Knowledge exchange and stakeholder engagement in natural resource science and management

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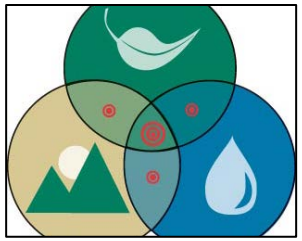
Painting credit: April Waters

Knowledge Exchange in this Room

Natural resource science by nature is interdisciplinary and requires collaboration

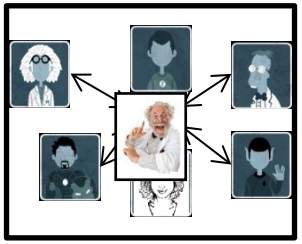
Case Studies are how we understand collaboration

United States, Australia, United Kingdom, Switzerland, etc.

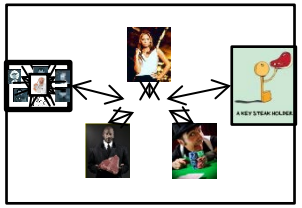


Water management, air quality management, riparian area conservation, biodiversity, etc.

Decision-support tool development, alternative futures exploration, sustainability, climate change adaptive management



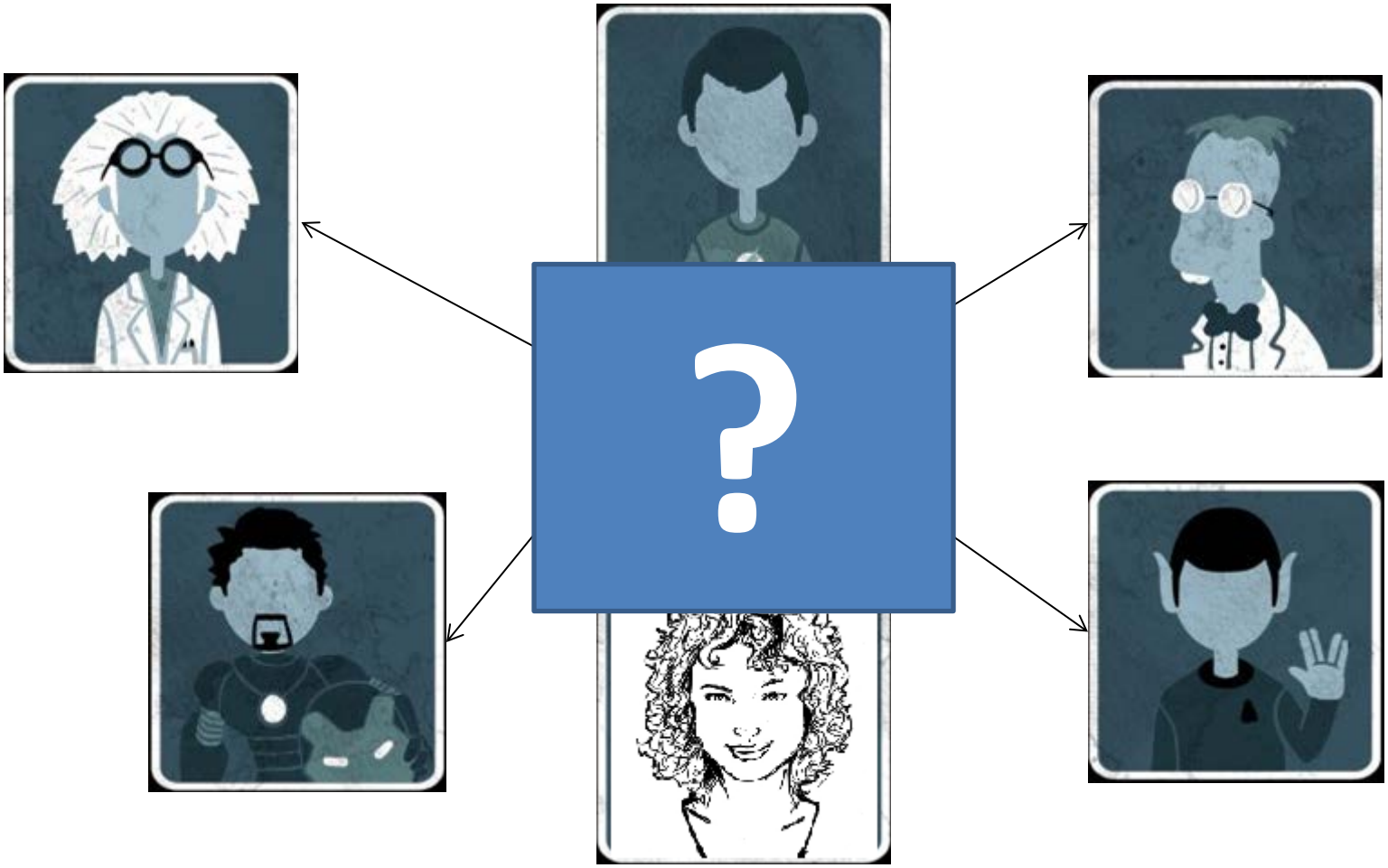
Multidisciplinary, Interdisciplinary, Transdisciplinary



Knowledge elicitation, directing research, workshops, interviews, learning and action networks, or not explained

