Using strategic foresight to bridge the SRM science-diplomacy divide:

The low-down on a high stakes futures

– **Presentation by Cynthia Scharf and Trish Lavery**

Centre for Future Generations

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Project rationale

Context

Policymakers' <u>knowledge</u> of SRM: minimal

Significant gap between science and diplomacy

Unlikely to see a globally coordinated, **science-led deployment** this decade

SRM decision-making will be shaped by *geopolitics, fragmented public narratives, climate risks and waning multilateralism.*

Overview and Goals: *ARIA-funded project*

Explore governance challenges of Earth cooling approaches
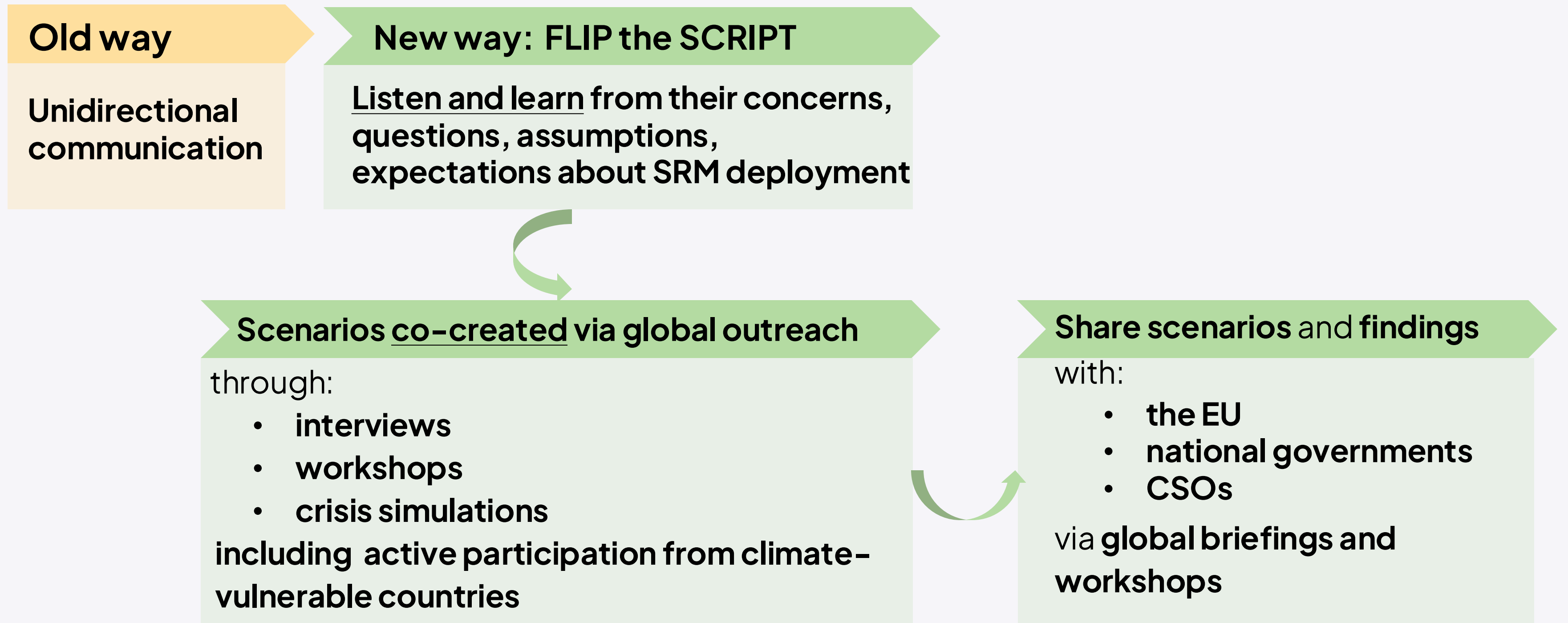
through **Foresight** *and* **Scenario** *tools*

➔ Analyze geopolitical and social dynamics shaping SRM governance

➔ Anticipate, deter, reduce and manage SRM risks through multilateral governance

➔ Identify equitable, effective governance pathways to reduce risks

Partners and roles

University of Leeds | **Workshops on geopolitical influences**

Australian National University | **Creating foresight and scenario tools**

Scenarios **highlight** the **urgency** of governance

OECD | **Using foresight to identify potential governance options**

→**Target audience: global *policymakers* and their *advisors***

Opening up the conversation

Old way

Unidirectional communication

New way: FLIP the SCRIPT

Listen and learn from their concerns, questions, assumptions, expectations about SRM deployment

Scenarios co-created via global outreach

through:
- interviews
- workshops
- crisis simulations

including active participation from climate-vulnerable countries

Share scenarios and findings

with:
- the EU
- national governments
- CSOs

via global briefings and workshops

Strategic foresight methodology

Dual-track methodological approach

Iterative and intuitive co-creation of scenarios.

Scenarios are co-created iteratively with a broad range of policymakers, scientists, civil society and other stakeholders, ranging from those with no SAI knowledge to deep SAI specialists.

Stakeholders are engaged via interviews or workshops that explore how global politics, public opinion, environmental conditions and technological developments could shape the path of SRM governance discussions.

Structured, expert-led scenario creation.

Scenarios are created by a structured and verifiable UNIDIR-adapted, expert-led methodology.

