAGER TYPE, WANT TO EMPOWER THEM AND GROW THEIR SKILLS. WE HOPE TO COMMUNICATE THESE THINGS BETTER TO THE GREATER HATCH COMMUNITY. LOOKING TO BRING THE TYPES OF CONVERSATION WE HAVE HERE AT THE LAB, BECAUSE IT WAS SO INSPIRING, INTO THE HATCH ENVIRONMENT.

### COHORT:K-12 CLEAR PATHWAYS>IMAGINATION STATION

#### STRATEGIC GOALS AND ACTIVITIES

WE ARE NOT AIMING TO RECRUIT MORE ENGINEERING STUDENTS. WE ARE LOOKING TO PROVIDE OPPORTUNITIES TO EXPLORE ENGINEERING FOR ALL STUDENTS.

A LOT OF POSITIVE WORK TAKING PLACE IN THE DDSB WITH STEM TIME/RESOURCE ALLOCATION (INCLUDING THE FUTURE CITIES COMPETITION WHICH IS MULTI-DISCIPLINARY) AND CONSENSUS OF TEACHERS ON APPROACH AND ASSUMPTIONS - DRIVEN BY THE CHANGE LAB

#### IMAGINATION STATION ACTIVITY

A LOT OF PASSION FOR DEFINING AND REFLECTING BACK THE COMPLEX SYSTEM OF EDUCATION INCLUDING ALL SUBSYSTEMS THAT LEAD TO ENGINEERING STUDENTS GRADUATING OUT OF K-12 GROUP DEFINED ROADBLOCKS TO VISUALLY SEE THE CHALLENGES GOING ON AND WILL BUILD A NEW VISUAL OF THE FUTURE STATE.

REALIZATION THAT THE ROADBLOCKS ARE ACROSS THE BOARD IN THE SYSTEM - NOT CLUSTERED IN ANY ONE AREA (ON SUBSYSTEMS AND ALSO ON THE CONNECTION POINTS BETWEEN SUBSYSTEMS)

A LOT OF CONVERSATION ABOUT ENGINEERING AND DISCIPLINE EXPLORATION AHEAD OF MOVING INTO UNIVERSITY AND THE VALUE OF 2+ YEARS OF SUBJECTS LIKE PHYSICS WHY IS THE SYSTEM SO LINEAR?



# Strategic Doing Cohorts

## Reconvening Presentations *continued*

### COHORT: K-12 *CONTINUED*

#### FUTURE STATE BUILDING

GOAL OF PLANNING FUTURE STATE IS TO PREPARE FOR MEETING WITH SUPERINTENDANT OF OPERATIONS AT DDSB IN 30 DAYS TO DISCUSS NEW SCHOOLS IN DURHAM\

#### REPORT BACK

A LOT OF INTEREST FROM THE CROWD IN K-12

IT WAS HELPFUL TO ALLOW DIFFERENT STAKEHOLDERS TO POST INFORMATION

WORKED WELL WITH PUTTING BARRIERS ON THE PIPELINE OF EDUCATION

ALLOWS FOR DIVERSE ANSWERS

GREAT VISUALIZATIONS ALLOWS FOR QUICK UNDERSTANDING

INVOLVE ALL STAKEHOLDERS IN DESIGN. PERFORM AND EXHAUSTIVE SEARCH FOR ALL STAKEHOLDERS

IMPORTANT TO KEEP IN MIND HOW WE SCALE OUR INITIATIVES

IN THIS CASE IT'S HOW WE BRING OTHER SCHOOLS TO THE LEVELS OF THE NEW SCHOOL AND HOW WE ALLOW ALL TYPES OF STUDENTS (GET A DIVERSE CROWD) TO ACCESS THE SCHOOL "ASKS" THE GROUP QUESTIONS AND FOR HELP



# End of Day 2

## Check Out **KEY TAKEAWAYS**

**What folks are saying about key takeaways and what they will commit to doing.**

*There is already an impact of ECL*

*Like that deadlines were made by initiatives in the next 30 days*

*There is an urgency to the problems we're talking about, and getting it right is important to the future, the planet, the next generation*

*Grateful to be able to observe how ECL is run as an American participant*

*Lots of learning, interested to see how Tech Stew will look like in education*

*The future will be great again!*

*The power of education & communication*

*A bit of humility*

*Still have a lot to learn*

*The value & potential of diverse partnerships*

*None of us can do this alone*

*How do we broaden the scope, include the key national influences into the lab*

*Hatch's mission is well aligned with ECL*

*The value of hearing different voices & diversity of ideas*

*Affirmation that what we're already doing (working with AI, other faculties) is valuable in the goal of achieving greater technological stewardship*

*Tech stewardship isn't just an engineering problem, lines are blurred with other sectors*

*So many people are thinking and caring about similar challenges*

*Inspiring to see what happens when group of people dedicate time to each other and a shared mission*

*Groups like this exist*

*There is great passion for K-12 education in this group*

*The gravity of having imaginative and aspirational statements*

*Benefit of having appreciative questions in an optimistic lens*

*Appreciate the time to pull back and evaluate the landscape but with a different perspective*

*Seeing pieces coming together, the excitement and energy being observed*

*Tech Stew is a network of government, academia and industry*

*How difficult all this is, the complexity of it all*

*What we're capable of*

*Appreciate the opportunity to be in these conversations*

*There are so many aspects of Tech Stew, we're only at the tip of the iceberg!*

*We are developing leadership champions through these critical discussions and communication*

*It's magic to see what happens when the question changes, so thank you for providing so many opportunities to see that this weekend*

*Becoming clear after attending all these labs that it's about workplace improvement, broader inclusion, creating networks*

# End of Day 2

## Check Out **KEY TAKEAWAYS** continued

### What folks are saying about key takeaways and what they will commit to doing continued...

*Happy that there is a meeting in 30 days to discuss what specifically I can do to continue my contribute*

*Appreciation for the love in this group*

*There's a willingness, cohesiveness, robustness, capability that I haven't experienced quite at this level from the previous 9 labs*

*Trying to visualize my experience with ECL from the first lab, to now; we are still diverging, but building more connections, deepening. I have faith that when we converge, it will be more sophisticated and complex, and have greater impact*

*The feeling is almost stronger than the thinking. We are trying to raise the bar on both of them*

### What will I [participants] do in the next month?

Use the world tech stew

Use more tech stewardship

Setting deadlines instead of just saying "I will do"

Will be talking to people (in recruitment setting) about tech stew

Continue to reflect on diversity

Spread good cheer about what ECL is doing to task force in company

Include ECL items in capstone project

Create an internal discussion in company

Bring interdisciplinary collaboration to their faculty

Utilizing and championing student ambassadors to reach new potential students

Wants to call other people who were here

Use tech stew in company

Create better definition for tech stew to students

Bring nobility of what we're doing to others

Talk to secretariat about further steps

Bring to Canadian Engineering Competition

Bring ECL and tech stew to G7 prior to ECL in June (Concordia)

Bring technological stewardship to projects in school

Use Tech Stew in the CFES NEM campaign

Bring more transparency to the what the lab does

Use ECL twitter more

Use handrail on stairs

Bring learned material to students

Talk to 16 year old daughter about tech stew

Increase commitment to tech stew