



Workshop to Support Implementation of NOAA's Uncrewed Systems (UxS) Strategy

Jon White

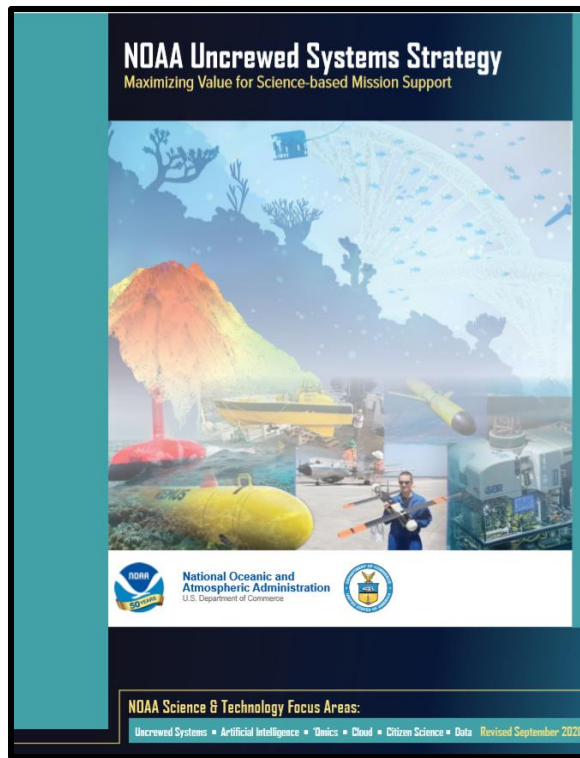
RADM, U.S. Navy (Ret.)

President and CEO Consortium for Ocean Leadership

27 October 2020



Background



NOAA Uncrewed Systems Strategy

Goal 1: Coordinate and Support UxS Operations at an Enterprise Level.

Goal 2: Expand UxS Applications Across NOAA's Mission Portfolio.

Goal 3: Accelerate Transition of UxS Research to Applications.

Goal 4: Strengthen and Expand UxS Partnerships.

Goal 5: Promote Workforce Proficiency in UxS Use and Operations.

- ***Give community stakeholders an opportunity to provide insight for the implementation of NOAA's UxS Strategy***
- ***Enhance relationships with the broad science and technology community to assist NOAA in this area, to the benefit of our broader security and prosperity that rely on a healthy and well-understood ocean and atmosphere.***
- ***Participation by invitation only; attendees selected based on expertise and experience with various uncrewed systems, and to ensure balanced representation across government, nonprofit, industry, and academic organizations.***

Background

- Virtual workshop format
 - August 4-6, 2020
 - >120 participants
 - Structured around five focus areas
 - Requirements Development
 - Research to Operations
 - Partnerships
 - Developing a Proficient Workforce
 - Building a Community of Practice
 - Blend of speakers, panels, and breakout sessions
- 

Special Thanks

- NOAA Leadership
- Workshop Executive Committee
 - Bill Burnett, U.S. Navy
 - Thomas Chance, Retired (formerly ASV, L3Harris)
 - RDML Tim Gallaudet, NOAA
 - Monty Graham, University of Southern Mississippi
 - Parimal (PK) Kopardekar, NASA
 - John Kreider, Kreider Consulting
 - Larry Mayer, University of New Hampshire
 - Phil McGillivray, U.S. Coast Guard
 - Chris Scholin, Monterey Bay Aquarium Research Institute
 - RADM Jon White, COL
 - Craig Woolcott, Dept. of Commerce
- Anthony Weeks, Graphic Illustrator

Summary Report

- Finalized September 2020
- Constitutes community-based input
- Does not reflect consensus statements
- Full report is available here:
<http://oceanleadership.org/unmanned-systems-workshop/>

NOAA S&T Strategies



4 AUGUST 2020

195 AI PROJECTS!

ENHANCING ABILITIES
OF UNMANNED
SYSTEMS via
AI!
... and a
COORDINATED
APPROACH.

AI STRATEGY

- ESTABLISH EFFICIENT ORG STRUCTURES and PROCESSES
- ADVANCE AI RESEARCH and INNOVATION
- ACCELERATE TRANSITION of RESEARCH to APPLICATIONS
- PARTNERSHIPS
- AI PROFICIENCY

"A WIDE RANGE of DATA TYPES are BEING USED."

37% of NOAA AI PROJECTS are in TRANSITION;
25% are OPERATIONAL



NOAA is a WORLD LEADER on ENVIRONMENTAL DATA! How could AI ENHANCE OUR CAPABILITIES?

IF YOU MAKE THE DATA SMALL ENOUGH, YOU COULD DO TELEMETRY ANALYSIS...

WHAT ARE THE BANDWIDTH ISSUES? REQUIRES EDGE COMPUTING...

"HOW MUCH ARE YOU PLANNING TO PUT OMICS on the U.S. PLATFORMS?"

MOBILE, AD-HOC DATA... and the CLOUD?

GETTING REAL-TIME DATA from U.S. TO SHIPS, AIR ASSETS, and GROUND ASSETS.

STRATEGY REVIEW

"IT'S AN UMBRELLA TERM!"

OMICS

- METABOLOMICS
- PROTEOMICS
- PHENOMICS
- METAGENOMICS + METATRANSCRIPTOMICS
- GENOMICS

e.g. COLLECTING OMICS DATA to DETECT and SUPPORT ESTIMATES of FISH STOCKS



WHAT ARE THE REQUIREMENTS? RISKS? BUSINESS CASES?

CLOUD and DATA STRATEGIES

- FULL CONTINUUM of CLOUD DEPLOYMENT MODELS:
 - PRIVATE
 - COMMUNITY
 - HYBRID
- COMMERCIAL CLOUD-BASED ARCHITECTURE should be the PRESUMPTIVE END STATE
- LEVERAGE EXISTING CLOUD INITIATIVES as FORCE MULTIPLIERS

THE FEDERAL LANDSCAPE IS MOVING toward the CLOUD! How CAN WE GUIDE NOAA'S ADOPTION?



DATA!

- HOW DO WE MAKE EFFECTIVE USE OF IT?
- HOW DO WE TREAT IT AS A VALUED ASSET?
- HOW DO WE LEVERAGE the FULL RANGE of DATA?

WE ARE RE-EVALUATING DATA FORMATS to SEE WHICH ARE MOST USEFUL!