Experts drawn from atmospheric and climate sciences; international relations and geopolitics, multilateral negotiations, security dynamics; emerging technology governance; public engagement; strategic communications, democratic governance; participatory decision-making; regional perspectives and governance traditions; and climate policy and diplomacy.
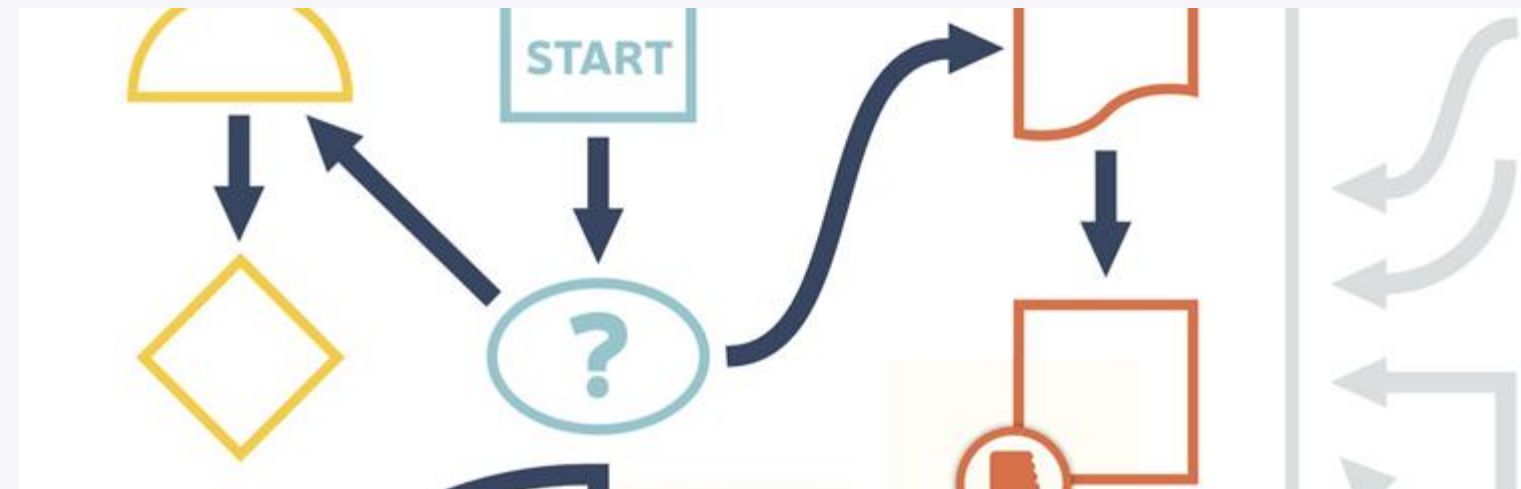
Scenario themes emerging

Community-led SRM

A minilateral coalition emerges to collaboratively design an SRM project to meet the specific requirements of the affected communities and stakeholders who requested the research. The initiative operates as part of an "all-in" climate strategy where no potential solutions are excluded from consideration.

Unilateral deployment

Country-A announces plans for SRM development to counter temperature rises, but without due consideration of geopolitical consequences -> securitisation & polarisation.
or,
Country-B's secret SRM deployment is announced and shocks the world but brings mixed relief.

Private sector investment surges

Private sector actors are a significant source of knowledge, power, capital, and narrative in international relations, a support SRM with increased funding. Supporters view this as a technological breakthrough to address climate change, whilst critics worry about profit-driven decision-making in global environmental management.

Fragmented global approach

Countries are pursuing solar radiation modification at vastly different speeds, with some opposed while others forge ahead. Rising climate migration are accelerating interest in SRM, but ideological divisions between climate-focused supporters and those motivated by migration control are undermining action.

| Factor identification | Influence analysis | Projection development | Consistency analysis | Cluster analysis | Narrative development |

International relations and geopolitics

1. **Great power positioning on SAI governance** - Extent to which superpowers (US, China) and significant national actors (Russia, India) compete for or cooperate on SAI governance leadership and framework development
2. **Regional bloc coordination patterns** - Degree to which regional groups (EU, G77, SIDS, African Union, ASEAN) develop coordinated positions on SAI governance versus fragmented approaches
3. **Climate vulnerable nation coalition strength** - Organisation and influence of climate-vulnerable states in demanding SAI governance frameworks that address their needs
4. **Threshold conditions triggering unilateral action** - Circumstances (climate tipping points, domestic pressure, technological capability) that could drive states to deploy SAI without international consensus
5. **Resistant state influence capabilities** - Capacity of SAI-resistant states to block, delay, or disrupt international SAI governance processes
6. **Technology alliance formation patterns** - Extent to which SAI-capable states form exclusive technology-sharing partnerships versus open multilateral arrangements
7. **Counter-SAI capabilities distribution** - Geographic spread of capabilities to oppose, disrupt, or neutralise other actors' SAI deployment
8. **Strategic information campaigns on SAI** - Use of disinformation, propaganda, and strategic communication by state and non-state actors to shape SAI governance outcomes
9. **Securitisation versus climatisation of SAI governance** - Extent to which SAI is framed and governed as a security/geopolitical leverage issue versus a climate response tool

Governance architecture and institutions

1. **Multilateral placement of SAI governance discussions** - Extent to whether SAI governance will be considered within existing frameworks versus the creation of separate institutional arrangements
2. **Transition from research to deployment governance** - Evolution (or lack thereof) from informal research oversight to formal governance structures capable of making deployment decisions
3. **Multilateral organisation adaptation capacity** - Ability of UN bodies, UNEP, and other institutions to develop effective SAI governance mechanisms
4. **National SAI governance institution development** - Domestic institutional capacity for participating in and implementing international SAI governance decisions
5. **Enforcement and compliance mechanisms** - Development of institutions capable of monitoring SAI activities and imposing consequences for non-compliance
6. **Emergency decision-making procedures** - Governance systems for rapid SAI deployment decisions under climate crisis conditions
7. **Legal framework development** - Development of binding international agreements versus reliance on soft law and voluntary measures
8. **Liability and compensation frameworks** - Legal mechanisms for addressing damages from SAI-induced climate and ozone changes
9. **Phase-out and termination procedures** - Governance of SAI cessation to avoid rapid warming

Participation and democratic legitimacy

1. **Democratic legitimacy of SAI decision-making** - Extent to which governance processes include meaningful public participation and democratic oversight
2. **Global South capacity and representation** - Scientific, technical, and diplomatic capacity of developing countries to participate meaningfully in SAI governance
3. **Indigenous and local community recognition** - Integration of indigenous rights and traditional knowledge into SAI governance frameworks
4. **Civil society influence patterns** - Role and effectiveness of NGOs, advocacy organisations, and social movements in shaping SAI governance
5. **Expert community diversity and independence** - Geographic, disciplinary, and institutional diversity in scientific advisory bodies informing SAI governance
6. **Corporate sector governance role** - Extent to which private companies involved in SAI technology development participate in or influence governance decisions

