



Pathways to the Future

ANDY HINES

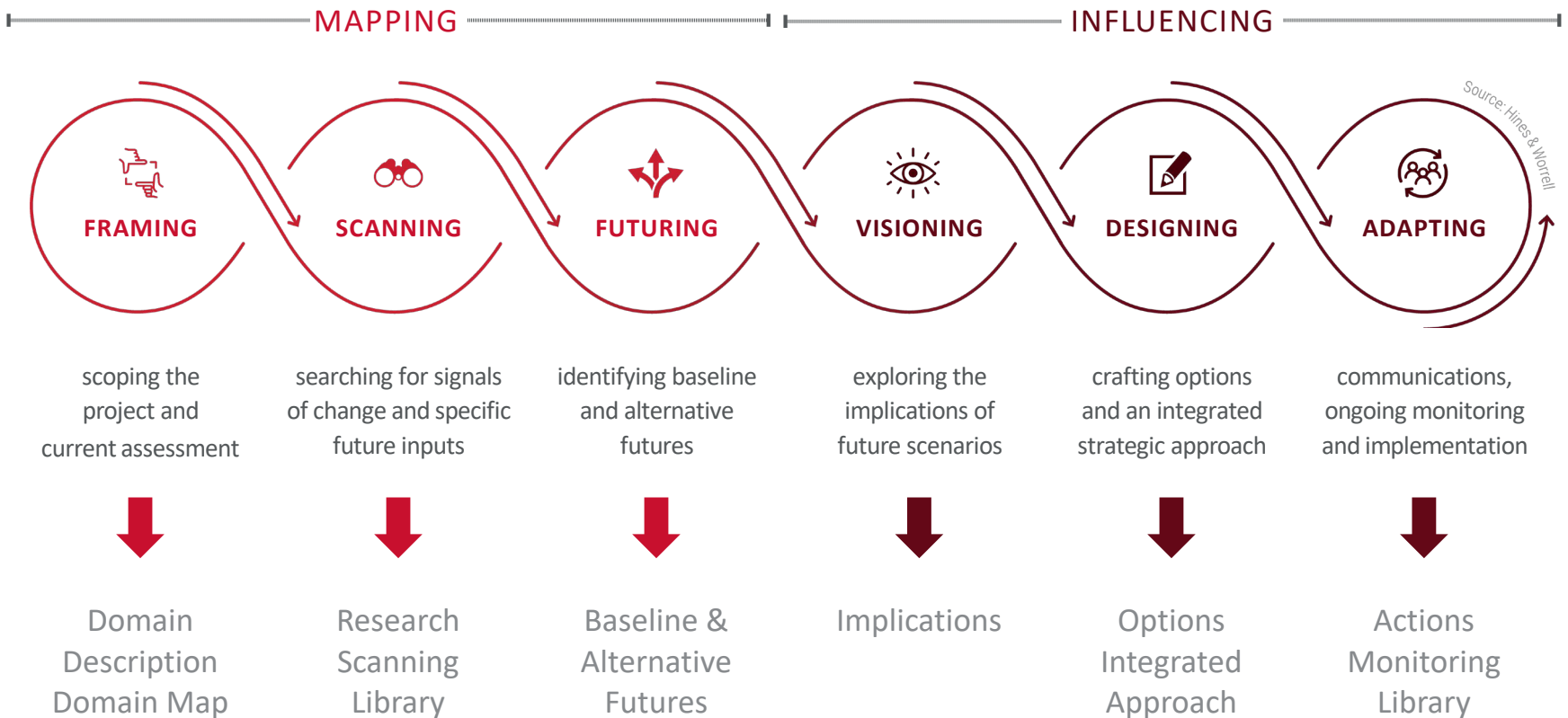
ASCENDXTEXAS 2023

MARCH 29, 2023

HOUSTON **FORESIGHT**

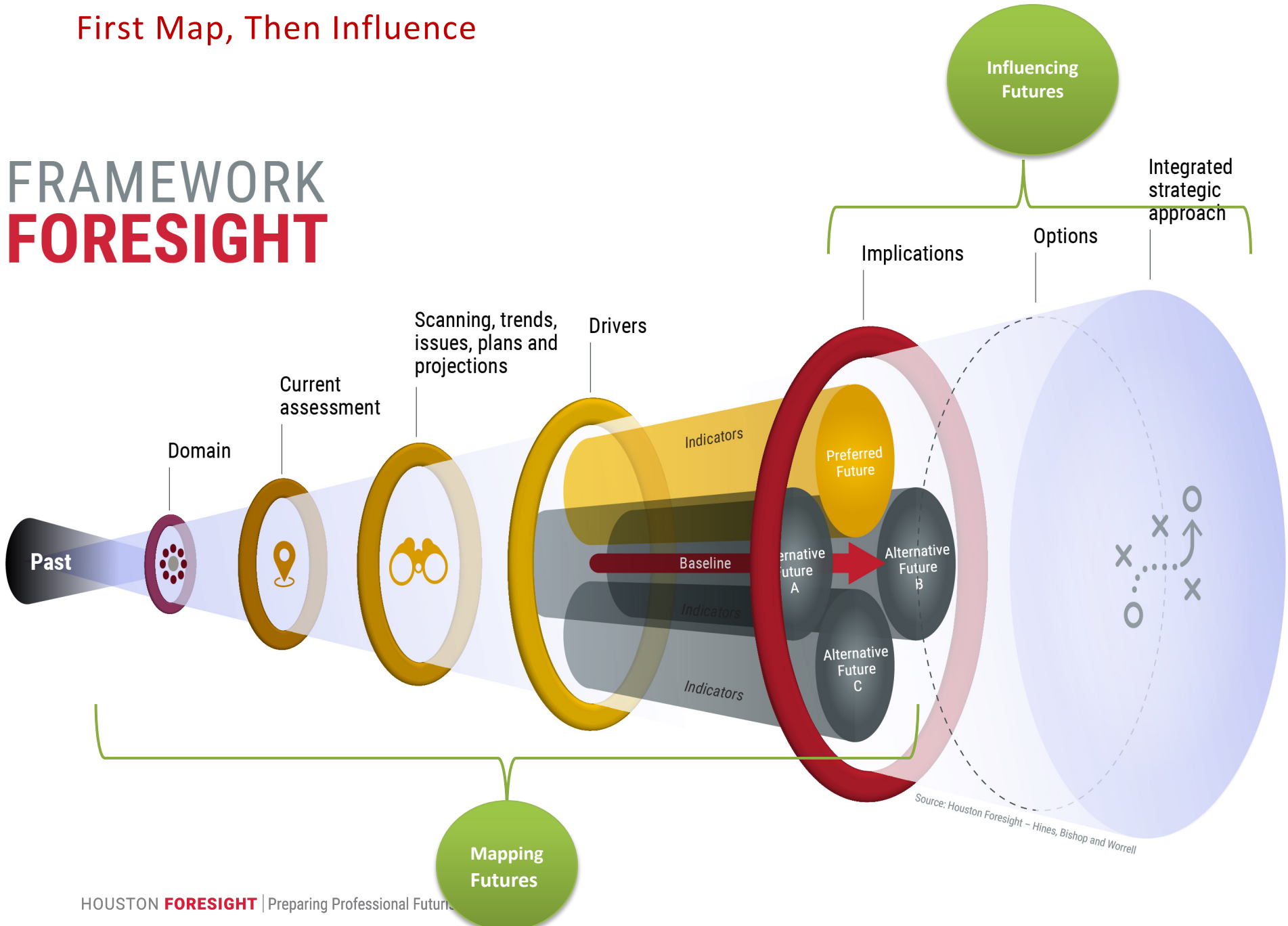
Preparing Professional Futurists

Tip #1 Explore the Future Systematically...



