HARVARD
GRADUATE SCHOOL OF EDUCATION

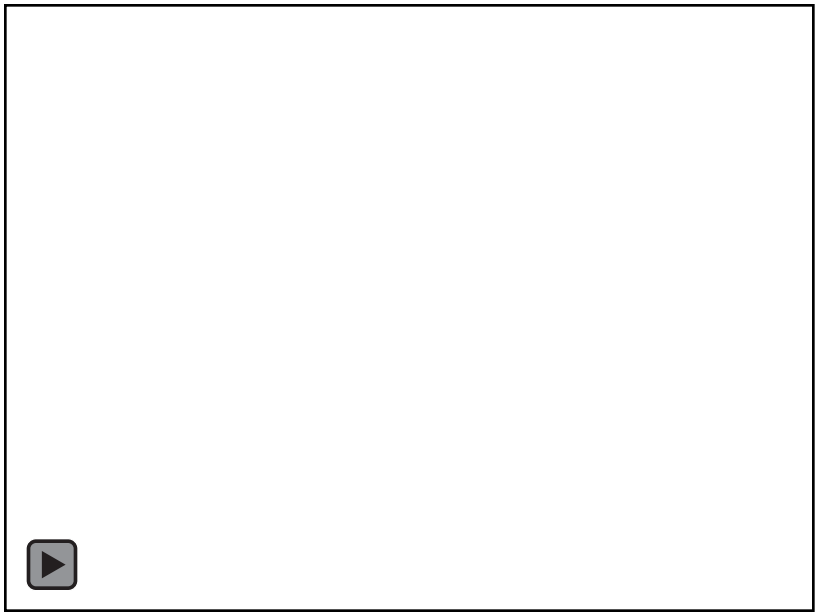
Systems Thinking for Educational Transformation

Dr. Tom Cassidy

This presentation includes audio. The transcript is available to the left. A print version is available in the [Resources] tab above.

Duration: 36 minutes

Objectives



- To provide a brief introduction to *“systems thinking”* for education leaders.
- To encourage you to think systemically about the work that you do.
- To encourage you to become “systems thinkers” and system thinking leaders.

Readings

- Fullan, Michael (2005). ***Leadership and Sustainabilty: Systems Thinkers in Action.*** (Newbury Park: Corwin Press)
  - ❖"The Starting Point" Pp 1-11
  - ❖"Leadership at the System Level" Pp81-98

- Senge, Peter et al (2000). ***Schools That Learn: A Fifth Discipline Handbook for Educators, Parents and Everyone Who Cares About Education.*** (New York: Double Day)
  - ❖"Orientation" Pp 3-19
  - ❖"A primer on the Five Disciplines" Pp 59-98
  - ❖- "Systems Thinking" Pp231-253.

- Benson, Tracy (nd). "Developing a Systems Thinking Capacity in Learners of All Ages," The Waters Foundation.

The Five Disciplines of a Learning Org

1. Personal Mastery	Self focus, life-long learning
2. Mental Models	Self reflection & inquiry
3. Shared Vision	Mutual purpose
4. Team Learning	Group interaction skills
5. Systems Thinking	Understanding complexity; linkages, interdependencies

(From "Schools That Learn" by Peter Senge et al)

Mental Models

"Mental models are deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world *and how we take action"*

-Peter Senge

"…new insights fail to get put into practice because they conflict with deeply held internal images of how the world works, images that limit us to familiar ways of thinking and acting." -Peter Senge

What are we referring to when we say "Systems Thinking?"

A perspective on reality that focuses on sharpening our awareness of systems and how the parts of a system interact.

A way of understanding reality that emphasizes the relationships among a system's elements, rather than the elements themselves.

"The whole is greater than the sum of its parts."

From Barry Richmond, High Performance Systems

What are we referring to when we say "Systems Thinking?"

A set of tools - such as causal loop diagrams, stock and flow diagrams and simulation models - that help us visualize, map and explore dynamic complexity.

A special vocabulary with which to express ones understanding of dynamic complexity. For example, systems thinkers often describe the world in terms of reinforcing and balancing processes, limits, delays, patterns of behavior over time…

From Barry Richmond, High Performance Systems

What is a “System?”

- A system is a set interrelated elements that are organized to achieve a common purpose.

- Systems can be natural or man-made; simple or very complex.

- Systems vary on a number of key characteristics
  - Degree of Openness
  - Number of levels within the system *(Hierarchy)*
  - Degree of self-regulation *(Homeostatic Balance and Feedback)*
  - Purposiveness *(Number and complexity of goals)*

Why is systems thinking important for educators?

