



Synopsis of 10-Year Anniversary SURF White Paper

State of the Practice

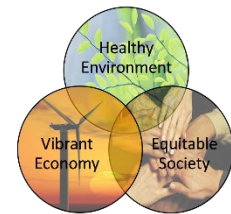
- Paul Favara – JACOBS
- Dick Raymond – Terra Systems
- Gerlinde Wolfe – AECOM
- Maile Smith – Northgate Environmental
- April 18, 2019



Safety and Sustainability Moment



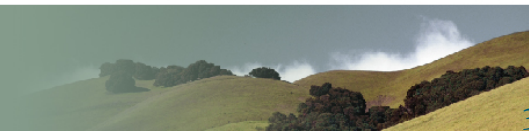
- Sustainable systems have a lower environmental footprint
 - Less natural resource recovery
 - Less processing
 - Less material management
 - Less transportation
 - Less waste production
- Results in reduced potential accidents, injury, environmental releases, emissions, water use
- Good for the planet – Safer for workers in the supply chain



SURF's Mission



- Maximize the overall environmental, societal, and economic benefits from the site cleanup process by:
 - Advancing the science and application of sustainable remediation
 - Developing best practices
 - Exchanging professional knowledge
 - Providing education and outreach
-
- SURF's first informal meeting in 2006



Ten years ago...big plans and big ideals

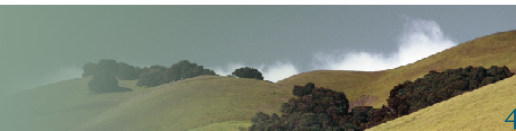


- SURF wrote a 110 page white paper to consolidate information about sustainable remediation and provide ideas on how to maximize its benefit



Feb 2009 @ DTSC in Sacramento, CA

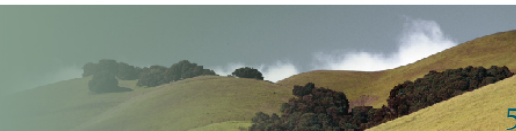
- Description of current status (the early days)
- Sustainability concepts and practices in remediation
- Impediments and barriers
- A vision for sustainable remediation
- Applications of sustainable principles, practices, and metrics to remediation projects



Ten years later (in 2019)...big plans and big ideals...(still!)...and we have made progress!



- SURF is writing a 10 year anniversary white paper on sustainable remediation
 - Share what the industry has accomplished in the last 10 years
 - Revisit our 2009 priorities and ideals for sustainable remediation
 - Current state of the practice
 - New frontiers in sustainable remediation
 - What will the next 10 years of sustainable remediation look like



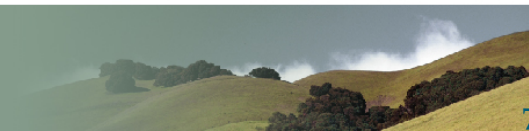


State of the Practice in 2019





- Increasing body of published material
- By workgroups such as SURF “chapters”, academics, consultants, and problem owners
- Several trends appear to be prevalent. These include:
 - Discussion and evaluation of ways to quantify/measure the effects of sustainable remediation; and
 - Development of standard procedures/protocols when evaluating and implementing sustainable remediation
- More recently,
 - focus on long-term sustainability of site remediation, and
 - benefits of rehabilitated land to strengthen community and ecosystem resilience.



Sustainable/Green Publications and Presentations



Journal of Environmental Management 204 (2017) 730–737

Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman



Research article

Utilization of waste materials, non-refined materials, and renewable energy in situ remediation and their sustainability benefits

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A Framework for Sustainable Remediation

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professionals from industry, government attempted to address this need by developing the framework provides guidance to pro evaluate and implement the most appropriate that will yield the greatest sustainability unique site characteristics. It also seeks to



Technical/Regulatory Guidance

Green and Sustainable Remediation:
A Practical Framework



ISO 18504:2017

Preview

Soil quality -- Sustainable remediation



Designation: E2893 – 13

Standard Guide for
Greener Cleanups¹

This standard is issued under the fixed designation E2893; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 Cleaning up sites improves environmental and public health conditions and as such can be viewed as “green.” However, cleanup activities use energy, water, and natural resources. The process of cleanup therefore creates its own environmental footprint. This guide describes a process for evaluating and implementing activities to reduce the environmental footprint of a cleanup project in the United States while working within the applicable regulatory framework and satisfying all applicable legal requirements.