First Map, Then Influence

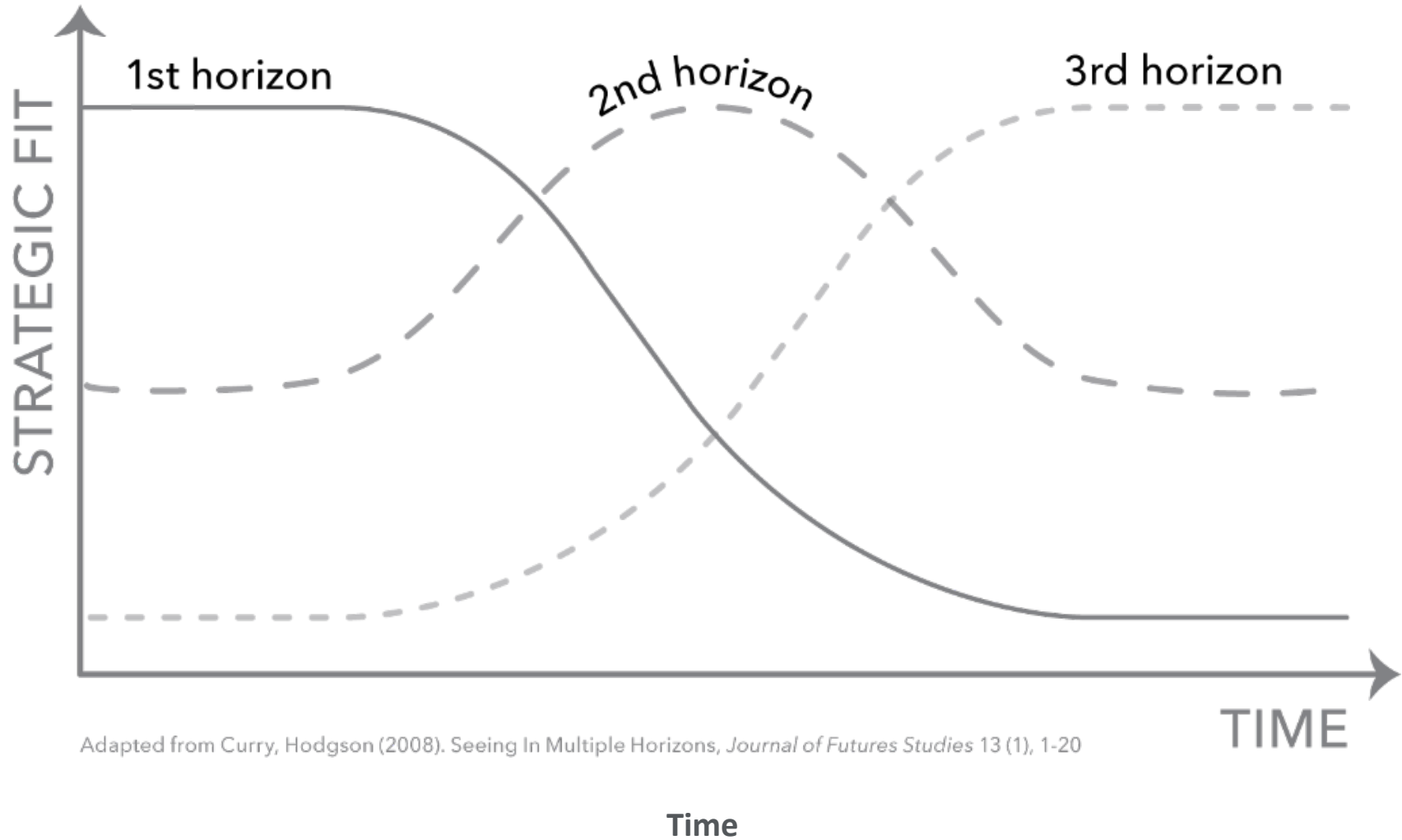
FRAMEWORK FORESIGHT



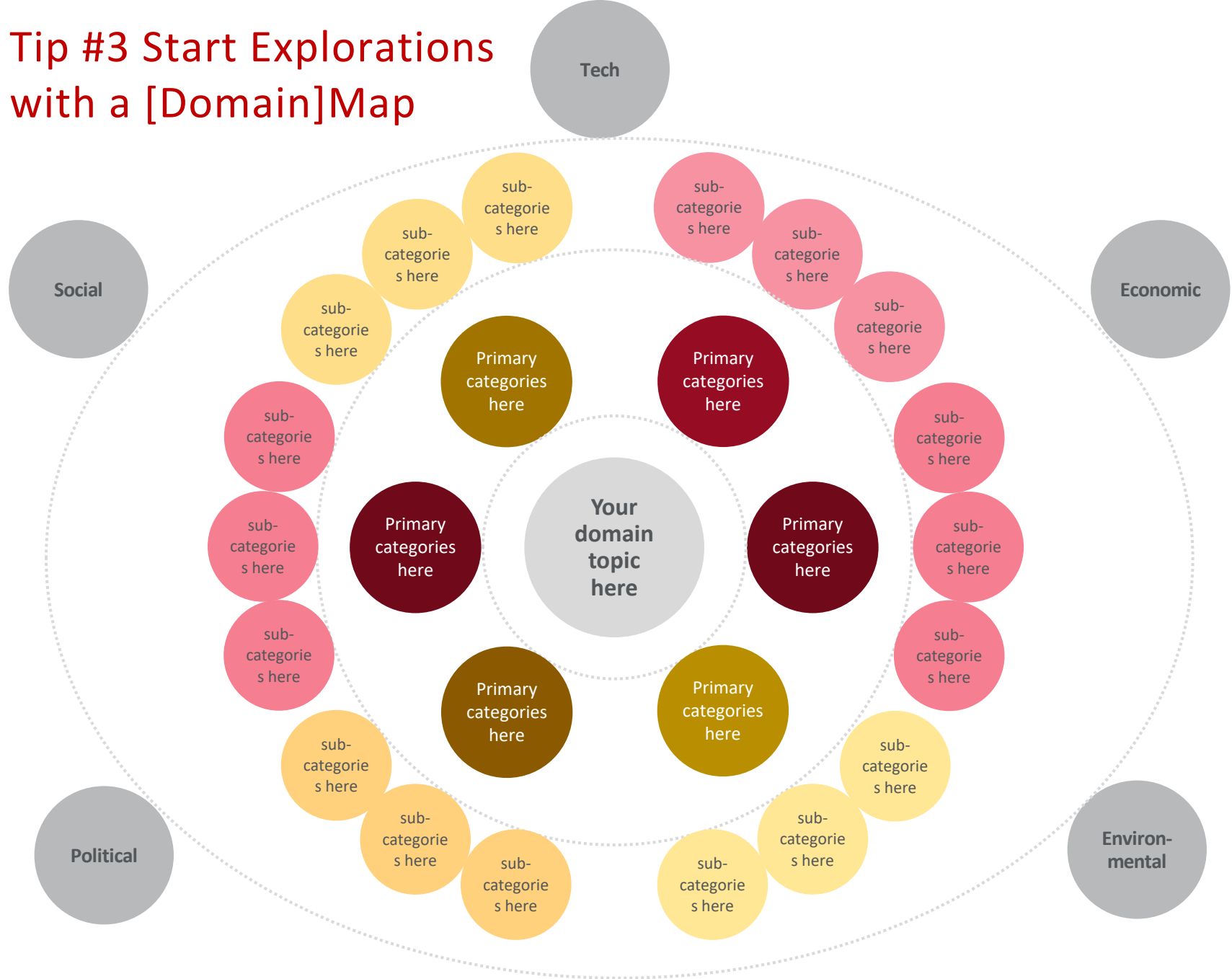
