A SEMI-FORMAL EXPRESSION FOR THE SUDANESE NATIONAL ICT STRATEGY HARMONIZED WITH WSIS GOALS

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ABSTRACT:

Current practices of formulating national strategies tend to express those strategies in natural text. It is very useful when putting and harmonizing strategy with relevant strategies and when conveying it to targeted audience. Despite its usefulness in expression, still the issues of correctness, ambiguity and measurability not obviuosly answered by natural language expression. Formal expressions on the other hand answer those issues but remain limited in audience. Semi-formal modeling and expressions are midway solutions that bridge the gab. A semi-formal model for the Sudanese national ICT strategy integrated with Geneva ICT indicators 2003 is presented in this paper.

ملخص:

تقدم هذه الورقة نموذج شبه صوري للإستراتيجية الوطنية السودانية لتقانة المعلومات و الإتصالات مدمج معها مؤشرات جنيف 2003. تنحي الممارسات الحالية في صياغة الإستراتيجيات الوطنية إلى التعبير عن هذه الاستراتيجيات بنصوص اللغات الطبيعية. وهذه الممارسة في غاية الفائدة في أثناء وضع و كتابة الإستراتيجيات و كذلك في مواءمتها مع الإستراتيجيات الأخرى ذات الصلة و للتواصل مع الشركاء المستهدفين. و علي الرغم من فوائد هذه الممارسة في التعبير عن الاستراتيجيات لكن يظهر قصورها الواضح عند التعرض لقضايا التمحيص من أجل الصحة و الخلو من الغموض و إمكانيات القياس، وبالمقابل الممارسة المقابلة و التي تتمثل في التعبير عن الإستراتيجيات بالطرق الصورية تجيب عن القضايا السابقة لكن يظهر قصورها في محدودية من يفهمونها. النمذجة و الصياغة شبه الصورية تمثل حلاً وسطاً يجسر الهوة.

INTRODUCTION:

Strategies have been described by Newman et al as "forward-looking plans that anticipate change and initiate actions to take advantage of opportunities that are integrated into the concept or mission of the company" [Newman et al. 1989]. In 2001, the Sudanese Government had approved a national strategy for ICT industry (SNS-ICT) to guide the development in this strategic field [GOS 2001]. The strategy was expressed in Arabic natural text in hundreds of pages. The ICT sector had developed fast in the late 1990th and the early 2000th to be the 4th component of the Sudanese economy. Besides the direct contribution of ICT in the national economy; it is well known the role of ICT as an enabling agent for the other sectors [WSIS 2005a]. An estimation of the size of this sector is given by the author to exceed ten billion USD by the end of 2006 with an opportunity to grow double within 5 years. This fast development was not necessary all due to or inline with the SNS-ICT. This is a typical case highlighted by Kaplan and Norton when they had advocated the creation of Office of Strategy Management OSM [Kaplan & Norton2006]. The work presented in this paper was initiated by the Higher Follow-Up Committee for the National Strategy for ICT Industry (HFC–SNS-ICT), in the Council of Ministers of Sudan Government.

In this paper an intermediate definition (semi-formal format) was developed for strategy modeling that benefited from the format used to define the UN MDG strategy [MDG-UN 2000]. The format was then used in expressing the SNS-ICT. The document sits between the formal definition and the natural text and is developed to work as a blending agent for the two approaches defined earlier and works in line with Quinn approach. A transformation was made from the natural text into a more structured format that summarizes the strategy SNS-ICT and puts it into a more formal format. Moreover performance measurement key performance Indicators (KPI) was introduced in the strategy as part of the intermediate document (which was not part of the original document). World Summit of Information Society [WSIS 2003b] and [WSIS 2005b] nominated some ICT indicators [WSIS 2003a] to be collected at all countries. These indicators were adopted as part of the introduced KPIs in the new definition of SNS-ICT. Another development (that is not reported here) which benefited from this work was the development of a formal model for SNS-ICT using Balanced Score Cards [Rayis et al 2005] then implemented with ARIS case tool [Sch et al 2003].

It was only then possible to link the strategy to operational programs to compare the current state of implementation to planned figures. Useful references for the values of the initial state of the strategy and further developments were found in [Yusuf 2002], [Ali et al 2004], [Ali 2005] and [Salih 2005].

