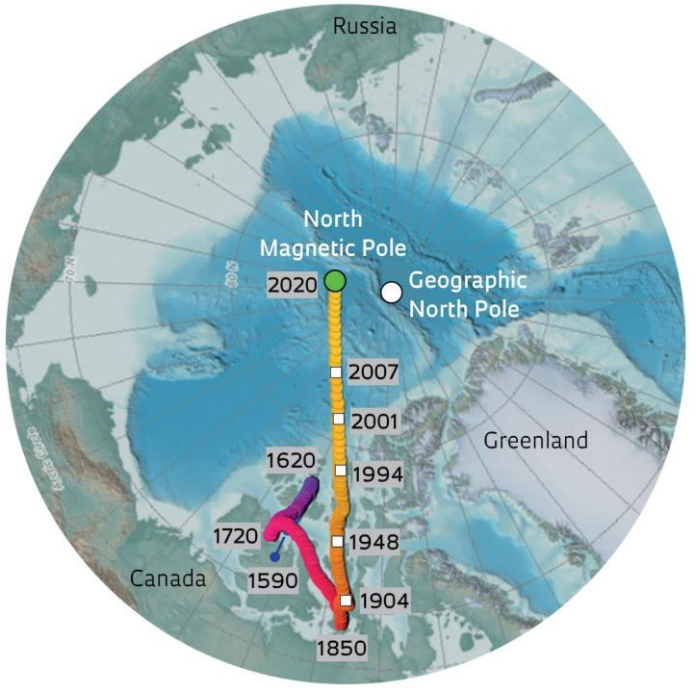
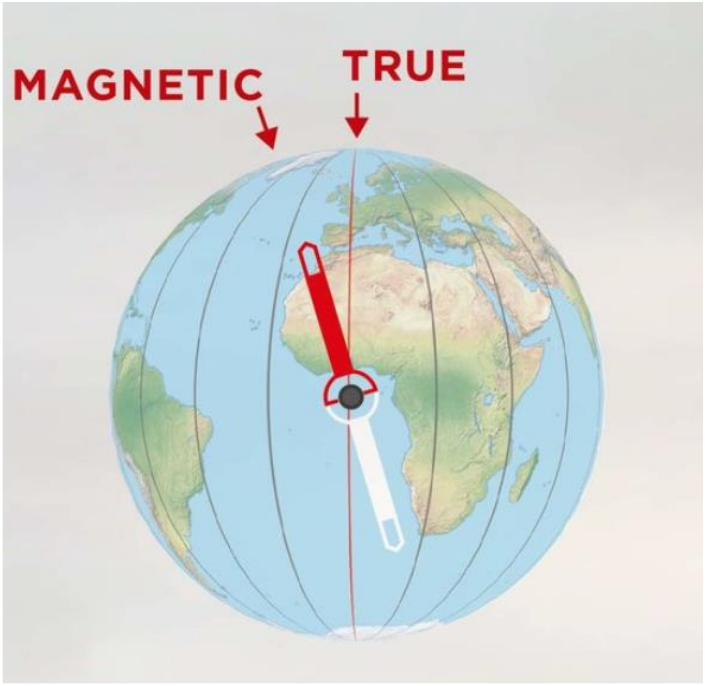
الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY

United Arab Emirates

Transitions Impact from Magnetic to True North (UAE Study Case)

Ninth Meeting of the Performance Based Navigation Sub-Group (PBN SG/9)
(Doha, Qatar, 9 - 11 December 2024)