Framing



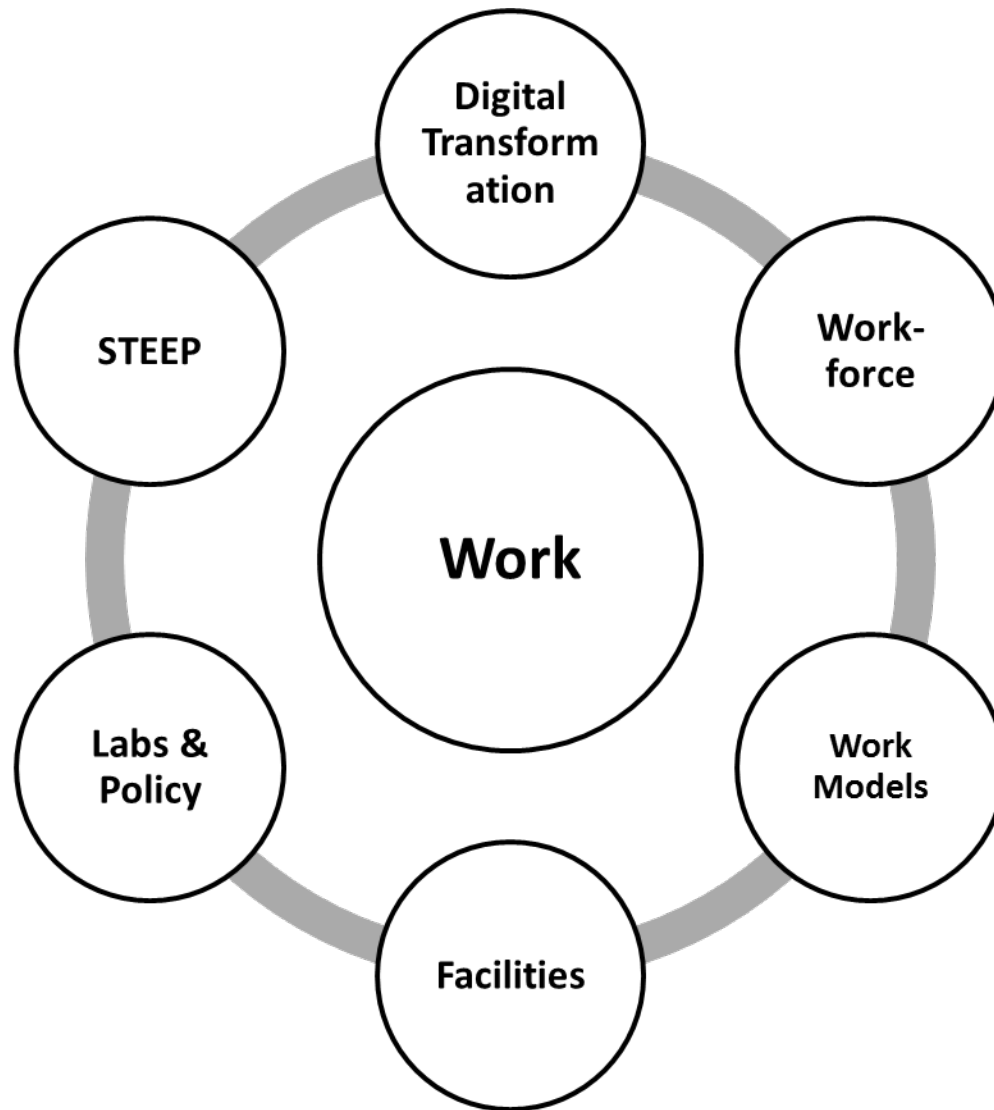
Tip #2 Think in Three Horizons