- Increasingly complex world that we all live in
- Increasingly complex education landscape
- Accelerating pace of change
- Many of our shortcomings in education can be explained by a lack of alignments among key system components
- Shift in education goals and objectives
  - From: Access, Maintenance and Control
  - To: Quality, Performance and Development
- Improving education quality requires greater attention to alignments and linkages
- We need skills, methods and *the habit of mind* to better identify and understand critical alignments and linkages

Education: A Story of Misalignments

- Education systems out of alignment with evolving and changing demands of business and industry.
- Students without the requisite knowledge, skills and attitudes to find meaningful employment and participate fully as responsible citizens in community.
- Students moving from one level in the system to the next, ill-prepared to succeed at the next higher level.
- Teachers graduating from professional programs with limited knowledge of new teaching-learning methods and limited ICT skills.
- Ministry structures and processes out of alignment with the needs of schools.

Why all these misalignments?

Because most past reform efforts, even those professing to be holistic efforts, have not been really been guided by a systems perspective. Attention to alignments and integration have been limited at best.

They've been component-based often with multiple parallel initiatives but with little real attention given to the integration and alignment of interventions.

Increasingly complex education landscape

- Changes in the world of work.
- Rapidly evolving ubiquitous technology (ICT).
- Changes in the knowledge and skills students need.
- Changes in what we know about the conditions necessary for effective teaching-learning.
- New knowledge and theories about child development and learning theory.
- Changes in our understanding of the physiology of learning (mind-brain).

"For every complicated problem there is a simple solution…

…and it is wrong."

- H.L. Mencken

“For every complicated problem there is a simple solution… and it is wrong.”

H.L Mencken

“Insanity is doing the same thing over and over and expecting a different result.”

Albert Einstein or Benjamin Franklin or ??

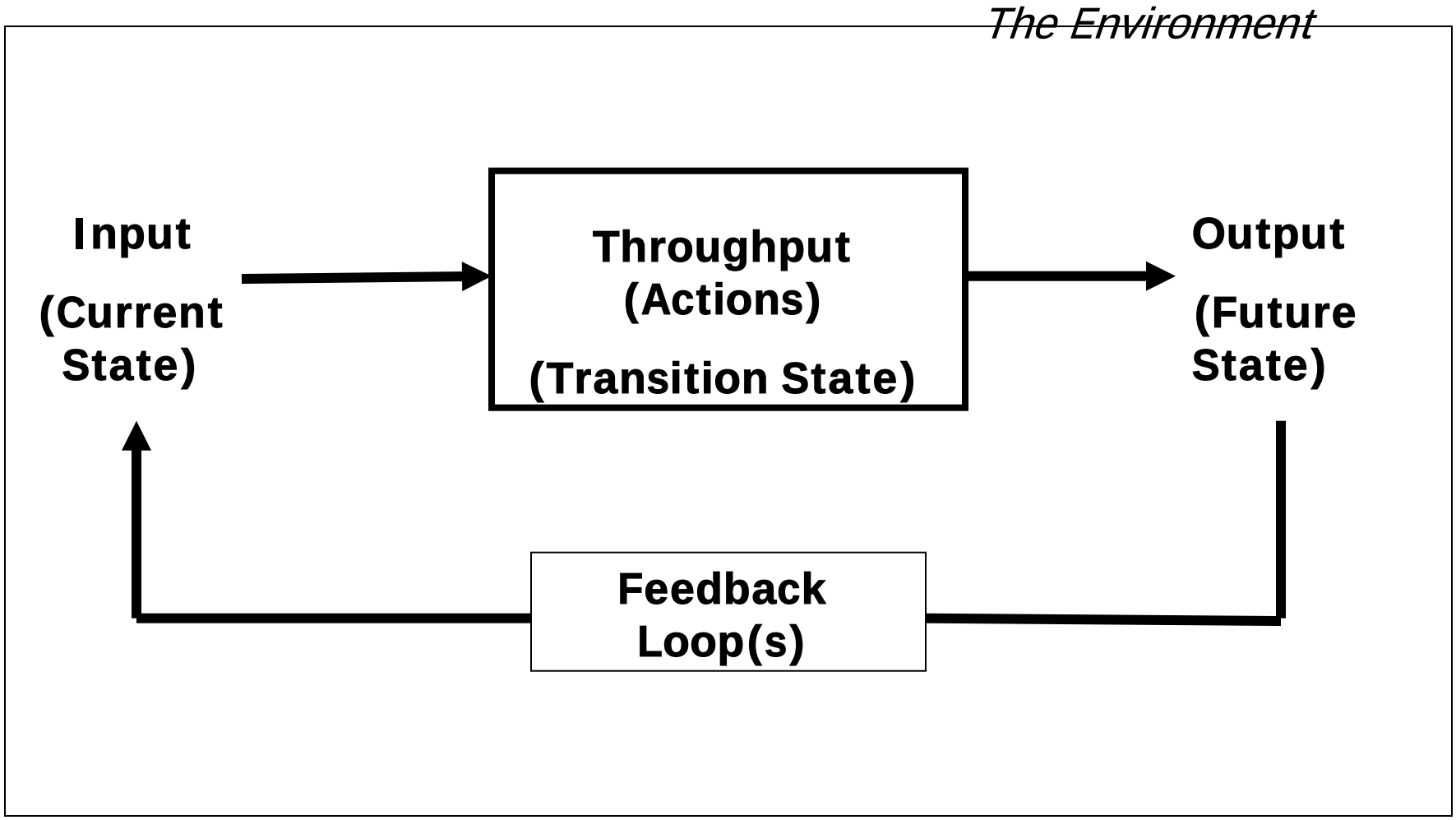
“No problem can be solved from the same level of consciousness that created it.”