STRATEGY FORMATION PROCESS:

In regard to strategy formation process, Hax& Majluf defined two main schools namely Formal-analytical process vs. power-behavioral approaches. Hax& Majluf described the Formal-analytical approach as "Strategy formation is regarded as a formal and disciplined process leading to a well-defined organizational-wide effort aimed at the complete specification of corporate, business, and functional strategy." The second approach was also characterized as emphasizing "issues such as multiple goal structures of organizations, the policy of strategic decisions, executive bargaining and negotiation processes, the role of coalitions in strategic management, and the practice of "muddling through"" [Hax & Majluf 1986].

Yet a third approach advocated by Quinn is to have a blended approach to strategy formation and expression Quinn described the approach as "Effective executives artfully blend formal analysis, behavioral techniques, and power politics to bring cohesive step-by-step movements toward ends which initially are broadly conceived, but which are then constantly refined and reshaped as new information appears." [Quinn 1980].

Strategy specification was defined by Winter & Fischer as "hierarchy of organizational goals and success factors, product/service model, targeted market segments, core competencies, strategic projects, maybe business princ-iples and dependencies between these artifacts." [Winter & Fischer 2007]. Strategy modeling and formalization is vital for validation, verification, and performance measurement and follow-up. To quote; Winter stated "By increa-sing the degree of formalization of strategy modelling, model consistency can be enhanced and specifications can be reused in subsequent business engineering phases like process (re-)design and information systems develop-ment." [Winter 2002]. The degree of formalization in which the strategy is expressed is subject to many factors. The most important is the audience, the

degree of robustness and consistency of the specification. A good guide for adopting formal techniques in a business environment can be found in [Stidolph & Whitehead 2003].

STRATEGY FORMATION DEFINITION:

The adopted format for the strategy definition is presented in this section as: a strategy is a set of statements which are: the vision, mission and n objectives which is composed of n directives each of which is described by finite number of pairs of Perspectives and Performance Indicators. A strategy map relates the components of the strategy in different layers in a cause-effect relationship.

$Str = \{V, M, [ob [Dir [Per, KPI]]]\}$ **Where:**

Str is a Strategy, V is a vision, M is a mission, Ob is a set of finite objectives, Dir is a set of directives achieving a specific objective, for each directive there are entries [**Per,KPI**] where Per are perspectives of a directive and KPI are its Performance Indicators.

In a less formal format this is defined as:

Str is:

Vision: <state Vision in a compact Phrase>

Mission:<state Mission (multi-folded expressions are allowed)>

Objectives:<state keyed objectives>

For each objective define a set of directives <[directives]>

For each directive define pairs <[Per,KPI]>

A visualization of a strategy may look as shown in Figure 1. This visualization is adopted from IDS Schere [Sch et al 2003]. A strategy is seen as a pyramid, with vision in the top followed by mission in the next layer, then objectives then directives and action plans. Action plans are specific projects working on perspectives to maintain its values of KPIs within the planned range. Cause – effect relations links different entities of the strategy map.
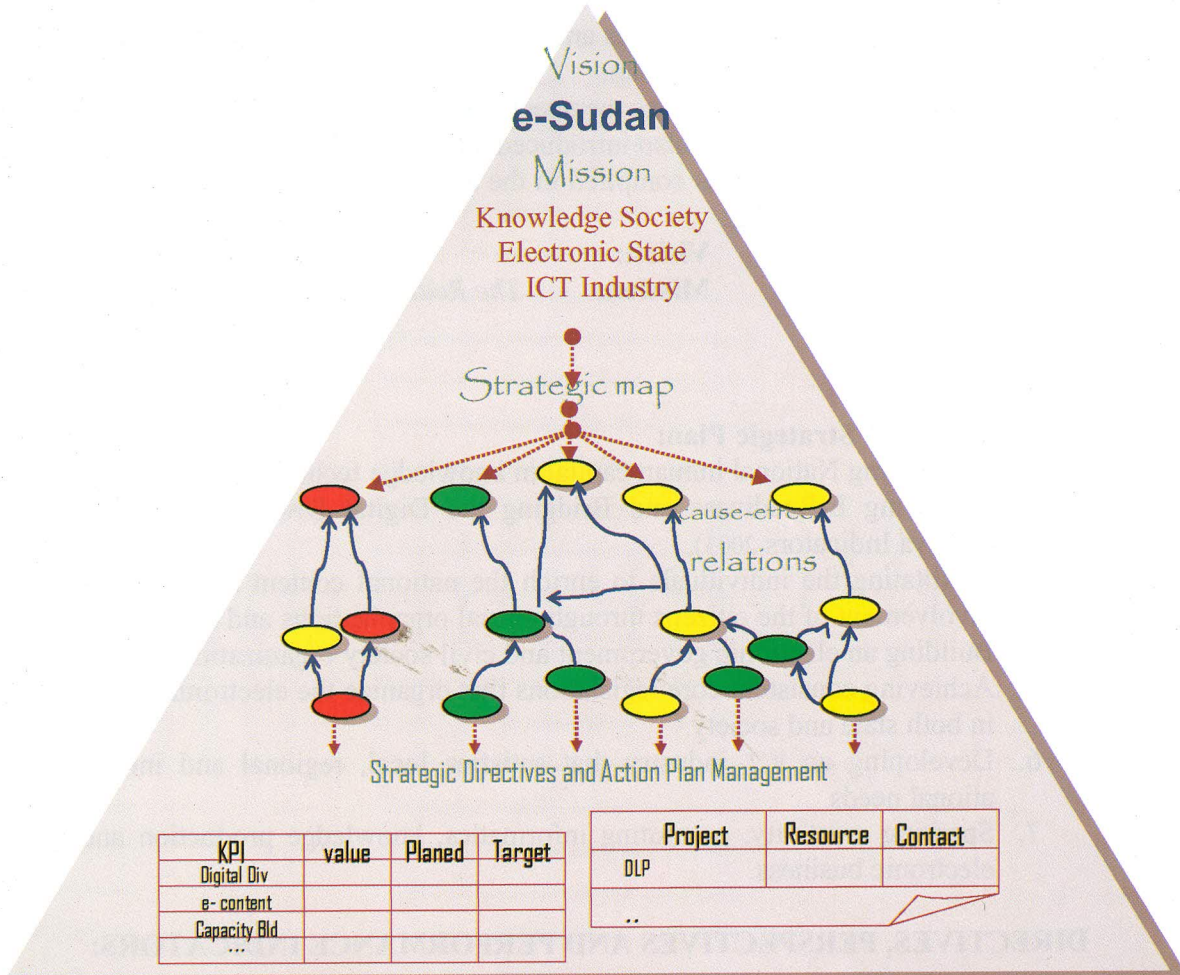
Figure 1. Strategy Visualization Format

SUDANESE ICT STRATEGY DEFINITION:

In this section the Sudanese national ICT strategy SNS – ICT was formulated in the following steps:

1. The SNS – ICT document was restructured and vision and mission were defied.
2. From the pages of natural text objectives were abstracted, then described by their directives.

3. For each directive perspectives and KPIs were searched from the text and linked to it in the strategy map.
4. Missing elements (directives, perspectives and KPI) were introduced and Geneva indicators were also introduced and integrated.
5. The whole strategy was compiled in the adopted format, which is presented in the following:

Vision:	*e-Sudan*
Mission:	*The Realization of a:*
	Knowledge Society,
	Electronic State and
	ICT Industry

Objectives of the Strategic Plan:
1. Developing National human capital in knowledge technologies,
2. Achieving E-Readiness and Bridging the Digital Divide (Integrating Geneva Indicators 2003),
3. Facilitating the individuals to enrich the national content and political involvement of the citizens through virtual organizations and e-voting
4. Building an electronic government and civil society organizations
5. Achieving consistent core legislations that organize the electronic works in both state and society.
6. Developing an ICT industry that satisfies local, regional and international needs
7. Sparking creativity, promoting informatics, knowledge production and electronic business.