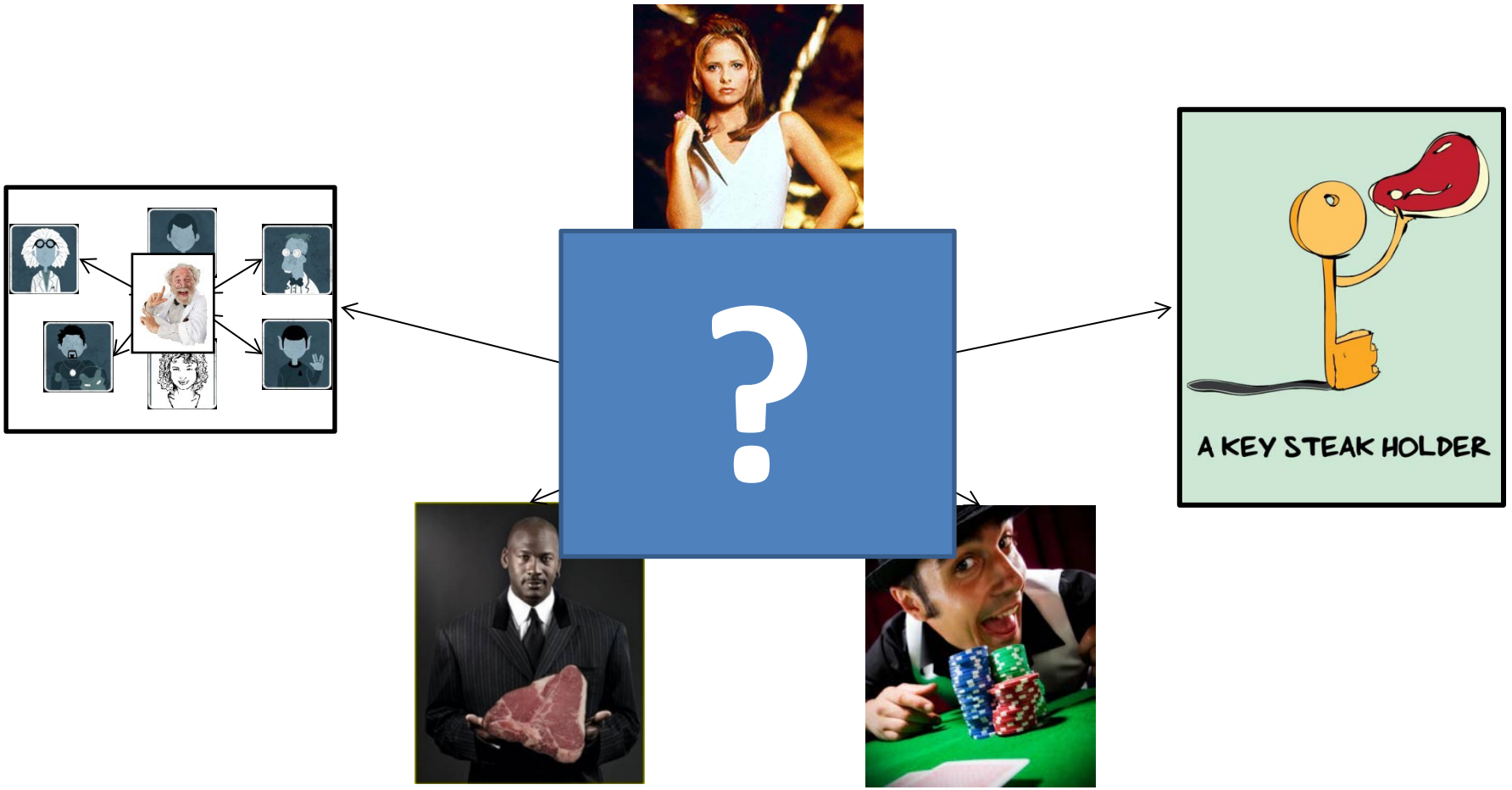
(Lienert et al., 2006; Mackenzie et al., 2012; Holzkamper et al., 2012; Stubbs and Lemon, 2001)

Interdisciplinary Collaboration:



(Fuller 2011; Holzkamper et al. 2012; Sol et al. 2013)

Transdisciplinary Collaboration: Interdisciplinary Research Engaging with Stakeholders from Start to Finish



Multiple Evidence Base Schematic (Adapted from Tengö et al. 2014.)

