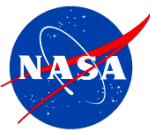




Mapping Lessons Learned to Improve Contextual Learning at NASA

Dr. Edward W. Rogers and Dr. Barbara Fillip
Goddard Space Flight Center/NASA

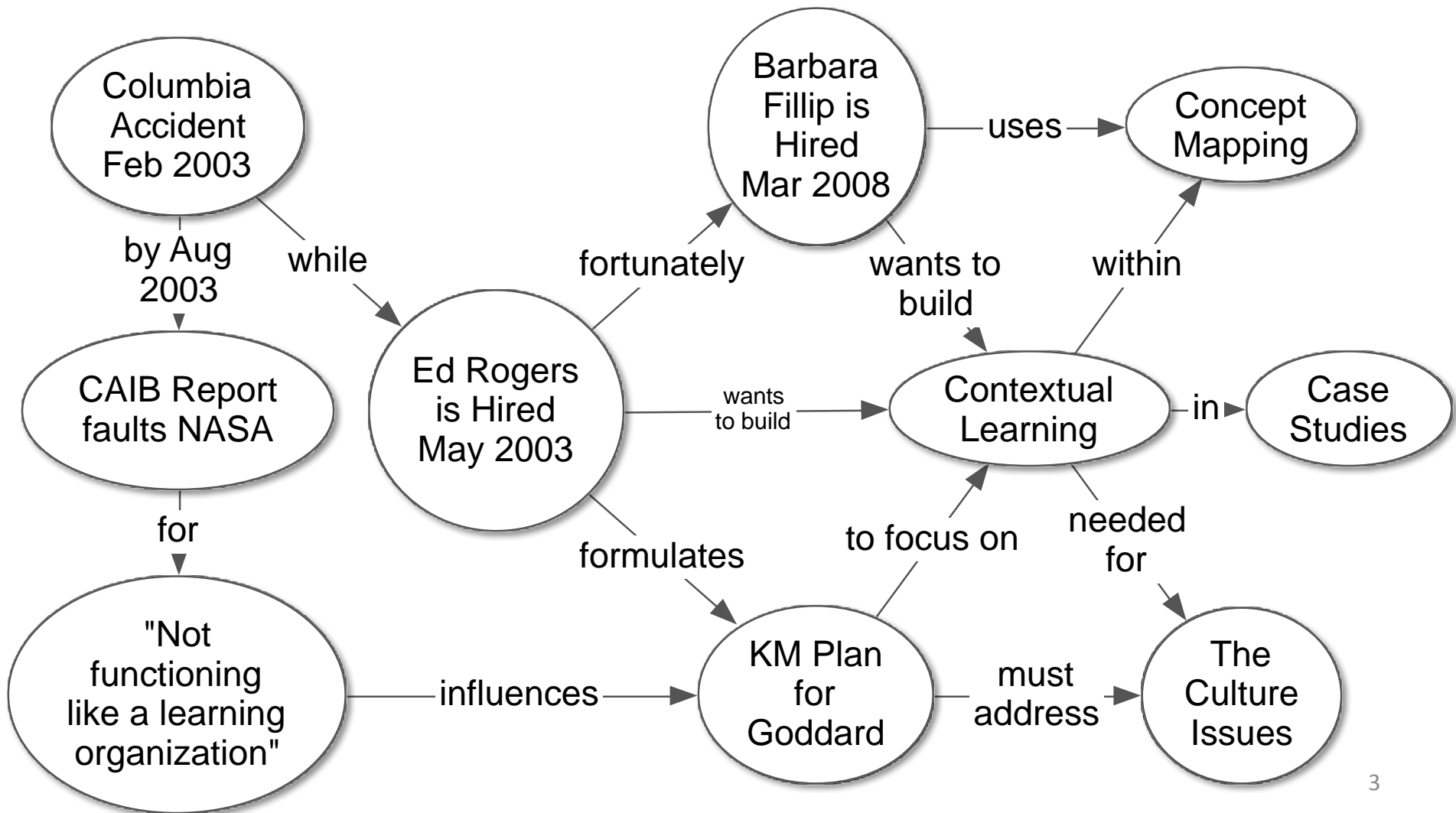


Mapping Lessons Learned to Improve Contextual Learning at NASA

Outline of Session

1. What we set out to do (post Columbia Accident ~2003)
2. Concept mapping as method for building/retaining context around Lessons Learned: How it works
3. Practical hands-on demonstration of Concept Mapping Lessons (in class exercise with pen and paper)
4. Our lessons learned / challenges in keeping the KM program going at GSFC
5. Your Questions and Comments?

The Context of Concept Mapping at GSFC



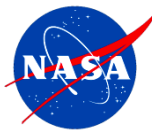
Costly Lessons About Learning



The Challenger
Launch Decision

The Columbia
Foam Strike





Goddard's Learning Plan

Building the Goddard Learning Organization:
A strategic plan for managing our collective knowledge and changing our culture to help GSFC function more like a learning organization



A learning organization facilitates the sharing of knowledge among people as much as among systems.

The Challenge to Change
The Need for a Plan to Manage Knowledge and Build a Learning Organization at NASA has been highlighted in a number of official documents. This Plan for GSFC is

“The Goddard Plan is designed to overcome the previous Agency focus on IT as a KM driver with its over-emphasis on ***capturing knowledge from workers*** for the organization and instead focuses on facilitating ***knowledge sharing among workers.***”

p5 of draft Goddard Learning Plan

Goddard must not sit by expecting our successes of the past to carry us through the times ahead.

Future Goddard projects should never accept risk or experience failure because the organization did not apply its own best knowledge.