DIRECTIVES, PERSPECTIVES AND PERFORMANCE INDICATORS:

1. Developing National human capital in knowledge technologies
1.1 Digital Literacy

No	Target	Performance Indicators
1	State and civil servants	Upper Management ≈% 100 Middle Management and clerks ≈% 100 Workers≈ 50%
2	Society	Youth ≈% 60 Women≈ % 40 Kids≈% 100

1.2 Developing Critical Mass of ICT Professionals & Experts

No	Target	Performance Indicators
1	State, civil servants, Society Organs	Upper Management (DSS& MIS) ≈ % 100 Middle Man., clerks OIS&MIS≈ % 100
2	Expatriate ICT Experts Return, International Experts Recruitment and Stopping Brain Drainage	Living Standard ≈ DBX Level Recruitment Ratio≈ % 100

1.3 Capacity Building in ICT and Knowledge Technologies

No	Target	Performance Indicators
1	Graduation of ICT specialists	9000 Graduates in technician level 3000 Graduates in Bachelor Level 300 Graduates in Master Level 30 Graduates in Ph.D. Level
2	Integration of ICT studies in all higher education Studies	%10 of syllabi in Theoretical Disciplines %20 of syllabi in Applied Disciplines

DSS: Decision Support Systems,
MIS: Management Information Systems,
OIS: Operation Information System.
≈ represents the target value for the indicator.

2. Achieving E-Readiness and Bridging the Digital Divide (Integrating Geneva Indicators 2003)

2.1 Achieving e-readiness

No	Target	Performance Indicators
1	Elevating Family and household readiness	1- Increasing households with radios to 90% (HH-1) 2- Increasing households with TV to 80% (HH-2) 3- Increasing households with fixed telephone line to 60% (HH-3) 4- Increasing households with PCs to 50% (HH-5) 5- Increasing households with Internet to 90% (HH-7) 6- Increasing households with Internet cyber-workspace to 10%
2	Elevating Individuals readiness	1- Increasing individuals with mobile phones to 20% (HH-4) 2- Increasing individuals to at used PCs in the last 12 month to 90% (HH-6) 3- Increasing individuals t to at used the Internet in the last 12 month to 90% (HH-8,9)
3	Levering the ICT infrastructures	1-Covering all the Sudanese territories with digital communications 2-Reducing communication costs to DBX levels
4	Bridging the Digital Divide between rural and suburban areas	1- Providing all villages and avenues with direct access centers 2- Contributing 10% of achieving the millennium development goals MDG

HH-X: Geneva indicators 2003

3. Facilitating individuals to enrich national content and political involvement of citizens through virtual org. and e-voting

3.1 Promoting the production, distribution, publishing and usage of national content

No	Target	Performance Indicators
1	Development of cultural and political content	1- Building web sites for each and every public and civilian organization 2- Building web sites for each and every national news paper, magazine, publishing house, theater, TV stations and radio station and regularly updating it. 3-Providing content with all national Languages and dialects.
2	Development of national scientific content	1-Electronic publishing of all postgraduate thesis, scientific reports and research (Production of 200000 cyber-knowledge object/annum)
3	Development of Sudan Atlas (in 6 UN official languages)	1- Development of 1000 information object / week

3.2 Achieving the ability of the national cyberspace to integrate, interact and compete within the cyber globe

No	Target	Performance Indicators
1	Establishing a positive image of the national profile in the cyber globe	1- Achieving a national excellence in high quality national graphics and multimedia on the web. 2- Digital conversion of %100 of rich national cultural and folkloric available in other formats.
2	Sparking Sudanese expatriates and internationals in enriching the Sudanese cyberspace.	1- 10000 Sudanese contributions/week 2- 1000 international contribution/week
3	The positive in international issues,polls and newsgroups	1- 100000 contribution/week

3.3 Achieving Information Democracy

No	Target	Performance Indicators
1	Citizen rights to direct access for information	1-Publishing basic information,policies, plans and annual performance reports
2	Achieving positive interaction between citizens and their reps in Parliament.	1- response to all citizen enquires through the electronic systems 2- reducing response time to 24 hours

4. Building Electronic Government and Electronic Civilian Community Organizations

4.1 Building and approving the systems

No	Target	Performance Indicators
1	Building e-Government systems	1-Accomplish of 25% of government systems annually 2-Achieving the integration of the systems
2	Building the systems of parties and civilian community organizations	1-Developing web sites for all political parties and civilian community organization

4.2 Achieving Transparency, Reliability And Forming Base For Fair Governance By Implementing The e-Government

No	Target	Performance Indicators
1	Achieving efficiency and transparency of government systems	1-leveraging managerial efficiency by 100% in government sector, private sector and civilian community organizations 2-Deploying all management processes and keeping the history records for 25 years at least.
2	Protecting all systems and securing their reliability	1-Protecting all systems and securing them by double the power factor 2-Keeping they systems reliable for 24/7/365 by 99,9999 %
3	Using information technology in governance and management	1-Achieving response time of 24 hours