OPEN... ACCESSIBLE... IN A USEFUL FORMAT...

NOAA S&T Strategies



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WHAT ARE THE BANDWIDTH ISSUES? REQUIRES EDGE COMPUTING...

"HOW MUCH ARE YOU PLANNING TO PUT OMICS on the U.S. PLATFORMS?"

MOBILE, AD-HOC DATA... via the cloud?

GETTING REAL-TIME DATA from U.S. to SHIPS, AIR ASSETS, and GROUND ASSETS.

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IT'S A MINDSHIFT.

195 AI PROJECTS!

4 AUGUST 2020

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Panel: Requirements Development (1/2)



REQUIREMENTS DEVELOPMENT PANEL DISCUSSION Moderated by CHRIS SCHOLIN

"HOW?"

IN ORDER TO GET THE REQUIREMENTS RIGHT,
YOU NEED TO GET THE CONOPS RIGHT...
... END to END...

HOW DO WE
START the
CONVERSATION?

- WHAT CAN WE DO NOW?
- WHAT'S EMERGENT?
- WHITE PAPERS, by region, Co-authored by AGENCY, INDUSTRY, RESEARCH

4 AUGUST 2020

PANELISTS:

LARRY
KARL

GUY
NOLL

PAUL
SIEGRIST

CAPT.
PETE SMALL

HOLISTIC
APPROACH?

? A CENTRALIZED
or DOMAIN-BASED
APPROACH?

— UNDER SEA?
— SURFACE?
— AIR?

PROMOTE NEXT
GENERATION
REGIONAL
SCALE FIELD
EXERCISES...

- REAL-WORLD OPERATIONS
- IDENTIFY INTER-AGENCY OVERLAPS

WITH ANY UNIVERSAL
or CENTRALIZED
approach, there's a
RISK that it WON'T
FIT.

SUBSTITUTE
'MISSION' for
'DATA': What are
you TRYING to
DO?

? ARE YOU WRITING
REQUIREMENTS for
PLATFORMS?
DATA?

"IT'S HARD TO WRITE
REQUIREMENTS FOR DATA!"

DATA-as-SERVICE or
OWNER-OPERATOR?

ADOPT a
"TECHNOLOGY
PUSH/AGENCY
PULL" APPROACH.

- DISRUPTIVE TECHNOLOGIES are not always ANTICIPATED.
- DATA-as-SERVICE vs OWNER-OPERATOR?
- STANDARDS, INTEROPERABILITY, COMMAND/CONTROL ELEMENTS are PARAMOUNT