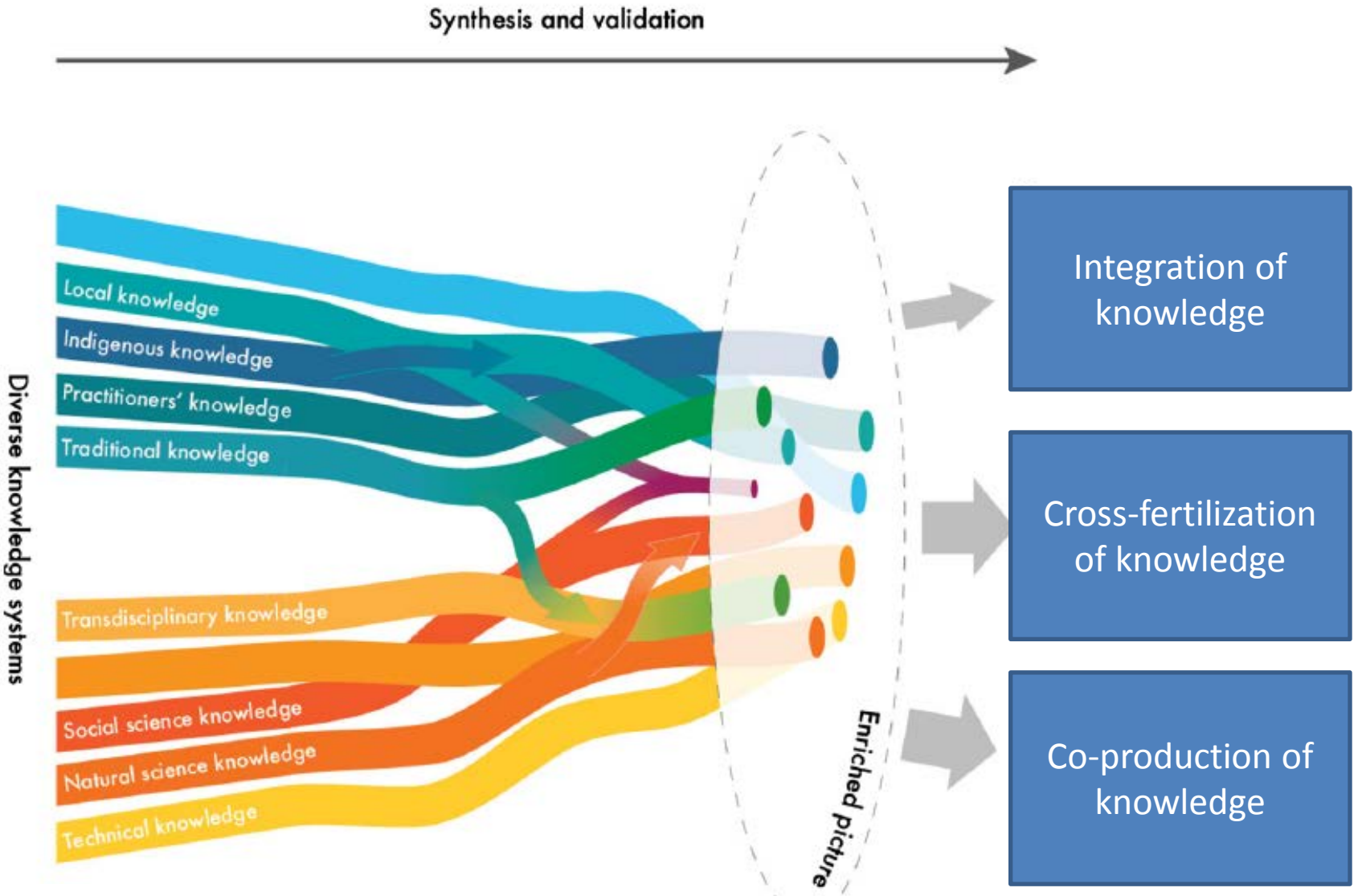
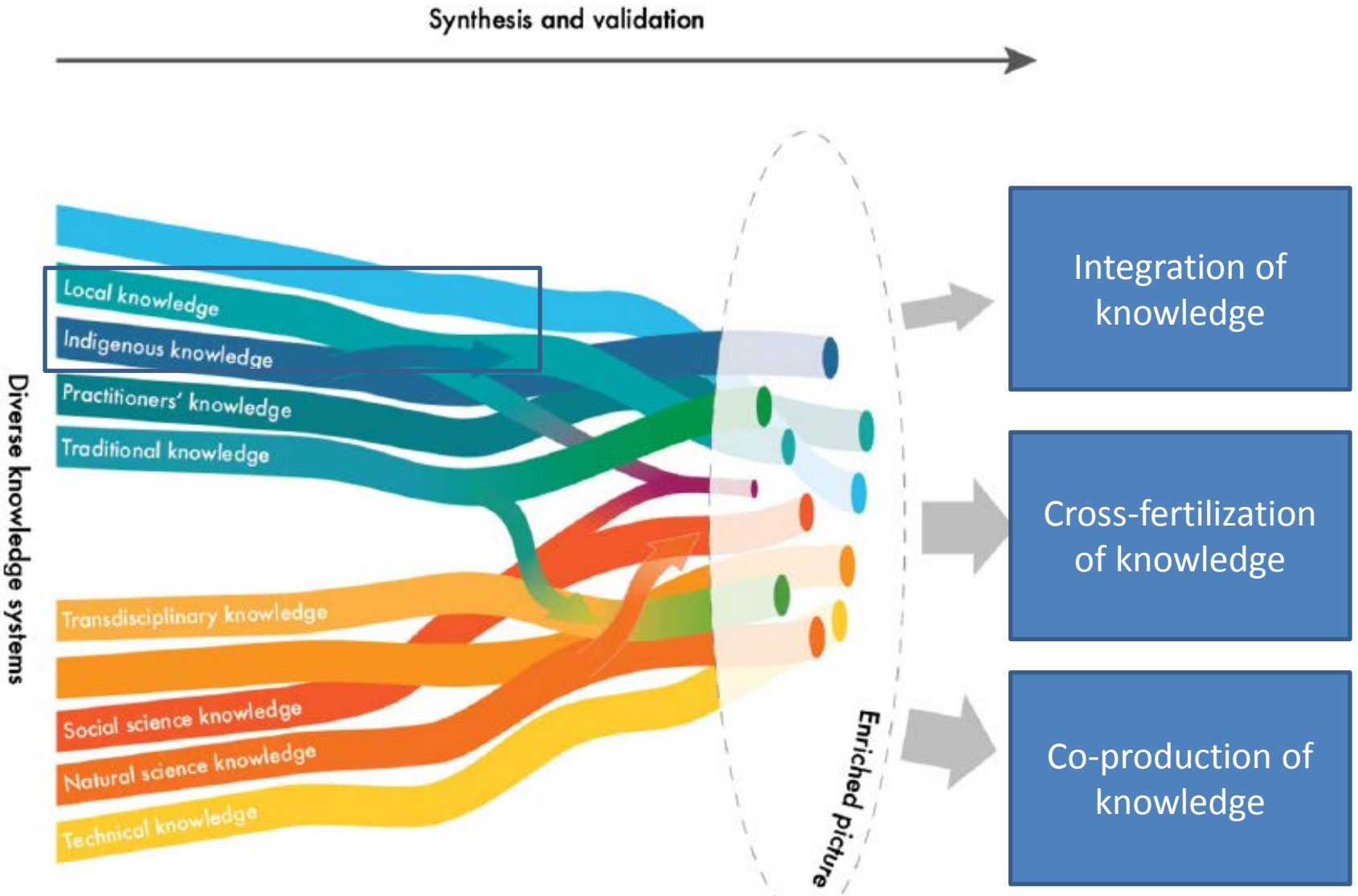


Fig. 1 An illustration of a multiple evidence base approach, where diverse knowledge systems contribute to generate an enriched picture of a selected problem or issue of concern. The enriched picture can serve as a legitimate starting point for further analysis and knowledge generation

Multiple Evidence Base Schematic (Adapted from Tengö et al. 2014.)