Albert Einstein

What is Systems Thinking?

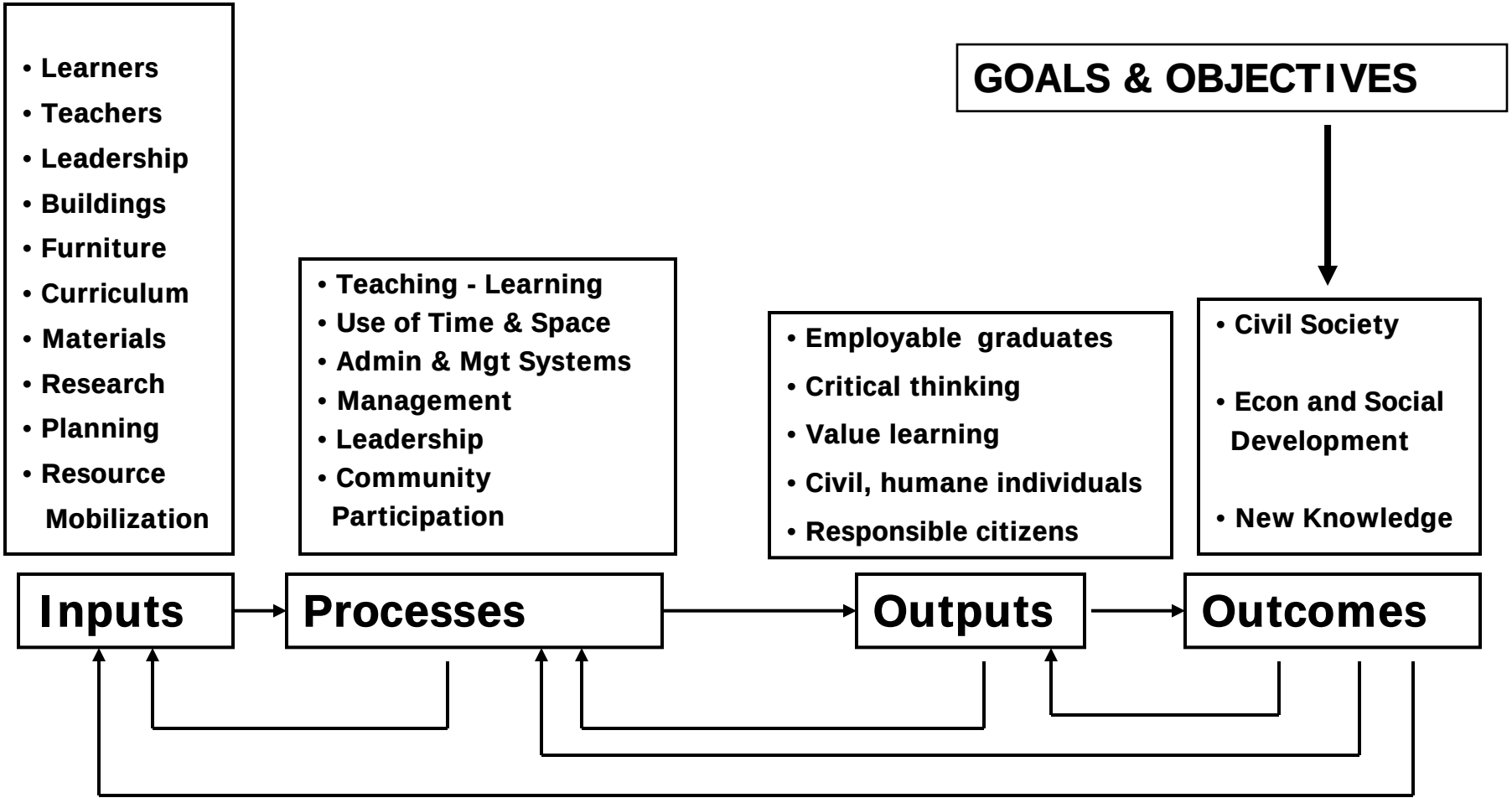
- Learning to see the “big picture.”
- Learning see *dynamic* complexities, as well as *detail* complexities
- Learning to see more than an endless succession of events; learning to see, understand and use *patterns of defining structures.*
- Learning to see the short, longer-term unintended consequences
- Understanding complexity; seeing linkages, alignments and interdependencies.