1.2 This guide may also be used as a framework for sites that are not located in the United States; however, the specific legal references are not applicable.

1.3 This guide describes a process for identifying, evaluating, and incorporating best management practices (BMPs) and, when deemed appropriate, for integrating a quantitative evaluation into a cleanup to reduce its environmental footprint.

1.4 This guide is designed to be implemented in conjunction with any cleanup process and should be used with other technical tools, guidance, policy, laws, and regulations to integrate greener cleanup practices, processes, and technologies into cleanup projects.

1.5 This guide provides a process for evaluating and implementing activities to reduce the environmental footprint of a cleanup and is not designed to instruct users on how to clean up contaminated sites.

1.8 This guide should not be used as a justification to avoid, minimize, or delay implementation of specific cleanup activities. Nor should this guide be used as a justification for selecting cleanup activities that compromise stakeholder interests or goals for the site.

1.9 This guide does not supersede federal, state, or local regulations relating to protection of human health and the environment. No action taken in connection with implementing this guide should generate unacceptable risks to human health or the environment.

1.10 This guide may be integrated into complementary standards, site-specific regulatory documents, guidelines, or contractual agreements relating to sustainable or greener cleanups.

1.10.1 If the cleanup is governed by a regulatory program, the user should discuss with the regulator responsible for site oversight how this guide could be incorporated into the cleanup and whether the regulator deems it appropriate for the user to report the process and results to the regulatory program.

1.10.2 The contractual relationship or legal obligations existing between and among the parties associated with a site or site cleanup are beyond the scope of this guide.

1.11 This guide is composed of the following sections: Referenced Documents (Section 2); Terminology (Section 3); Significance and Use (Section 4); Planning and Scoping (Section 5); BMP Process (Section 6); Quantitative Evaluation (Section 7); Documentation and Reporting (Section 8); and Keywords (Section 9).

es not purport to address all of the associated with its use. It is the of this standard to establish appropriate practices and determine the applications prior to use.

its

ironmental Site Assessments: Phase I Assessment Process

ask, visit the ASTM website, www.astm.org, or at service@astm.org. For Annual Book of ASTM for to the standard's Document Summary page on

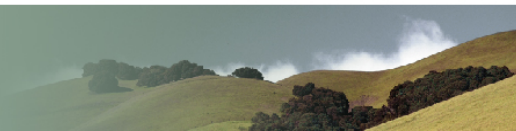
- J Wiley & Sons
 - Sustainable remediation – 191
 - Green remediation - 84
- ES&T
 - Sustainable remediation – 15
 - Green remediation - 18
- Science Direct
 - Sustainable Remediation – 395
 - Green Remediation - 168
- Countless case studies and ideas presented at conferences



Guidance from Organizations (examples)



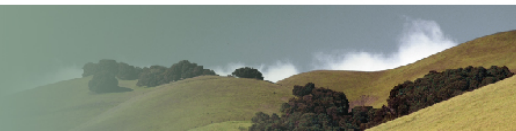
- Frameworks and methods for incorporating sustainable remediation
 - ASTM (Green), ASTM (Sustainable), ITRC GSR, SURF Framework, SuRF-UK, USEPA Guidance, NICOLE
- BMPs also included above
- Tools:
 - Footprint: SiteWise, SRT, EPA SEFA
 - LCA: Various commercial software, OpenLCA



