

Vision for WIGOS in 2040

Progress and next steps

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Overview

1. Why a Vision for WIGOS in 2040?
2. Drivers for a new *Vision*
3. Vision for WIGOS/Space in 2040
4. Vision for WIGOS/Surface in 2040
5. Toward an integrated *Vision for WIGOS in 2040*

1. Why a Vision for WIGOS in 2040?



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Why a "Vision for WIGOS in 2040"?

- Serves a reference for WMO Members and other service providers, providing context and expected boundary conditions relevant for observing system developments
- Forcing agent for satellite agencies – current 2025 Vision too near-term
- Sets frame for future systems deployment, development and integration
- Cg-17: Develop a “*Vision for WIGOS in 2040*”, to be submitted to CG-18 in 2019

2. Drivers for a new long-term Vision



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The world in 2040?

Future State 2030 (KPMG, 2015)

- Global megatrends impacting governments and citizens



While they are highly interrelated, the megatrends can broadly be grouped into trends reflecting changes in the status and expectations of individuals, changes in the global economy and changes in the physical environment



#1 Demographics

- Higher life expectancy and falling birth rates are increasing the proportion of elderly people across the world, and challenging the solvency of social welfare systems including pensions and healthcare.
- Some regions are also facing the challenge of integrating large youth

|The consequences of demographics



An aging world



Public pension systems
under pressure



Healthcare spending
increases



Youth bulges



#3 Enabling technology

- ICT- based technologies have enabled R&D and growth of technologies in many fields such as applied science, engineering, health and transport.
- Exponential growth in the volume and speed of access to information can generate new markets and challenge existing institutions.
- While developed countries may have greater access to many of these

techn
less d

The consequences of enabling technology

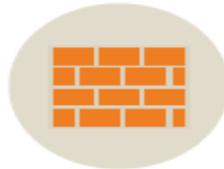
ties for
ets.



Transformation of communication



Big data



The boundary between what is considered public and what is considered private is blurring



Change of security and policing to focus on dealing with cyber crime



New social service models



A new future for manufacturing

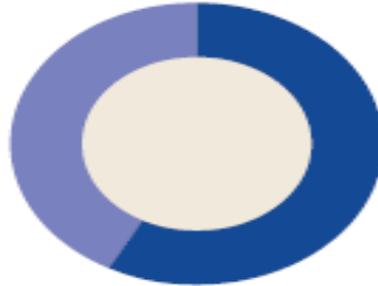


Transportation transformations



#6 Economic power shift

The evidence of change



Developing countries
will account
for an estimated
57%
of global GDP by 2030.⁸⁵



Developing countries
will be home to 440 of
the world's fastest
growing cities,
generating
47%
of global GDP growth
through 2025.⁸⁶

The consequences of economic power shift



The 'global south'
as the engine
for growth



Emerging
multi-polar
world order



Innovation as the
source of
sustaining growth



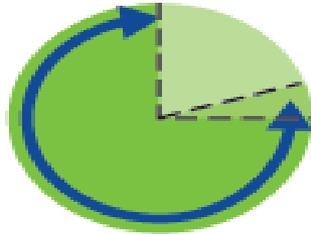
Increased consumption
base driving economic
opportunities



#7 Climate change

- By 2050, costs of extreme weather could reach up to 1% of world GDP pa.
- With warming of 3-4C, up to 200 M people could become permanently

THE DEVELOPING WORLD WILL SHOULDER



75-80%

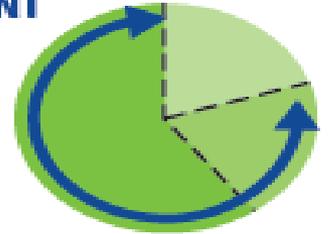
of adaptation costs, with East Asia and Pacific regions carrying the highest costs.¹⁰⁹

LOCAL MITIGATION EFFORTS ARE INCREASINGLY IMPORTANT

Cities account for

60-80%

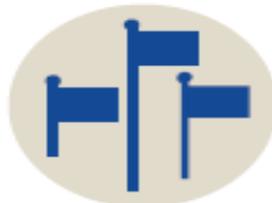
of energy consumption and are responsible for the same portion of global CO₂ emissions.¹¹⁰



The consequences of climate change



Unpredictable, dramatic ecosystem impacts



The challenge of global cooperation



Pressure to adapt to 'locked-in' effects of global warming



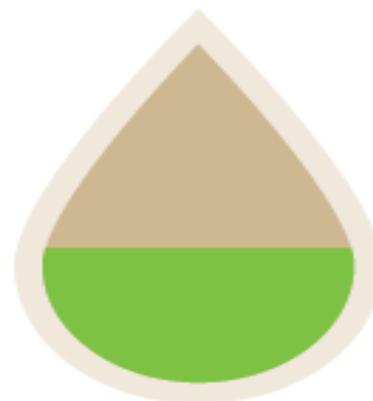
A greater role for cities



#8 Resource stress

The evidence of change

The population is growing and so is the middle class:



40%

Estimated global gap between water supply and demand by 2030.¹²¹



The International Energy Agency projects an approximate **40%** increase in global energy demand by 2030.¹²²



Economic growth



Population growth



Technological advancements

DRIVEN BY



#8 Resource stress/2

- "If nothing is done, we will run out of water before we run out of oil"



1 billion

About more people will live in areas of water stress by 2030 in a business-as-usual scenario.¹²⁴

 = 200 million

Both growing demands and unstable production patterns due to climate change will cause global food prices to double between 2010 and 2030.¹²⁵



The consequences of resource stress



Food and agricultural pressures



Increased water demand



Energy demand on the rise



Competition for metals and minerals

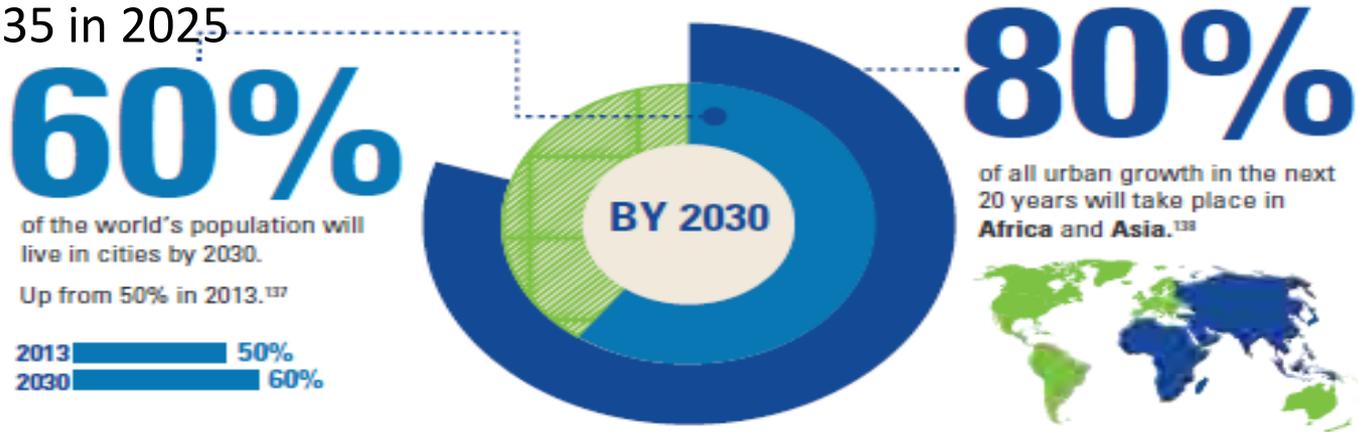


Increased risk of resource nationalism



#9 Urbanization

- The number of megacities (pop. 10+ million) will increase from 20 today to 35 in 2025



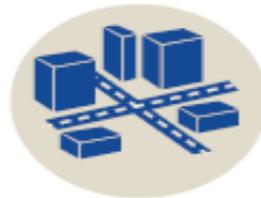
The consequences of urbanization



Urban growth driven by developing world



Interrelationship between built environment and natural environment



Large-scale urban infrastructure needs



Urban poverty pressures including growing populations living in informal settlements



3. Vision for WIGOS/Space in 2040



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Vision for WIGOS/Space 2040

Initial draft prepared by WMO/CBS Expert Team on Satellite Systems (ET-SAT), using input from:

- the WIGOS Space 2040 workshop, Geneva, 18-20 Nov 2015
- the Coordination Group for Meteorological Satellites (CGMS)
- the Inter-Programme Coordination Team on Space Weather (ICTSW).

Draft v1.0 based on feedback received from a series of consultations:

- WMO Presidents of Technical Commissions meeting (19-20 January 2016)
- Consultative Meeting on High Level Policy on Satellite Matters (CM-13, 28-29 January 2016)
- WMO CBS Inter-Programme Expert Team on Satellite Utilization and Products (IPET-SUP-2, 23-26 February 2016)
- 2016 meeting of the Coordination Group for Meteorological Satellites (CGMS).

4. Vision for WIGOS/Surface in 2040



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Vision for WIGOS in 2040; Surface

- Drafting Workshop organized by OPAG-IOS in Offenbach August 2016, involving primarily CBS Experts
- User Workshop in Geneva, October 2016, involving a broader user community (all WMO technical commissions, donor agencies, GCOS, WCRP, GFCS, Global Cryosphere Watch, World Bank, ...)

