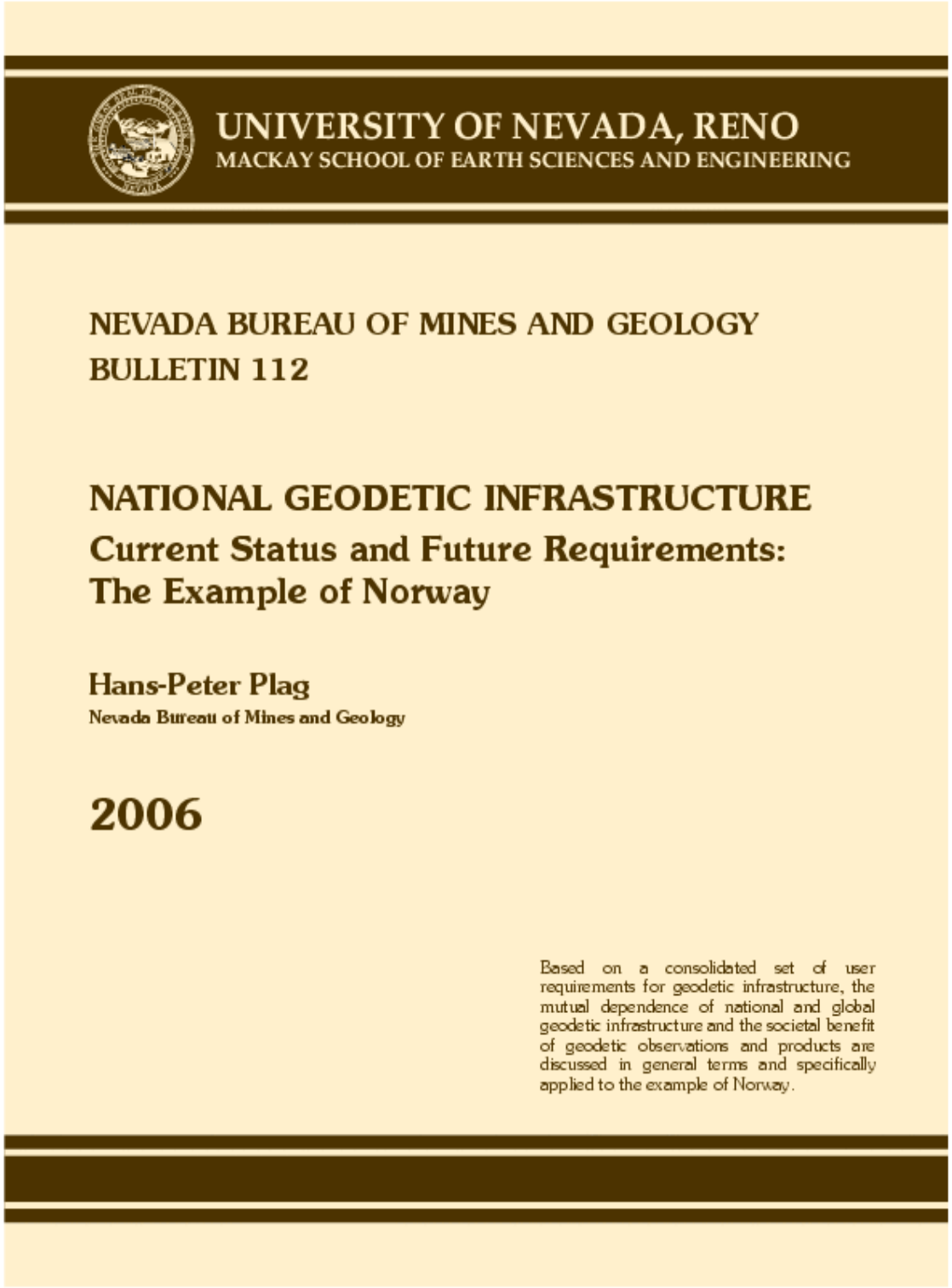
GGOS 2020: Comments on Chapter 7: Integrated scientific and societal user requirements and functional specifications for the GGOS

Hans-Peter Plag,

Quantitative user requirements

Tables with

- Quantity
- Application
- Spatial resolution
- Temporal resolution
- Reference frame
- Accuracy
- Repeatability
- Latency
- Quality of requirement



Based on a consolidated set of user requirements for geodetic infrastructure, the mutual dependence of national and global geodetic infrastructure and the societal benefit of geodetic observations and products are discussed in general terms and specifically applied to the example of Norway.

The Users and Their Requirements

Application	Parameter	Accuracy	S.R.	T.R.	Fr.	R.
Mantle convection and plate tectonics	3-d velocities	< 1 mm/yr	n/a	n/a	G	several decades
	static geoid	$< 10^{-9}$	n/a	n/a	G	and longer
	secular strain rate	10^{-15} s^{-1}	10^3 km	n/a	G	
Postglacial rebound	3-d velocities	< 1 mm/yr	10^2 km	n/a	G	several decades
	geoid	$< 10^{-9}$	n/a	n/a	G	and longer
	strain rates	10^{-15} s^{-1}	10^2 km	n/a	G	
	Earth rotation	0.1 mas/yr	n/a	n/a	G	
	local sea level	< 1 mm/yr	2 to $10 \cdot 10^2$ km	n/a	G	
Climate change, including present changes in ice sheets and sea level	3-d displacements	1 mm	10^2 km	months	G	decades
	3-d velocities	< 1 mm/yr	$< 10^2$ km	n/a	G	decades
	local gravity	< 0.3 μGal	$< 10^2$ km	n/a	L	decades
	geoid	< 10 mm	200 km	n/a	G	decades
	Earth rotation	0.1 mas/yr				
	local sea level	< 1 mm/yr	10^2 km	months	n/a	decades
Ocean circulation	gravity field	$< 10^{-9}$	10^2 km	months	G	decades
Hydrological cycle	gravity field	$< 10^{-9}$	10^2 km	months	G	decades
	3-d displacements	< 1 mm	10^2 km	months	G	decades
Seasonal variations	gravity field	$< 10^{-9}$	10^2 km	months	G	decades
	local gravity	< 1 μGal	n/a	months	L	decades
	3-d displacements	< 1 mm	10^2 km	months	G	decades
	Earth rotation	1 mas				
Atmospheric circulation	Earth rotation	1 mas		days		decades
Earth tides	gravity	0.01 μGal	10^3 km	hours	G	years
	3-d displacements	1 mm	10^3 km	hours	G	years
	strain	$^1 0^{-15}$ s^{-1}				
Surface loading	3-d displacements	< 1 mm	10^2	< 1 day	G	years
	local gravity	0.1 μGal				