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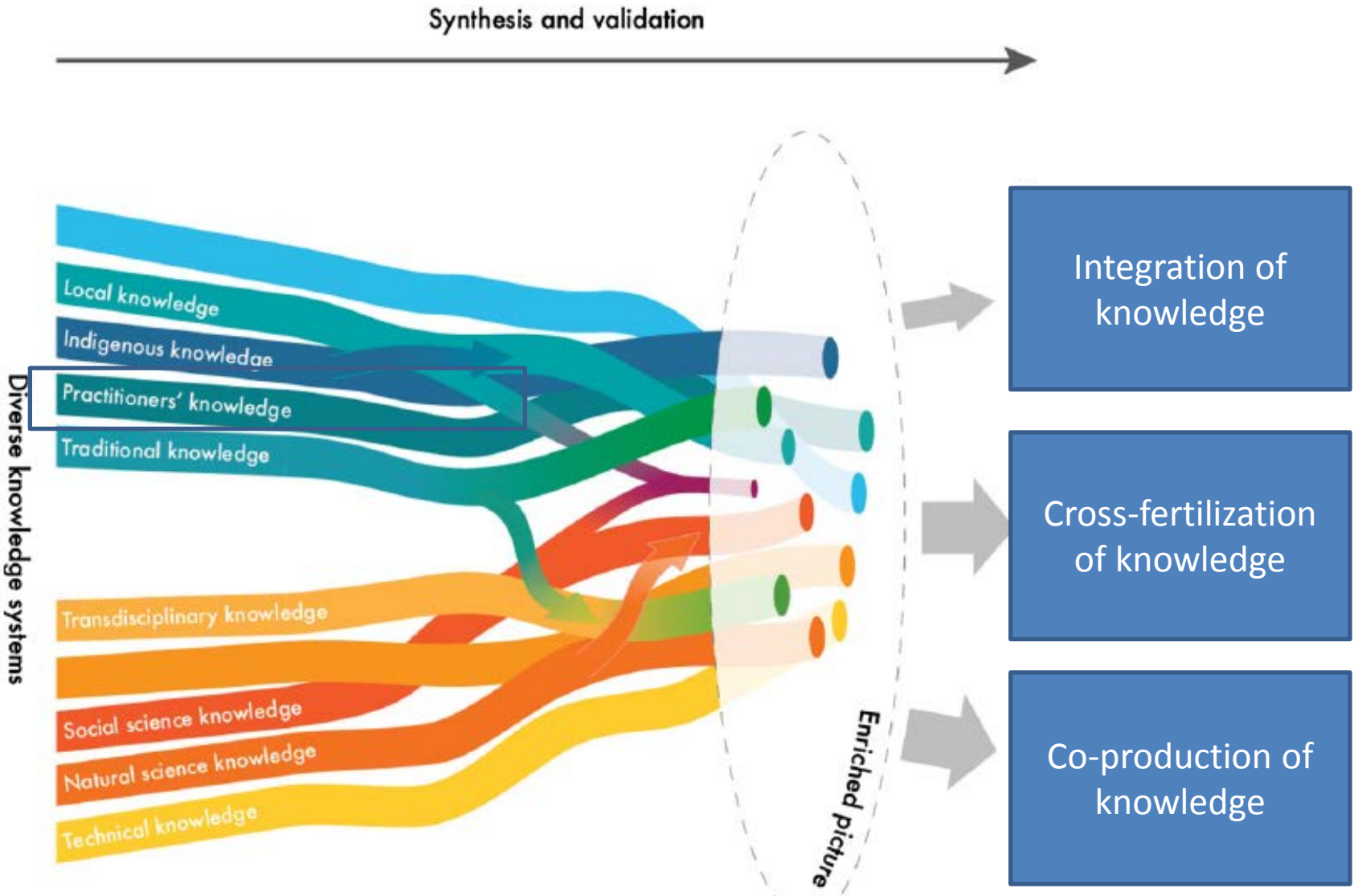

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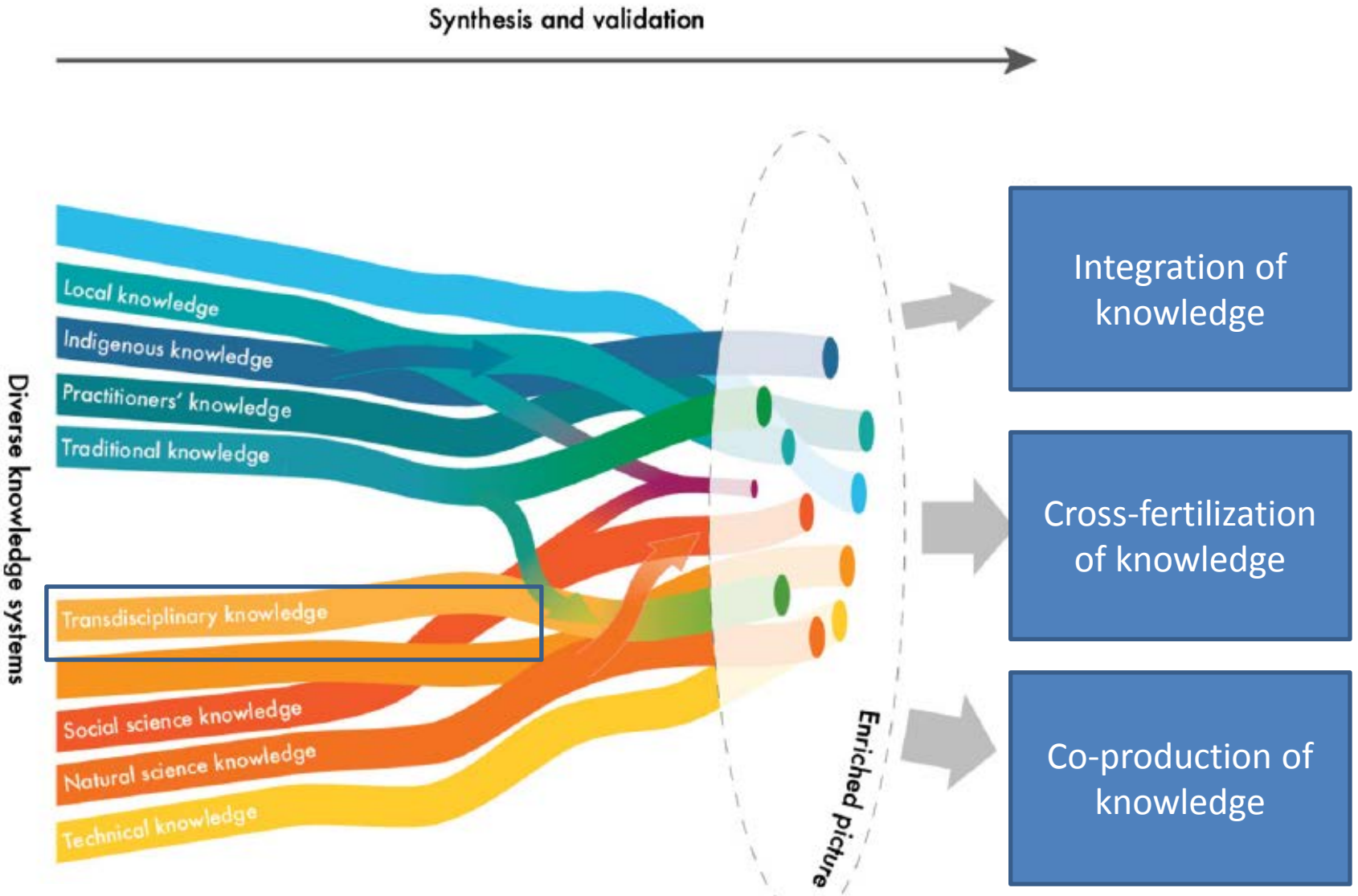