Tip #3 Start Explorations with a [Domain]Map

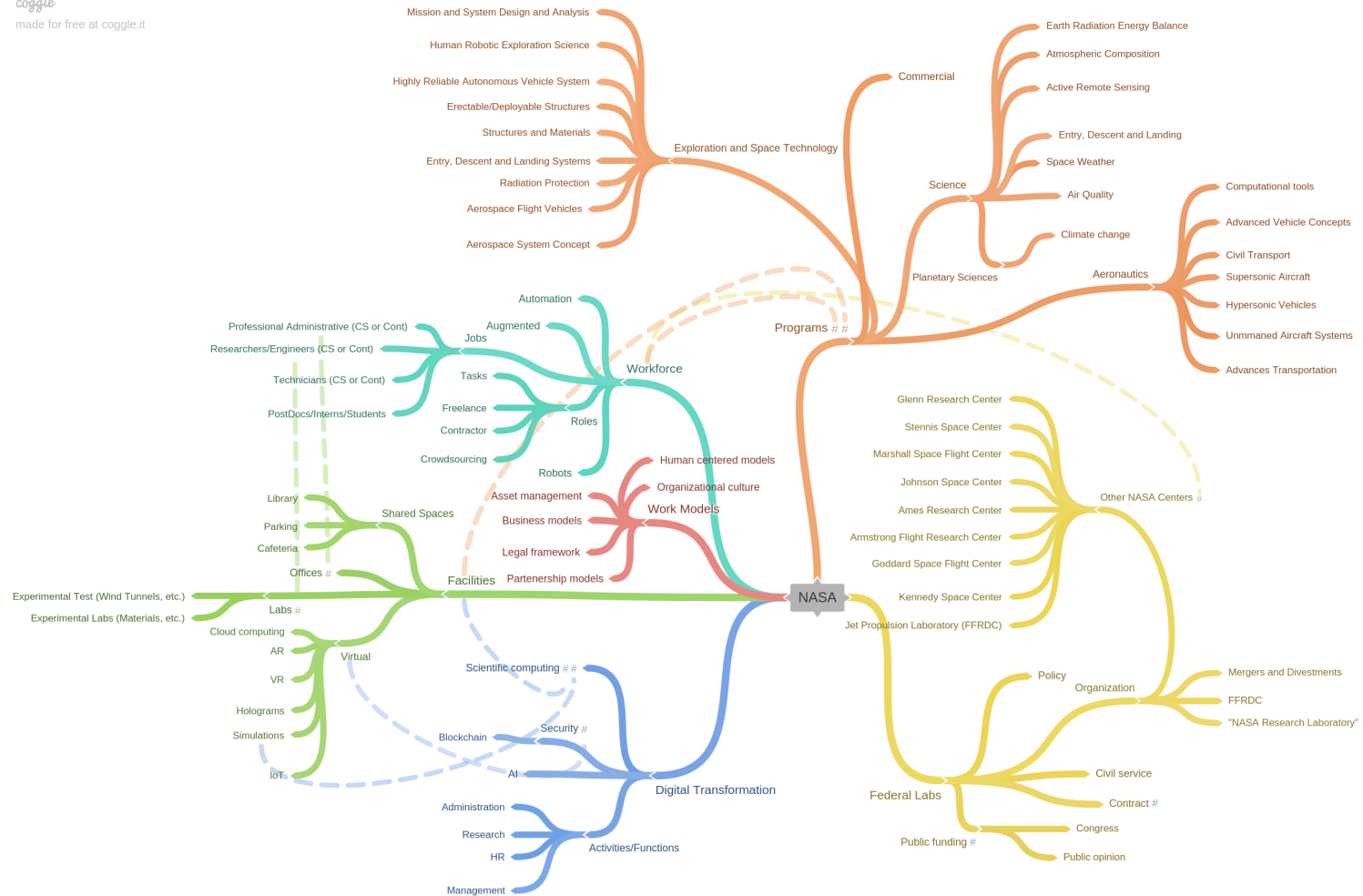


Domain Map: NASA Langley “Future of Work”