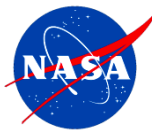
¹ Strategic Plan for Knowledge Management, NASA Knowledge Management Team, April 2, 2002 (unsigned draft document) available on the NASA KM website at: <http://www.km.nasa.gov/home/index.html>

Goals of Learning Plan

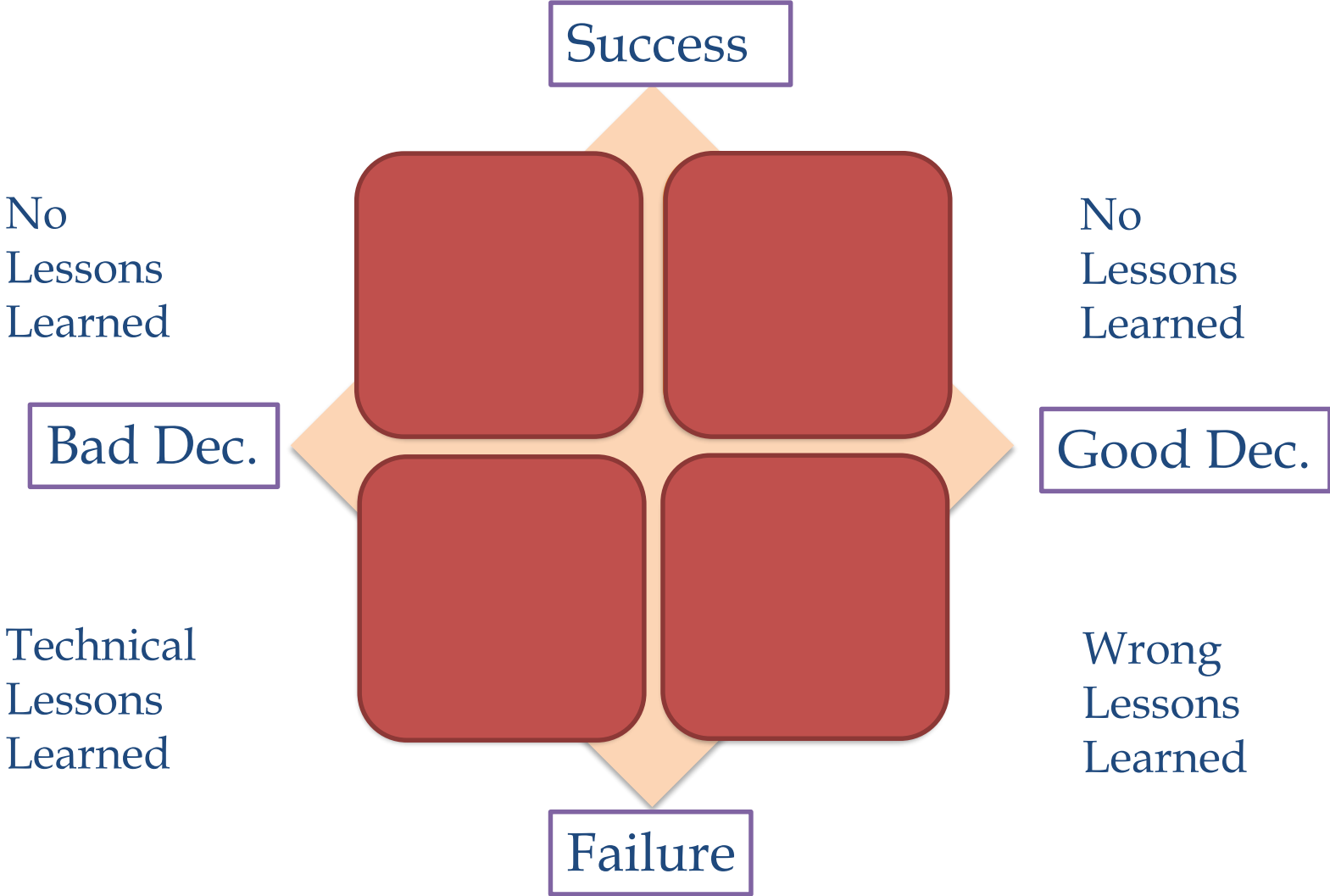
1. Manage Knowledge Assets Efficiently
2. Facilitate Effective Knowledge Use
3. Build a Learning Organization Culture