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What shared benefits emerge across 3 "cases" of knowledge exchange?

1. Indigenous and Local Ecological Knowledge (System)
2. Cooperative Research in NOAA Fisheries (Program)
3. Willamette Water 2100 (Process)

Indigenous and Local Ecological Knowledge (ILEK) is…

1. Long-term

2. Empirical

3. Management

4. Dynamic

5. Inter-generational

6. Holistic

7. Place-based

"a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment."

– Berkes 2012

2. ILEK Exchange in Context

Documentation

Co-management

(Thornton and Sheer 2012, Pourchez 2011, Friedlander et al. 2013; Nels and Baird 2007; Usher 2000)

2. ILEK Exchange Benefits

Advance discovery and understanding	Holistic understanding of environmental system linkages Access to long temporal scales in a small spatial scale New ideas and concepts
Broaden participation of underrepresented groups	Affirmation and respect for historically disenfranchised societies and cultures Improved understanding of each others' world views and concerns
Develop research community	**Local capacity building and power sharing** **Future collaborations formed**
Benefit society	Compliance with management plans when they incorporate cultural practice Ownership of research results and products

(IPBES document, Drew 2005. Thornton and Sheer 2012)

NMFS Cooperative Research is…

"a scientific activity involving two or more partners who gain more collectiveiy than each would separately in the pursuit of a shared research goal. A scientific activity uses statistically robust methodology, maximizes precision, and either minimizes or accounts for bias."

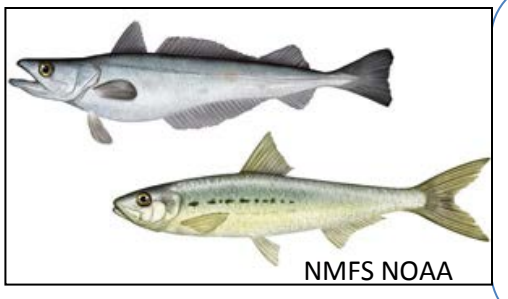
1. Active
2. Groupwork
3. Gestalt
4. Collaborative
5. Scientifically sound
6. Objective

– Cooperative Research and Cooperative Management Working Group

3. Cooperative Research Contexts

Southern California Hook and Line Survey in Cooperation with Sport Fishing Industry

Bycatch Reduction Engineering Program (BREP)



