Multi-view framework to assess Spatial Data Infrastructures

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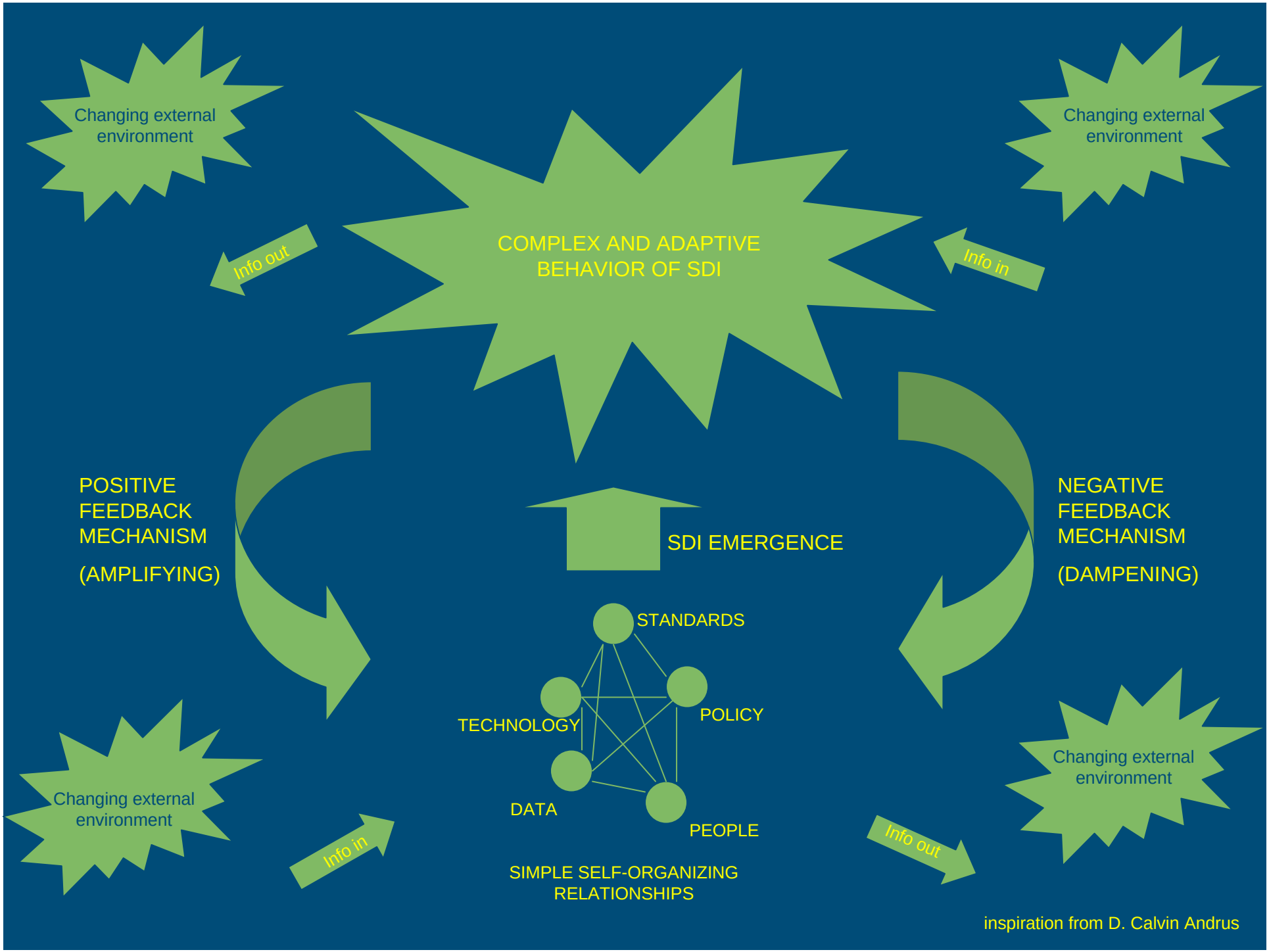
Presentation outline

- Complex Adaptive Systems
- Complexity of SDI
- Assessing Complex Adaptive Systems
- Multi-view framework to assess SDI

Complex Adaptive Systems (CAS)

- Complex Adaptive System is a dynamic network of many agents (which may represent cells, species, individuals, firms, nations) acting in parallel and constantly, and reacting to what the other agents are doing (Waldrop, 1992).
  - openness
  - self-organization
  - feedback mechanisms
  - adaptability
  - …