Social and political dynamics

1. **Public opinion polarisation on SAI** - Extent to which SAI becomes a polarising political issue across and within societies
2. **Consensus patterns** - Agreement or disagreement among scientific, political, citizen, and business stakeholders on SAI governance approaches
3. **Generational political leadership trends** - Impact of emerging political leaders on SAI governance positions
4. **Social movement dynamics** - Strength and coordination of anti-geoengineering activism, climate justice movements, and pro-SAI advocacy
5. **Conspiracy theory and misinformation influence** - Impact of chemtrails theories and SAI disinformation on public opinion and policy-making
6. **Cultural and religious resistance patterns** - Extent to which cultural or religious objections to atmospheric modification influence governance outcomes
7. **Trust in institutions for SAI governance** - Public confidence in scientific and political institutions to make legitimate SAI decisions
8. **Climate emergency framing prevalence** - Extent to which climate crisis (including tipping points) narratives justify expedited or emergency SAI governance procedures

Scientific knowledge and risk perception

1. **Aggregate risk perception driving deployment urgency** - Collective assessment of climate risks, SAI risks, public opinion, and termination shock creating pressure for deployment decisions
2. **Scientific uncertainty management approaches** - Governance frameworks for making SAI decisions under persistent scientific uncertainty about impacts
3. **Perceived proximity to climate tipping points** - How anticipated climate thresholds influence the urgency of SAI governance decision-making
4. **Knowledge sharing versus secrecy patterns** - Extent of international scientific collaboration versus national security restrictions on SAI research
5. **Risk assessment institutional capacity** - Development of or reliance on existing credible, legitimate institutions for evaluating SAI risks and benefits
6. **Volcanic eruption analogues** - Use of natural stratospheric aerosol events to inform SAI understanding

Technology and capabilities

1. **Perception of technological readiness for deployment** - Consensus on whether SAI delivery systems have progressed to deployable capabilities
2. **SAI capability concentration versus distribution** - Extent to which high-altitude delivery and dual hemisphere infrastructure capabilities remain concentrated among few actors or spread globally
3. **Dual-use technology governance** - Management of overlap between SAI delivery systems and military/commercial aviation capabilities
4. **Monitoring and verification system development** - Technological capacity to track and verify SAI activities for governance compliance

Climate pressures and policy integration

1. **Mitigation policy integration frameworks** - Governance mechanisms ensuring SAI remains complementary to rather than substituting for emissions reductions
2. **Climate impact severity and attribution** - Extent to which worsening climate impacts create political pressure for SAI deployment decisions
3. **Perceived adequacy of existing climate solutions** - Extent to which carbon dioxide removal scaling, renewable energy deployment, and mitigation efforts appear sufficient to address climate risks without SAI
4. **Adaptation policy coordination** - Integration of SAI governance with traditional climate adaptation planning and funding
5. **Development pathway compatibility** - Alignment of SAI governance with sustainable development goals and Global South development priorities

Factor identification | Influence analysis | Projection development | Consistency analysis | Cluster analysis | Narrative development
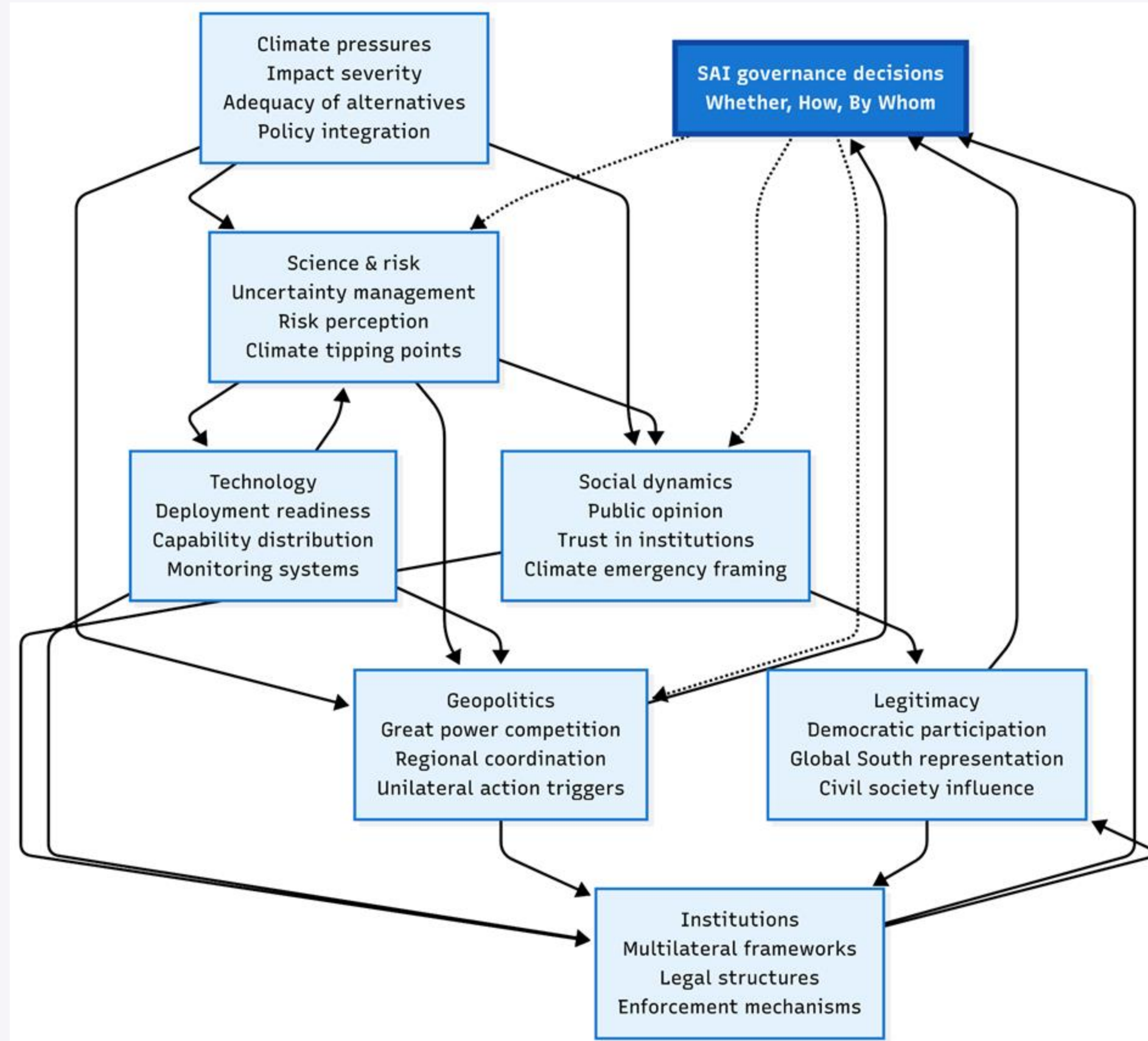
OBJECTIVE: Create a complete list of factors that might influence SRM governance decisions