Learning Practices

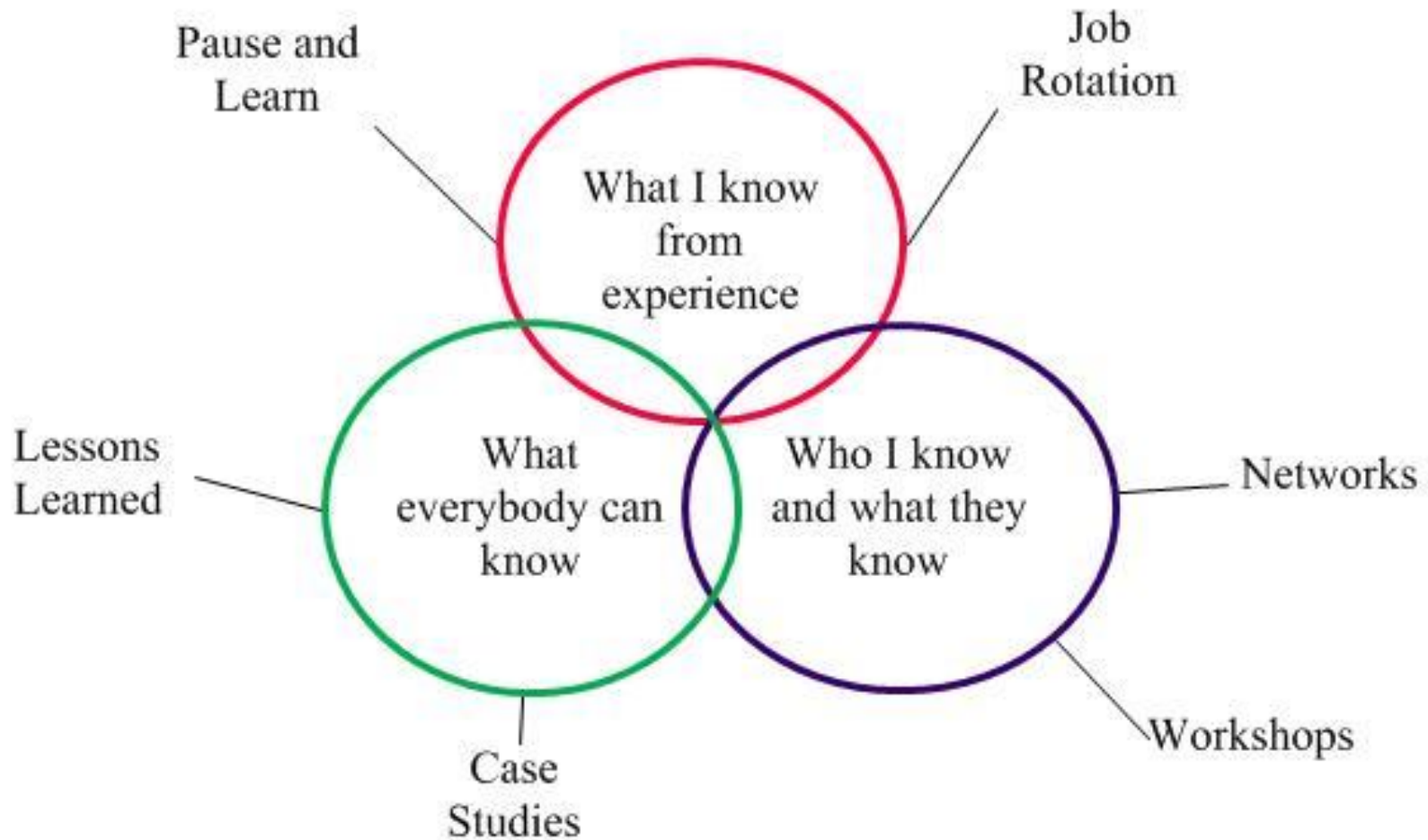
1. Pause and Learn
2. Sharing Workshops
3. Case Studies
4. Lessons Learned
5. Case-Based Training
6. Experience-Based Design Rules



Decisions – Outcomes – Lessons Learned



How do we learn





Why “Pause and Learn” ?

“We do not learn from experience... we learn from reflecting on experience.”

— [John Dewey](#)

A Pause and Learn...

... a method for reflecting and transferring individual lessons from a specific project event among fellow team members.

Team members meet behind closed doors, take off their official “hats” for a brief period, and look back on a recent event to gain a more thorough understanding of what has happened, and why.

(see brochure and papers listed in Resources)





Standard Pause and Learn Session

- 10-20 participants from a single project team
- 90 minutes
- 4-5 key topics identified in advance
- Key questions
 - What went well?
 - What didn't go well?
 - What would we do differently?