Plag (2006)

Generic Functional Specifications

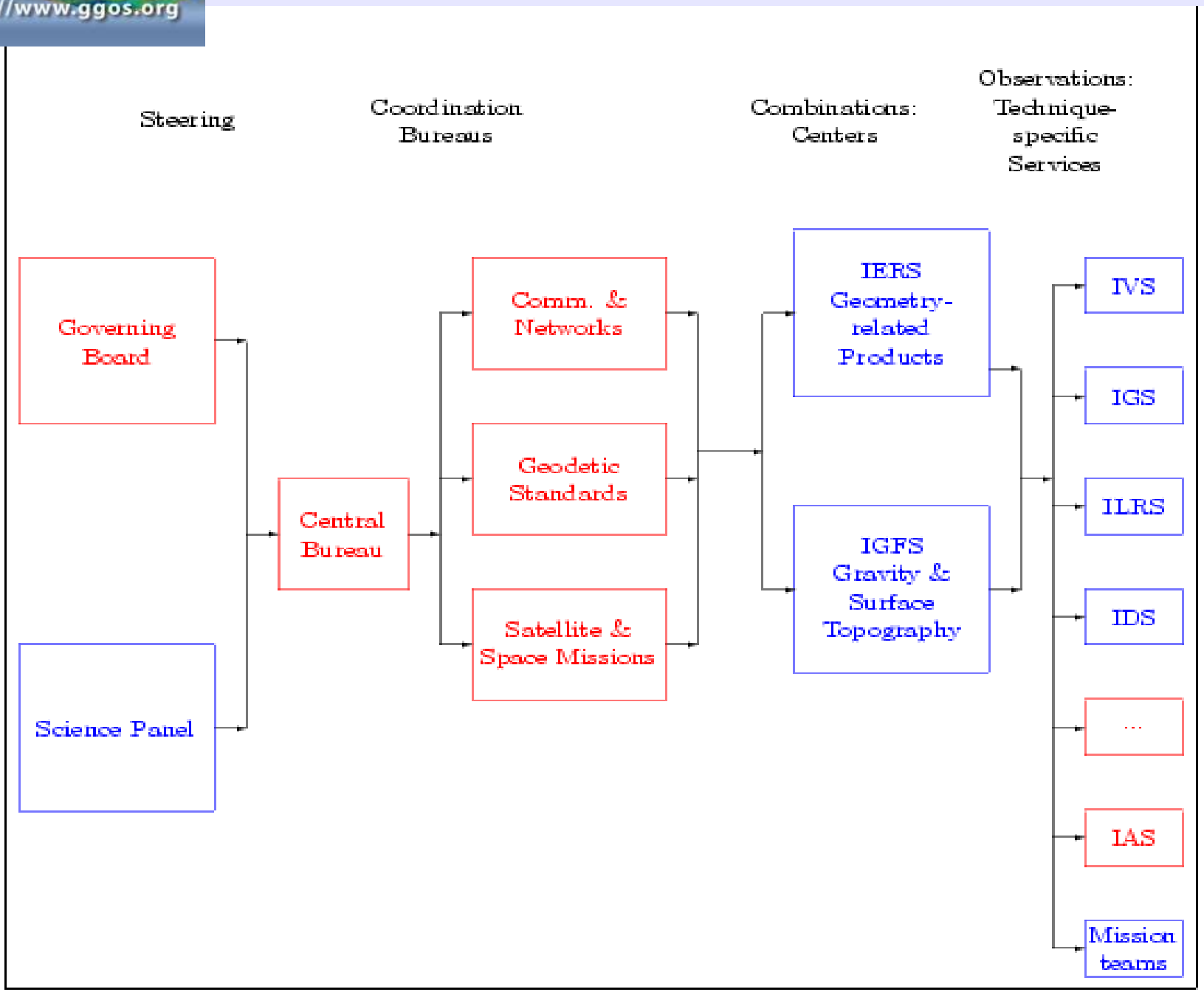
Tables with

- Application/Goal
- Observation
- User requirement
- Functional specifications
- Technical requirement
- Technique \\ \hline\hline

Generic Functional Specifications

Example:

- Goal: Determine mass balance of the Earth's ice masses
- Observation: Monitor ice surface changes over decades
- UR: Displacements of ice surface with 5 cm, 2 mm/yr
- FS: Provide global ice surface displacements with ... spatial resolution, ... temporal resolution, and ... accuracy
- TR: Maintain reference frame, continuous satellite missions
- Technique: Laser altimetry, ...


Steering
Coordination Bureaus
Combinations: Centers
Observations: Technique-specific Services
Governing Board
Science Panel
Central Bureau
Comm. & Networks
Geodetic Standards
Satellite & Space Missions
IERS Geometry-related Products
IGFS Gravity & Surface Topography
IVS
IGS
ILRS
IDS
...
IAS
Mission teams