● International relations and geopolitics
● Governance architecture and institutions
● Participation and democratic legitimacy
● Social and political dynamics
● Scientific knowledge and risk perception
● Technology and capabilities
● Climate pressures and policy integration

EXPERT GROUP ROLE:

● Review the short list of influence factors.
● 1 – 3 hours in September 2025.

Factor identification | Influence analysis | Projection development | Consistency analysis | Cluster analysis | Narrative development

RATING SCALE

3	strong direct influence
2	medium impact
1	weak, delayed influence
0	no influence

		1	2	3	4	5	6	7	105
		Climate impact severity and attribution	Framing of SAI in governance discussions	Public opinion polarisation on SAI	Climate vulnerable nation coalition strength	Multilateral placement of SAI discussions	Democratic legitimacy of SAI decision-making	Global South capacity and representation	Threshold conds triggering unilat action
1	Climate impact severity and attribution		2	2	2	1	0	0	3
2	Framing of SAI in governance discussions	0		2	1	3	2	1	0
3	Public opinion polarisation on SAI	0	3			1	2	1	1
4	Climate vulnerable nation coalition strength	0	0	0		3	2	2	0
5	Multilateral placement of SAI discussions	0	0						0
6	Democratic legitimacy of SAI decision-making	0	0						2
7	Global South capacity and representation	0	0						3
105	Threshold conditions triggering unilat action	0	0						

The **framing of SAI discussions** (climate vs security) will strongly impact the **multilateral placement of SAI discussions** in the future.
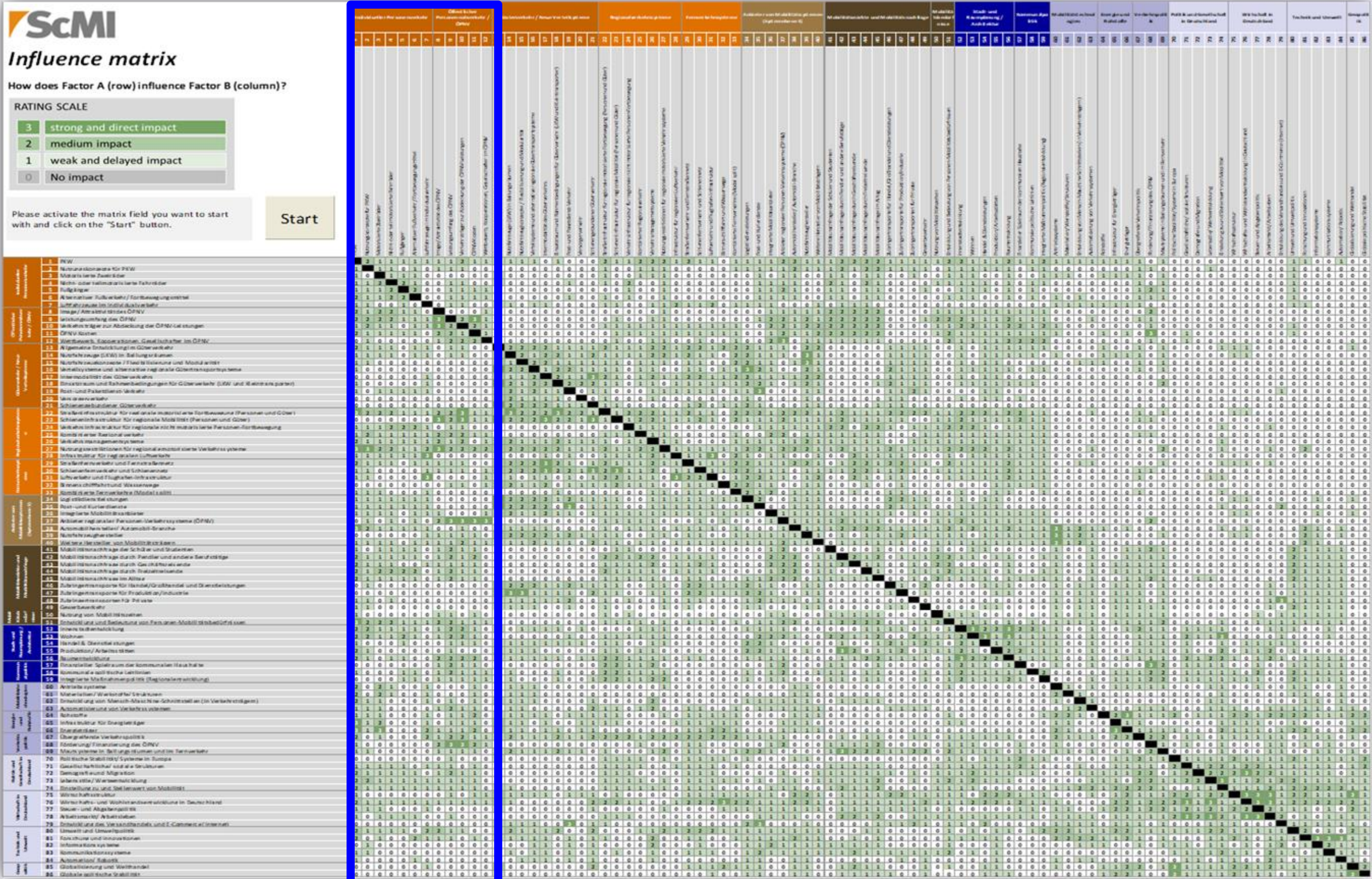
Factor identification | Influence analysis | Projection development | Consistency analysis | Cluster analysis | Narrative development

OBJECTIVE:

- Identify the most influential twenty factors.

