

Interpreting Information Through Different Lenses: Decision Making (with Deep Uncertainty) at the National Level

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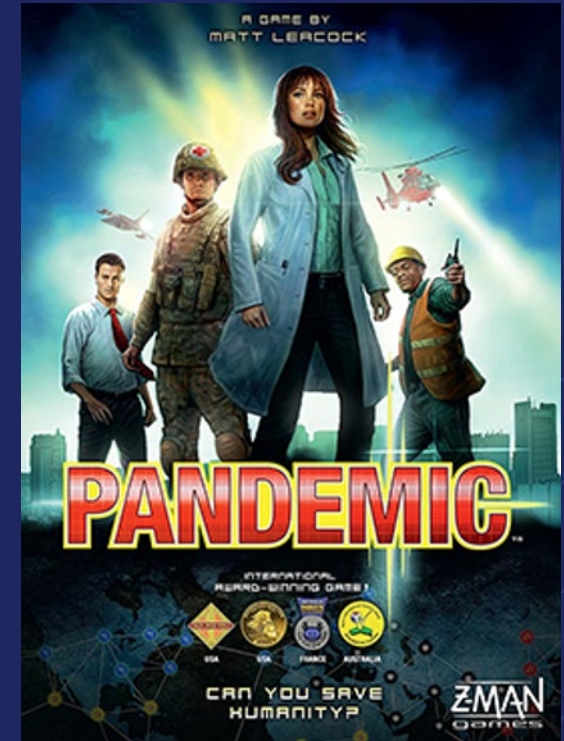
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A Framework for Decision Support

Figure 1.2 — Marchau, Walker, Bloemen & Popper (eds.), *Decision Making under Deep Uncertainty* (2019)