Room for Improvement



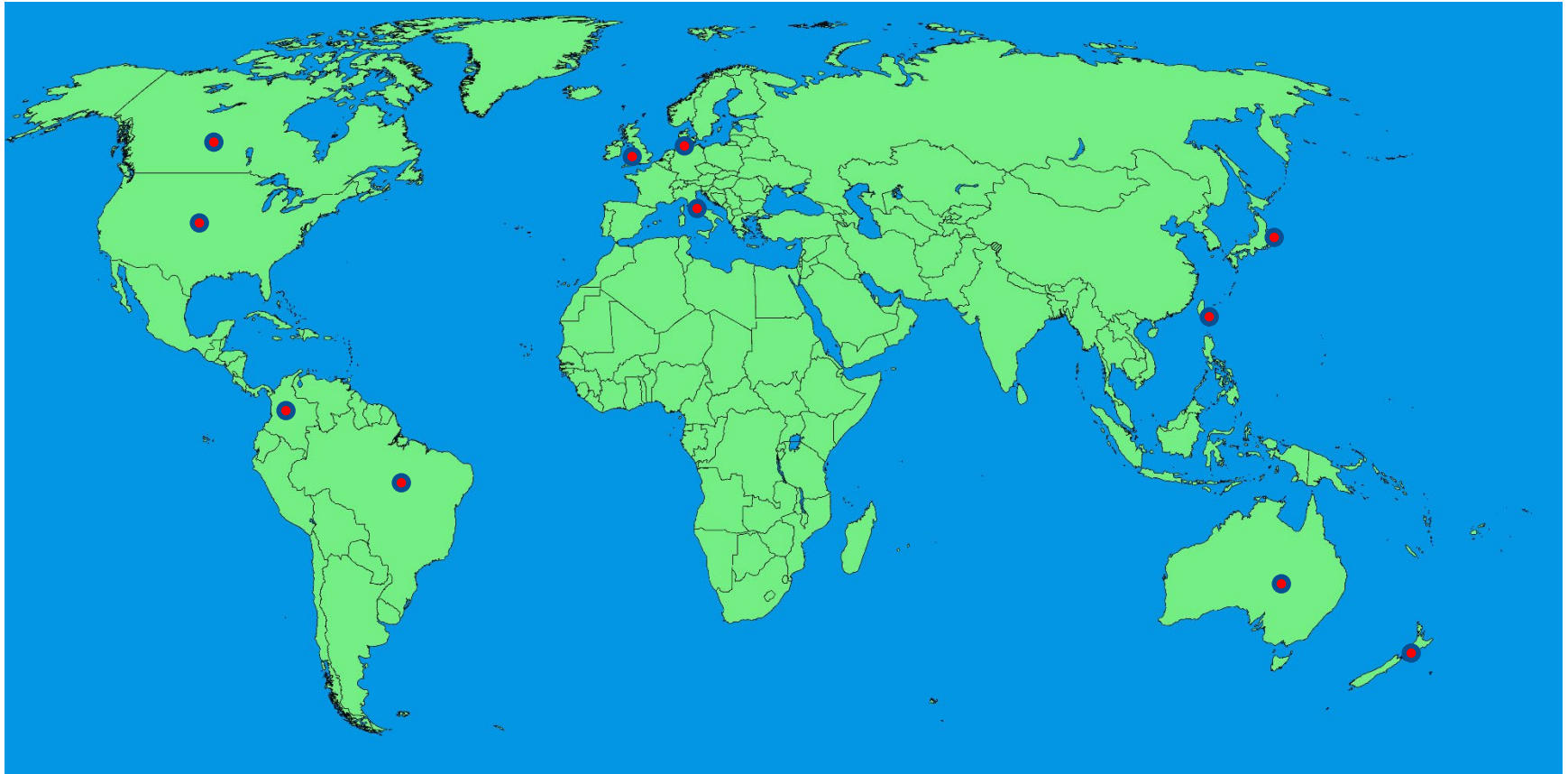
- Better education and understanding by practitioners, regulators, and problem owners – more breadth and depth
- Incorporation of Adaptive Management
- In a regulatory driven industry, recognition that Sustainable Remediation can provide a benefit without a regulatory driver
 - 12 states reference in one way or another
- Better awareness of benefits in corporate (problem owner) programs
- Avoidance of “Green Washing” language



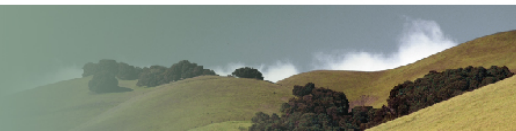
International SURF Groups and Partners



To share progress and learnings among member organizations and develop opportunities for collaboration



USA, ANZ, Italy, Canada, Taiwan, UK, Brazil, NL & NICOLE, Columbia, Japan, CL:AIRE