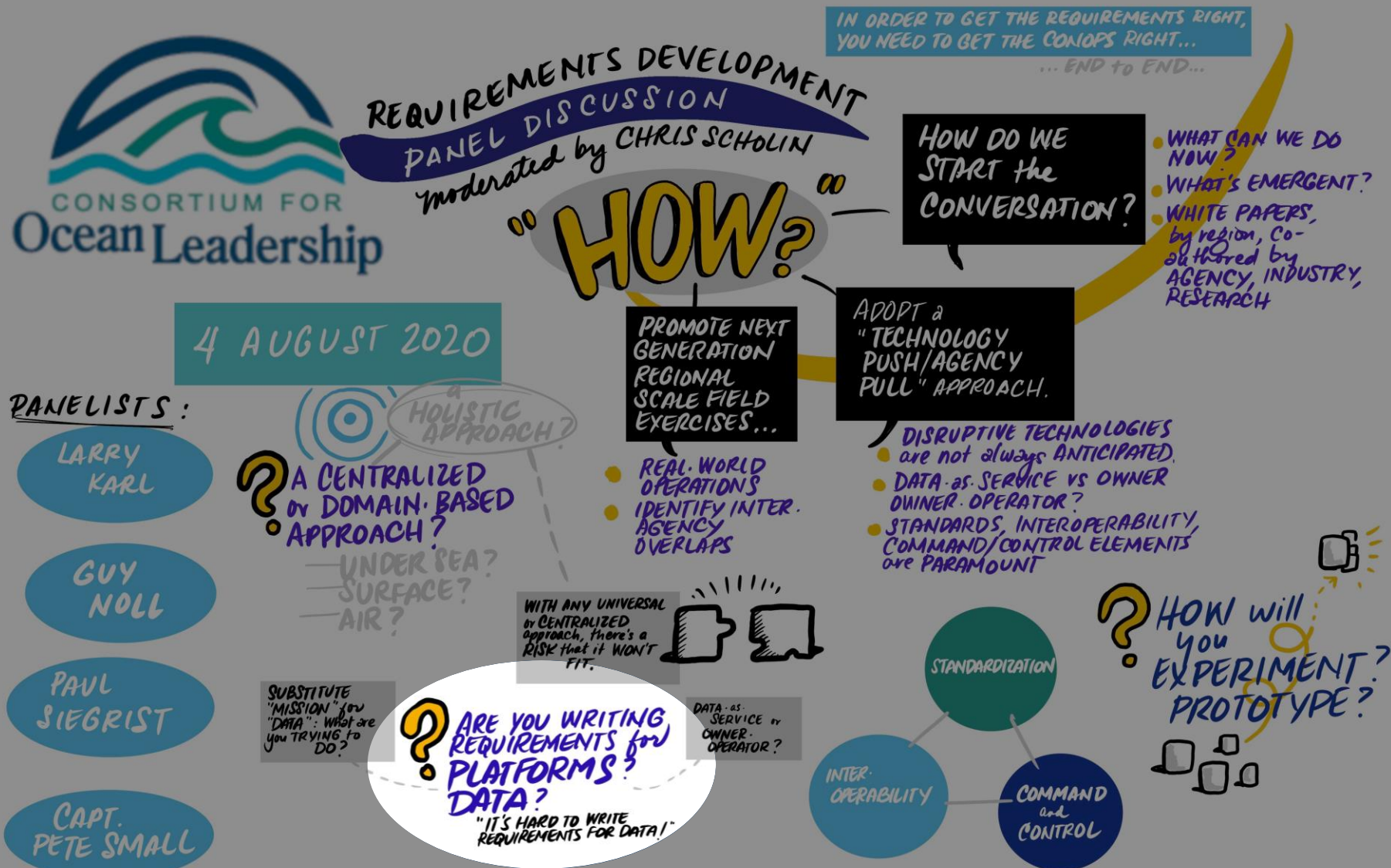
STANDARDIZATION

INTER-
OPERABILITY

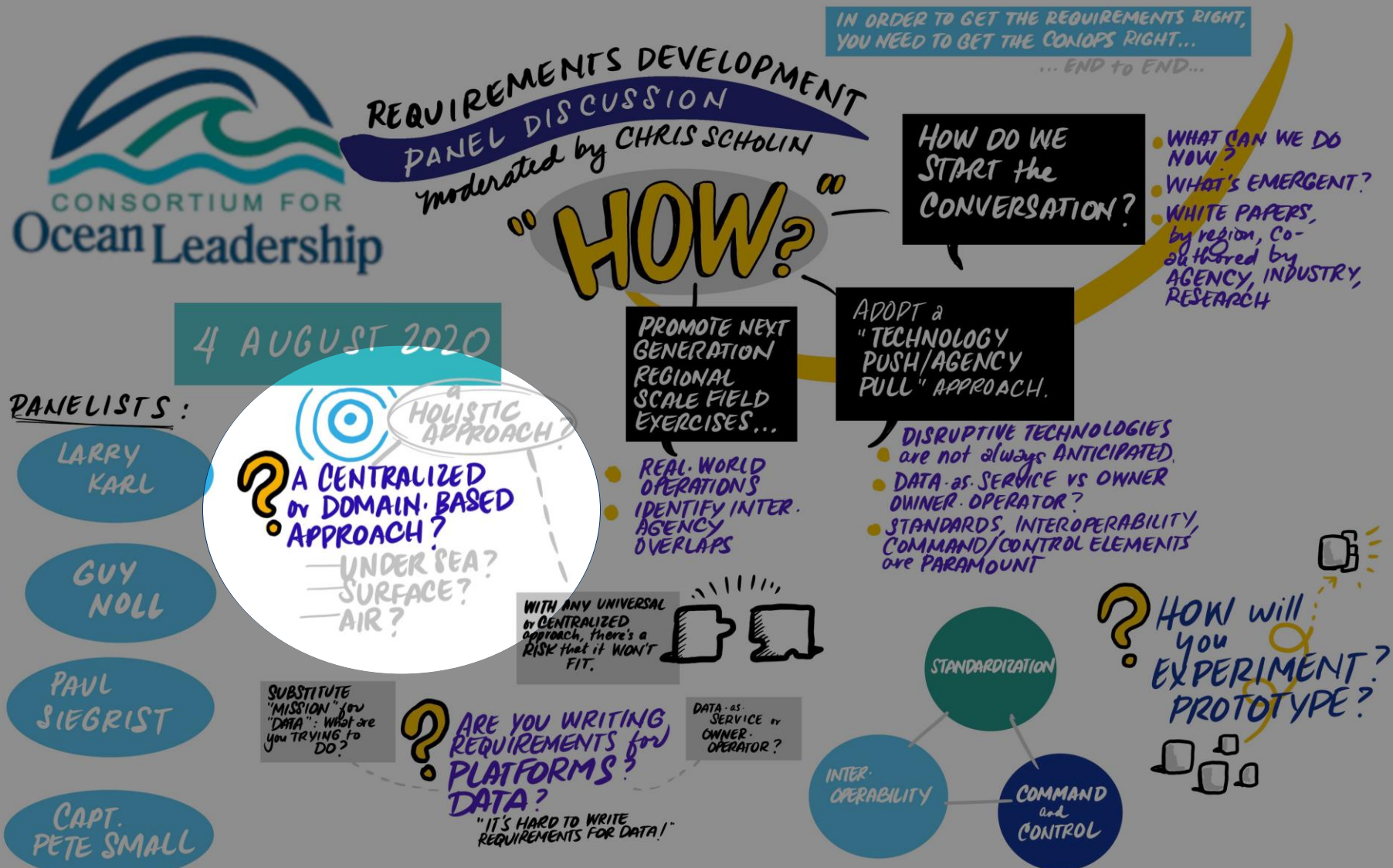
COMMAND
and
CONTROL

? HOW will
you
EXPERIMENT?
PROTOTYPE?

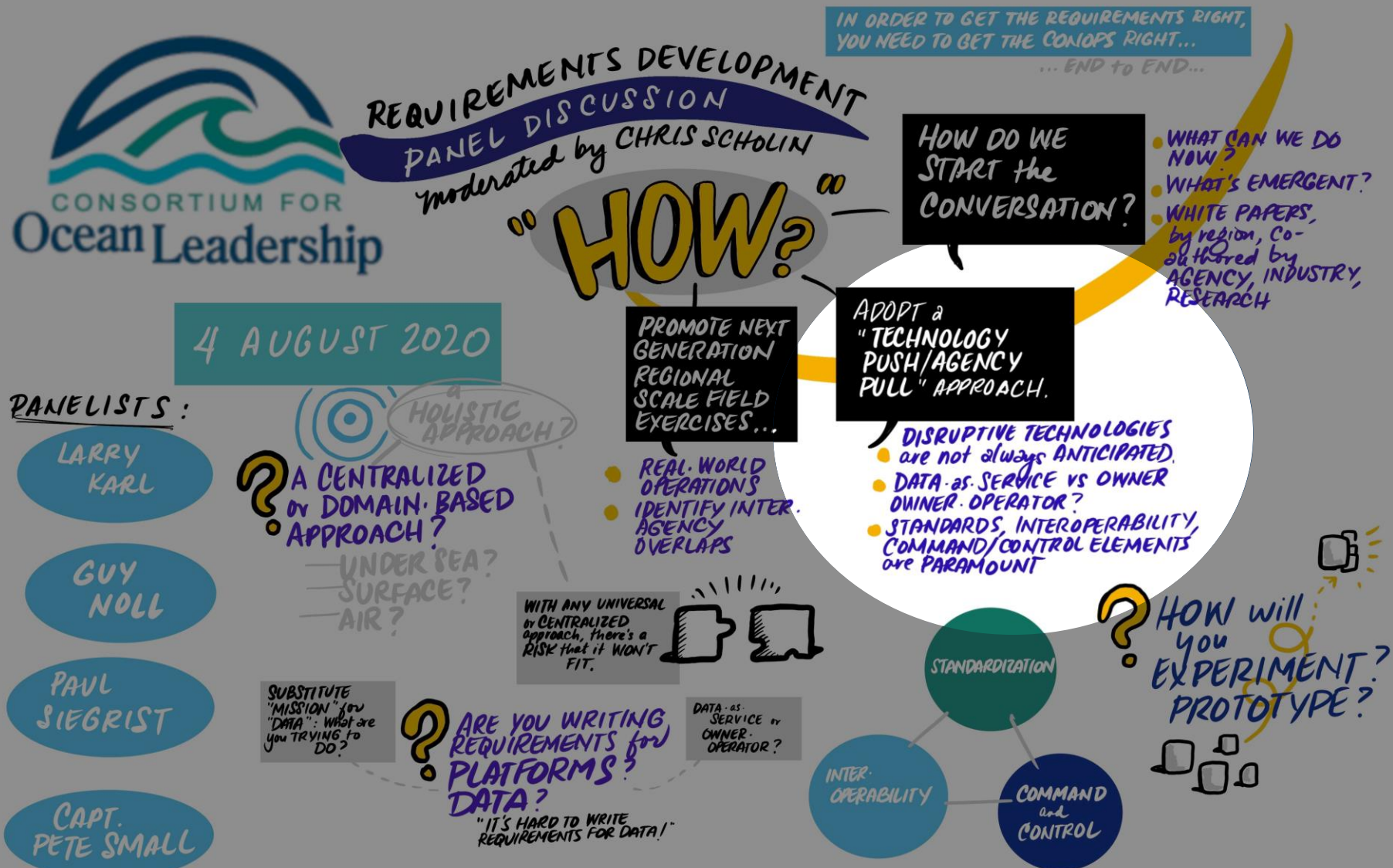
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Panel: Requirements Development (1/2)