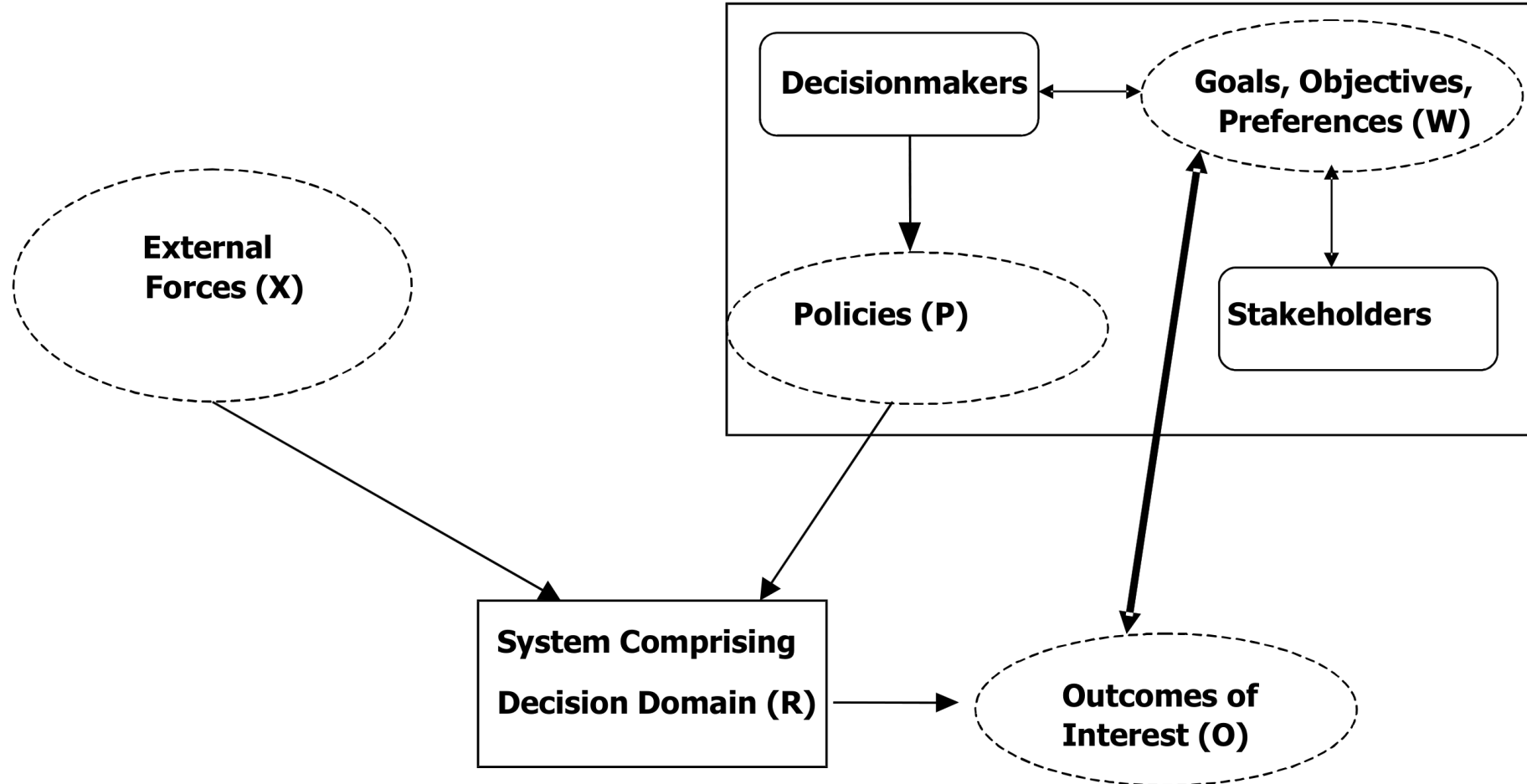
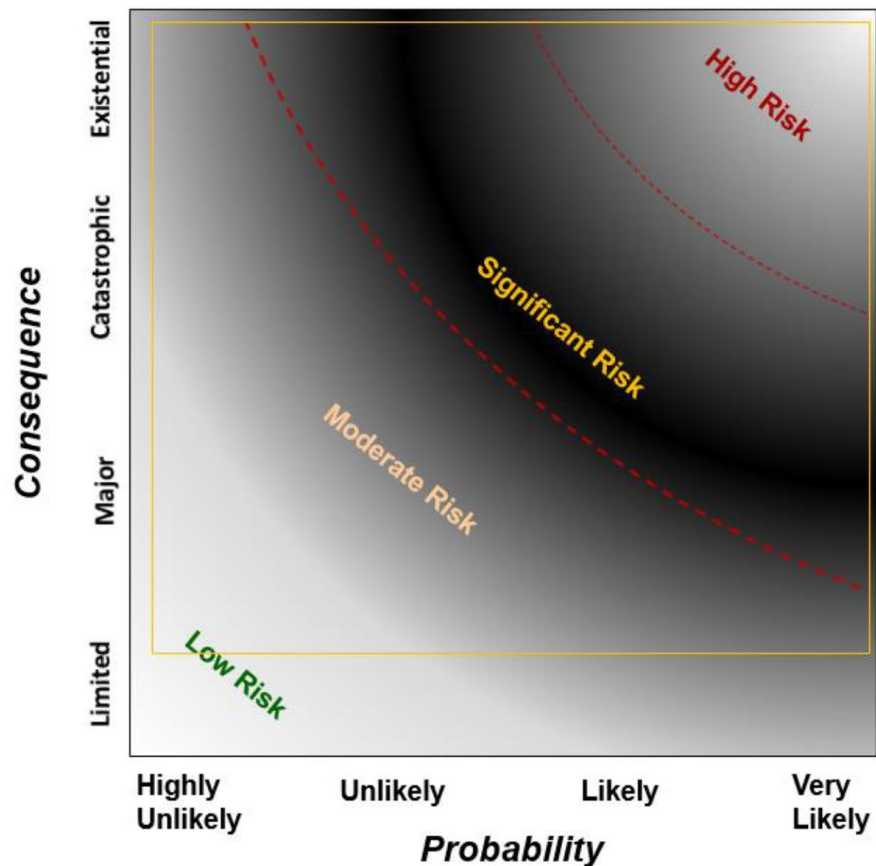


Fig. 1.2 A framework for decision support

Source: Marchau, V.A.W.J., Walker, W.E., Bloemen, P.J.T.M., Popper, S.W. (eds.) (2019). *Decision Making under Deep Uncertainty: From Theory to Practice*. Springer. ISBN 978-3-030-05252-2, p. 5.