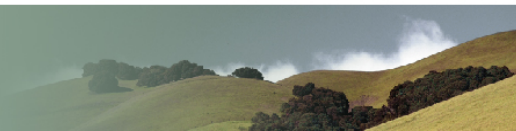
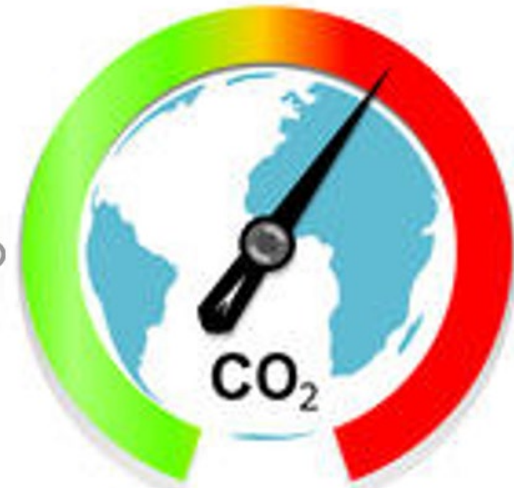
Emerging Frontiers in Sustainable Remediation



Climate Change and Resilience



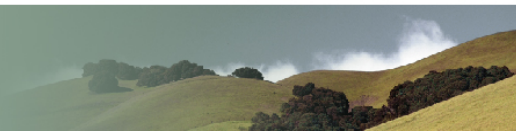
- Climate change (aka extreme weather) can undermine remedy effectiveness
- SURF recommends an intersection of practices for sustainable remediation and climate adaptation
- Opportunities for synergy include vulnerability assessments that build on existing practices



Monetization



- Some environmental impacts can be monetized
 - E.g., cost to society for each pound of SO_x emitted
- Challenge with current foot-printing tools is they focus on different emissions that impact different categories
- A monetized impact can convert all these emissions into a single unit – making it easier to compare different approaches
- Finding monetized values stakeholders can agree on remains a significant challenge



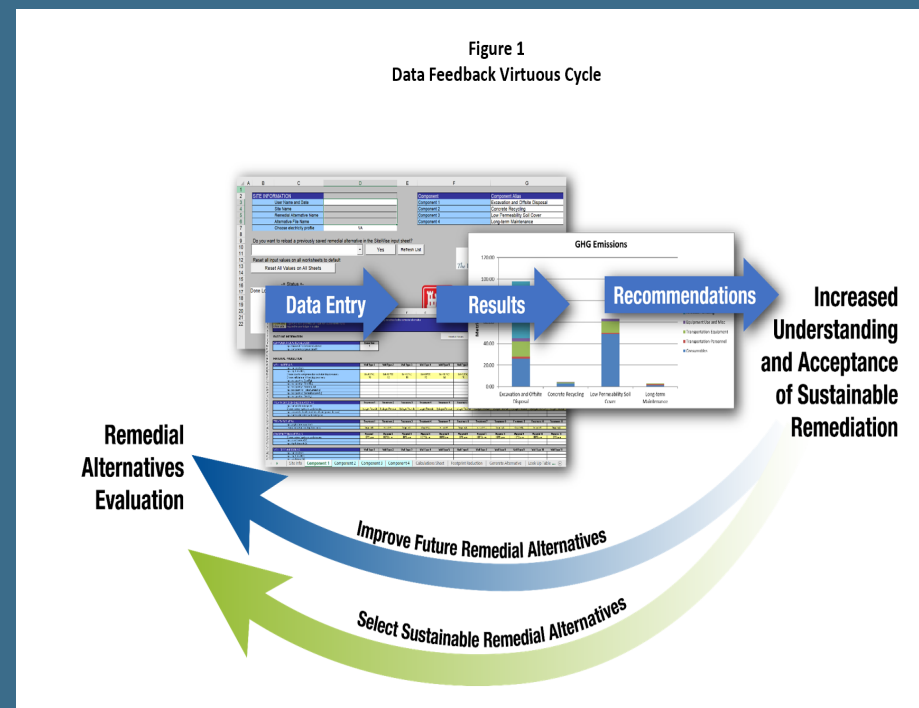
Programmatic Sustainable Remediation



- Different organizations implementing their “brand” of sustainable remediation (examples)
 - DOD
 - Aerospace
 - Oil and Gas
 - Chemical
 - Transportation
 - Regulatory authorities
 - Utilities