Panel: Requirements Development (2/2)



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WE NEED COLLABORATION around REQUIREMENTS and COST.

... as well as INCLUSION and INTEGRATION...

QUESTIONS...

WHAT'S the ROI?
WHAT'S the BUSINESS CASE?

WHAT ARE THE NEEDS BY REGION?

WHAT are the REQUIREMENTS for DATA QUALITY?

— GRANULARITY
— ACCURACY
— "THEY'RE EVOLUTIONARY."

Is the DATA FIT for PURPOSE?

- Platform-centric?
- Deliver back to a repository so others can use it?

IS IT OPEN?
IS IT TESTED with FORENSIC ANALYSIS?
Data!

Do you HAVE REQUIREMENTS around DATA ARCHIVING?
— AUTHORITY DATA VS. OPPORTUNISTIC DATA.

"WE NEED PLATFORMS IN ORDER TO PROVE OUT THE CONOPS... BUT THERE'S A BARRIER TO ENTRY."

THIS INFORMS HOW TO WRITE a REQUIREMENT for DATA as SERVICE!

"WE DON'T HAVE THE MONEY TO BUY THE PLATFORM..."

THE PROCESS IS NOT DESIGNED FOR DATA as a SERVICE, but for PLATFORMS.

WE ARE GETTING SMARTER ABOUT THE DATA! WHERE WILL IT GO? WHO WILL USE IT?

ARE WE WRITING REQUIREMENTS THAT ARE IMPOSSIBLE?

WHO ARE THE WRITERS? THE USERS?

Panel: Requirements Development (2/2)