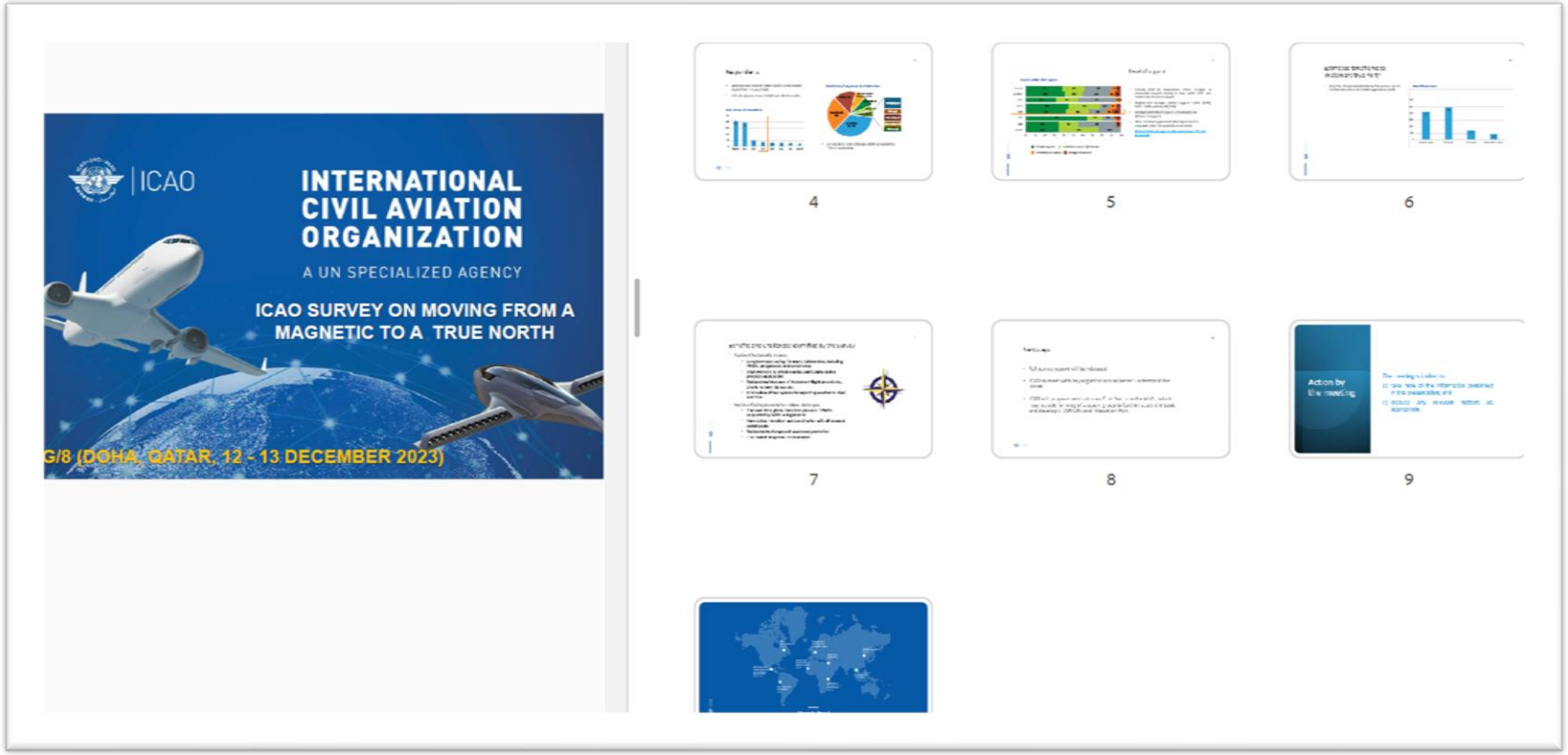




PBN SG/8 Working Paper Overview (Doha, 12-13 Dec)

ICAO Survey on Moving from Magnetic to True North

- ICAO conducted a survey to assess the transition's impact on air operations.
- Feedback gathered from states covered technical, operational, and cost impacts.
- The conclusion highlighted the importance of global collaboration for a successful transition.