EXPERT GROUP ROLE:

- Conduct influence analysis of all of a subset of identified factors.
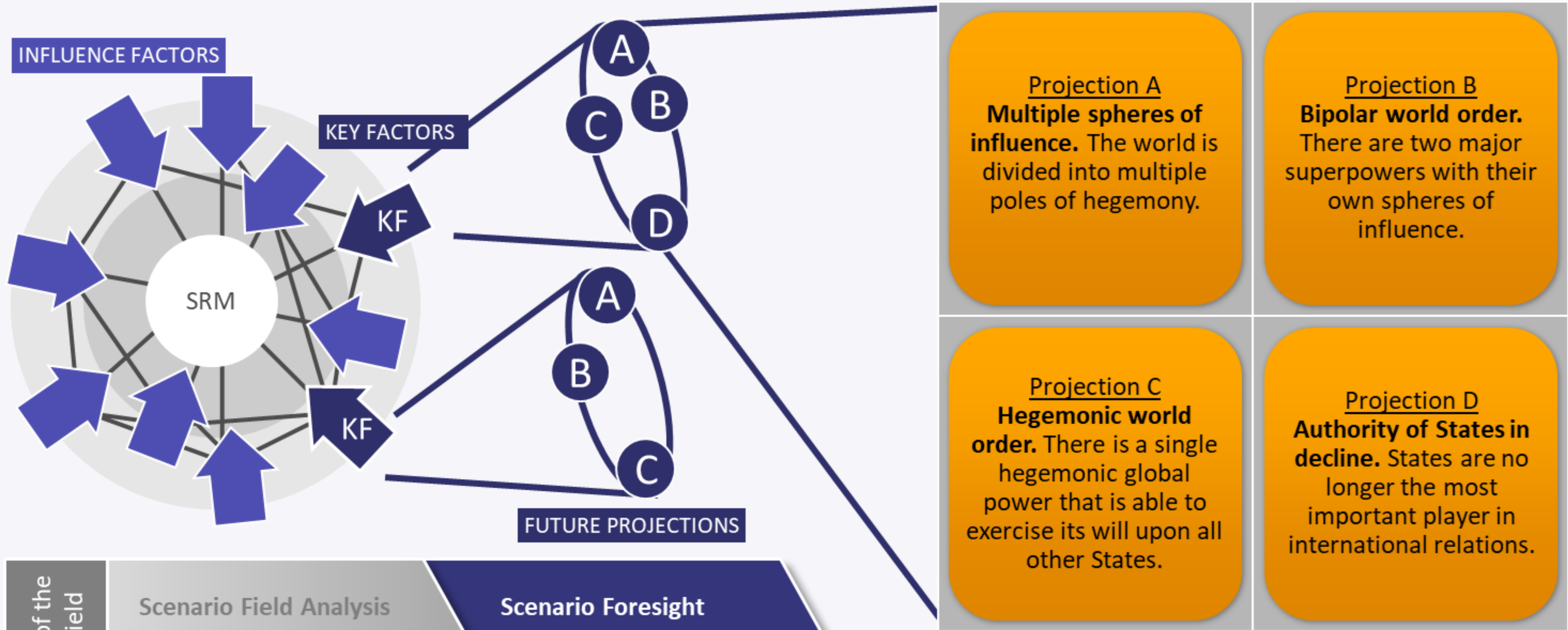
- 2 – 7+ hours in October 2025.

Factor identification | Influence analysis | **Projection development** | Consistency analysis | Cluster analysis | Narrative development

INFLUENCE FACTORS

KEY FACTORS

SRM

KF

KF

A
B
C
D

A
B
C

FUTURE PROJECTIONS

Projection A
Multiple spheres of influence. The world is divided into multiple poles of hegemony.

Projection B
Bipolar world order. There are two major superpowers with their own spheres of influence.

Projection C
Hegemonic world order. There is a single hegemonic global power that is able to exercise its will upon all other States.

Projection D
Authority of States in decline. States are no longer the most important player in international relations.

#15 Polarity in international relations

Definition of the scenario field

Scenario Field Analysis
What are the key factors for understanding the environment of the automotive business?

Scenario Foresight
What alternative developments are conceivable for the individual key factors (future projections)?

| Factor identification | Influence analysis | Projection development | Consistency analysis | Cluster analysis | Narrative development |

EXPERT GROUP ROLE:

● Reviewing projections to ensure they are comprehensive and accurate

● 1 – 3 hours in November 2025.
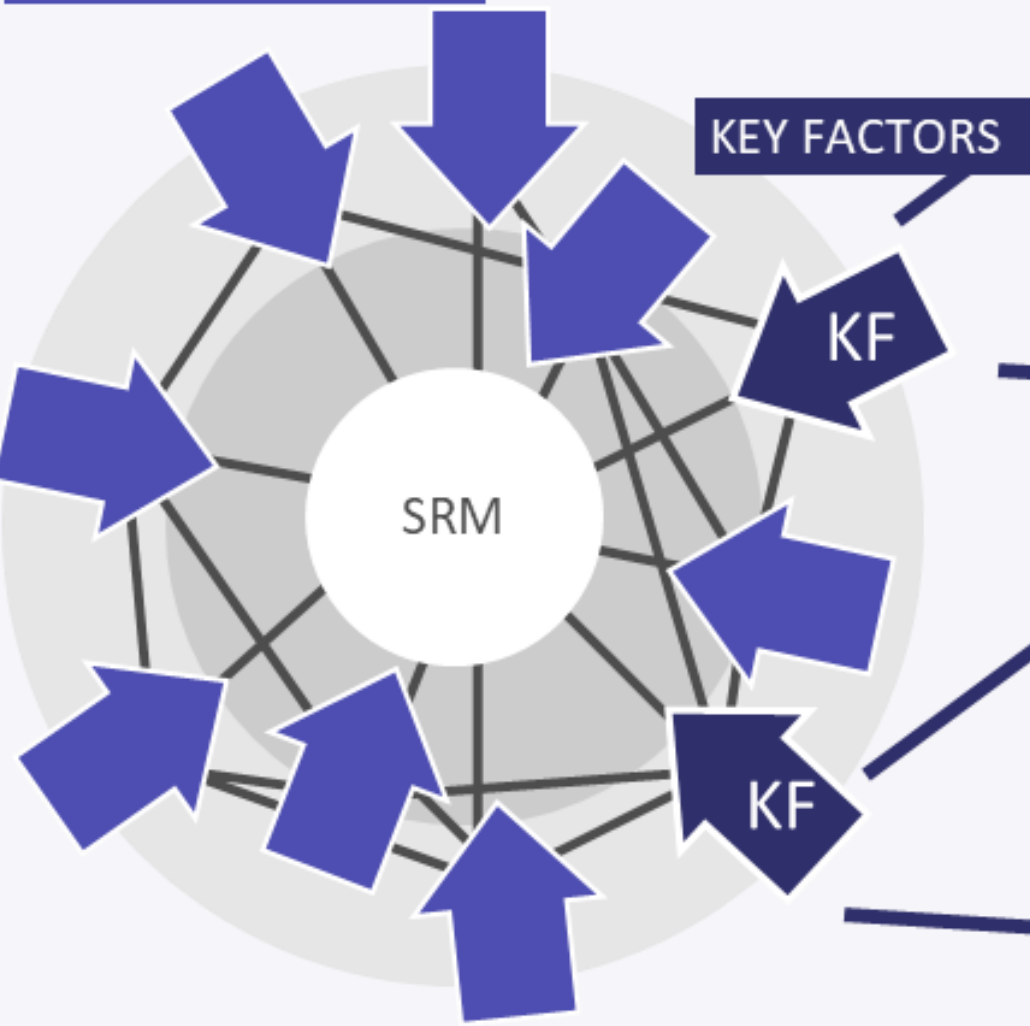
Factor identification › Influence analysis › Projection development › **Consistency analysis** › Cluster analysis › Narrative development