Tool: Coggle for Domain Maps

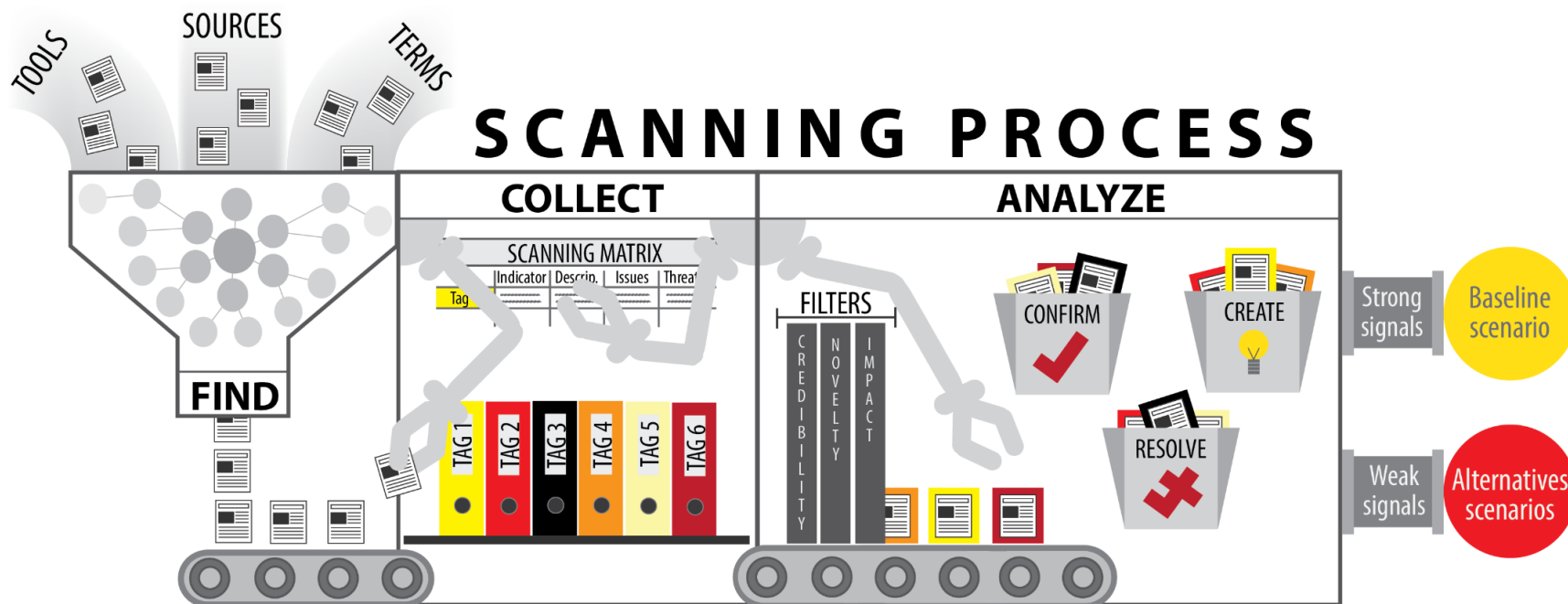
coggle
made for free at coggle.it



Scanning



Tip 4. Scan for Signals of Change



Source: Houston Foresight - Andy Hines and Maria Romero

.... And collect them



🏠 / My Groups / NASA Langley



NASA Langley

Team scanning library for NASA Langley work project

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scientific computing	17
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NASA LARC Scanning Examples



[Crowdsourcing a Meeting of Minds: Designing the Future of Work - The Governance Lab](#)

@ NYU - 1 views

thegovlab.org/designing-the-future-of-work-2

H2 workforce work models crowdsourcing flash teams Upwork



[We're all used to an 8-hour work day. But is it effective? | World Economic Forum](#)

www.weforum.org/...our-day-isnt-working-heres-why

H2 workforce WEF Digital Transformation



['We are in a Pre-9/11 Cyber Moment' Says NIAC - FEDmanager - News for feds](#)

www.fedmanager.com/...re-9-11-cyber-moment-says-niac

H1 Digital transformation security cybersecurity Federal Labs

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www.sciencenews.org/...m-computers-are-about-get-real

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[Elon Musk: Humans must merge with machines or become irrelevant in AI age](#)

