An overview of the Threshold 21 (T21) Framework

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1. Background: the Millennium Institute (MI)
2. T21: History
3. T21: the Starting Framework
4. Conclusions
Millennium Institute – Mission

Help people and organizations enhance insight for decision-making in complex systems towards the development of a global sense of shared responsibility about our common future.

• Developing and disseminating advanced analytical tools that support prospective strategic planning

• Increasing capacity among a broad range of partners in System Dynamics and Threshold 21 around the world
1980: Dr. Gerald O. Barney directs the Global 2000 Report for President Carter
1983: Millennium Institute is founded
1983-1993: Research on national planning models (Managing a Nation)
1994: First application of T21 (Bangladesh)
Recent evolution: 1995 - 2007

- Applications in over 25 countries
- Trained hundreds of people
- Broadening of basic structure
- Continuous update of key relationships
- Development of user interface
Recent evolution: 2005 - 2007

- Series of external reviews:
  - Jack Homer (MIT)
  - University of Bergen
  - UNDP

- Open source – non commercial purposes
- Models’ library for download
History of T21

T21 applications worldwide
1. Identification of key issues to be analyzed
2. Data collection and analysis
3. Training Phase I – min. 6 weeks
4. Development of T21-Country first version
5. In-depth analysis and discussion of results
6. Training Phase II – min. 2 weeks
7. Modification of the model => final version
8. Analytical report, documentation and user version

Time required: Min. 6 months
The model was originally built for serving three purposes:

(1) Studying mid-long term development issues

(2) Testing alternative policies

(3) Enhancing learning about system

=> Support mid-long term planning through understanding of the system
Necessary characteristics for mid-long term planning models:

1. Endogenously represent key variables (E)
2. Comprehensive (C)
3. Properly represent dynamic complexity (D)
4. Transparent (T)
Exogenous vs. Endogenous GDP

GDP → Gov. Revenue → Gov. Expenditure

Economy

Society

Environment

T21 Overview

Exogenous vs. Endogenous GDP

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### Overview of Approaches

#### Commonly used approaches

<table>
<thead>
<tr>
<th>Approach</th>
<th>Software</th>
<th>E</th>
<th>C</th>
<th>D</th>
<th>T</th>
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<tbody>
<tr>
<td>Accounting spreadsheets</td>
<td>MS-EXCEL</td>
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<td>EVIEWS</td>
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<tr>
<td>System dynamics</td>
<td>VENSIM</td>
<td>YES</td>
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</table>
Strengths of System Dynamics - Vensim approach:

1. Proper representation of complexity
2. Multidisciplinary
3. Transparent – User friendly
4. Flexible
5. Powerful
T21 Overview

Time Horizon of Analysis

National Vision

Mid Term Strategic Plans

National Development Plan

MDG Strategies

Yearly Budgets
T21 Overview

Type of issues at stake

Some examples of issues T21 can address:

• Poverty
• Economic and demographic growth
• Access to social services
  – Education
  – Healthcare
• Environmental sustainability
• Energy transitions
• …
T21 Overview

Type of model

- System Dynamics model
- Dynamic
- Model is solved via simulation
- Uses sensitivity analysis (Kalman filtering)
- Uses optimization techniques (Montecarlo)
- Represents causal relationships
- Structural approach
T21 Architecture

Population
Labor
Education
Health
Infrastructure
Poverty

Society

Births
Deaths

Government
Households
Technology
Row

Investment
Production

Revenue
Expenditure
Financing
Debt

Agriculture
Industry
Services

Environment

Land
Water
Energy
Minerals
Sustainability
Emissions

Water Demand
Water Supply

Energy Demand
Energy Supply
Advantages and Limitations

Advantages of T21 approach

1. Captures overall socio-economic-environmental developments
2. Proper representation of dynamic complexity: Feedbacks and Delays
3. Multidisciplinary
4. Transparent – User friendly
5. Flexible
6. Powerful engine - Vensim
Limitations of T21 approach

- Mid-long term approach: misses short-term dynamics
- National/Global perspective: does not consider local diversity
- Medium-High level of aggregation: parameters are averaged by sector
- Requires active involvement of client in definition of model’s structure
T21 Applications: examples

- Mali: PRSP II & MDG analysis
- Mozambique: Agenda 2025
- Jamaica: Development Plan
- Ghana: MDG Analysis
Activities

- Develop T21-Starting Framework (SF): Open Source, for non-commercial purposes
- MCM customization
- T21-SF customization
- On site custom training (2 weeks)
- 6-week training
- 2-day Development exec. course
Millennium Institute

Vision for the future

- Internationalization and decentralization
- Emphasis on MDG and national priorities
- Emphasis on Africa (& developing nations)
- Capacity building for long term (Universities)
- New partnerships (public & private) - UNU
Thank you for your attention

Questions and comments are welcome

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