

standard for the assessment of sustainable development at the local, regional and federal levels, and be recommended for practical use in the development and adoption of new regional solutions.

KEYWORDS:

sustainable development, index, Russian Federation regions, social development, economic development, environmental stress

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**CARTOGRAPHY ENABLING COMMUNICATION AND DECISIONMAKING
IN SUSTAINABILITY ISSUES (ECONOMIC, SOCIAL, ENVIRONMENTAL)
OF TRANSNATIONAL DECLARATIONS, CONVENTIONS,
TREATIES, FRAMEWORKS AND DIRECTIVES**

ABSTRACT

The role of cartography in multi-national or global programs [https://en.wikipedia.org/wiki/Category:United_Nations_treaties] operationalization is gaining importance for practical success at an increasing speed. The paradigm change consists mainly in the fact that it is not the final stage of visualization of facts in a sequence of digital information product generation that is the focus of cartographic competence, but instead, communication issues and corresponding decision support is immanent in the complexity of information management in all stages (Strategic Structure, Actor-Specific Requirement Analysis, Specification and System Design, Information Flow and Implementation of Active Processes, Goal Reaching Control and Recursive Guidance). Thus, Cartography is seen as the key information science discipline that enables decision making and goal-reaching control at all levels and stages in the tasks mentioned.

The cartography and geoinformation challenges of massive inter-organizational cooperation are in the adequate highly complex information components operation and real-life application in sustainability enforcement. The main strategic domains to be investigated, developed and implemented are Interoperability and Infrastructures, Analysis for Decision Support, Applied Semiotics, Situation Dynamics and Standards. It is shown that the current inherent information management deficits can be avoided to a high degree by applying and adjusting cartographic methods and technologies for use in the appropriate complexity domains of facts, actors, decisions and actions.

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Cartographic Information Science and Technology, Interdisciplinarity, Interoperability, Information Infrastructures, Documentation, Analysis, Applied Semiotics, Situation Dynamics, Standards, Information Management Deficits, Challenges

INTEROPERABILITY AND INFORMATION INFRASTRUCTURES

Although Geoinformation is currently one of the best investigated and implemented fields of science and practice in terms of interoperability needs, the challenges lie in the vast amount of interdisciplinary information sources that are expected to contribute to the different levels of decision making inherent in the above mentioned types of international frameworks.

Many of the other science and technology spheres (extended from mere environmental domains into the professional fields of economic and social influences, including e.g. the health management and operations domains (logistics)) are not yet prepared in terms of interoperability praxis in the same way as is standard now for most of the “core” geo-information data fields.

Vast interdisciplinarity leads to massive requirements in intergovernmental as well as cross-organizational infrastructures, including private domain information.

Without such methods and techniques implemented, there will be no final reproducibility, reliability, adequate control of transparency, and formal traceability of information flows in decision making.

ANALYSIS FOR DECISION SUPPORT

Cartography as an information and communication science field is deeply involved in all processes of scientific and practical scenario support for impact of different action alternatives including situative risk variability. In these processes, we face the typical combinations of context specification and dynamic context change together with basic uses of models or analytic techniques with data access and retrieval functions.

Current deficits range throughout all processes involved, including formal definition of recording / data collection, documentation, basic principles of analysis, legal framework for guidance and control of goal reaching etc.

APPLIED SEMIOTICS

Compared to the detailed investigations and standardization successes in syntax and semantics, the pragmatics domain lags far behind in comparably documented suggestions, experiences and realizations. Towards fully comprising syntax, semantics and pragmatics, specifications and implementation guidelines for the action-related modelling domains (including formal process design, implementation, runtime action and effect models) need to be developed far beyond the current typical reduction to functions of mere information transfer that are available today.

Management decision on operational actions together with appropriate goal-oriented guidance tasks rely on the availability and implementation of processes and semiotics parameters variability automation. Alternatives for decision typically go along with factual or anticipated context changes.

SITUATION DYNAMICS

All real-life management tasks follow the three elementary action principles: to do nothing / something / alternatives. The corresponding goal-reaching efforts are guided by effectiveness and degrees of urgency.

From the management point of view, there is a need for “Situative Cartography” that comprises models of fact sets, interoperability and inter-organizational use for decision and action under dynamic facts and actors change, nevertheless allowing for consistent cognition and action on complex management levels.

STANDARDS

Audits, quality assurance, not only in data (syntax), but also in semantics (Metainformation) and pragmatics (information use, decision and action).

For transnational and cross-organizational interoperability, quality issues related to the effectiveness of decisions have to come along with the implementation of audit principles and techniques for post-decision control, transparency and knowledge acquisition.

Measures and proliferation of uncertainty in complex information flows are directly related to the concepts of threshold values for decision-making and triggering of actions (pragmatics).

INFORMATION MANAGEMENT DEFICITS

Currently there is a considerable discussion on aspects of information overflow. In management terms it shows that contrary to such opinion, there is a massive deficit of data, analytics, and corresponding decision support in most of the thematic data fields and on the different levels of information management.

There is a tendency to consider not only the alternatives of possible actions but along with those also to consider the consequences in overall costs respectively, finances consequences for different decision alternatives.

Auditing in order to create liabilities or check existing liabilities for (sufficient) appropriateness and effectiveness will be inevitable for completing the information management cycle.

CHALLENGES AND EXPECTATIONS

The adequate management of complex control and guidance of information flow and action-relevant decision support will benefit essentially from the following principles to be implemented:

- Management-related situation documentation guidelines that might be based on prior experience e.g. [Hurricane Katrina, A Nation Still Unprepared (US Senate Report), 2006, <https://www.congress.gov/109/crpt/srpt322/CRPT-109srpt322.pdf>] or need to be negotiated for becoming best practice.
- Development of the inherent synergy effects between the interdisciplinary and inter-organizational approaches (in particular also the synergetic effect of elimination of information deficits as well as the effect of information infrastructures for interdisciplinary information management) with effect on the overall strategy.
- Development of transnational clearinghouses, observatories, testbeds and response mechanisms that provide high-quality technical experiments and guidance.
- Increasing evidence of cartography competences for operability issues as well as for abstraction of complexity
- Cultural issues as well as methods and techniques to grant inclusion demands.
- Needs of technical and implementation-oriented multinational committee drafts and agreements on formal models, implementations and runtime environments.

The political and societal expectations can only be met if cartographers involve their broad professional competences in the complete information management tasks and processes faced in sustainability issues (economic, social, environmental) of transnational declarations, conventions, treaties, frameworks and directives.