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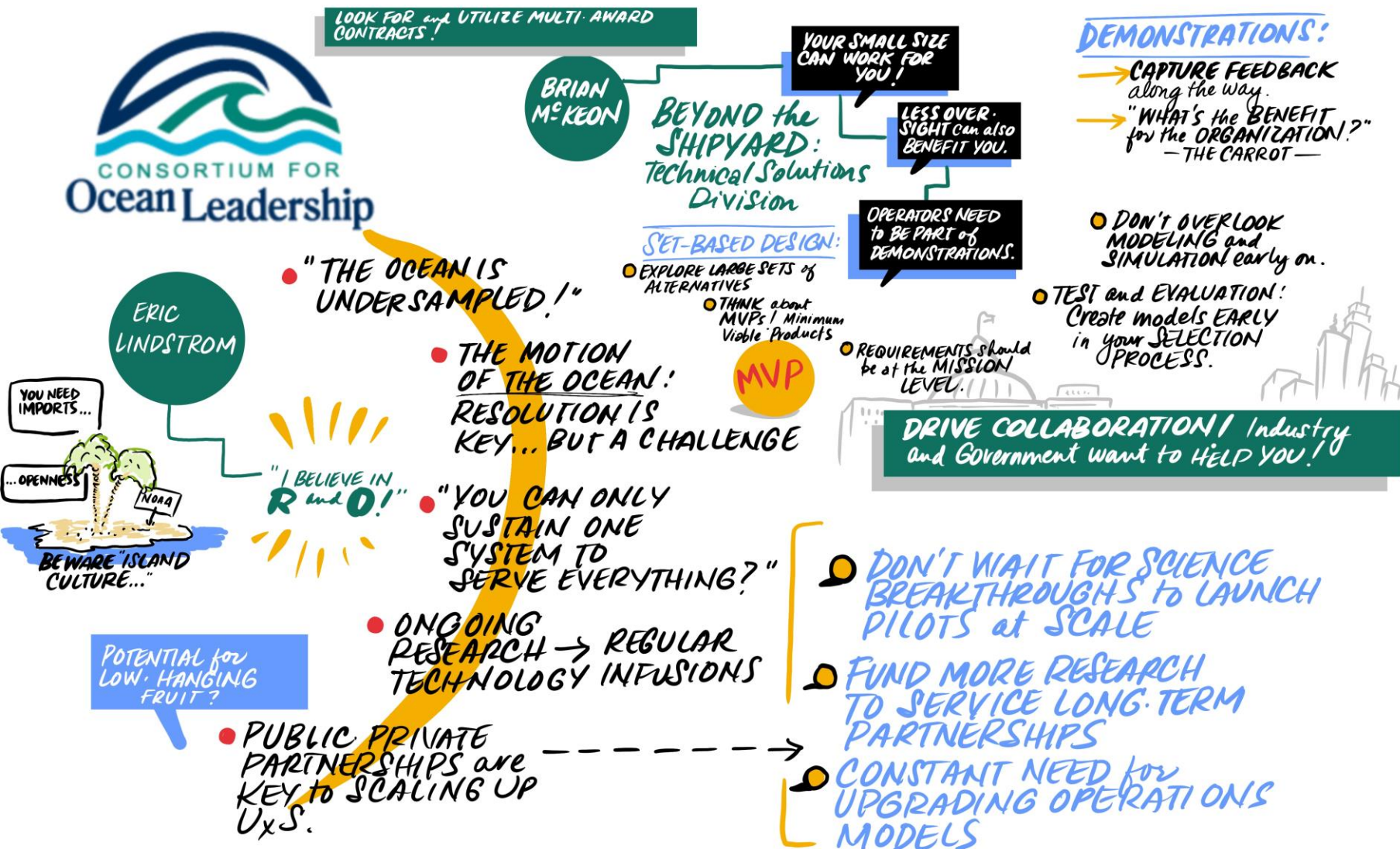
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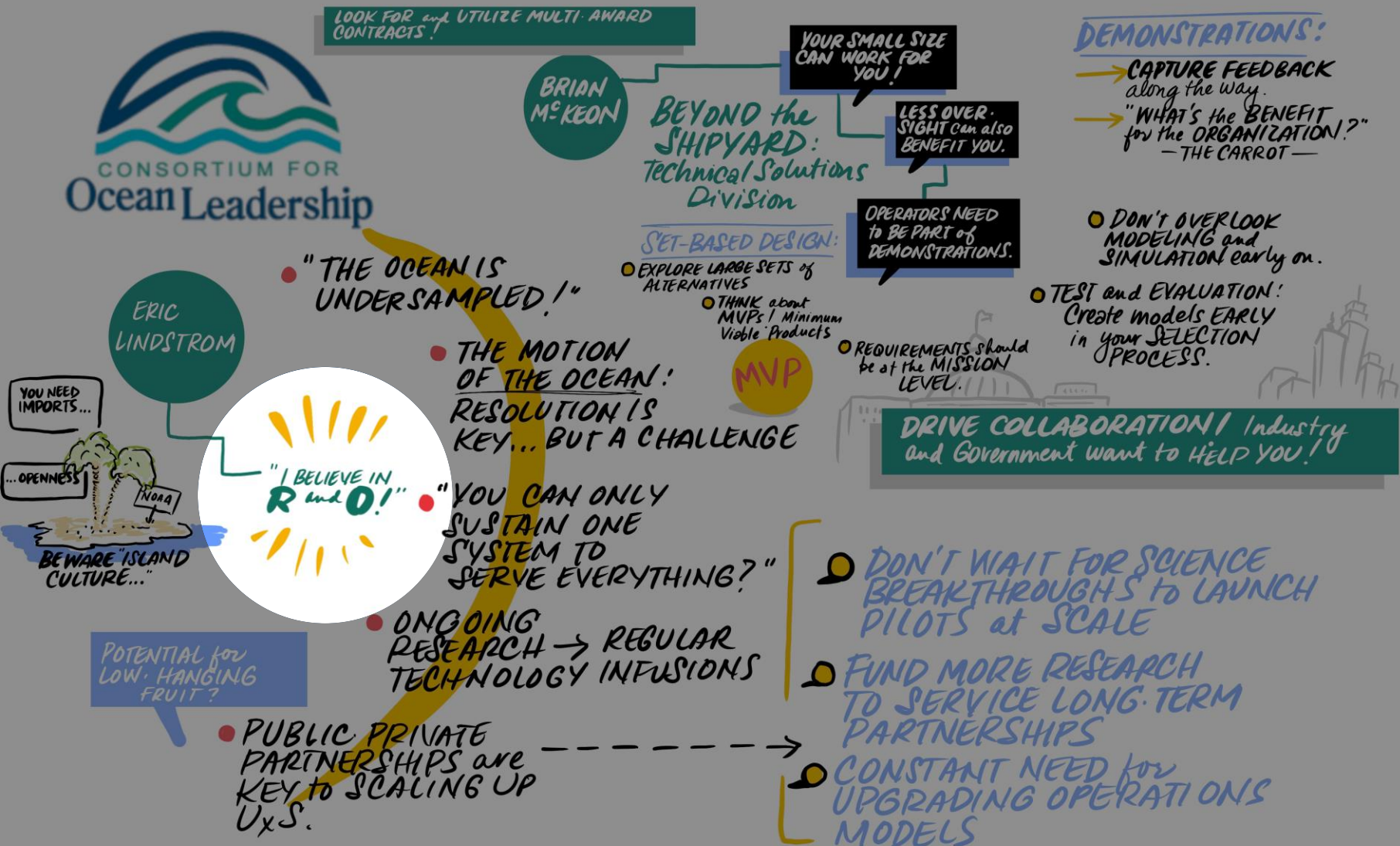
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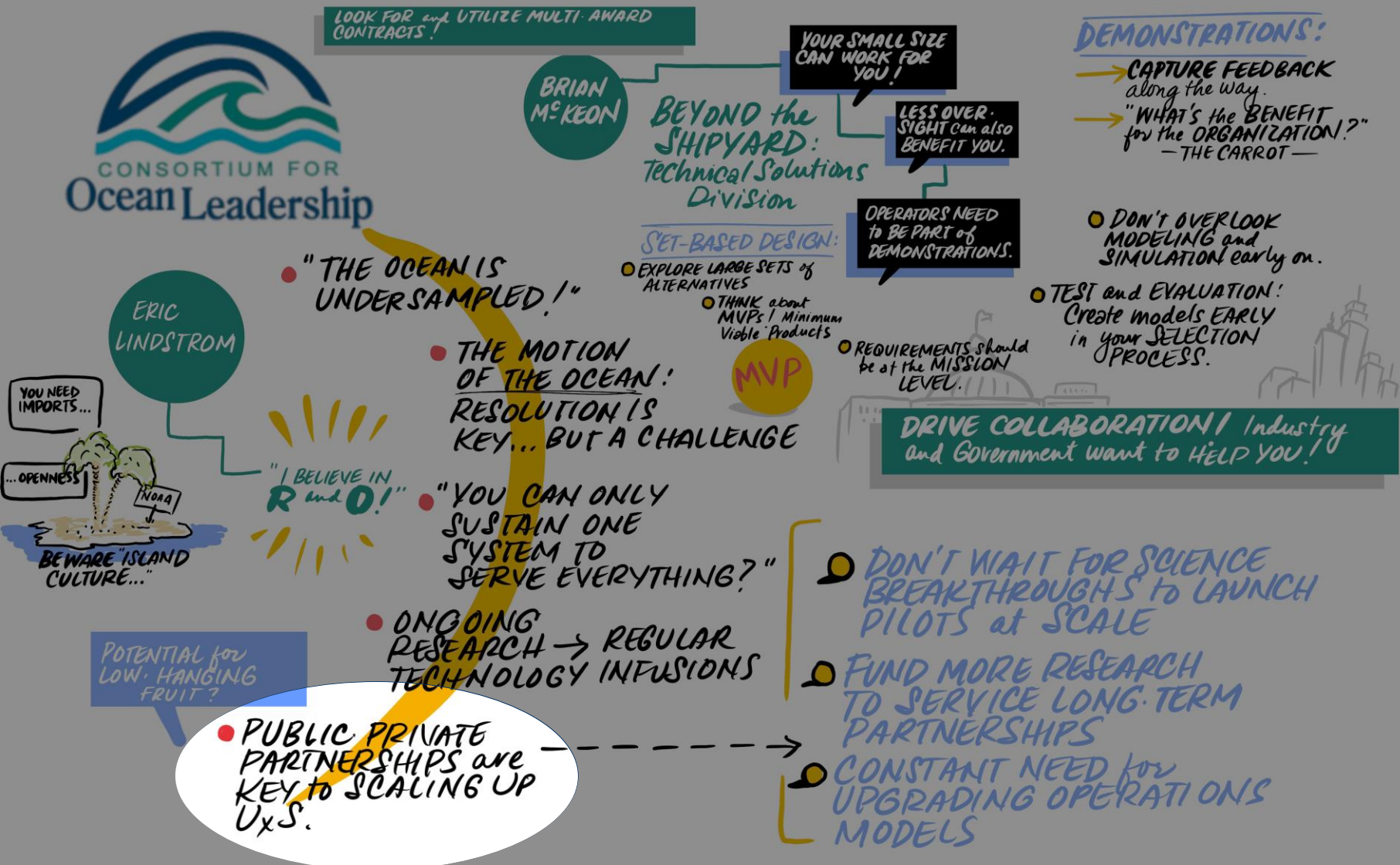
Panel: Research to Operations