Learning Throughout

STEPS

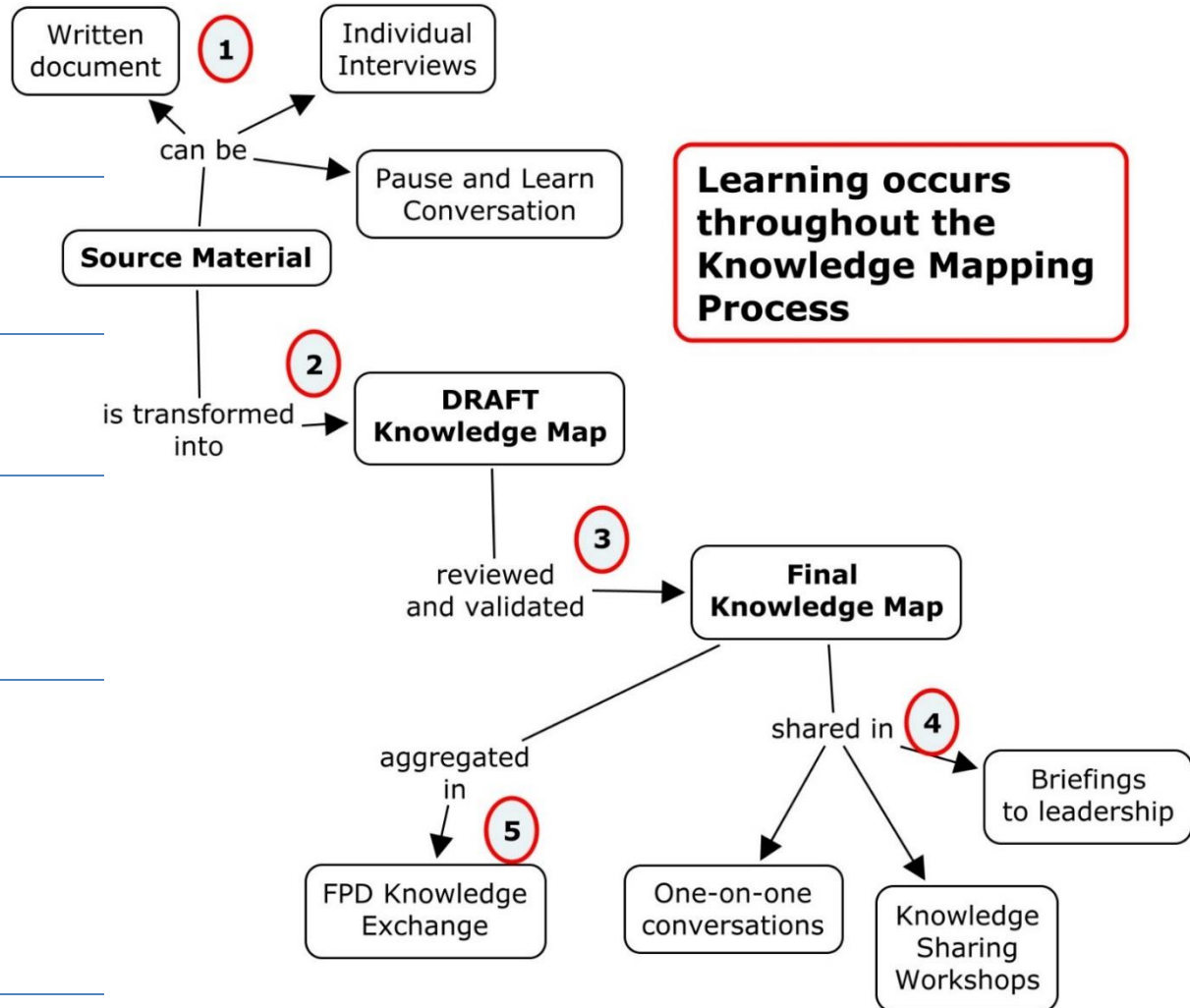
PLAN

FACILITATE

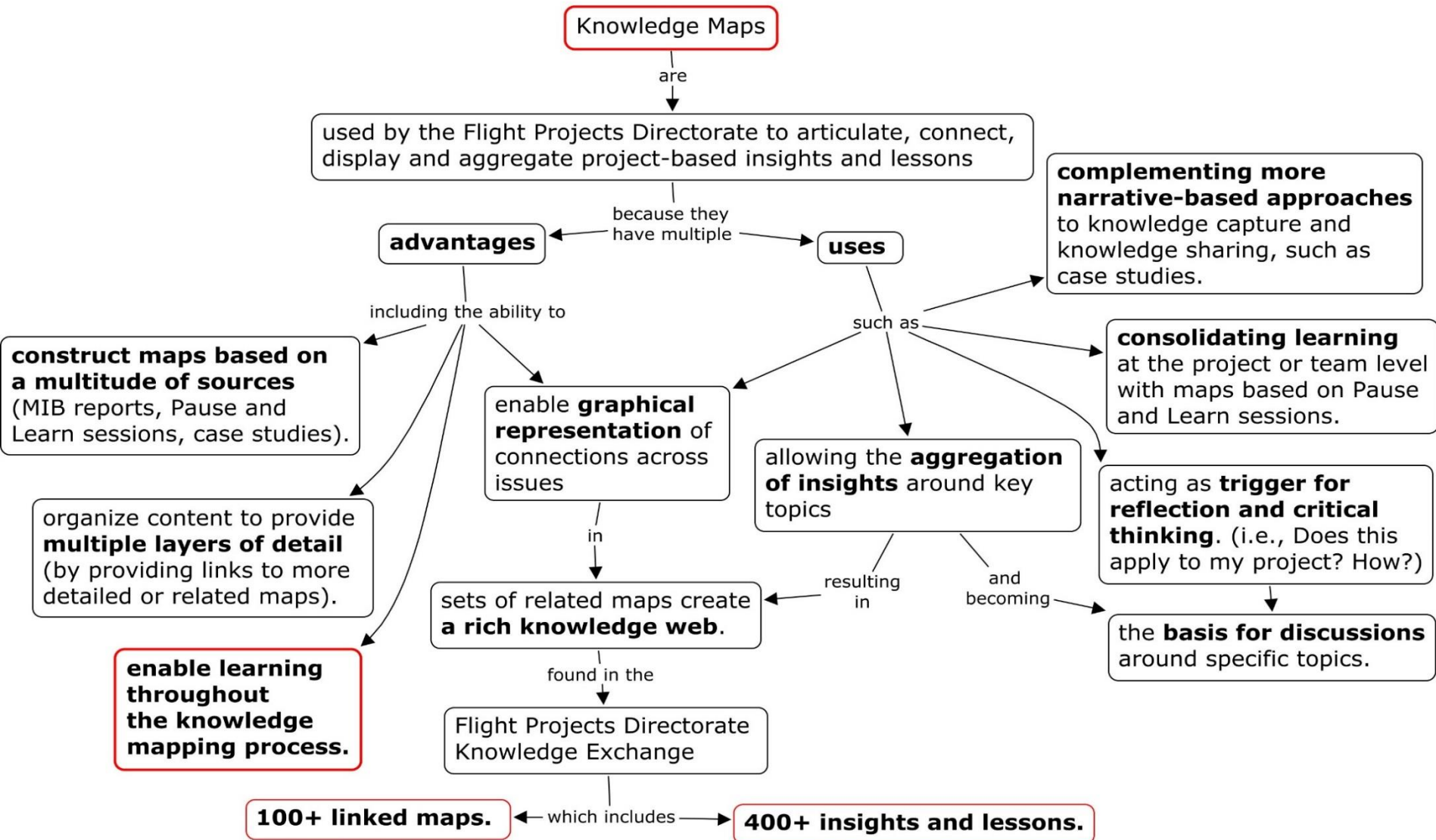
DOCUMENT

VALIDATE

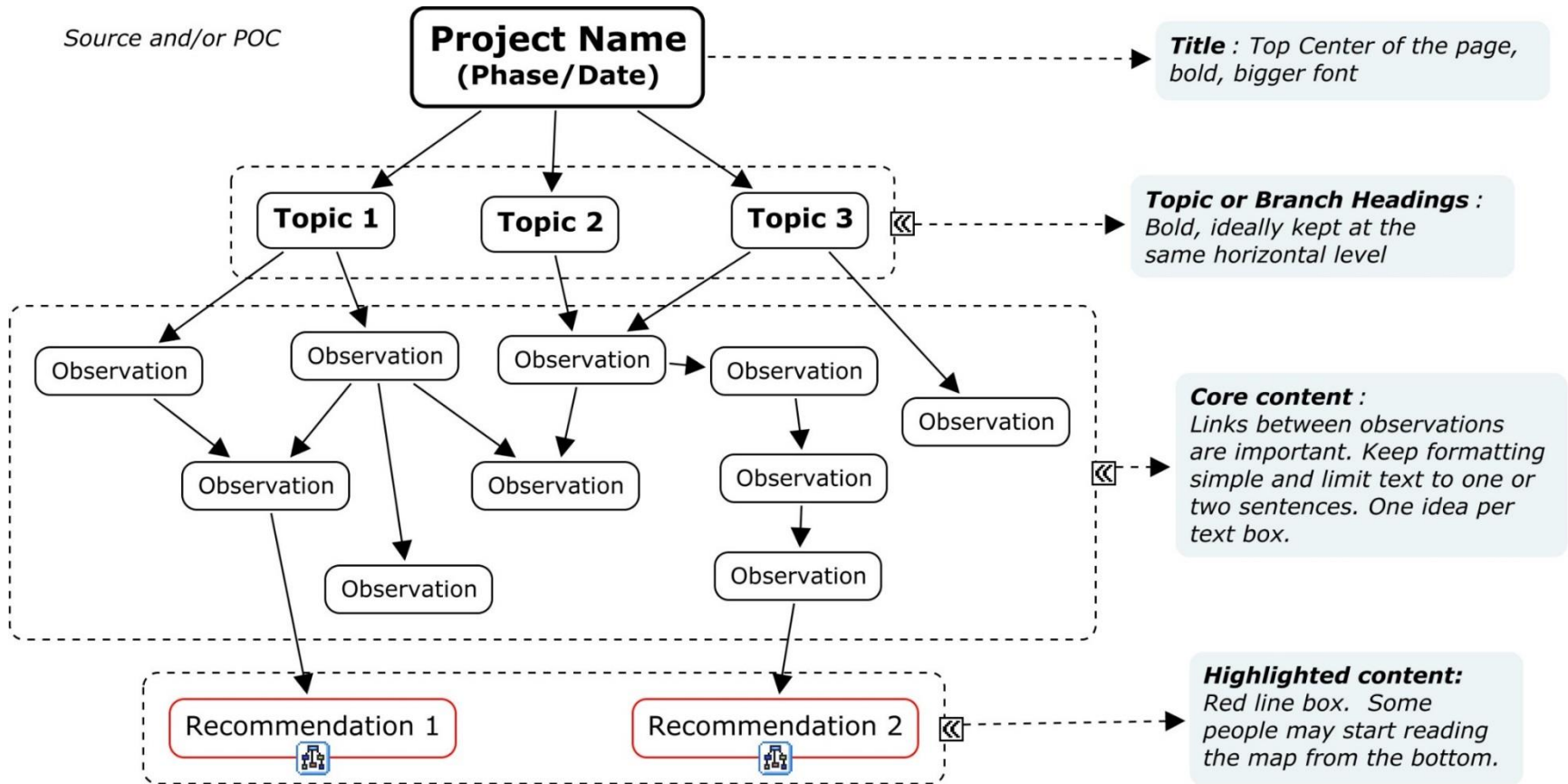
DISSEMINATE



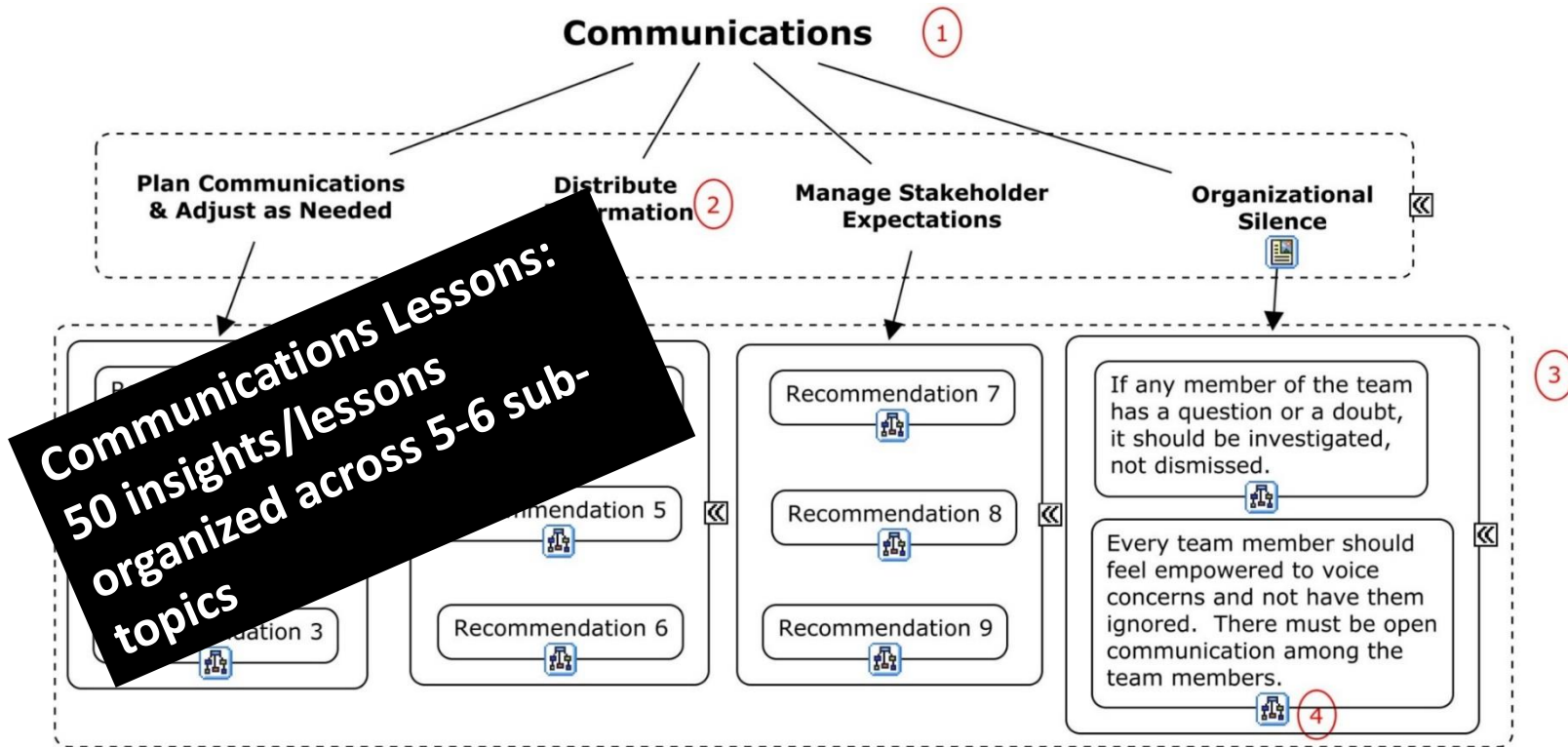
Benefits of Knowledge Maps



Template for a Conversation map



Topic Map



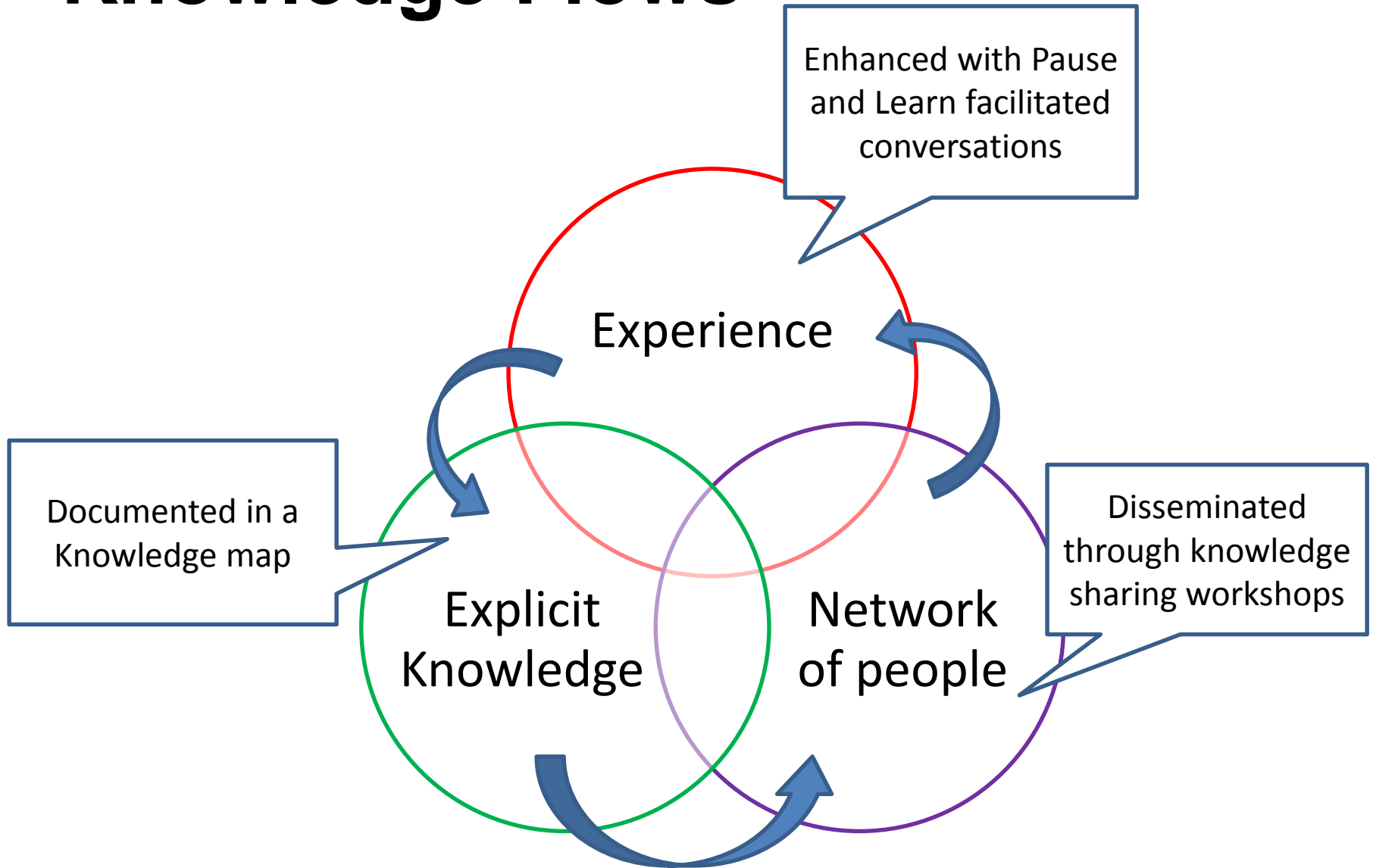
1 ← Knowledge Domain/Map Title

2 ← Sub-topics / Branch headings

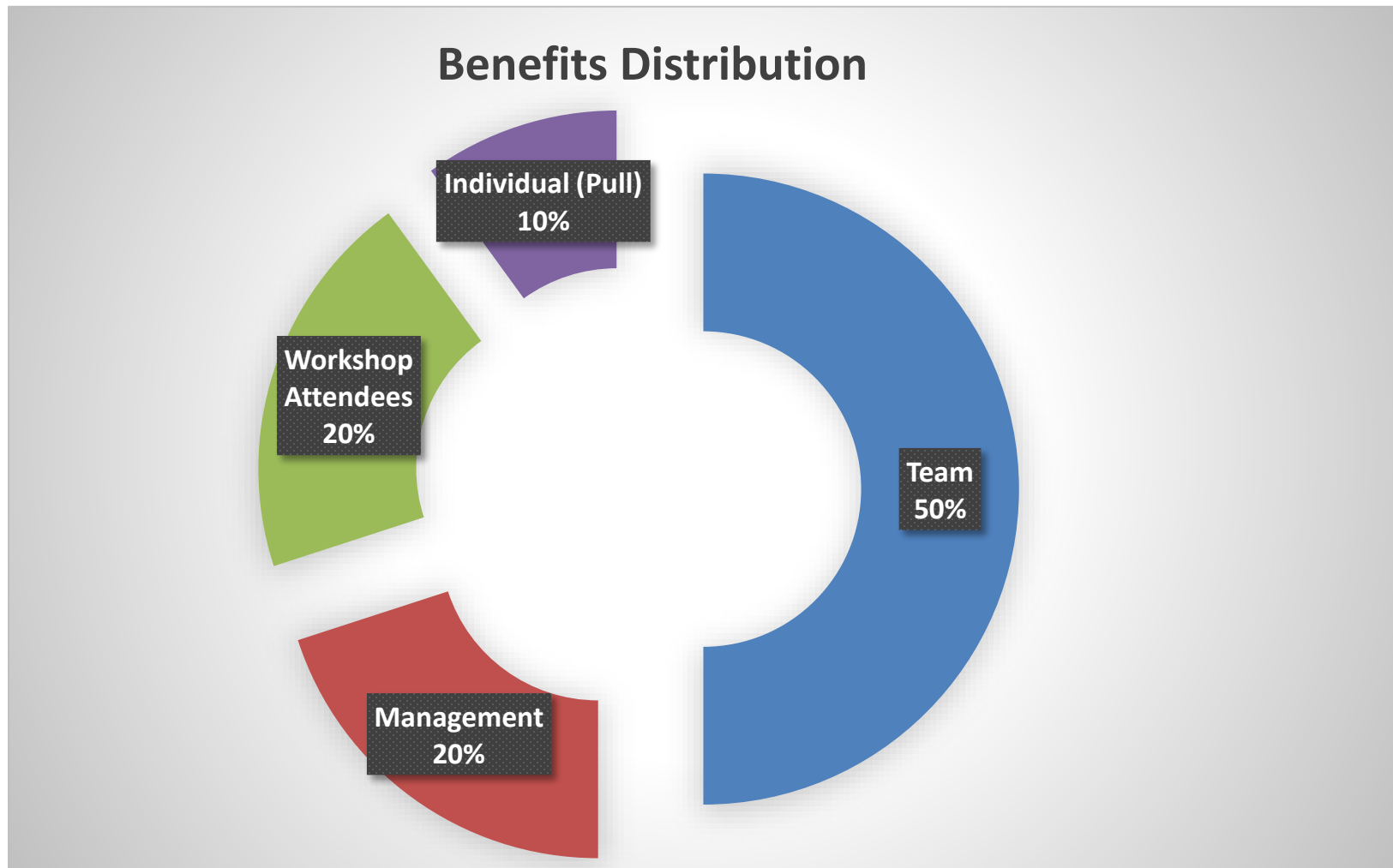