Changing external environment
Changing external environment
Info out
COMPLEX AND ADAPTIVE BEHAVIOR OF SDI
Info in
POSITIVE FEEDBACK MECHANISM
(AMPLIFYING)
SDI EMERGENCE
NEGATIVE FEEDBACK MECHANISM
(DAMPENING)
STANDARDS
TECHNOLOGY
POLICY
DATA
PEOPLE
Changing external environment
Changing external environment
Info in
Info out
SIMPLE SELF-ORGANIZING RELATIONSHIPS
inspiration from D. Calvin Andrus

Complexity of SDI

- Complexity built by dynamic and non-linear interactions between components
- NSDI's evolving nature
- The conceptual objectives may vary (depending on the environment e.g. country, region)

- Analyses of structure and behaviour of three SDIs - Dutch, Australian and Polish - indicate that the SDIs share the same behavioural characteristics as CAS.

Complexity of SDI

Characteristics \ NSDI case countries	Australia	The Netherlands	Poland
Openness	Very open, ASDI's array of members is very heterogeneous, ASDI participates in regional initiatives	Open; RAVI cooperates with wide range of partners	Limited openess, one dominant NSDI body, reluctant to cooperate
Feedback loop	Assessment initiatives of ASDI exists: audit, control	'Space for Geo-information' as a positive feedback loop	Limited; postulates and recommendations of SDI reports neglected
Emergence	Emergence of new bodies from inside GI community in the last years	'Space for Geo-information' program emerged from GI community	Since 2004 emergence of new bodies creating polish SDI (SADL,2005)
Adaptability	ANZLIC changed from land to spatial oriented	Adapting its status to changing environment	Adaptation to INSPIRE program
Self-organization	ASDI created only by consensus	Dutch SDI initiative was dependent on voluntary rather then mandatory participation.	Self-organization distorted likely due to top-down and formalized approach
Dynamism	e.g. Constant flow of information between state and territory SDIs	Dynamic as the postulates of first SDI vision achieved in 10 years	Limited n/a or rather dynamic but no general pattern
Unpredictability	Less unpredictable now	Unpredictability decreased by strong awareness	Very unpredictable, many SDI like initiatives have been not successful since 70s

High evidence that SDI's behave like CAS

Assessing complex adaptive systems

High evidence that SDI behave like CAS

Characteristics of the evaluated object should determine the choice of the evaluation models

Hansen (2005)

Use principles of evaluating CAS to SDI

Assessing complex adaptive systems

Principles of evaluating Complex Adaptive Systems described by Eoyang and Berkas (1998):

- framework should have flexible structure
- framework should capture various scales
- multiple approaches and views
- framework should include multiple assessment methods (case studies, questionaries etc…)

Assessing complex systems

- Truly complex problems can only be approached with complex resources (Cilliers, 1998).
- Multi-faceted view is needed in understanding concrete SDI initiative (De Man, 2006).

Assessment requirements (Chelimsky, 1997)