www.cnn.com/...icial-intelligence-robots.html

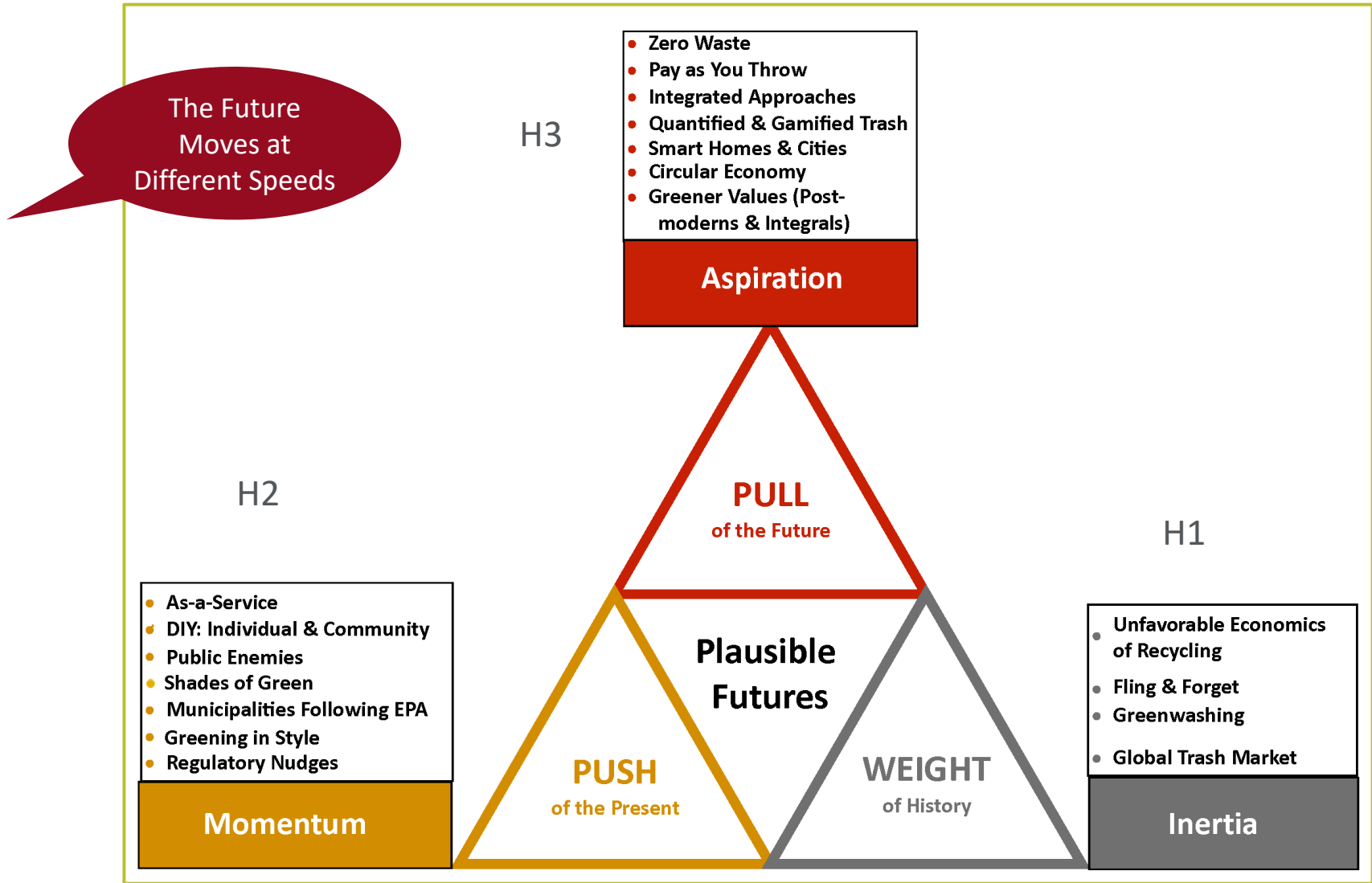
H2 workforce augmented AI

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Futuring



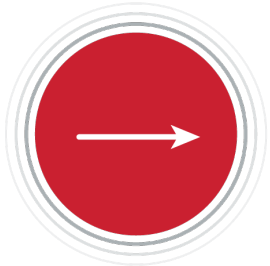
Tip #5 Identify Key Drivers of Change: The Futures Triangle



Tip #6 Understand the Future with Stories

H1

Current way of doing things within the domain



BASELINE > Same Rules

The system moves forward along its current trajectory. This is the “official future” and usually considered most likely.

H2

Zone of transition



NEW EQUILIBRIUM > Changing Rules

The system reaches a balance among competing forces that is significantly different from the current balance.



COLLAPSE > No Rules

The system falls apart under the weight of “negative” forces.

H3

Vision of New system



TRANSFORMATION > New Rules

The system is discarded in favor of a new one with a new set of rules..