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Breakout: Partnerships



BREAKOUT GROUP #2

5 AUGUST 2020

SMALL BUSINESS
WILL LIKELY
DRIVE INNOVATION.
What do we INVEST?
How will we BENEFIT?

CREATE SHORT-
TERM WINS...

THERE IS PRIVATE
CAPITAL waiting
for NOAA!

**WHAT'S
IN IT
for
ME?**

VALUE PROPOSITION
NEEDS TO BE AN
"AND", not an
"OR."

**RUN
EXPERIMENTS with a
LARGE NUMBER of
PARTNERS.**

... and OPERATIONALIZE
your EXPERIMENTS.

"PUT IT IN THE
WATER!"

**WHERE DO PARTNERS
FIND THEIR OWN SELF-INTEREST
IN THE
COLLABORATION?**

... with FORMAL
AGREEMENTS.

**HOW DOES THE PARTNERSHIP
SERVE ALL OF THE PARTNERS?**

**WHO WILL BE DOING
THIS WORK anyway?
WHERE IS THE
COMMUNITY?**

e.g. MULTIPLE AGENCIES working
on UNCREWED SYSTEMS

**IS EVERYONE ON THE
SAME PAGE?**

**IS THE AMOUNT OF MONEY
THAT PARTNERS HAVE TO
INVEST IN THE EFFORT
COMPELLING ENOUGH TO
ATTRACT QUALITY PARTNERS?**

"WE MAY NOT HAVE
THE MONEY, but
WE HAVE the GEAR!"

... and
EXPERTISE and
STANDARDS-DRIVEN
SCIENCE!

**WILL NOAA'S BUDGET LOOK THE SAME
FOR THE FORESEEABLE FUTURE?**

**WHAT are
BEST PRACTICES?**

**WHAT CAUSES
PARTNERSHIPS
to FAIL?**

**WHAT MIGHT
WORK for
NOAA?**

FUNDING
OPPORTUNITIES, by NOAA,
for ADVANCED
TECHNOLOGY DEVELOPMENT,
e.g. SENSORS

**BE INVOLVED IN
THE BLUE ECONOMY!**

PARTNER
at the POLICY
and
SOLUTIONS
LEVELS...

**REQUIREMENTS
NEED TO BE AT
THE MISSION
LEVEL.**

THINK CREATIVELY
about BUSINESS
MODELS for
PARTNERSHIP!

COULD NOAA LEAD
through "SERVICE"?

Partnerships!

"PEOPLE MAKE THE PARTNERSHIP."