Related Working Papers

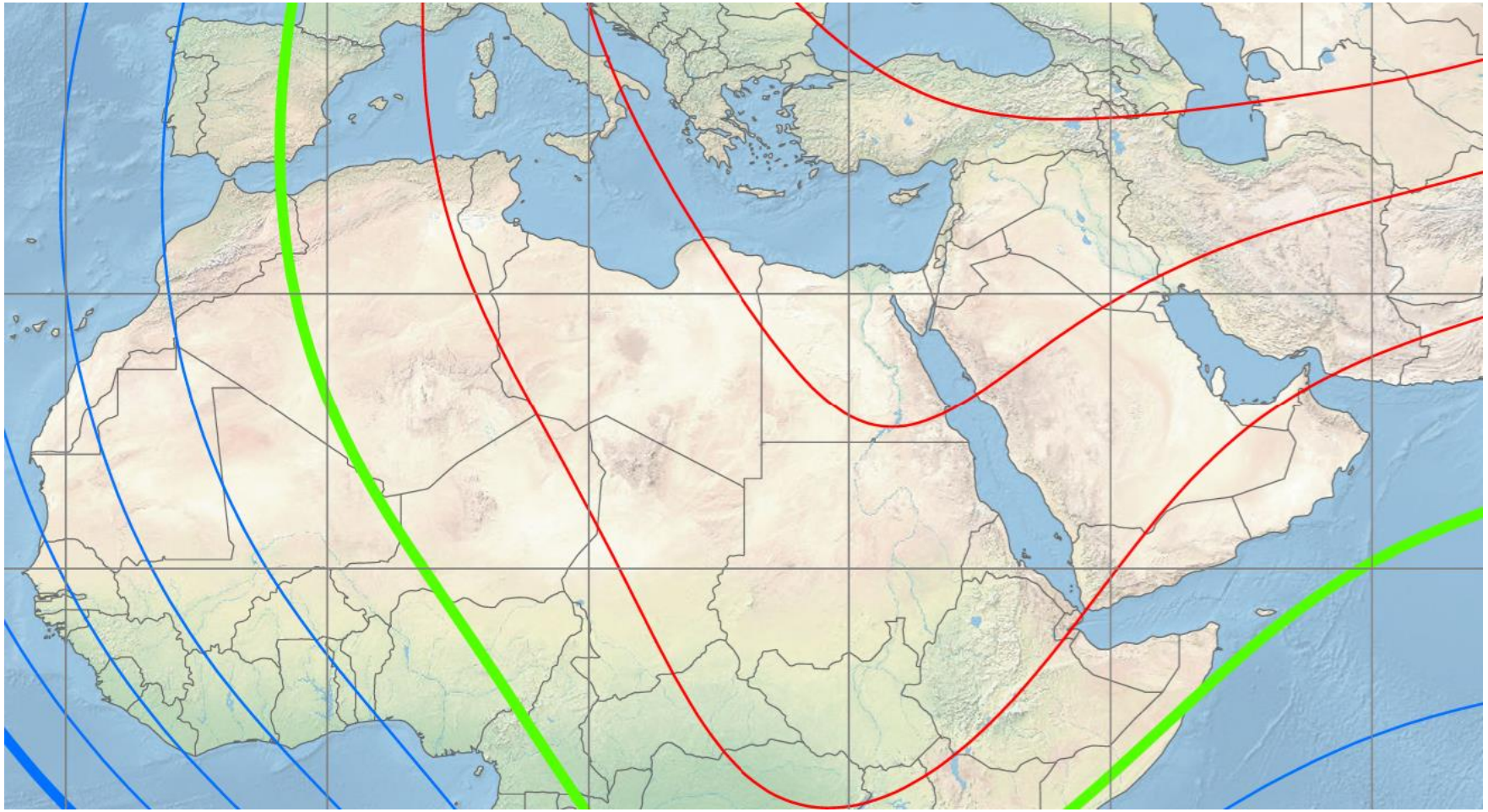
- Canada presented papers to the ANC detailing the change to switch to a True North Reference system in aviation
  - AN Conf/12 WP/147
    - Para 6.5.25: ICAO invited interested states to study the technical, operational, and economic impacts, as well as the costs and benefits.
  - AN Conf/13 WP/114
    - Para 3.44: ICAO should explore the costs and feasibility of adopting True North.
    - *Recommendation 3.5/4*: Conduct a detailed study on the technical, operational, and economic feasibility.