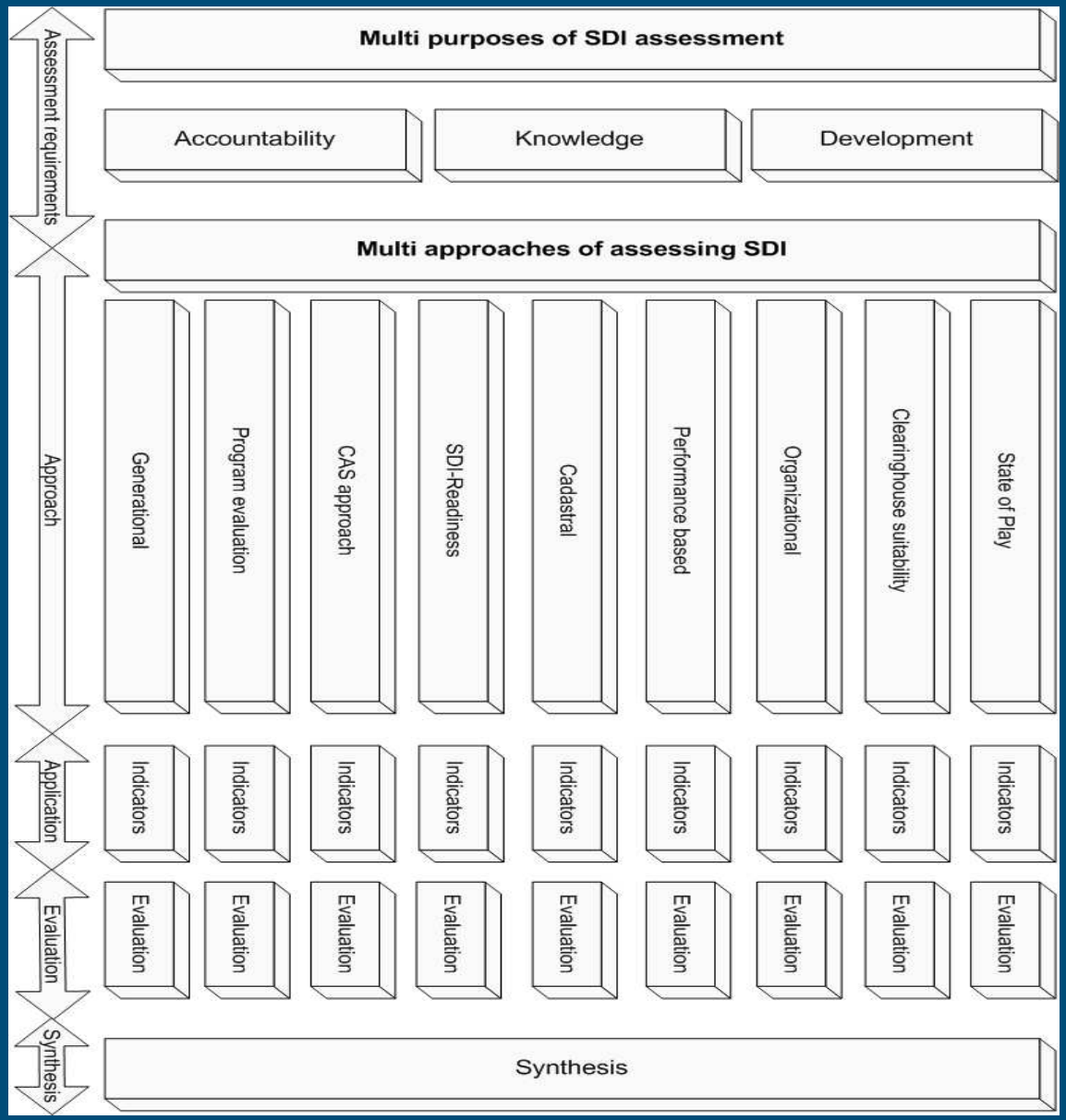
- Accountability – to test if the program works

Summative evaluation

- Knowledge – to better understand the program
- Developmental – to improve the program

Formative evaluation

Multi-view assessment framework



Approach	***Specific Goal Description***	***Status***	***Assessment purpose class***
Generational	To measure the development of SDI's worldwide	In progress	Developmental Knowledge
Program evaluation	To determine the worth and the accomplishment of the objectives of SDIs	Not developed	Developmental Knowledge Accountability
CAS	To better understand and assess mechanism and characteristics of SDI as CAS	Not developed	Developmental Knowledge
SDI-Readiness	To assess if the country is ready to embrace the SDI development	Applicable	Developmental Knowledge
Cadastral	To measure five evaluation areas of LAS	In progress	Knowledge Accountability
Organizational	To measure SDI development from institutional perspective	Applicable	Developmental
Performance based	To measure SDI effectiveness, efficiency and reliability.	In progress	Accountability
Clearinghouse suitability	To measure the development and impact of SDI clearinghouses worldwide	Applicable	Developmental
State of play	To measure the status and development of SDIs	Applicable	Developmental Accountability

Application and Evaluation

Application

- Measuring the indicators
- GSDI World Survey

Evaluation:

- Two functions:
  - Evaluation of SDIs
  - Evaluation of the framework itself and its approaches

Synthesis

- How to **integrate** the assessment results of the different approaches in order to have a comprehensive SDI assessment?

Multi-view assessment framework - summary

Some characteristics:

- covers three general assessment purposes (Chelimsky, 1997): developmental, knowledge and accountability
- acknowledges the complex and multi-faceted character of SDI
- acknowledges multiple actors (different views on SDI)
- reduces the potential biases of assessment outcomes

Thank you