Breakout: Partnerships



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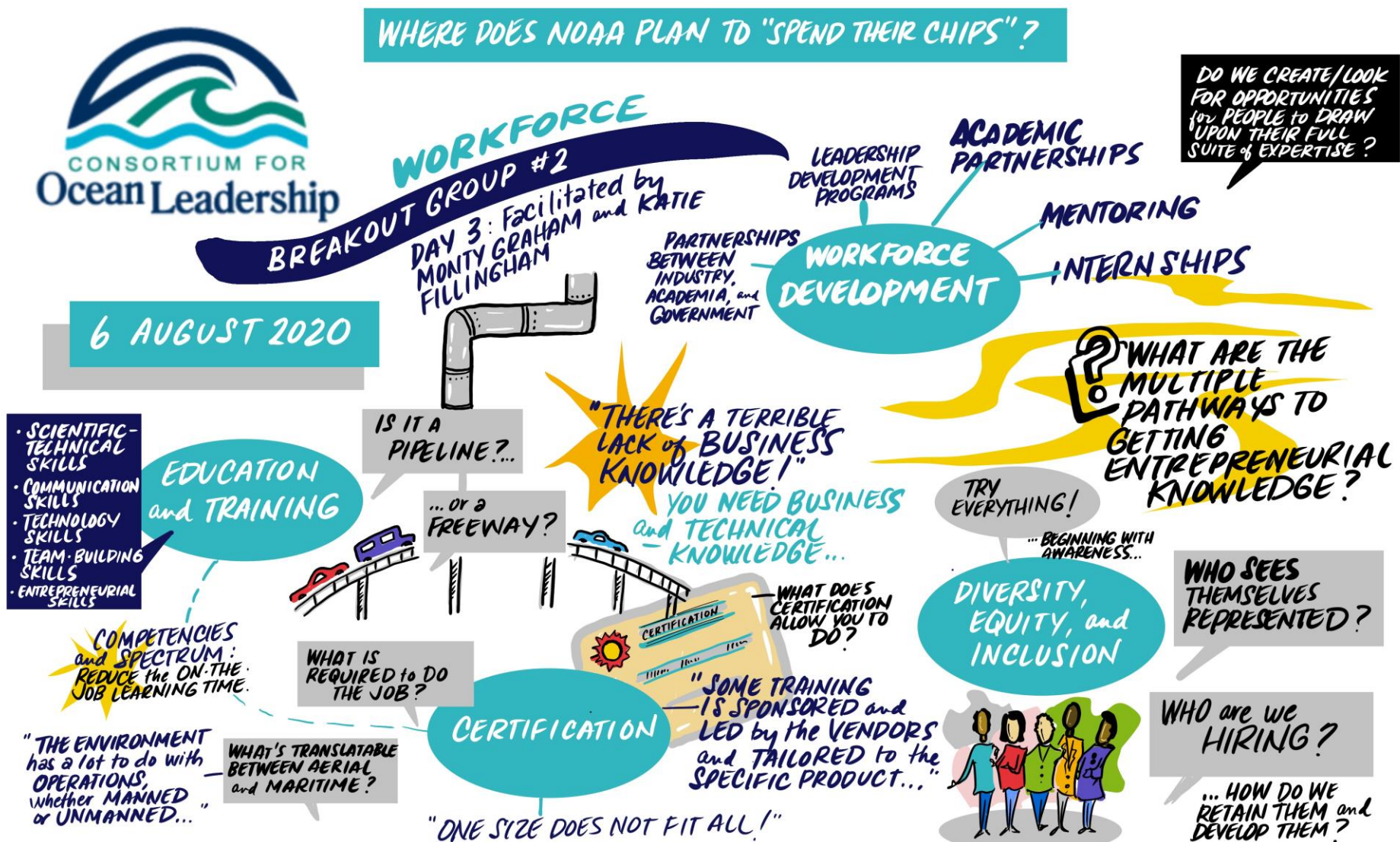
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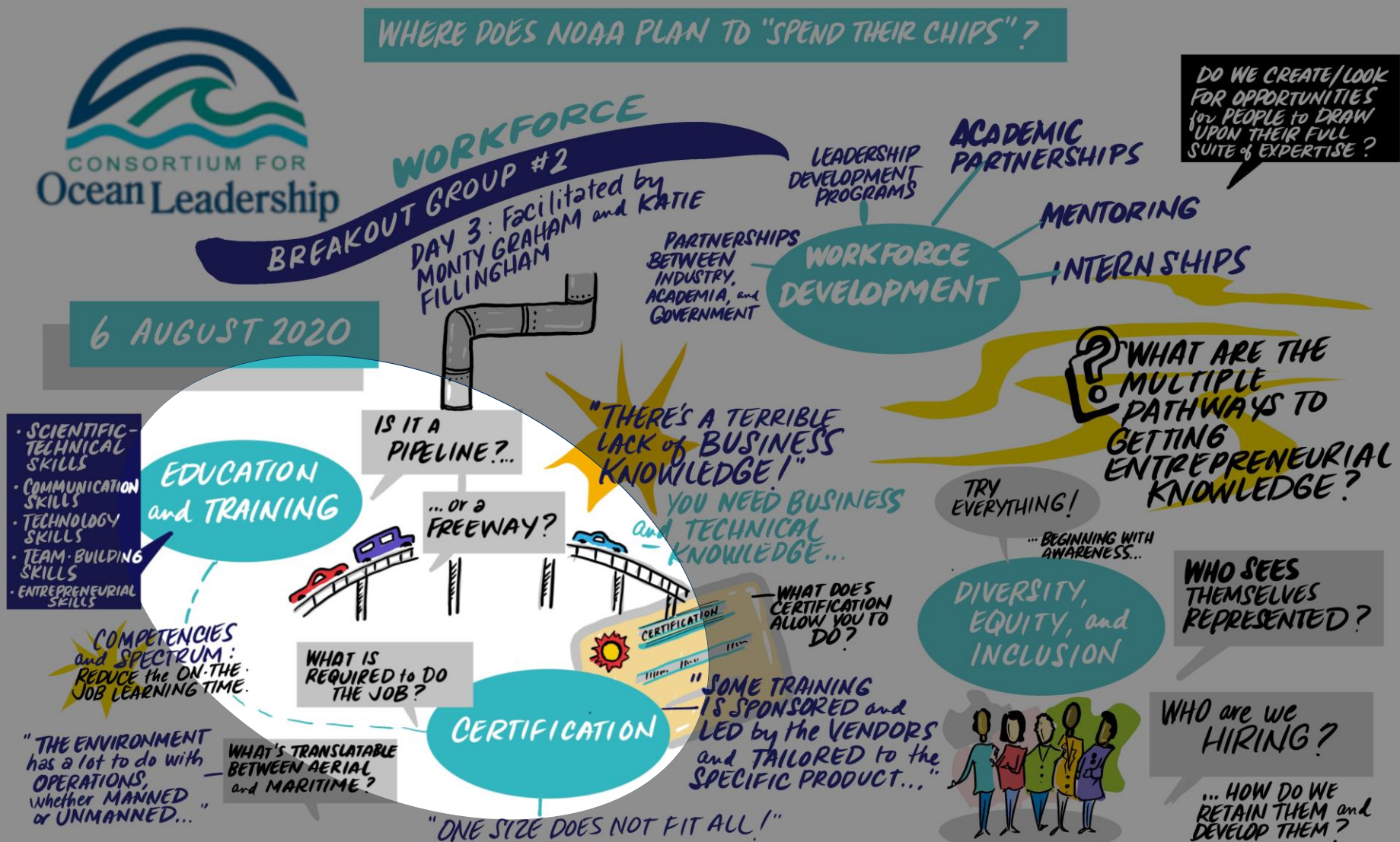
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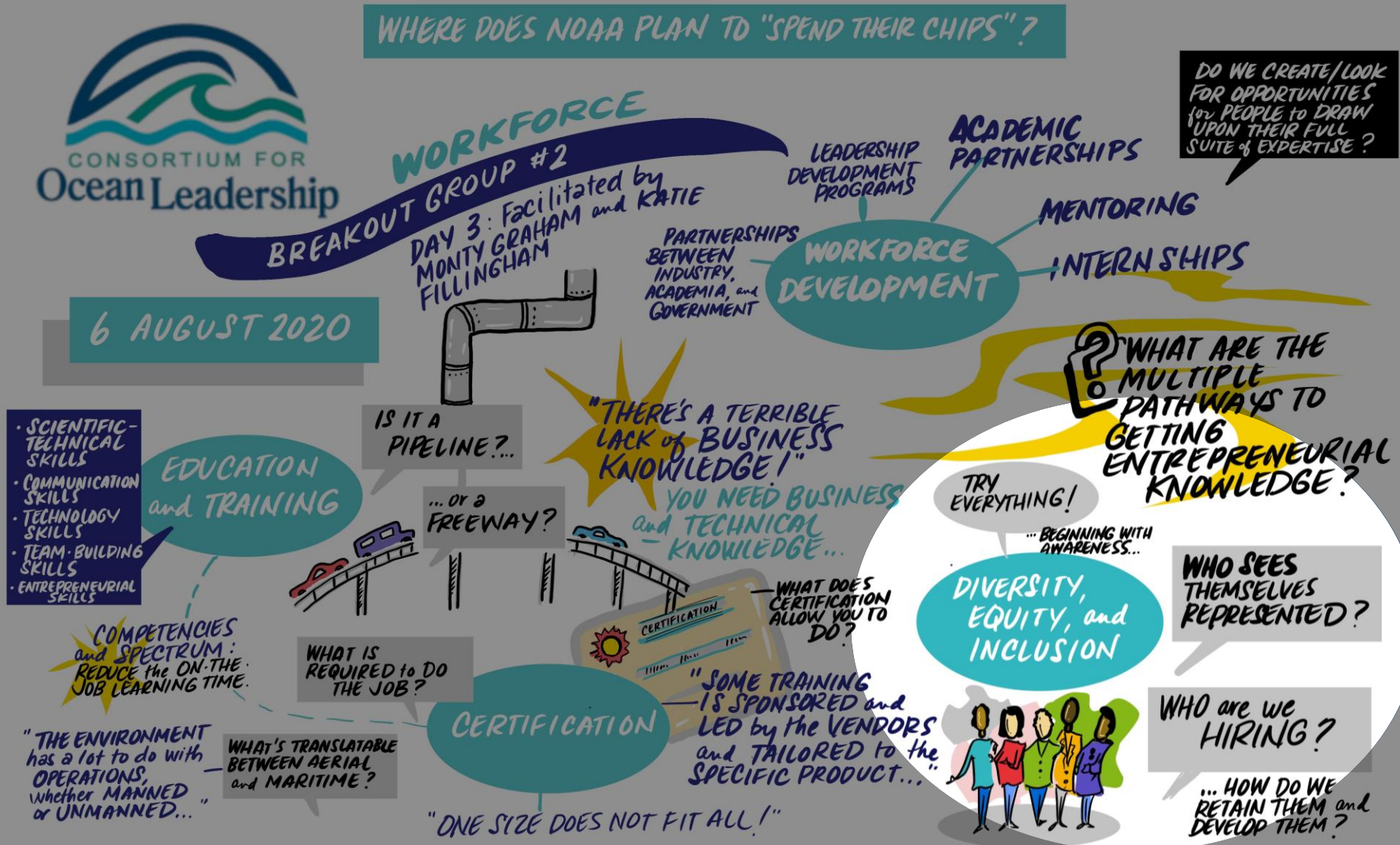
Breakout: Developing a Proficient Workforce