Chairman of the Joint Chiefs of Staff Manual 3105.01: Joint Risk Analysis



Strategic Risk on an ISO curve reflects a risk level based upon both the range of consequences and the probabilities of risk events. Disparate events could have “equal” risk levels, with one weighted more on probability and one on consequence.

HIGH: A likely existential hazard to strategic interest.

SIGNIFICANT: A somewhat likely catastrophic hazard to strategic interest.

MODERATE: A somewhat unlikely medium hazard to strategic interest.

LOW: A strategic risk event with a combination of low likelihood and limited consequence.

Figure 9. Strategic Risk Contour

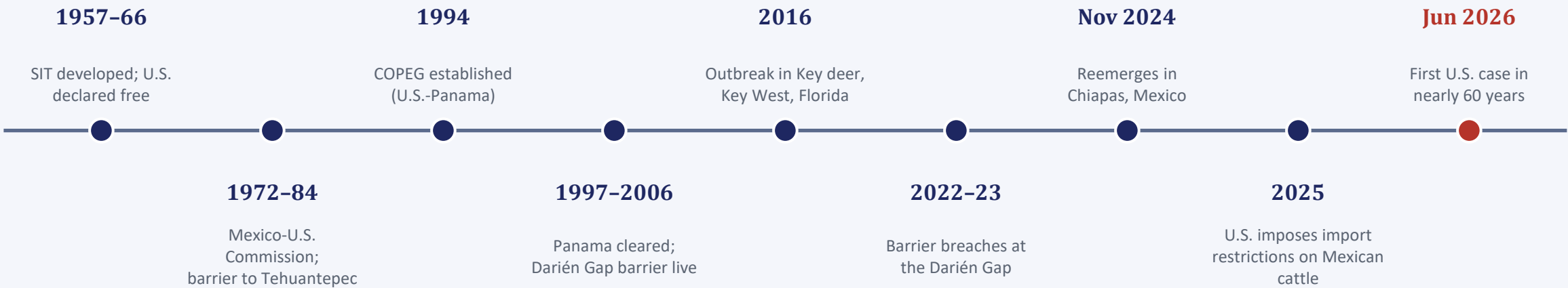
- Challenges to Successful Risk Analysis
- Complexity – unclear cause and effect relationships
 - Uncertainty – Incomplete knowledge forcing use of assumptions
 - Ambiguity – multiple legitimate interpretations of the same information
 - Time Horizon - period of risk mitigation
 - Lack of shared terminology
 - Lack of consensus on “Risk to What?”

Risk Level is a function of assessed Probability (P) and Consequences (C) of an action or decision $[F(P,C)]$

Probability of Event (P)	Consequence of Event (C)	Strength of National Interest (SOI)
Highly Unlikely (~0-20%)	Limited: Confined, Short-term damage to Interests	4: Premier: Impacts U.S. Homeland, Vital Interests
Unlikely (~21-50%)	Major: Considerable, mid-term damage to Interests	3: Strong: Impacts Key Global Systems, Allies
Likely (~51-80%)	Catastrophic: High order, long-term damage to Interests	2: Moderate: Impacts Key Partners, Regional Interests
Very Likely (~81-100%)	Existential: Permanent destruction relative to Interests	1: Low: Impacts “Others”, Local Interests

Figure 10. Strategic Risk Tables

New World Screwworm - The 60-Year Arc: Push the Barrier South, Hold It...Lose It



Decisions to push the pathogen into South America and to sustain legacy solutions in the face of evolving geopolitical realities helped create current risk to US influence in this hemisphere, risk to US agricultural industry and risk to consumers; impact of new mitigation measures 12-18 months away.