3 ← Recommendations/Insights aggregated from the conversation maps, organized based on sub-topics and linked to the original conversation maps.

4 ← The little map icon below each recommendation opens up a hyperlink leading to the original conversation map. Other icons represent links to documents or websites.

Knowledge Flows



Who Benefits? How?



Hands-on Exercise – Create a Map about...



Making the Intersection a Roundabout...



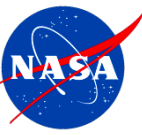


**SO
WHAT?**

What can you take away
from this?

**QUESTI
ONS?
COMME
NTS?**



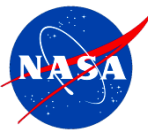


Back up/Details slides

Project Life Cycle – Pause and Learn Regularly

NASA Life-Cycle Phases	<i>Pre-Systems Acquisition</i>		FORMULATION Approval for Implementation			IMPLEMENTATION <i>Systems Acquisition</i>		<i>Operations</i>	<i>Decommissioning</i>
	<i>Pre-Systems Acquisition</i>	<i>Systems Acquisition</i>	<i>Systems Acquisition</i>	<i>Systems Acquisition</i>	<i>Systems Acquisition</i>	<i>Operations</i>	<i>Operations</i>	<i>Decommissioning</i>	<i>Decommissioning</i>
Project Life-Cycle Phases	Pre-Phase A: Concept Studies	Phase A: Concept and Technology Development	Phase B: Preliminary Design and Technology Completion	Phase C: Final Design and Fabrication	Phase D: System Assembly, Integration and Test, Launch	Phase E: Operations and Sustainments	Phase F: Closeout		

Plans for Pause and Learn sessions should be included in the project’s Lessons Learned Plan, which is part of the Project Implementation Plan.