ICAO State Letter – Expert Nominations (3 January 2024)

➢ ICAO Request for Expert Nominations (Ref.: AN 11/65-IND/24/1)

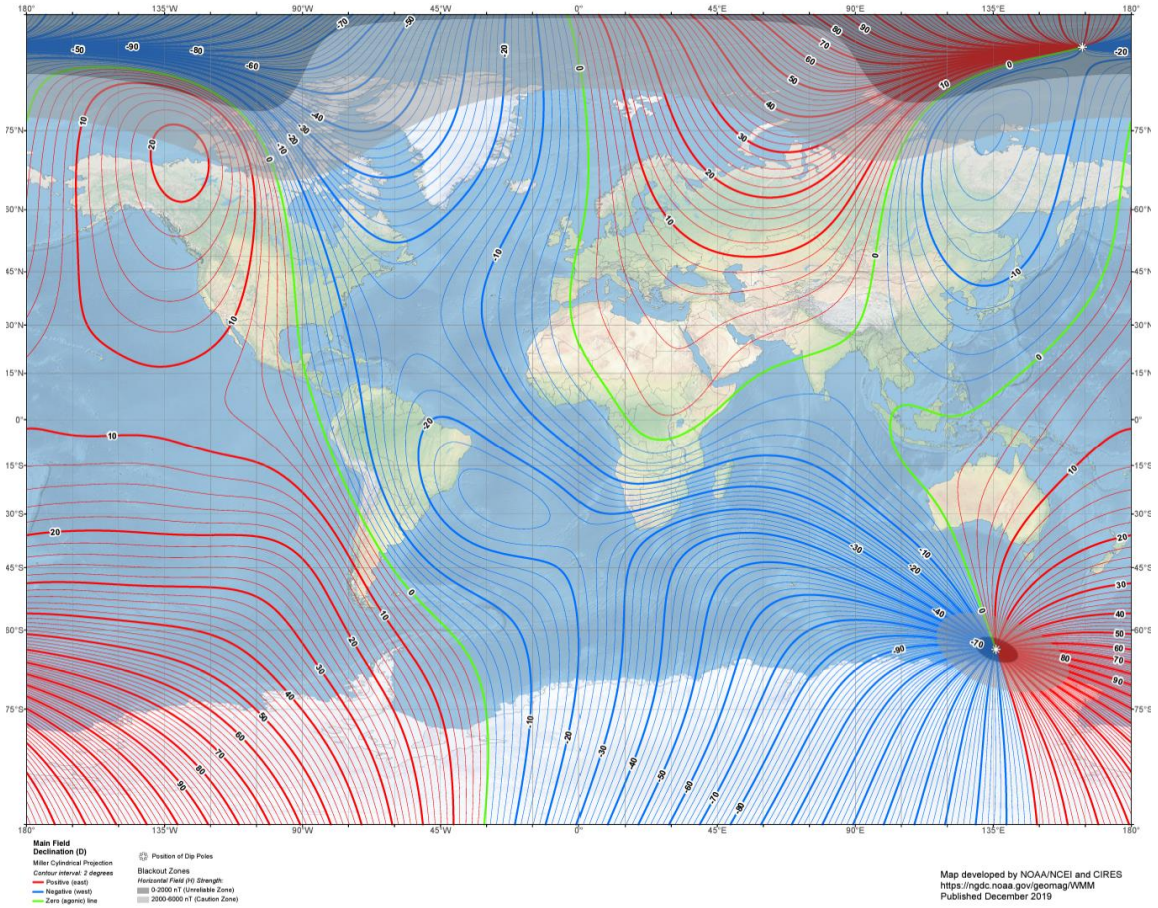
- At the seventh meeting of its 224th Session, held on 7 November 2023, supported the establishment of the True North Advisory Group (TRUE-AG)
  - ICAO invited states and organizations to nominate experts for TRUE-AG.
  - Participating Countries & Organizations:
    - Australia, KSA, USA,UAE, Incorporated (ARINC), (CANSO), (EASA),(EUROCONTROL),(GAMA), (IAIN), (IAOPA), (IATA), (IBAC), (ICASC), (ICCAIA), International Federation of Air Line Pilots' Associations (IFALPA), (IFATCA) and others.
  - Task: Develop CONOPS, analyse impacts, and conduct studies on costs, benefits, and safety.