Lenses – 60 Years Of Efforts To Mitigate “Flesh-eating Infections”

DIPLOMATIC

- Chain of bilateral/multilateral treaties: 1972 Mexico-U.S. Commission → country-by-country agreements (1987–97) → 1994 COPEG (90% U.S.-funded).
- US import restrictions on Mexican cattle vs Mexico's import halt and Canada's Texas cattle ban — cooperative science relationship vs. adversarial trade dynamic, simultaneously....
- Eradication in US and Central America shifts problem to South America and Caribbean – and allows pathogen to continue to evolve and return in the future

Political

- Recurrence in US due to:
 - COVID supply chain disruptions
 - Increased sale of infected cattle due to low supply in US
 - Human migration
 - Drug trade
- Election year; mid-term TX Senate race
- Ranchers have been staunch supporters of Republican agenda and are hurting economically due to increased gas and fertilizer costs, decreased demand for beef due to higher beef prices
- Detection relies on human observation and reporting of infected animals
- Lack of shared lexicon between human and animal health experts

MILITARY/NATIONAL SECURITY

- Military Logistics/airlift analog: aerial dispersal across remote terrain (Tehuantepec, Darién) sustained for decades.
- Desire to limit Chinese influence in this hemisphere balanced against other competing priorities

ECONOMIC

- Eradication in US generated ~\$1.3B/yr regional benefit; COPEG saves ~\$2.3B/yr for U.S. cattle industry; \$41B TX cattle industry...beef and dairy
- Will take years and billions of dollars to push back
- Current outbreak layering direct losses onto trade-driven disruption (Mexico/Canada restrictions) atop record-tight cattle supply.
- Assumption that this will not create significant risk to human health now or in the future
- Opportunity to leverage synthetic biology to develop new risk mitigation measures – potential new markets with attendant political risk

Operation Warp Speed: Eleven Months from COVID Sequence to Shots in Arms



Wrong lessons learned: 1. Misinformation about safety and efficacy; 2. Safe to reduce investments in infectious disease research because, when needed, can fund pharma companies to rapidly produce countermeasures on demand.

Lenses – COVID and Operation Warp Speed

DIPLOMATIC

- First Trump administration withdrew funding from WHO/COVAX in 2020 while locking up options on 800M–1.6B U.S. doses — drawing “vaccine nationalism” criticism; 670K more lives lost globally due to initial distribution priorities
- Biden administration in Feb 2021 with a \$4B COVAX pledge (with confidence US demand would be met); U.S. became COVAX's largest donor
- US countermeasures arguably superior to those developed in Russia and China; extensive mis- and dis-information efforts
- Supply chain vulnerabilities exploited in spite of trade agreements

Political

- Presidential election year
 - Thousand dying daily
 - School and business closures
 - Accepted risk of investing \$10Bn without knowing if any of the vaccine candidates would be safe and effective
- Early mis-steps with detection; insufficient healthcare capacity
- The Star-Trek-derived name became a liability — experts warned it implied corners were cut, fueling hesitancy; “we are not cutting corners;” enduring wedge issue (as was the case after 1918 pandemic)
- GAO separately faulted FDA for insufficient EUA transparency to the public.