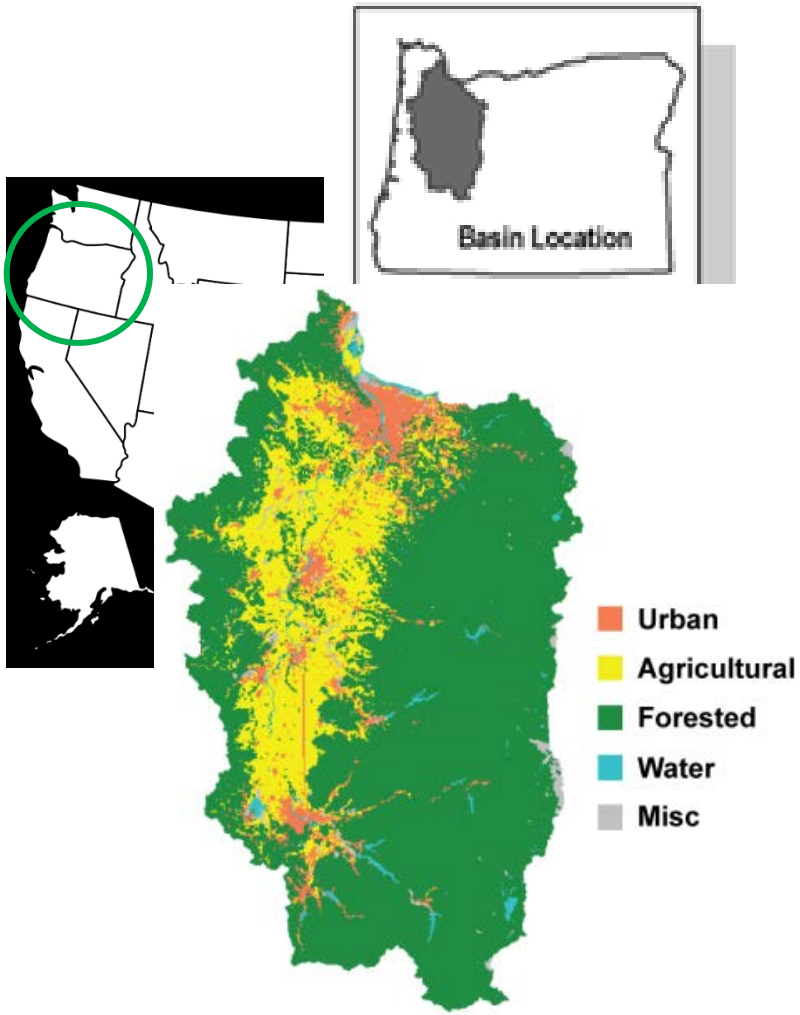
SaKe (Sardine-Hake) Survey

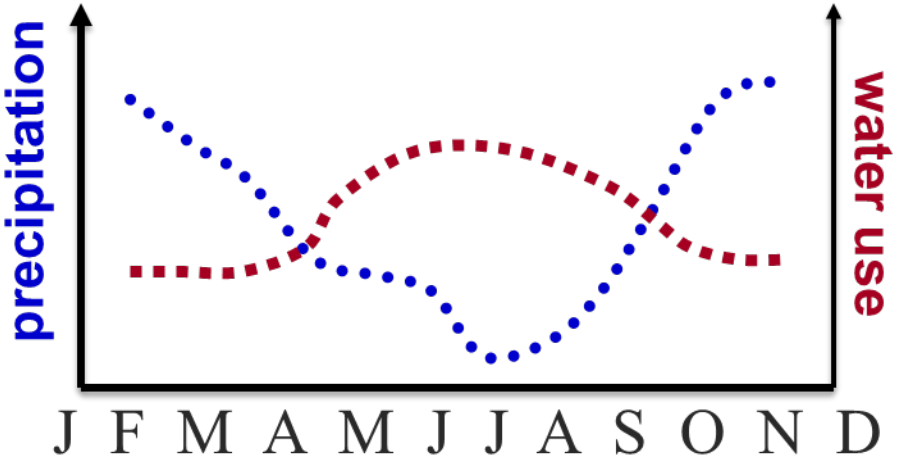
3. Cooperative Research Benefits

Advance discovery and understanding	Increase precision and scope of research surveys More information about fishing operations Fishermen knowledge inform research and technology design and testing
Enhance research infrastructure	Leverage resources across partnered institutions
Develop research community	Build mutual understanding and respect among fishermen and scientists
Benefit society	Compliance with resulting science-informed management decision Trust in the scientific results Voluntary adoption of a research product

Willamette Water 2100

Context





Anticipating water scarcity and informing integrative water system response in the Willamette Valley

Willamette Water 2100

Stakeholder Engagement

Field Trips

Large Group Meetings

Small Group Meetings

Year 1

Years 2-4

Year 5

WW2100 Participation in researcher-stakeholder engagement can:

- Advance discovery and understanding
- Broaden participation of underrepresented groups
- Enhance research Infrastructure
- Broad dissemination of results
- Benefit Society

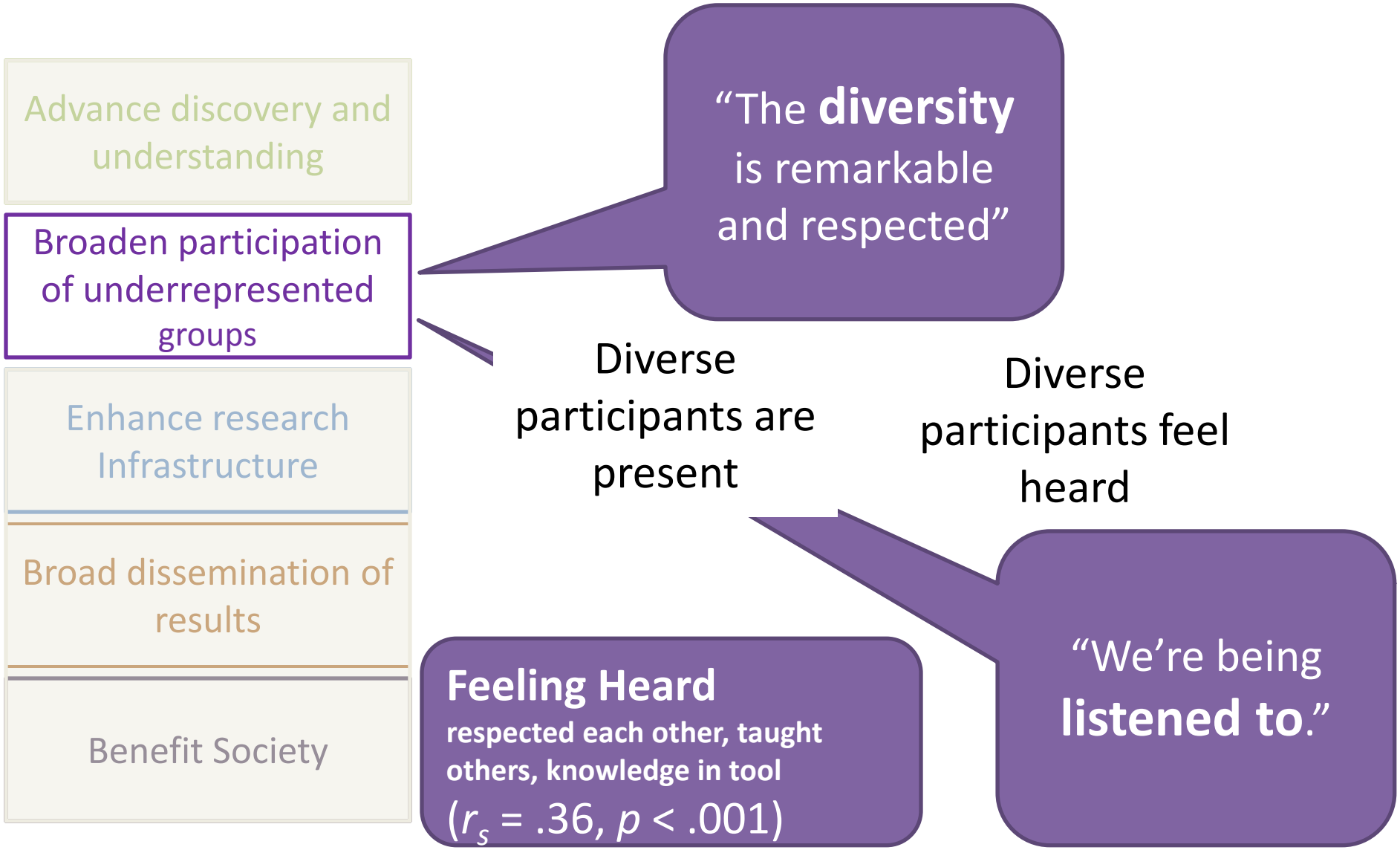
Integrating new and traditional sources of knowledge and perspectives

"**Provided a feedback mechanism** on what we're doing and whether it's reasonable or not."