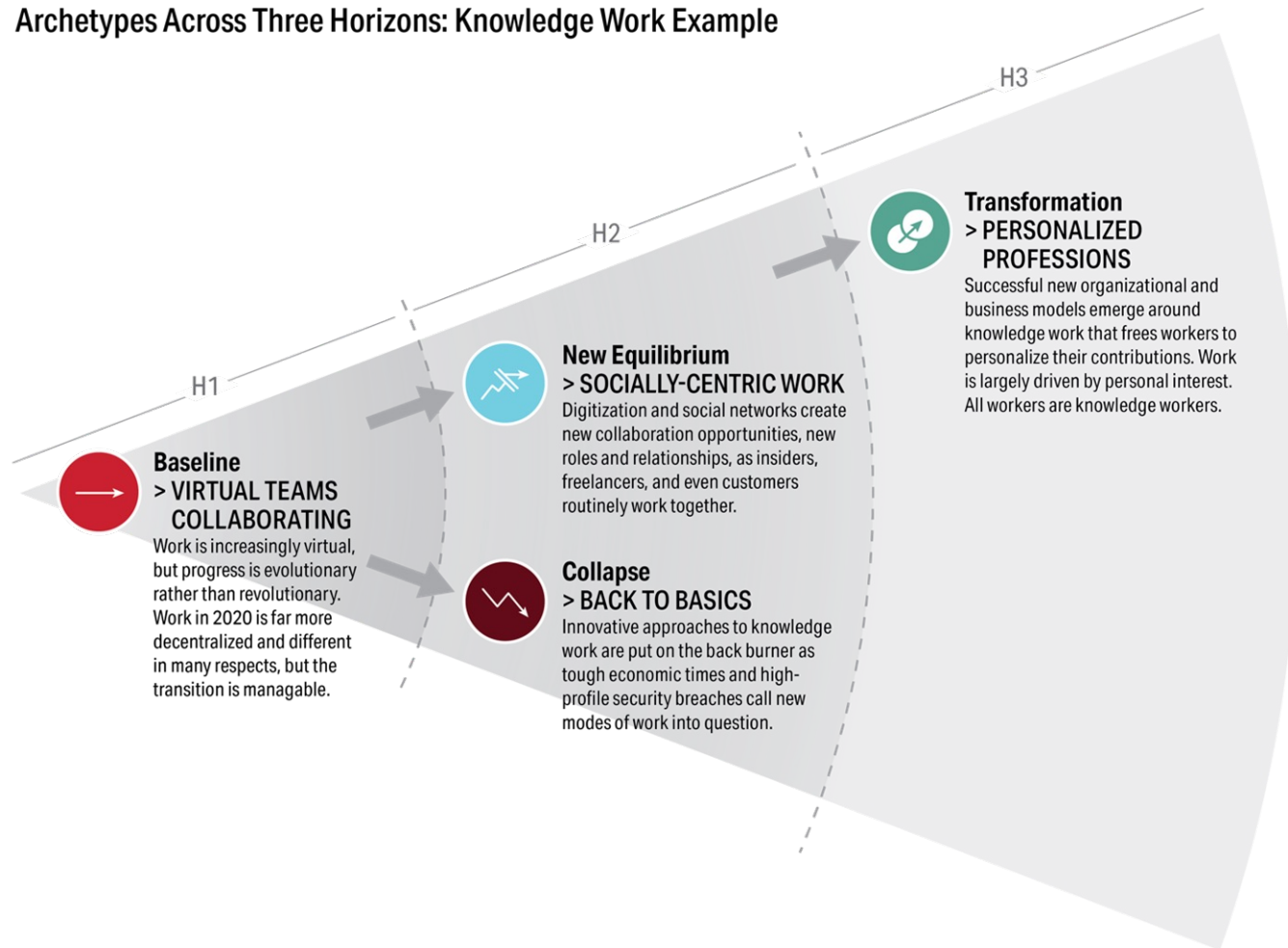


TRANSFORMATION > New Rules

The system is discarded in favor of a new one with a new set of rules..

Historic Example: Knowledge Work

Archetypes Across Three Horizons: Knowledge Work Example



Future of Work

New Frontier (Transformation)



A gradual, intentional approach to guide a symbiotic relationship between people and their tech partners

Breaking Orbit (New Equilibrium)



Learning to Be Back in Charge

Good to Go (Continuation)

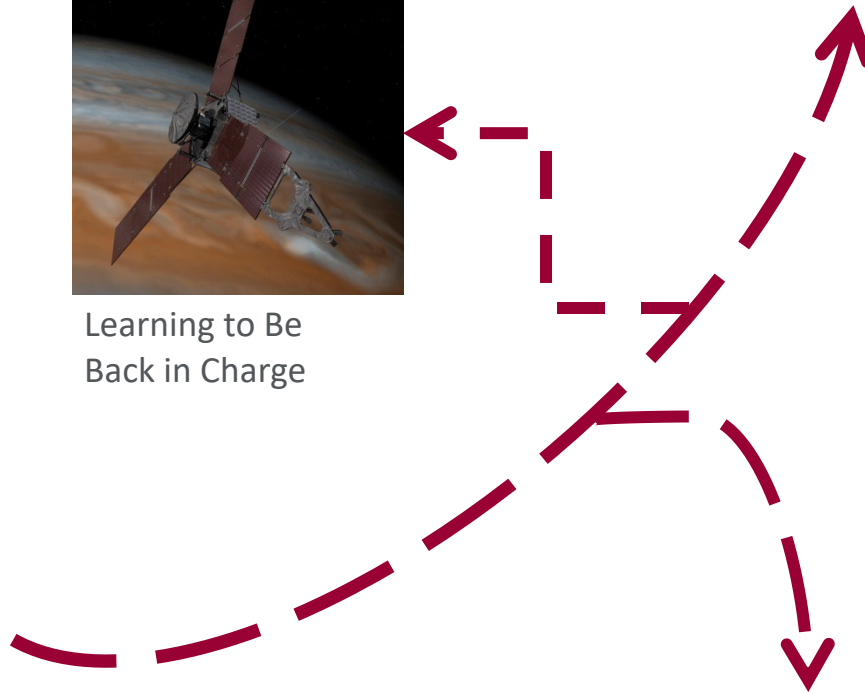


Privatization, automation, and virtualization to drive commercial success

Failure to Launch (Collapse)



Work for people available, but pay is scarce



Visioning: Implications Analysis



Tip #7 Identify Downstream Implications

Key change from Scenario	One 1 st order impact	2 nd Order Impacts (for each 1 st order impact)	3 rd Order Impacts (for each 2 nd order impact)
Robot and automation proliferate	Fully autonomous AI technologies capable of symbiotic partnership with humans	2A. Line between humans and their embedded tech blurs	3A1. LaRC freely funds advanced augmentation upgrades for employees to improve their work and to encourage their retention.
			3A2. Non-augmented can't keep up
		2B. Superior AI simply replaces humans	3b. Sabotage AI to provide its use

Designing



Tip #8: Identify Issues

Scenario	Issues/Opportunities
<p><i>Good to Go (Continuation)</i></p>	<ol style="list-style-type: none"> 1. How can we increase security without slowing down work? 2. What is the view around acceptance and importance of private dollars? 3. How we deal with concept of role of basic research in Federal Labs? 4. How we deal with loss of control in “open” context in which we both bid and gather? 5. View around one lab and multiple locations 6. <i>How do we get ahead of augmentation and role of employer?</i> 7. To what extent do we move to “project based” employment (instead of lifetime)? 8. Should we build “mega-facilities” or move to just-in-time/modular facilities? 9. How do we deal with individual concerns about their personal physical space? (hoteling)
<p><i>Failure to Launch Collapse</i></p>	<ol style="list-style-type: none"> 10. Managing by FTE 11. Proactively decide what missions belong where in cooperation with other agencies 12. How do we get ahead of the need to move facilities? 13. How and when to design for integration?... with digital transformation/augmentation 14. How early and how much to invest in digital transformation? 15. How do we adapt decision-making in a more open idea gathering contact? (“right” of AI) 16. How to maintain “smart buyer” capability in relevance to AI?
<p><i>Breaking Orbit NE</i></p>	<ol style="list-style-type: none"> 17. Explainable AI 18. How much do we trust digital and augmented technologies (balance between human and digital) 19. What do we need to train and build/re-train skills?
<p><i>New Frontier Transform-ation</i></p>	<ol style="list-style-type: none"> 20. How to manage self-tasking teams and individuals 21. Develop standards and checks for autonomous AI (transparency) 22. Organize around guiding principles rather than standards (in a dynamic context)