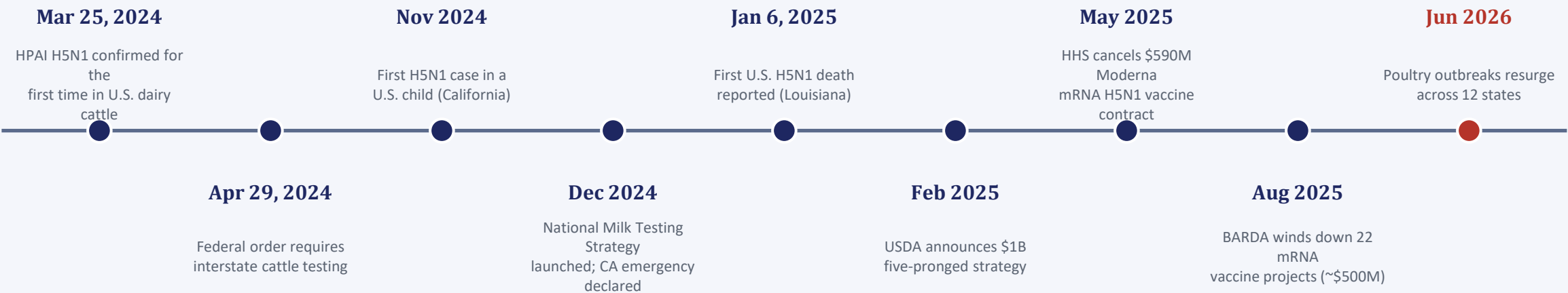
MILITARY/NATIONAL SECURITY

- Initial concerns about ability to defend the US and to deter potential adversaries; USS Theodore Roosevelt and impact on training
- DARPA funded some of the original mRNA platform research; NIH funded research into SARS virus...OWS could not have occurred without this long-term R&D investment
- HHS- DOD collaboration of necessity
 - Gen. Gus Perna (Army Materiel Command) applied the military decision-making process to a civilian public health crisis.
 - DoD paired military contracting authorities and security and logistical capabilities with BARDA's funding authority + Defense Production Act prioritization of manufacturing inputs.

ECONOMIC

- A novel advance-market-commitment model: government paid for at-risk manufacturing before efficacy was proven, running “prove” and “build” in parallel instead of sequentially. ~\$12.4–\$18B invested against a U.S. 2021 GDP gain estimated at \$438B.
- US \$18B investment resulted in US\$5.2T economic impact as trade restored
- Accusations of fraud

US “Avian Influenza:” From Dairy Herds to a Recurring Fall Cycle



Biological threats continue to naturally evolve over decades or centuries, but are often viewed as acute events; avian flu outbreak began in 1990s with virus's reservoir in wild migratory birds – and now in >40 other species; short-term crisis response versus long-term investments in global eradication or risk reduction.

Lenses for an Enduring, Multi-species Biological Threat

DIPLOMATIC

- 80+ countries have imposed regionalized restrictions on U.S. poultry imports — roughly double the count from the 2014–15 outbreak. Ironically, the fear of losing “vaccination-free” export status is a major reason USDA has not deployed a licensed poultry vaccine it has already funded.
- Difficult to reconcile US positions on NWSW and H5N1

POLITICAL

- Electoral politics
- USDA – protect US cattle and poultry industries without losing “vaccine-free” export status....need for multiple programs to support farmers
- HHS Secretary Kennedy's suggestion of letting the virus “run through the flock” to find naturally immune birds drew sharp criticism from public health experts.
- 96% reduction in outbreaks in France using poultry vaccines; US has vaccines but choosing not to employ at this time

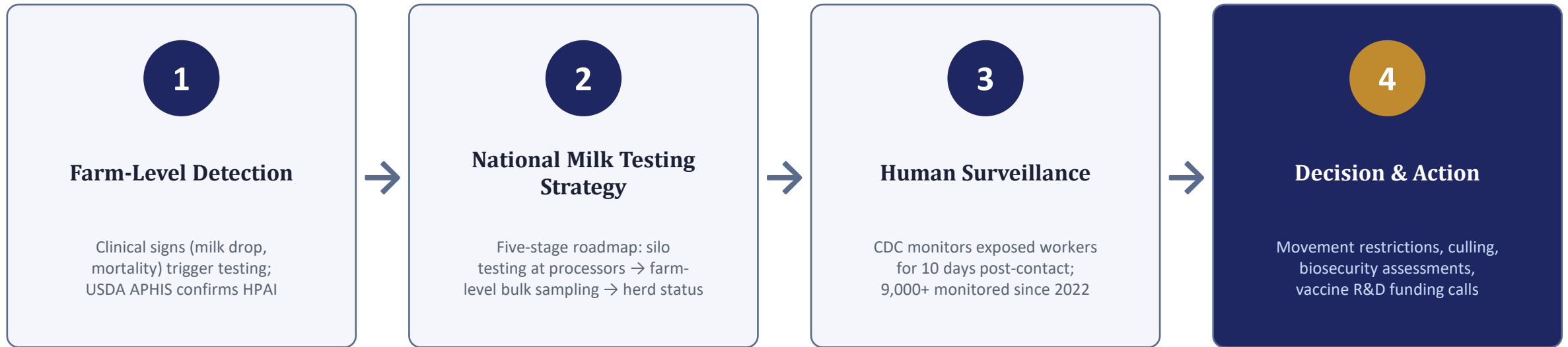
MILITARY/NATIONAL SECURITY

- BARDA's nucleic-acid vaccine partnership with DoD's Joint Program Executive Office, now being restructured amid the 2025 mRNA wind-down.
- NIH director dropped biodefense and pandemic preparedness as one of NIAID's three core responsibilities - \$1.9B of research supporting national security priorities in flux