Plan

When?

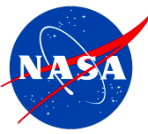
- Capturing lessons throughout the project life cycle
- Critical milestones
- Not just when there is a problem?

Who?

- Whoever, within the team, can add value to the conversation or learn from it. “All of us are smarter than any one of us.”
- Be inclusive (but keep it within the team)

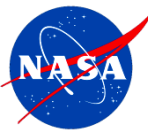
What?

- Scope the topics and time period covered
- Get some background information



Facilitate

- **Ground rules** need to be communicated clearly, and every time; go through the script at the beginning of a PaL every time, clarify expectations
- **Managing conversation dynamics:** Managers in the room play a key role in setting the tone, expectations, etc... and in helping to articulate what the lesson is once enough discussion has taken place
- **Probe** but don't question anyone's judgment or dismiss anyone's input. Also, the PaL session is not the right time to tell the team about lessons learned on other projects.



Document

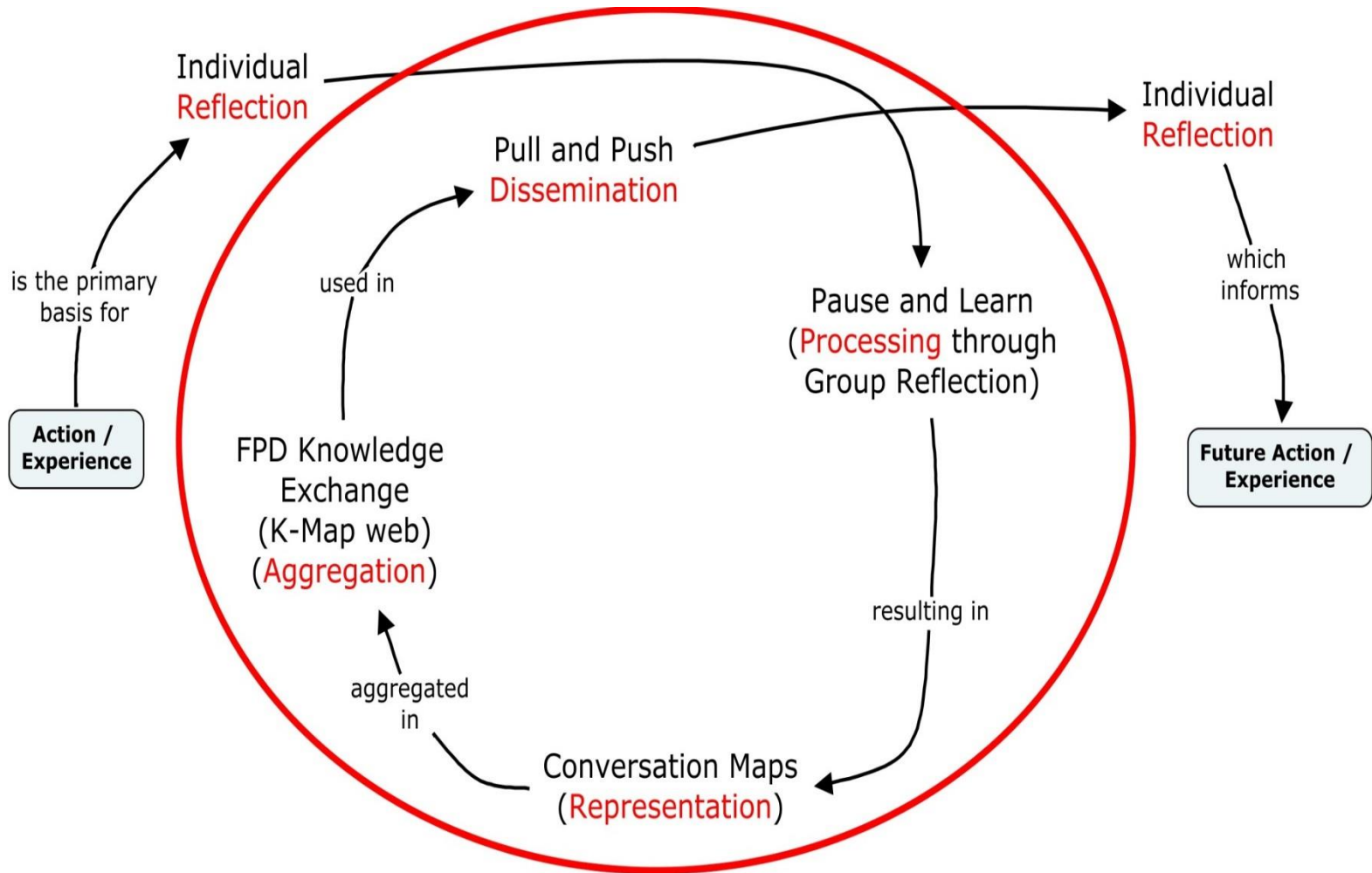
- Knowledge Maps (KMAPs) are a way of visually representing the PaL conversation and highlighting key insights or lessons that emerged from the conversation.
- Many lessons are not “new lessons”, yet they are worth capturing; when the same lessons come up regularly, a “best practice” should be identified and disseminated.
- Non-attribution: This provides an extra layer of comfort to have an open discussion but it’s typically easy to figure out who the key actors were in any particular project.



Validate

- **Project Review:** Review draft maps with the Project Manager and/or Principal Investigator (sometimes more people are involved in the review but review meetings can turn into a second PaL – AVOID)
- **Management review:** The maps are meant to represent the project's perspective. If management disagrees with any of it, a note can be added, but the map is not changed.

Disseminate



Exploring *the* Future

Only knowledge
will take us there.