INFLUENCE FACTORS

KEY FACTORS

SRM

KF

A
B
C
D

A
B
C

FUTURE PROJECTIONS

Projection bundle

RATING SCALE

5	highly consistent
4	consistent
3	independent
2	partially inconsistent
1	highly inconsistent

Perceived adequacy of existing climate solutions

			5A	5B	5C	5D
			Solutions failing, crisis deepening	Insufficient progress, major gaps	Moderate progress, gaps remain	Solutions scaling rapidly enough
Polarity in international relations	10A	Multiple spheres of influence	2	4	4	3
	10B	Bipolar world order	3	4	2	4
	10C	Hegemonic world order	3	3	4	4
	10D	Authority of states in decline	4	4	2	3

The **consistency assessment** is used to group combinations of future projections into groups that are logically likely to co-occur.

Definition of the scenario field

Scenario Field Analysis
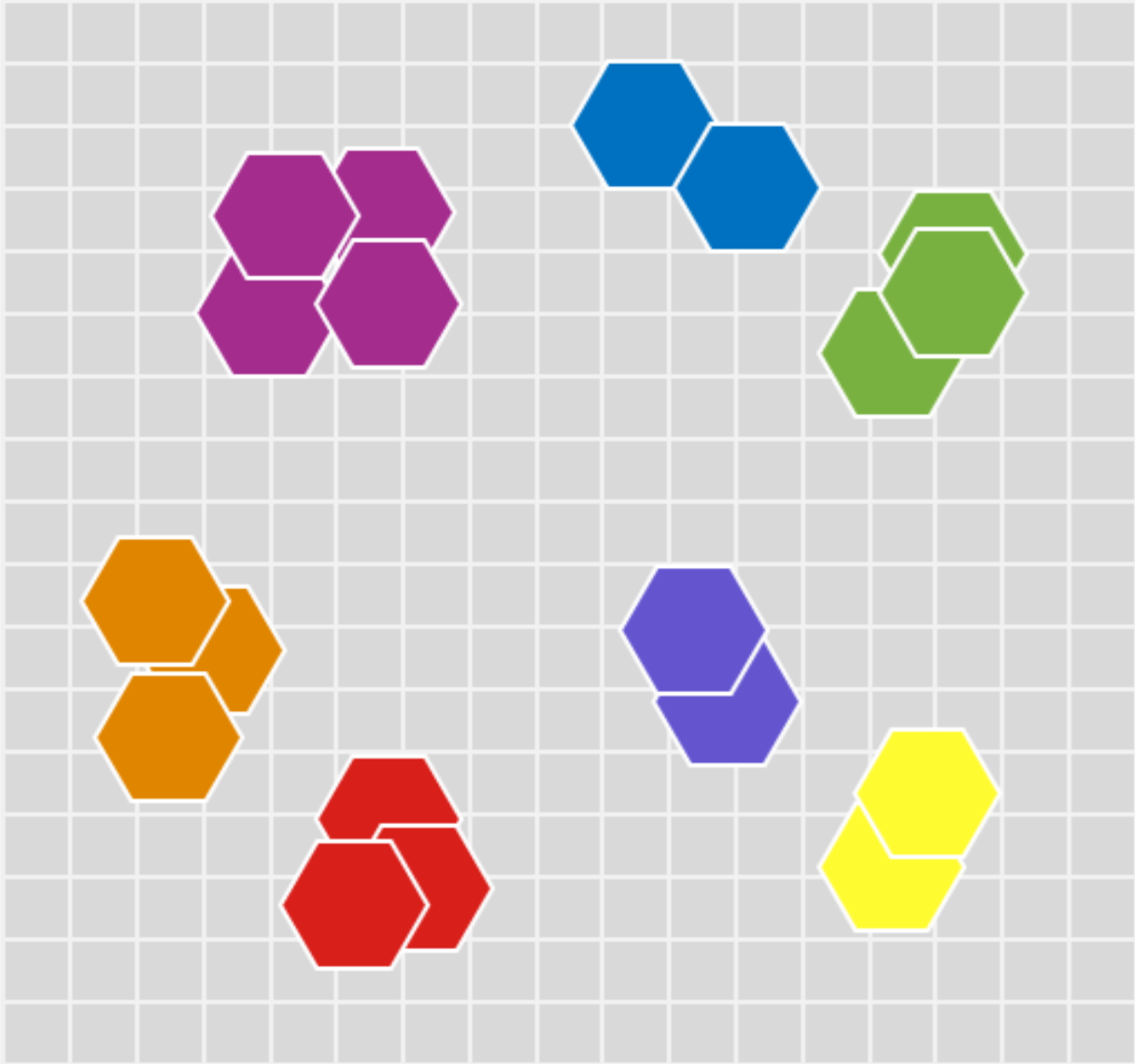What are the key factors for understanding the environment of the automotive business?