Magnetic Field (MID Region)



Magnetic Field Declination

- Earth's magnetic north pole is currently moving towards Siberia
- This movement has been ongoing for over a century, with the pole drifting in a relatively linear path from Canada towards the geographic North Pole and beyond
- The movement is driven by fluid dynamics in the Earth's liquid outer core, which generates the magnetic field



Tasks and Required Expertise for TRUE-AG

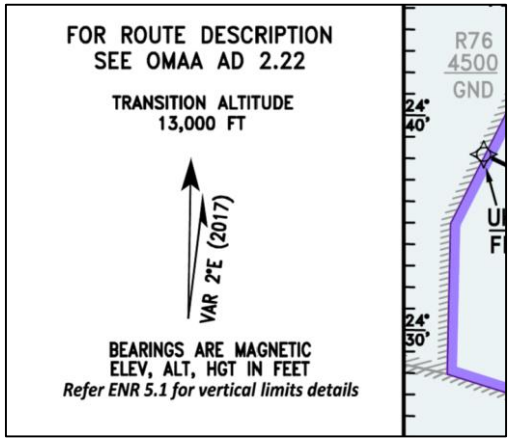
- Tasks:
  - Develop CONOPS for True North implementation.
  - Conduct studies on impact (cost-benefit analysis, safety, and SWOT).
  - Provide ICAO with the way forward (road map) for True North
- Required Expertise:
  - ANSPs, Regulators, Avionics Experts, Air Traffic Control (ATC), Procedure Designers, etc.

Affect on the Industry

- Navigation
  - Huge documentation change (Airspace Management Vs AIM)
  - Thresholds denomination could be changed (i.e. OMAA in the UAE)
- Calibration Systems:
  - ILS/DME → Not required since the LOC is adjusted to RWY axis with the azimuth corresponding to the APCH RWY
  - VOR/DVOR → Adjusted to Magnetic North in accordance with ICAO Annex 10
  - VOR indicates magnetic radials, & that would have to be changed to “True” radials

Affect on the Industry

- AIM
  - MAG/VAR tables are updated every 5 years, and it takes at least 3 years to be fully realised
  - The switch to True North would reduce workload and limit publishing errors
- ATC:
  - ATM system has MAG/VAR tables coded within it's code and does the conversion. Moving to True North would require an upgrade (cost)
  - The move would entail training for ATC staff which shall be basic due to the low magnetic declination in the UAE



Affect on the Industry

- IFPD
  - ICAO requires procedures to be published with magnetic bearings
  - Our IFPD software is capable of doing both and provides values in True & Magnetic
  - IFPD software & AIM systems are not integrated, therefore same working methodology will continue
- Military:
  - Unaware of their systems, avionics and conversion abilities
  - No feedback received, however whatever military complies with civil rules when flying in civilian airspace

Affect on the Industry

➢ Airspace Users

- One major airline in the UAE advised that their Airbus fleet is capable of doing flying and presenting True North as of today.
- However, their Boeing fleet would require an upgrade.

Transitioning to True North Advisory group

D11

	A	B	C	D	E	F	G	H
1	**Systems:**	**Components:**	**1.** Will all aeronautical data need to be reassessed from scratch?	**2.** What rotation requirements are required for the listed navigation aids, for example, remotely or manually?	**3.** What rotation/realignment is required for surveillance systems?	**4.a.** Training: a.What training will be required for staff leading up to and after the change?	**4. b.** Will this be different than the training currently done following a magnetic change?	**5.** Are there any other considerations?
2	All Aeronautical Data:	RADAR, ADSB, MLAT, ASDE, Video Mapping						
3	Surveillance							
4	Flight Planning Systems:	creation, conformance						
5	Navigation Systems:	VOR, DME, TACAN, NDB, VDF, TLS, SBAS, GBAS, ILS, vectors, Others?						
6	Third party data systems:	Jeppesen, LIDO, Nav Blue, Engine out route developers, etc.						
7	Weather systems:							
8								