Vision 2040 - surface-based component

- Preamble
- High level goals to guide evolution of WIGOS
- Link to WMO Strategic Plan
- Using existing, new and emerging technologies
- **Leading to better data, products and services from NHMSs**
- WMO, working with partners
- Major changes → science, IT, products, training, ...
- Rapid changes in implementation agents ...
- ... but principles of **sharing observations** remain
- Supersedes Vision 2025 – reflects broader scope of WIGOS; updates on observing technologies and their development
- **To be combined with Vision 2040 Space**



5. Toward an integrated Vision for WIGOS in 2040



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Integrated *Vision for WIGOS in 2040*

- Following the October 2016 Workshop, decision made to develop an overarching *Vision for WIGOS in 2040*, and to include the existing Space- and Surface-based Vision documents as Annexes, once completed
- This plan was subsequently endorsed by the Commission for Basic Systems and the Inter-commission Coordination Group for WIGOS (ICG-WIGOS)
- The current versions of the *Vision for WIGOS in 2040*, *Annex I (Space)* and *Annex II (Surface)* are included in CGMS-45 WMO-WP-1

WMO Executive Council (May 2017)

- **Recommends** {...} that the current draft Vision developed by a community of technical commission experts and representatives by the space agencies and user communities under the leadership of ICG-WIGOS [*EC-69-inf05-1(1)-WIGOS-Decisions-VISION-2040_en*] be used as the basis for further consultation with Members, satellite operators, and user communities;
- **Decides** that the Inter-commission Coordination Group on the WMO Integrated Global Observation System (ICG-WIGOS) take ownership of the further development of the Vision, including the work necessary for the integration of the two drafts into one coherent Vision document, with a view to have it approved by the Eighteenth World Meteorological Congress in 2019.

WIGOS VISION ROADMAP (as of June 9 2017)

No.	Task/Activity	Deadline/event	Responsible	Status	Comment
1.	Present the both Visions at CBS-16 as the INF docs	CBS-16 (Nov 2016)	PM/WIGOS	completed	
2.	Drafting the Vision and further elaboration the space and surface visions (without Annexes)	Dec 16	S. Barrell (sections 1.-5.); chair, ET-SAT (sections 6., 7.-space); chair, IPET-OSDE (sections 6., 7.-surface part)	open (in progress)	First draft of overarching document completed; further editing to be done in June and July; Annexes still in development
3.	Review the draft (sections 1.-7., without annexes) and the work plan Draft the list of stakeholders for consultation and list of events for presentation of the Vision	ICG-WIGOS-6 (Jan 2017)	PM/WIGOS, co-chairs, ICG-WIGOS	completed	
4.	Complete surface- and space- annexes	June-August 2017 <i>(previously April 2017)</i>	chair, ET-SAT (space part); chair, IPET-OSDE (surface part) & cleared by ICT-IOS Chair	open (in progress)	Annex II (Surface) ready by end of July; Annex I (Space) open for comments from CGMS agencies until July
5.	Submit the draft Vision to EC for further guidance Organize the Vision Side event	EC-69 (May 2017)	PM/WIGOS	completed	EC decision; no Side Event
6.	Compile the first full draft Develop a core set of Vision slides for a consultation process	August 2017	PM/WIGOS; co-chairs, ICG-WIGOS	open	Pending input from ICT-IOS (Annex II) and CGMS-45 (Annex I)

7.	Consultation with stakeholders (Technical Commission Presidents, GFCS, GCOS, GFCS, CEOS, CGMS, ...)	September- October 2017	PM/WIGOS	open	
8.	Integration Workshop with lead authors of Vision, Annex I, Annex II	November 2017	PM/WIGOS	open	
9.	Submit the Vision for consideration and guidance/recommendations for final elaboration	ICG-WIGOS-7 (Jan 2018)	PM/WIGOS	open	
10.	Submit the Vision for consideration and guidance/recommendations for its finalization	EC-70	PM/WIGOS	open	
11.	Submit the Vision for consideration	CBS-Ext.(2018)	PM/WIGOS	canceled	(no CBS-Ext 2018)
12.	Submit for approval by ICG-WIGOS-8	ICG-WIGOS-8 (Jan 2019)	PM/WIGOS	open	
13.	Submit for approval by Cg-18			open	

Summary and Conclusions

- Draft *Vision* documents for the components of WIGOS (surface- and space-based).
- Per Decision 5.4.2(1)/1 (CBS-16), ICG-WIGOS to take the lead in intergrating these two statements into a common framework as an over-arching Vision for WIGOS in 2040
- ICG-WIGOS now taking the lead in developing these into an over-arching coherent *Vision for WIGOS in 2040*, with the aim of submitting it to Cg-18 (2019) for its approval
- CGMS has been heavily involved in the development of the Space-based Vision, and will be given the opportunity to comment also on the integrated document