Scenario Foresight
What alternative developments are conceivable for the individual key factors (future projections)?

Scenario Creation
Which plausible scenarios (as a plausible combination of future projections) are conceivable and how are these scenarios related?

Factor identification | Influence analysis | Projection development | Consistency analysis | **Cluster analysis** | Narrative development

INFLUENCE FACTORS

KEY FACTORS

SRM

KF

KF

A

B

C

D

A

B

C

Projection bundle

FUTURE PROJECTIONS

Definition of the scenario field

Scenario Field Analysis
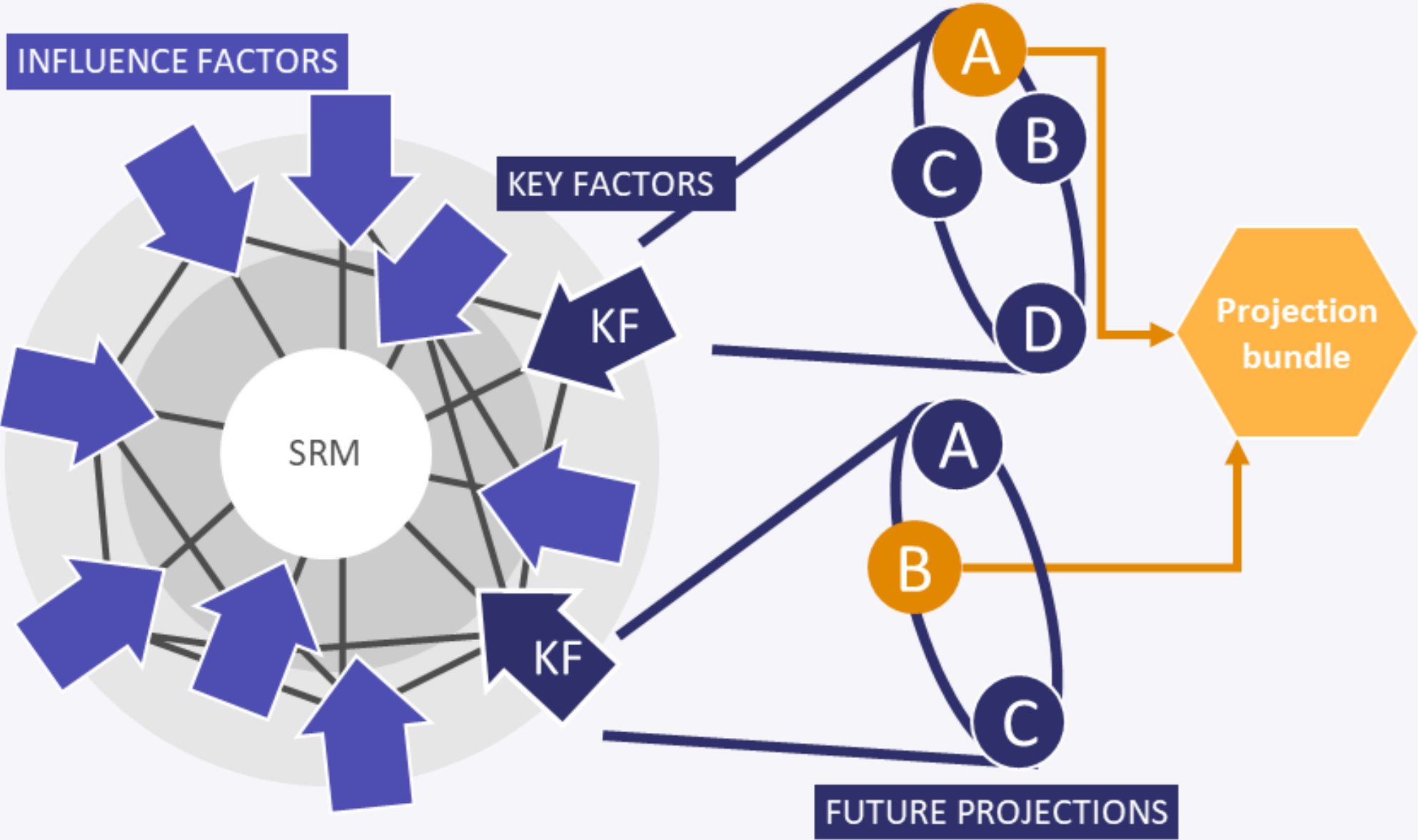What are the key factors for understanding the environment of the automotive business?