ECONOMIC

- \$1.1–\$1.4B+ in indemnity payments plus a new \$1B five-pronged strategy.
- Retail egg prices peaked near \$6.23/dozen (+60%+ YoY) before wholesale prices fell 64% by mid-2025 — only for prices to face renewed pressure from the 2026 poultry resurgence.
- DoJ reached settlement with three egg producers for price-fixing

Data & Situational Awareness: Multi-Species Surveillance



- ◆ Silo testing catches infection before clinical signs appear — Nevada and Arizona D1.1 outbreaks were both identified through milk-silo testing prior to cattle showing symptoms, validating the surveillance model; intense industry opposition to performing and sharing results of this surveillance due to fears about impact on sale.
- ◆ Genomic sequencing tracks reassortment risk across species — distinct genotypes (D1.2 in swine, D1.3 in poultry workers) show the virus is probing multiple mammalian hosts simultaneously, not just cycling in birds, suggesting need for long-term strategy to mitigate risk, especially to humans
- ◆ Poor human surveillance likely led to undercounting— mild or asymptomatic infections in farmworkers without close monitoring access are easy to miss; workers who are not US citizens are very unlikely to agree to surveillance (or treatment).

Recurring Themes

- 1 Need to understand who the decision-makers are and how they are assessing risk; politicians are the ultimate decision-makers regarding most funding and many policies – and are acutely sensitive to electoral dynamics and to donors
- 2 Political decisions to decrease investments in preparedness are rationale in the short term and lower US ability to effectively mitigate risk from future outbreaks; this waxing and waning investment calculus is not compelling to many politicians focused on the next election
- 3 Successfully mitigating risk during complex biological problems often relies on years of experience (playbooks, operational plans, etc.), robust historical and current data, multi-disciplinary inputs and international collaboration
- 4 Understanding and informing the general public's knowledge of personal risk is critically important; perception of trust worthiness and transparency are critically important; anger and fear are much easier to elicit than trust
- 5 Reconciling different perspectives on similar data is easier if there is a shared lexicon between stakeholders (economists, animal/human health experts, educators, employers, etc.)
- 6 Tools like large language models can ingest large quantities of data and will become increasingly useful to better inform decision makers about historical trends and successes as well as predictive analyses of future risk mitigation options

Key Sources

Situational / Government

- ◆ CDC — New World Screwworm Outbreak, HAN Advisory #526
- ◆ USDA-APHIS — [screwworm.gov](https://www.screwworm.gov), Stop Screwworm program
- ◆ Congress.gov CRS — New World Screwworm: Current Issues (IN12558)
- ◆ U.S. GAO — Operation Warp Speed reports (GAO-21-207, GAO-21-319)
- ◆ HHS — “Explaining Operation Warp Speed” fact sheet
- ◆ FDA — EUA guidance for COVID-19 vaccines, Oct 2020
- ◆ CDC — A(H5) Bird Flu Current Situation, Bird Flu in Dairy Cows
- ◆ USDA — Five-Pronged Strategy press releases, APHIS HPAI dashboard
- ◆ FDA — Avian Influenza in Dairy Cattle investigation updates