... and Develop Options

Getting Ahead of Augmentation

Category	Description	
What is the issue?	Issue: 12. How do we get ahead of augmentation and role of employer?	Response: Getting Ahead of Augmentation
Why is it important?	People will start augmenting, both as individuals and competitive nations What policies do we have for a workforce that is “mixed”? What about competitive threat and unintended consequences	
What should we do (actions)?	Maintain a diverse mix of augmented and non-augmented (eg. Phd, Masters, etc...) Develop different performance standards Different mix of work roles New criteria to be an astronaut	
How to make it happen (resources)?	Build upon the HRP program to explore and expand use of augmentation Expand scope of biomedical engineers on campus and benchmark	

Tip #9 Build the Pathway

Getting Ahead of Augmentation

Phase 1	Phase 2	Phase 3
<ul style="list-style-type: none">• Identify and monitor external examples of augmentation	<ul style="list-style-type: none">• Conduct internal augmentation pilots• Create process for security validation of personal electronic devices such as smartwatches, fitness trackers, body cameras, and the like for use at work• Work with AI Assistant vendors like Amazon or Google on secure in-house chatbot assistant devices and “behind the firewall” LaRC-specific support services for those devices• Develop customized in-house AI Assistant features which connect to LaRC team knowledgebases, data visualization software, test instrumentation, and other tools which would benefit from hands-free use	<ul style="list-style-type: none">• Institute a policy for NASA sponsored human augmentations, including a “human over-ride” capability to deal with potential for runaway AI

Adapting



Tip #10 Track Movement Over Time

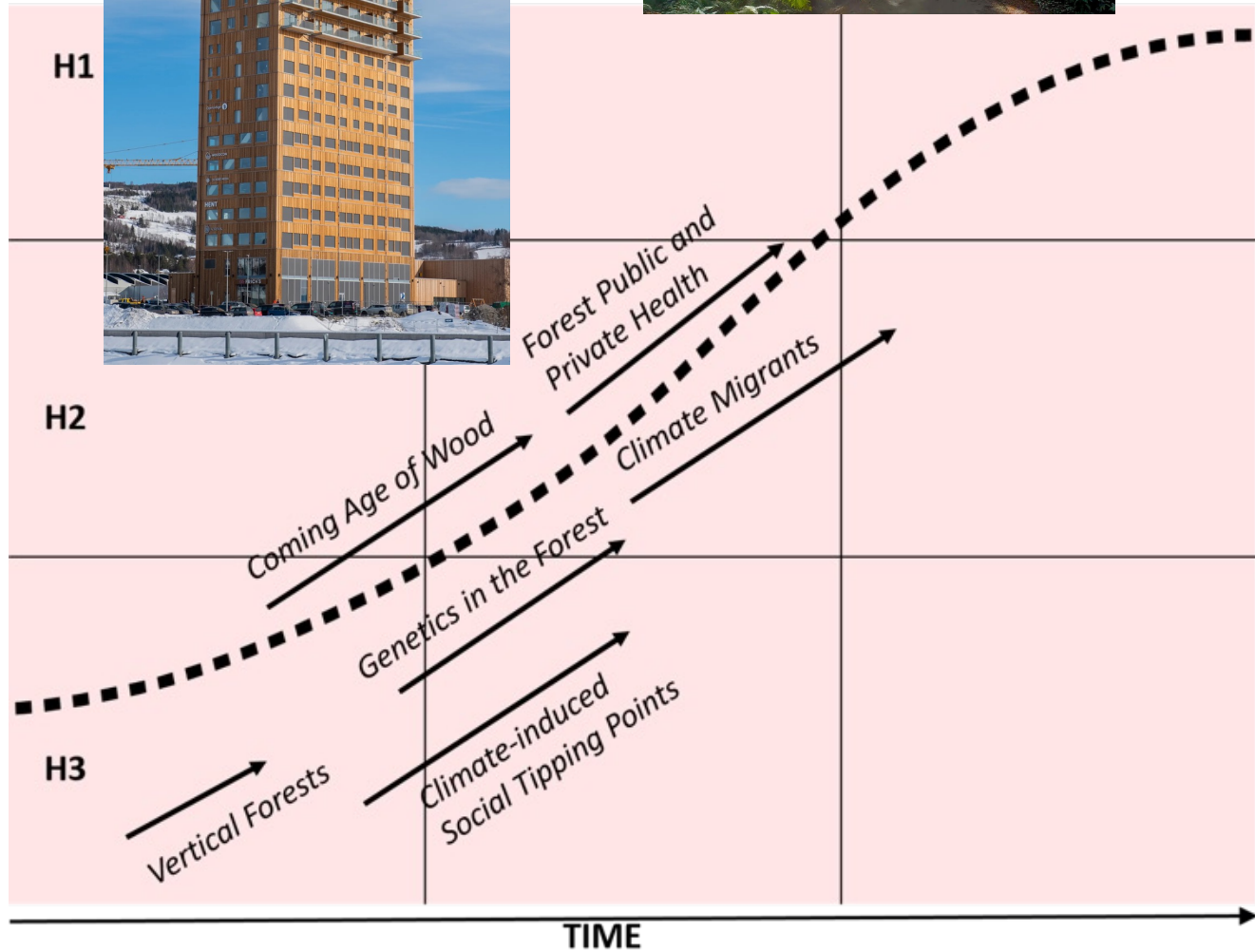
Coming Age of Wood
(Wood skyscrapers)



Vertical forests



Forest Public and Private Health
(Forest Bathing)



The Tips

- 1: Explore the Future Systematically
- 2: Think in 3 Horizons
- 3: Start Explorations with a [Domain] Map
4. Scan for Signal of Change
- 5: Identify Key Drivers of Change
- 6: Understand the Future with Stories
- 7: Identify Downstream Implications
- 8: Prioritize and Share Options via Elevator Speeches
- 9: Track movement over time



If you do your foresight homework,
you will not be surprised!