Scenario Foresight
What alternative developments are conceivable for the individual key factors (future projections)?
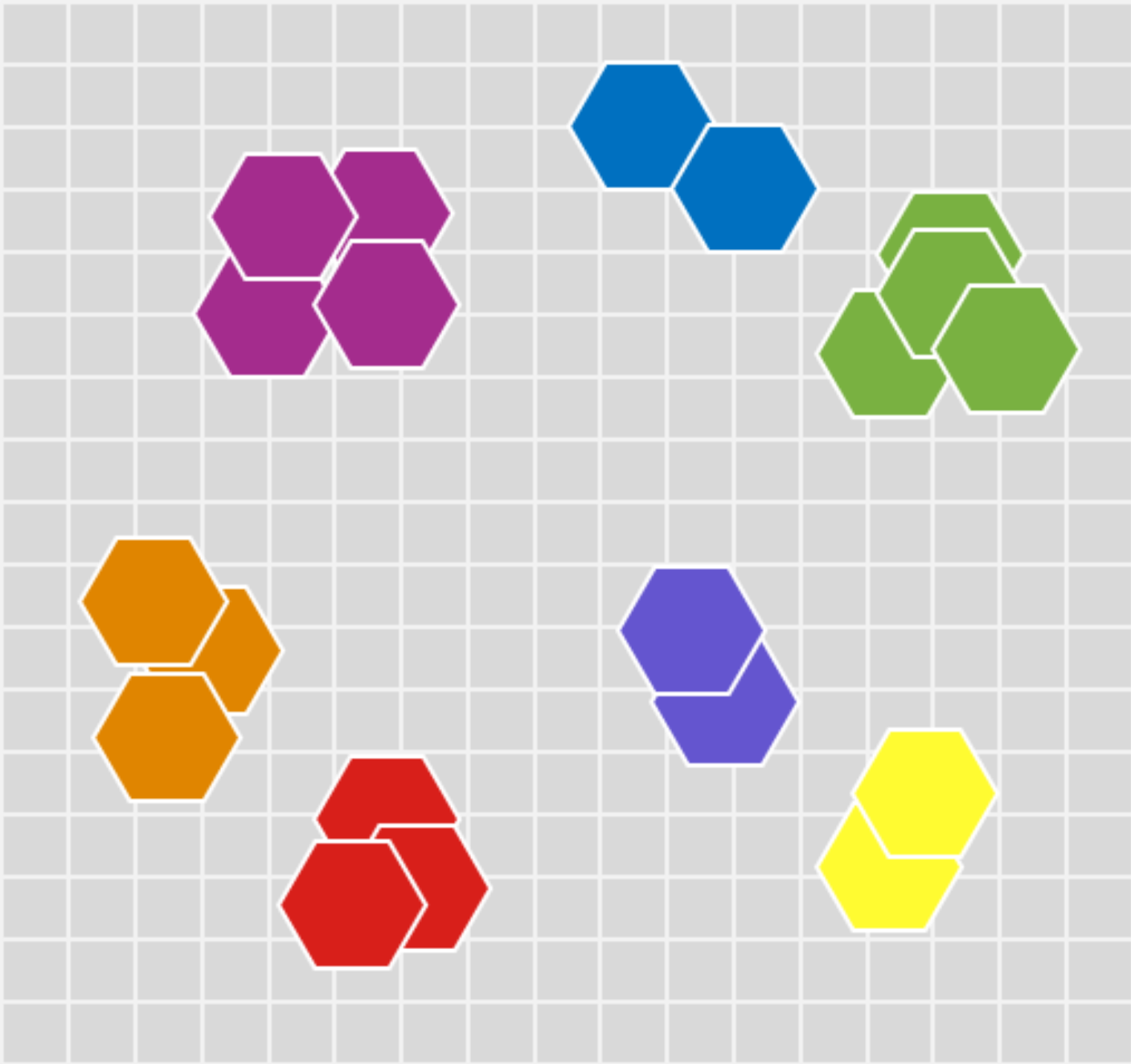
Scenario Creation
Which plausible scenarios (as a plausible combination of future projections) are conceivable and how are these scenarios related?

*In the **cluster analysis**, the "most consistent" projection bundles are aggregated to a manageable number of scenarios according to their similarities.*

Factor identification → Influence analysis → Projection development → Consistency analysis → Cluster analysis → **Narrative development**

Key factor		Projections		Scenario 1	Scenario 2	Scenario 3	Scenario 4
1	Polarity in international relations	1A	Multiple spheres of influence	95	0	0	0
		1B	Bipolar world order	5	67	33	100
		1C	Hegemonic power structure	0	33	67	0
2	Climate impact severity and attribution	2A	Catastrophic impacts w/ attribtn	12	5	42	46
		2B	Severe impacts, some consensus	88	10	17	38
		2C	Moderate impacts, uncertain	0	10	0	15
		2D	Manageable impacts w/ adaptatn	0	76	42	0
3	Strategic information campaigns	3A	Cooperative transparency efforts	63	0	0	0
		3B	Intensive disinfo campaigns	37	90	58	100
		3C	Minimal information operations	0	10	42	0
4	Public opinion polarisation on SAI	4A	Highly polarised, partisan issue	10	10	33	85
		4B	Moderate disagreement	0	43	17	15
		4C	Low awareness, no polarisation	71	19	25	0
		4D	Broad consensus, minimal issues	20	29	25	0

16	Global South capacity and representation	16A	Strong capacity, equal represntn	27	0	0	69
		16B	Building capacity and voice	73	0	0	33
		16C	Limited capacity, tokenistic incl	0	76	0	0
		16D	Excluded, minimal capacity	0	24	100	0

Timeline of expert group input

| SEPT | OCT | NOV | DEC | FEB |

FACTOR IDENTIFICATION

Review predetermined factors.
1- 3 hours

PROJECTION DEVELOPMENT

Review predetermined projections.
1 – 3 hours.

SCENARIO CLUSTER IDENTIFICATION

Review selected scenario cluster.
1 hour with project team.

1
2
3
4
5
6

INFLUENCE ANALYSIS

Conduct influence analysis on all or a subset of factors.
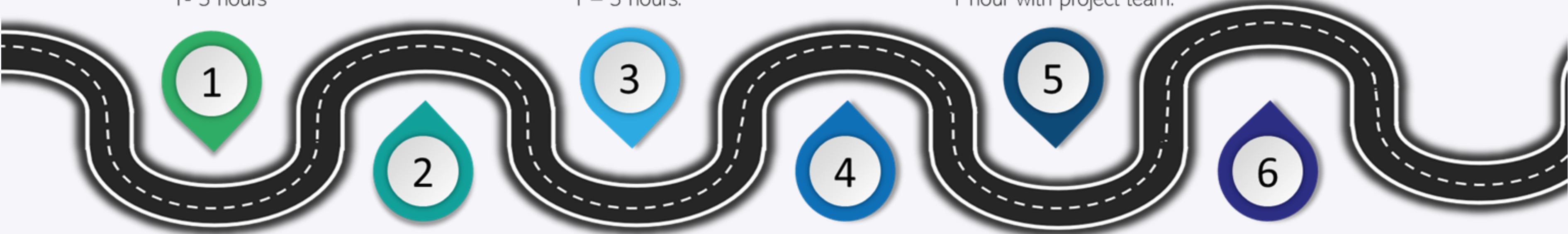2 hours – 7 hours

CONSISTENCY ASSESSMENT

Review selected consistency assessment pairs
1 hour with project team.

SCENARIO NARRATIVE DEVELOPMENT

Review scenario narratives.
1 – 3 hours

Questions?

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