The Virtuous Cycle



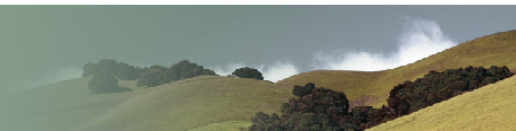
Societal Impacts and Engagement



- The remediation industry struggles with how to factor in societal impacts
- Obvious in brownfield redevelopment and activities that significantly impact communities
- Less clear on best path to proceed with respect to other type remedies
 - Are typical public engagement processes enough
 - Risk and uncertainty to problem owner losing narrative



- Continue to strive for identifying the right level of engagement
- Other types of engagement such as community level
- We need more engagement from social scientists (our views are dominated by “typical” remediation practitioner’s backgrounds)

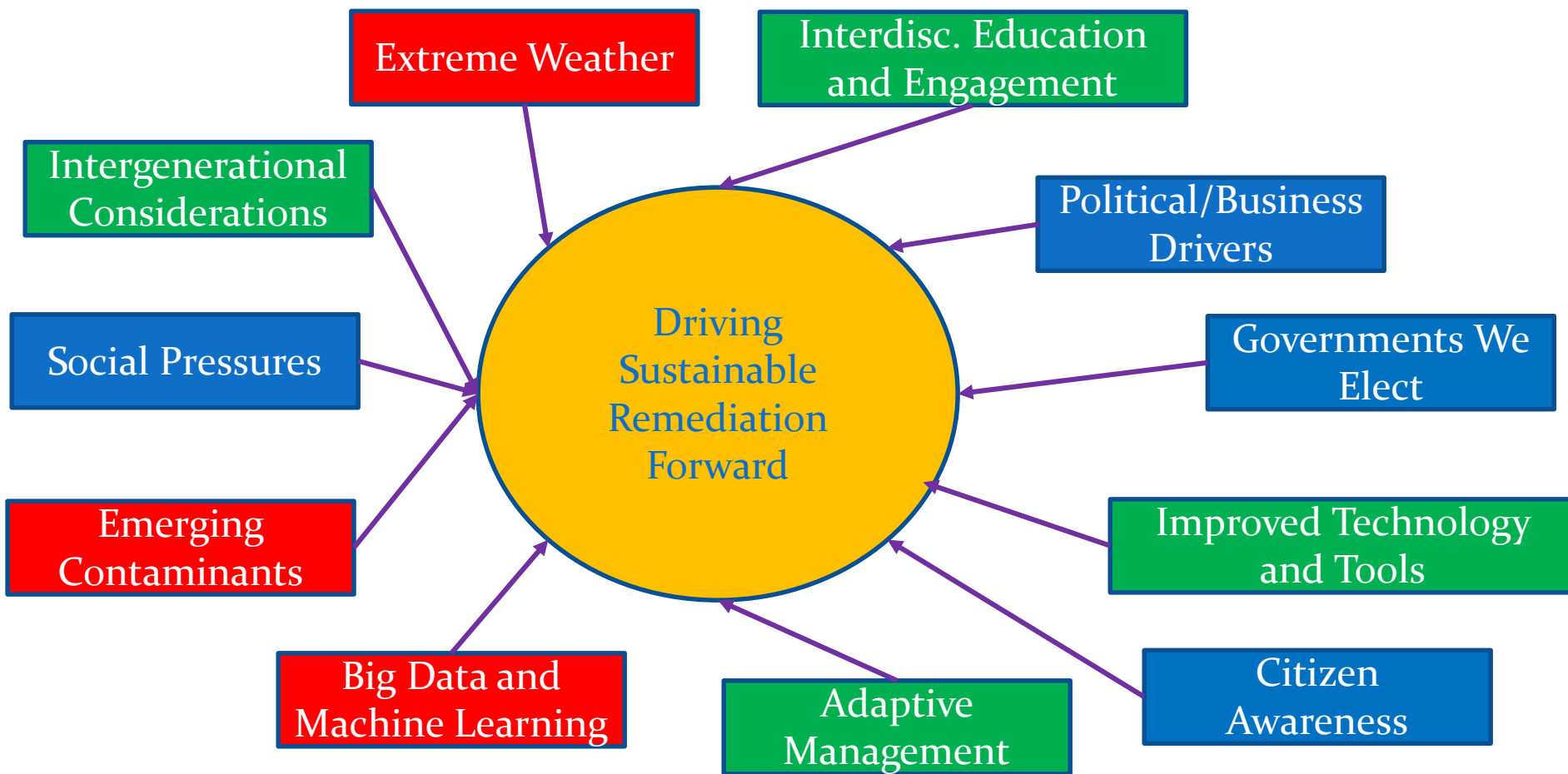




**What can happen with
sustainable remediation in
the next 10 years?**



Influence of Events on Sustainable Remediation Advancement



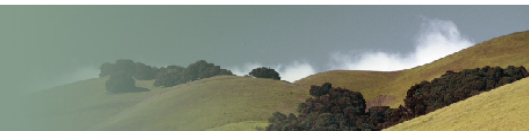
 Transformational  Progression  Societal Influences



Societal Influences



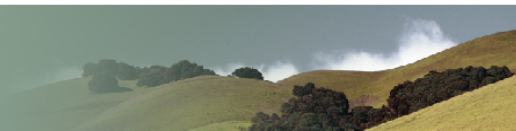
- Citizen Awareness – social media and activism bringing new attention to cleanup
- Social Pressures – more informed citizenry may facilitate more demand for sustainable solutions
- Political/Business Drivers – may increase demand for sustainable solutions based on stakeholder, branding, and optimization
- The Governments We Elect – can accelerate or decelerate sustainable remediation deployment



Transformational Impacts



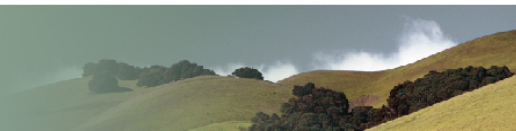
- Extreme Weather
 - Failure of remedies and resulting releases
 - More frequent and intense impacts
- Emerging Contaminants
 - What will the silver bullet technology be?
 - Will it be sustainable?
- Big Data and Machine Learning
 - Offers opportunity to reshape how we evaluate sites
 - And the remedies we plan/implement