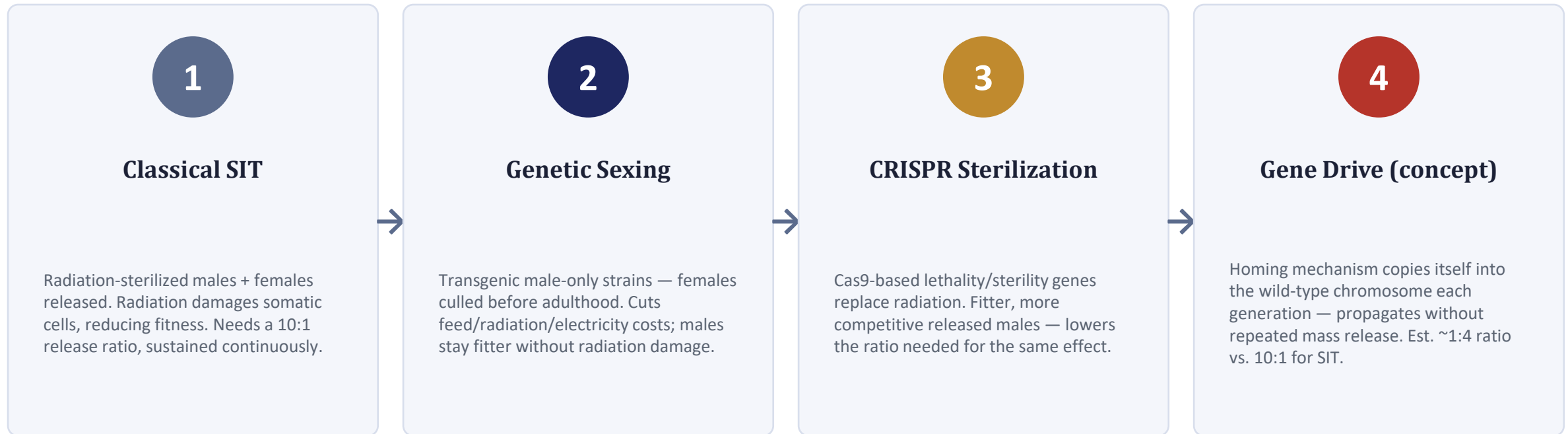
Economic

- ◆ American Farm Bureau Federation — Market Intel briefs
- ◆ USDA Economic Research Service — Texas impact study
- ◆ Federal Reserve Bank of Dallas — Southwest Economy
- ◆ Heartland Forward — U.S. GDP impact analysis
- ◆ PMC / peer-reviewed — Global health & economic value of COVID-19 vaccination
- ◆ medRxiv — Global ROI of COVID-19 vaccines, first year
- ◆ CBS News — USDA indemnity payment analysis
- ◆ Center for American Progress — Egg price policy analysis
- ◆ AVMA — H5N1 dairy cattle situation reports

Science / Genetic Biocontrol

- ◆ FAO / IAEA — Joint Coordination Research Project launch
- ◆ NC State University — M. Scott lab, genetic biocontrol webinar
- ◆ BMC Biology / Communications Biology — SIT 2.0, NWS genomics
- ◆ NBER / CEPR — Impact of global vaccination campaign on mortality
- ◆ Wikipedia / news archives — OWS organizational history, Perna/Slaoui
- ◆ Defense News, Army.mil — DoD logistics role interviews
- ◆ CNN, The Hill, BioPharma Dive, HHS.gov — BARDA mRNA wind-down coverage
- ◆ Nature Medicine — Human H5N1 infections in the U.S., Mar 2024–May 2025
- ◆ USDA/Canada CFIA — International poultry trade restriction records

Synthetic Biology: From Radiation SIT to Gene Drive



Where NWS work actually stands today: steps 1–3 are funded/in development and are self-limiting — the engineered trait dies with the released, sterile individual. Step 4, a true self-propagating gene drive, is conceptual/early-stage for NWS and would represent a materially different technology and risk category.

Data & Situational Awareness Under Compression: 10 years to 11 months



- ◆ Overlapping, not skipped: Phase 1/2/3 trials ran with overlapping timelines rather than the usual strict sequence
- ◆ EUA required at least 2 months of post-final-dose safety follow-up for at least half of trial participants — short relative to full licensure, but not an open-ended waiver.
- ◆ Real-time confidence tracking (Pew, Kaiser Family Foundation polling) informed public communication strategy as hesitancy became a bigger bottleneck than supply.
- ◆ **Manufacturing process for mRNA vaccine doesn't change between diseases — only the encoded sequence does; fundamentally different from traditional platforms, which require rebuilding the biological manufacturing process from the ground up for new pathogens.**

From OWS's mRNA Triumph to a 2025 Policy Reversal...politics versus science



The throughline across three campaigns: the same reusable mRNA “software” model that made Operation Warp Speed's 11-month timeline possible is, five years later, being defunded for the exact kind of pandemic-potential pathogen it was built to answer quickly.