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Breakout: Developing a Proficient Workforce



Panel: Building a Community of Practice



HOW DO WE INCLUDE MORE PEOPLE ...

...IN OUR EXPERIENCE?

BUILDING a COMMUNITY of PRACTICE

BILL BURNETT
FRANCISCO CHAVEZ
CHELLE GENTEMANN
JOHN KREIDER
JYOTIKA VIRMANI

6 AUGUST 2020

**FOCUSED TEAMS...
A COMMUNITY of
PRACTICE...**

- ADAPTIVE...
- RESILIENT...
- CONTINUOUS LEARNING...

ALIGNMENT
with CULTURE

EXCHANGE
PROGRAMS

MEASURE
VALUE!

NON-GENDERED
LANGUAGE

AVOID
CONFUSION.

"MANNED/UNMANNED
VEHICLES"

↳ "UN-
CREWED"

OPEN
SCIENCE

**? WHAT CAN
NOAA LEARN
from OTHER
COMMUNITIES?**

OPEN,
SHAREABLE
DATA

REGIONAL
VS. ENTERPRISE
SOLUTIONS?

LEVERAGE
OTHER AGENCY
or PRIVATE SECTOR
MODELS and
FRAMEWORKS
e.g. DECADAL
SURVEY

USEFUL DATA
FORMATS: BRING
THEM INTO THE
PRACTICE

KNOW WHERE THE DATA IS!

ACCESS to DATA is
KEY to the UTILITY
of that DATA!

MODELERS...
ADAPTIVE
SAMPLING...
AI COMMUNITY...

DEVELOP/ACQUIRE
TOOLS for
DISTRIBUTED
R+D/ OPERATIONS.

LEARN
from
HISTORY...

THE MORE EYES
ON THE DATA,
THE HIGHER THE
QUALITY.

DEVELOP a
CLOSE WORKING
RELATIONSHIP
between R+D and
OPERATIONS.



Panel: Building a Community of Practice



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Summary

- UxS will only become more important...
- Integration across strategies
- Partnerships
 - Partner agencies
 - PPPs are essential
- Continuing/consistent external engagement is critical
 - Community input
 - Shared ownership
 - Community advocacy for NOAA

Summary (continued)

- Balance - own to operate *and* data as service
 - “Mission” margins as well as profit margins
- Developing a Community of Practice *and* a Proficient Workforce
 - Standardization in training
 - Don’t reinvent best practices
 - DE&I (Language matters: “Uncrewed” vs. “Unmanned”)

COL as a Partner

- Broad membership and reach; represent the oceanographic research and tech community
- Trusted and honest broker
- Working in education (NOSB) and DE&I
- Ties to ocean exploration and ocean observation
- Ensuring relationships are maintained
- Maintain strain
- Bridging transitions
- *An amazing staff!*



jwhite@oceanleadership.org