Process utility
learned from each other, relationships, discussion
(r_s = .39, p < .001)

Model Understanding
what model can and can't do and why
(r_s = .42, p < .001)

Participation in researcher-stakeholder engagement can:



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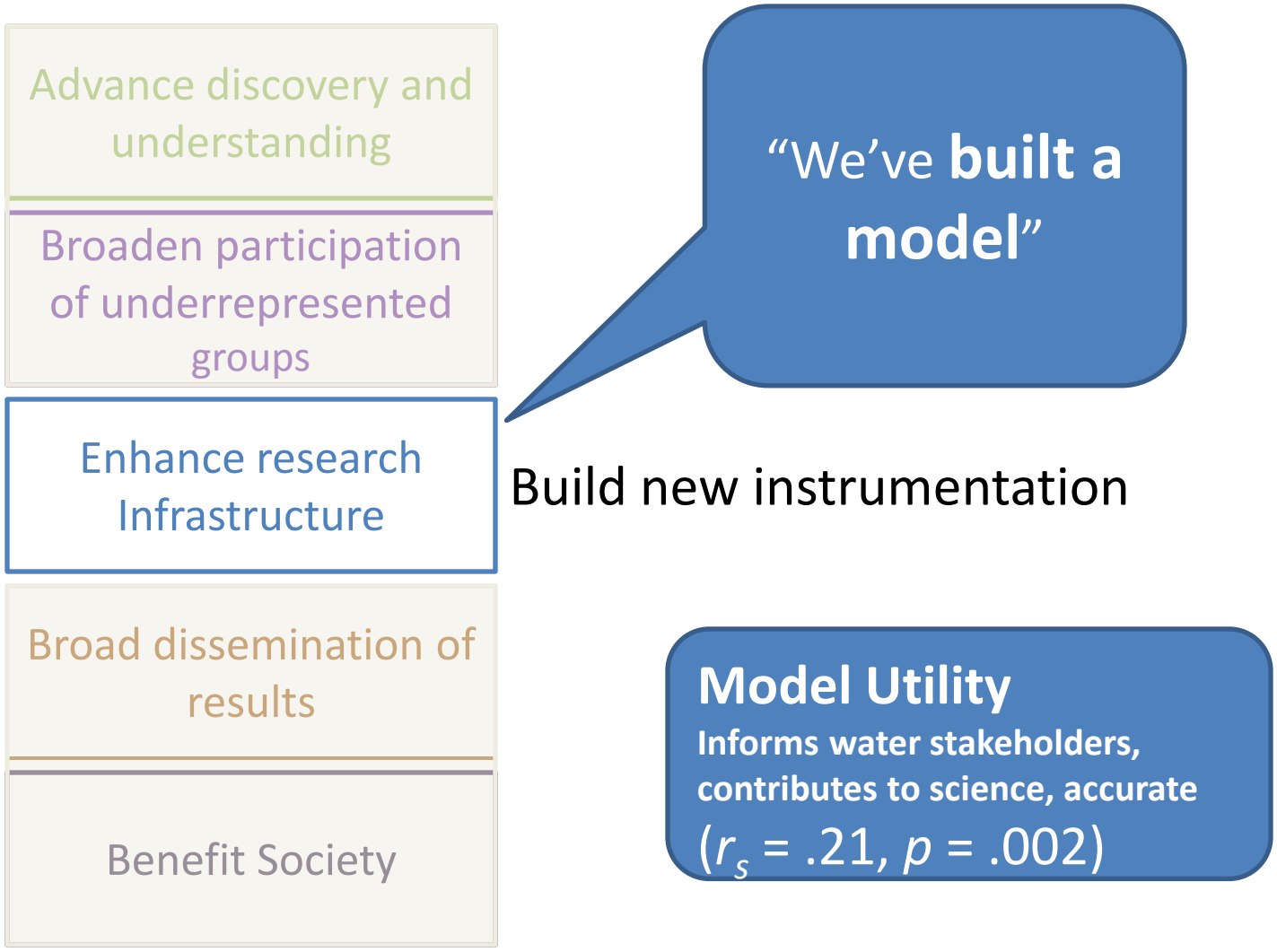

Model Utility

Informs water stakeholders, contributes to science, accurate

(r_s = .21, p = .002)

Participation in researcher-stakeholder engagement can:

Advance discovery and understanding

Broaden participation of underrepresented groups

Enhance research Infrastructure

Broad dissemination of results

Benefit Society

"I would say that the **discussions** and the **relationship-building** have been more beneficial to me than the actual nitty gritty numbers"

Form and strengthen research partnerships and networks

Process utility
learned, relationships, discussion
(r_s = .39, p < .001)

"The most meaningful product of projects like this is the **connections** between people"

Participation in researcher-stakeholder engagement can:

Advance discovery and understanding

Broaden participation of underrepresented groups

Enhance research Infrastructure

Develop research community

Broad dissemination of results

Benefit Society

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Advance discovery and understanding

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"People **take the output back** to the groups they belong to"

Train stakeholder ambassadors of science

Model Understanding
what model can and can't do and why
(r_s = .42, p < .001)