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Subject	Components/Systems:
All Aeronautical Data published by a state:	
	Charts (IFP, ENR Charts)
	Navigation Data (Tabular Description)
	AIP (ENR Data, AD Data)
	Data Exchange (AIXM)
	Publication systems
	IFP Design
	Data Origination
Third party data providers:	
	Production Systems
	Processing Standards (ARINC, RTCA, EUROCAE)
	Charts
	NavData
	AMM/AMDB
	Obstacles/Terrain
	3rd party Procedure Design
	UAS
Flight Planning Systems:	
	FP Processing and distribution systems (state, regional, etc.)
	Flow management systems
	Data exchange (i.e. FIXM, FF-ICE)/Creation, conformance
	3rd party FP service providers
Surveillance Systems:	
	Ground Based (RADAR, ADS-B, MLAT, ASDE, SMR)
	Space Based (ADS-B, ADS-C, GADSS, ADT)
Navigation Systems:	
	Ground Based (VOR, DME, TACAN, NDB, VDF, ILS)
	Space Based
	Management System
Communication Systems:	
	VHF, SATCOM, CPDLC, UHF
Weather systems:	
	Weather/MET Sensing and Display (Video Mapping)
ATM/UTM System:	
	ATS/ATC Procedures (Separation, etc.)
	Chart Video Mapping
	Surveillance data processing
	Flow and capacity tools
	ATS/ATCO displays (targets, target tools, maps, overlays, display orientation)
	ATS (ATCO, ATC and ATS Specialists) Personnel

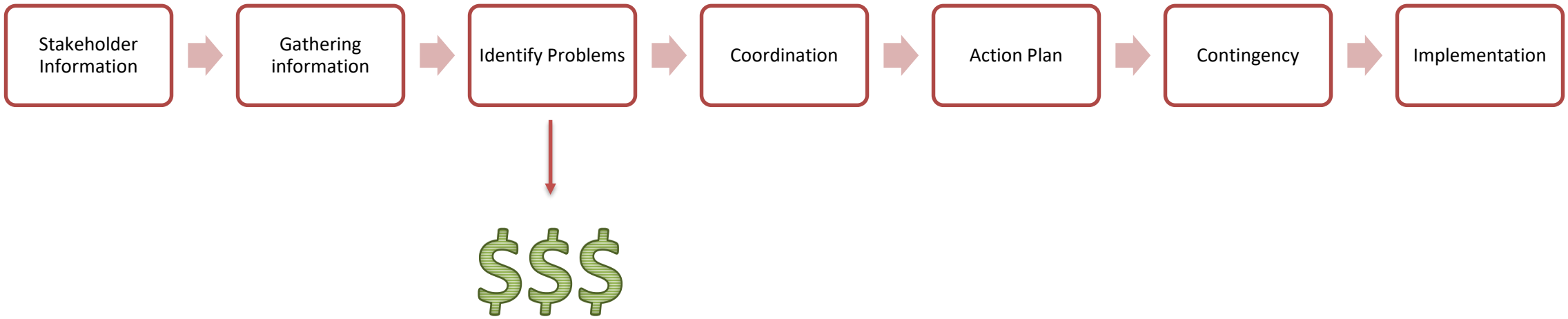
A	B	C	D	E	F
Subject	Components/Systems:	System Change/Impact	Operational Change/Impact	Training Change/Impact/Requirement	Additional Considerations
All Aeronautical Data published					
	Charts (IFP, ENR Charts)				
	Navigation Data (Tabular Description)				
	AIP (ENR Data, AD Data)				
	Data Exchange (AIXM)				
	Publication systems				
	IFP Design				
	Data Origination				
Third party data providers:					
	Production Systems				
	Processing Standards (ARINC, RTCA, EUROCAE)				
	Charts				
	NavData				
	AMM/AMDB				
	Obstacles/Terrain				
	3rd party Procedure Design				
	UAS				
Flight Planning					
	FP Processing and distribution systems (state, regional, etc.)				
	Flow management systems				

Summary

- True North transition in the UAE is expected to be straightforward as the effect is almost negligible (+2 E)
- National & Regional action plans would be required
- Due to different technicalities we might see a world of co-existing navigation (True & Magnetic) until the world is fully transitioned
- Due date for the plan/advise to ICAO is 2030

Summary

- Coordination is required between:
  - Regulators, ATC, FPD, AIM, CNS, Military, Airlines, General Aviation, OEMs



Thank You