5. Achieving legislation consistency for managing digital activities in the society and the state

5.1 Finding the suitable organizational environment for the information industry activities to grow

No	Target	Performance Indicators
1	Protecting privacy and intellectual property	2-Approving and implementing privacy low and digital signature 3-Approving and implementing intellectual property low
2	Protecting the activities and electronic wealth	4-Approving and implementing electronic transactions low 5-Approving and implementing anti-computer crime low 6-Improving the specialized justice and police entities.
3	Achieving consistency with international lows	

5.2 Achieving system and information security and consistency of policies

No	Target	Performance Indicators
1	Developing commercial and financial information protection systems	1-reducing percentage of inter and intra hacking down to 1%
2	Enabling monitoring on activities	2-establishing specialized centers and councils
3	Achieving integration and consistency within government policies	3- Merging ministries of Communications and Information & Information Technology

6. Developing An ICT Industry That Satisfies Local, Regional And International Needs:

6.1 Building a Strong Base for Information Industry

No	Target	Performance Indicators
1	Achieving a considerable economic growth	4- Contributing 10% GNP 5- Attracting 200 million USD of international investment per annum.
2	Wealth development, poverty eradication and increasing employment opportunities	1- Achieving 25% growth in the business market 2- Achieving 100% growth ratio in Employment opportunities. 3- Building 1000 development cells in rural and poor areas.
3	Levering IT production quality and rates	1- Reducing production cost and time by 25%. 2- Achieving international quality rates. 3- Maintaining a classified record for all companies, institutions and professionals.

6.2 Realizing State Commitment in Sparking IT industry

No	Target	Performance Indicators
1	Launching Pioneer projects	1- Offering 10 pioneer e-government projects every year. 2- Sudan Electronic City (MOST). 3- Sudan-Sat (MOST) 4- PC assembly ≈1000000/anum (MOST)
2	Providing finance for IT industry	5- Providing 150 million USD Budget for e-government per annum. 6- Introducing ICT development and maintenance article in all government and private budgets. 7- Facilitating 300 million USD for ICT industry
3	Achieving a positive business environment.	1- Combating business barriers 2- Custom exemption for ICT products and services 3- Tax exemption for companies operating in ICT. 4- Promoting high investment privileges for ICT industry.

7. Sparking creativity, promoting informatics, knowledge production and electronic business.

7.1 Supporting digital creativity

No	Target	Performance Indicators
1	Achieving excellence and creati - vity	1. Arranging 10 annual competitions and award in the information industry
2	Being developed and	2. Smart Village and tech- incubato/ state 3. Supporting 1000 creative each year 4. Financing and supporting digital products: 1000 products annually.

7.2 Encouraging information production

No	Target	Performance Indicators
1	Developing national production	1. Achieving 70% self satisfaction in software products (MOST) 2. Transferring 25% of the systems into open-source 3. Approving national standards in 60% of the products.
2	Leveraging information and knowledge exports	1. taking top 3 international information products and services 2. contributing with 20% of total exports

7.3 Encouraging electronic commerce

No	Target	Performance Indicators
1	Developing Sudanese ecommerce websites	1. Building 10 stocks and central digital markets annually 2. Building 500 commercial websites for the companies each year.
2	Merging ICT with the commercial business	1. Offering and approving digital payment facilities. 2. Offering e-commerce portals 3. Offering government tenders and procurements into the Gov e-Procurement Portal
3	Increasing commercial electronic exchange	B2B to $5 B, G2B to $2 B,C2B to $2 B C2G to $2 B

CONCLUSIONS:

A semi formal model for the Sudanese National Strategy for ICT industry was given. Many benefits had been gained namely:

- The compact representation achieved by semi-formal modeling made easy to have a comprehensive understanding (Top View) for the strategy.
- Ambiguity is minimized to a very high extent, cross validation and harmonization is possible.
- Follow up of performance based on a concrete ground is available.
- A next advanced stage is reached where the strategy is available for complete formal modeling based on balanced score cards.

A template for strategy modeling is reached in an ad-hoc manner. This template forms a nucleus for a methodology for strategy development.

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