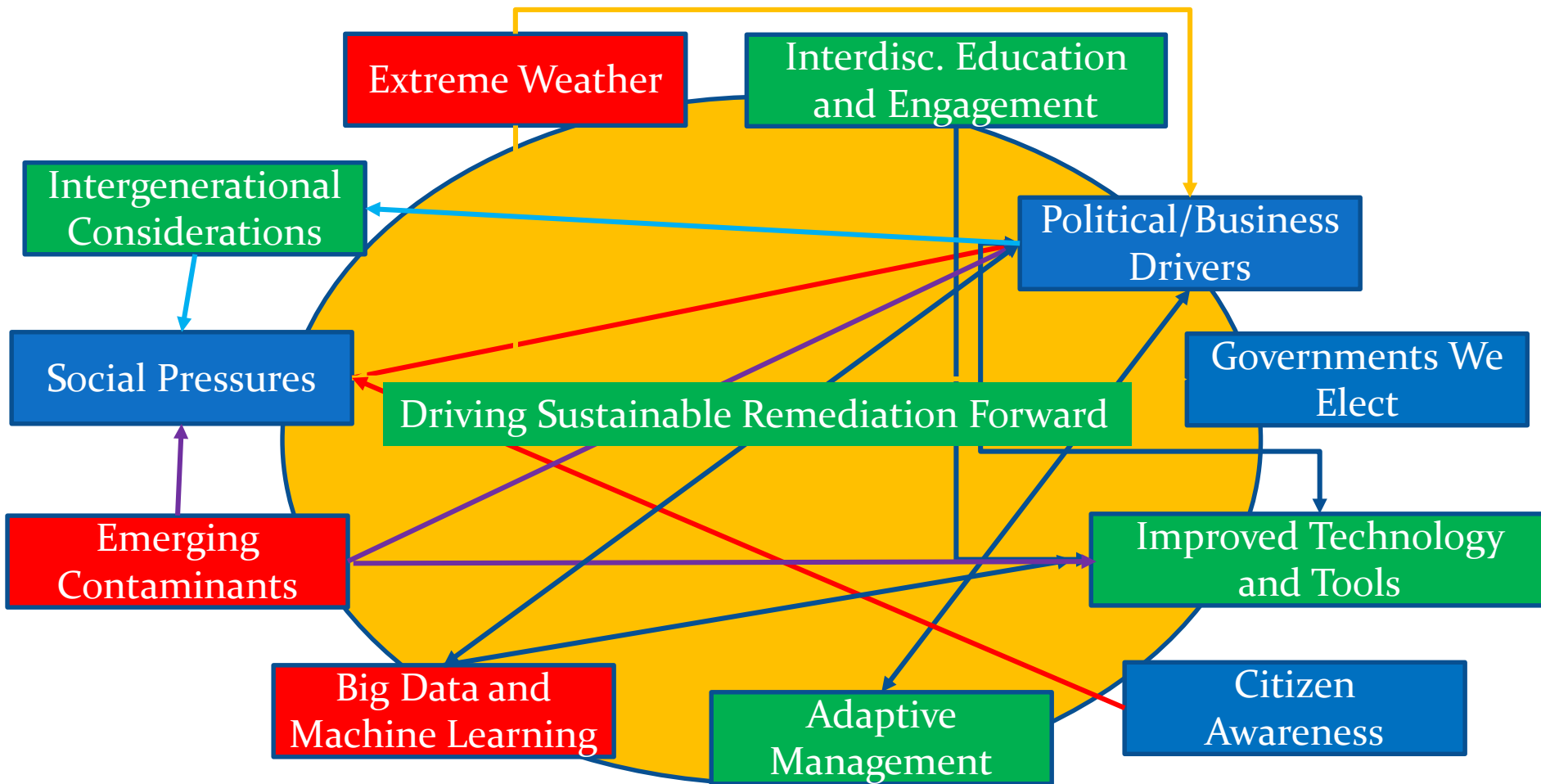
Progression of the Practice Impacts



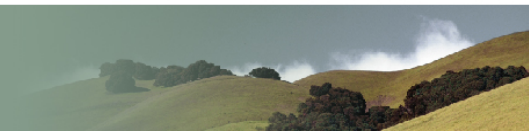
- Interdisciplinary Education and Engagement
 - Economists, social scientists, ecologists, probability forecasters, climate scientists
 - More texture to our solutions with different perspectives included
- Intergenerational Impacts
 - As complex sites move more into decisions, multi-generation cleanup may be met with more skepticism
- Technology and Tool Improvements
 - E.g., Open Source LCA, Valuation, Natural Treatment Systems, BMPs
- Adaptive Management and Sustainable Remediation a natural fit



Influence of Events on Sustainable Remediation Advancement



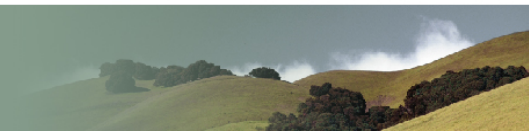
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Conclusions



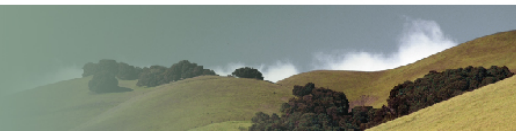
- The 2009 White Paper launched new ideas in sustainable remediation
- Significant body of resources (papers, frameworks, tools, case studies) exist
- Some of the ideas in the original white paper came to fruition, others did not
- International organizations have formed (12); 12 states recognize
- Some large organizations have implemented programs; most organizations have some experts; not ubiquitously practiced in all organizations
- Expanding into new frontiers
- Sustainable Remediation will advance through natural progression, societal influences, and transformational events



Awesome Contributors and Involvement in SURF Start Year



Contributor	Affiliation	SURF Joined
Amanda McNally	Geosyntec	2010
Arianna Libera	Univ. of Southern California	2017
Barbara Maco	Wactor & Wick, LLP	2012
Betsy Collins	JACOBS	2017
Dick Raymond	TerraSystems	2006
Gelinde Wolf	AECOM	2011
John Simon	NATHAN	2009
Maile Smith	Northgate Environmental Mgmt	2007
Matthew Ambrusch	Langan Engineering	2016
Melissa Harclerode	CDM Smith	2013
Paul Favara	JACOBS	2007
Reanne Ridsdale	Ryerson Univ	2014





Thank You!

Look for our paper in the 2019 Autumn Issue of the Remediation Journal!