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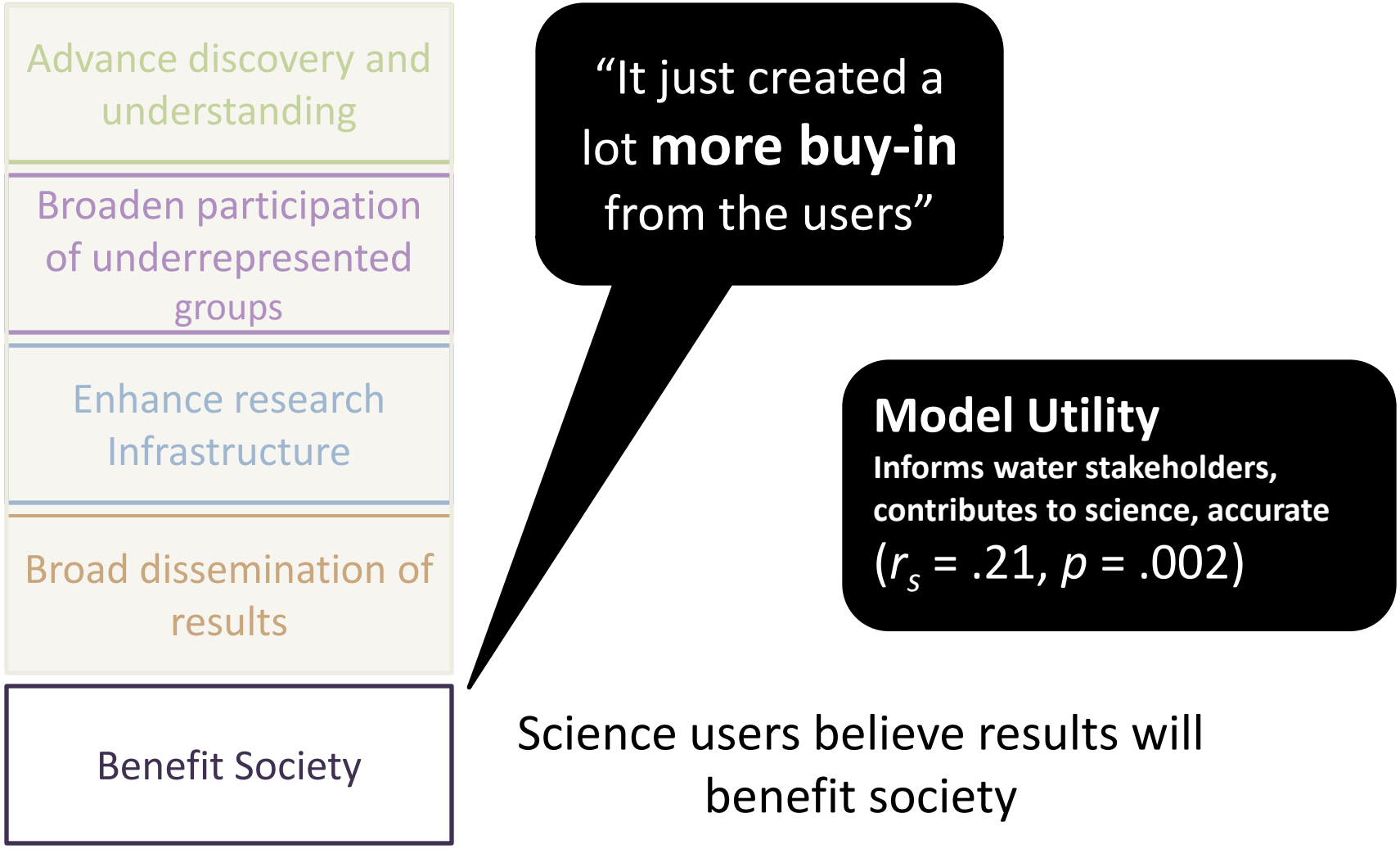


Successes you can achieve

Process Success

"I think getting a group of stakeholders in the room…all coming from **different perspectives** and having…great **thoughtful conversation**"

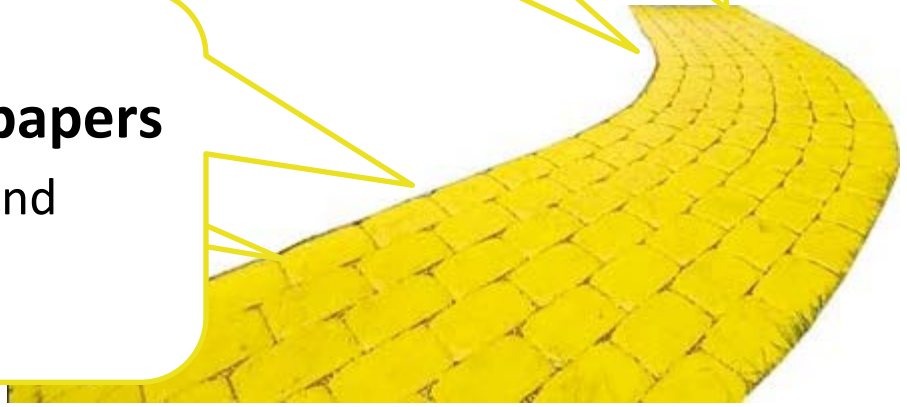
Research Success

"I feel quite confident saying that in terms of just the **model** that this is without a doubt the best look at water in the Willamette Valley that's ever been done."

"There were **papers published** and written."

Personal Success

"I'm **learning** …and that's always helpful, both personally and professionally."



Common Benefits?	ILEK	CR	WW2100
Advance discovery and understanding	✓	✓	✓
Broaden participation of underrepresented groups	✓		✓
Enhance research Infrastructure	✓	✓	✓
Develop research community	✓	✓	✓
Broad dissemination of results			✓
Benefit Society	✓	✓	✓

Complicated science

Speaking different languages

Engagement as an afterthought

Different disciplinary traditions

Different stakeholder engagement philosophies

Disagreement on when, and how to involve stakeholders

Busy-ness

“lack of a shared vision in a project”

Complicated project

Unclear questions and goals

Shared Lessons Learned

- Engage – early and often

- Not with strangers

- Invest in it

- Know your role

- Employ a bridge

If you remember 3 things…

1. Stakeholder engagement can advance your science and broaden its impact.

2. Engage early and often with adequate resources.

3. Building research and management relationships may be the greatest success of these projects.

Thank you

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Institute for Water & Watersheds

Sea Grant Oregon

MRM marine resource management

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

NSF The National Science Foundation


Thank you

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