“General” Systems Theory



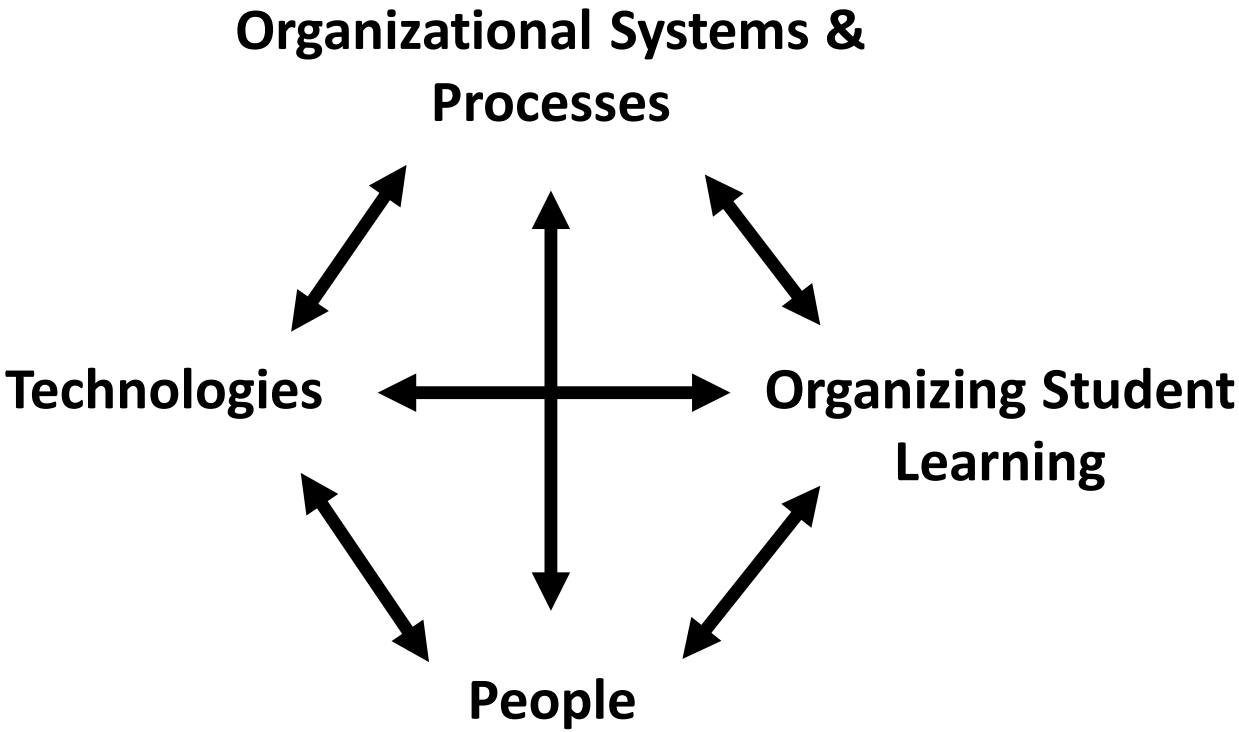
Ludwig Von Bertalanffy (1940s)

Economic, Political, and Social Context



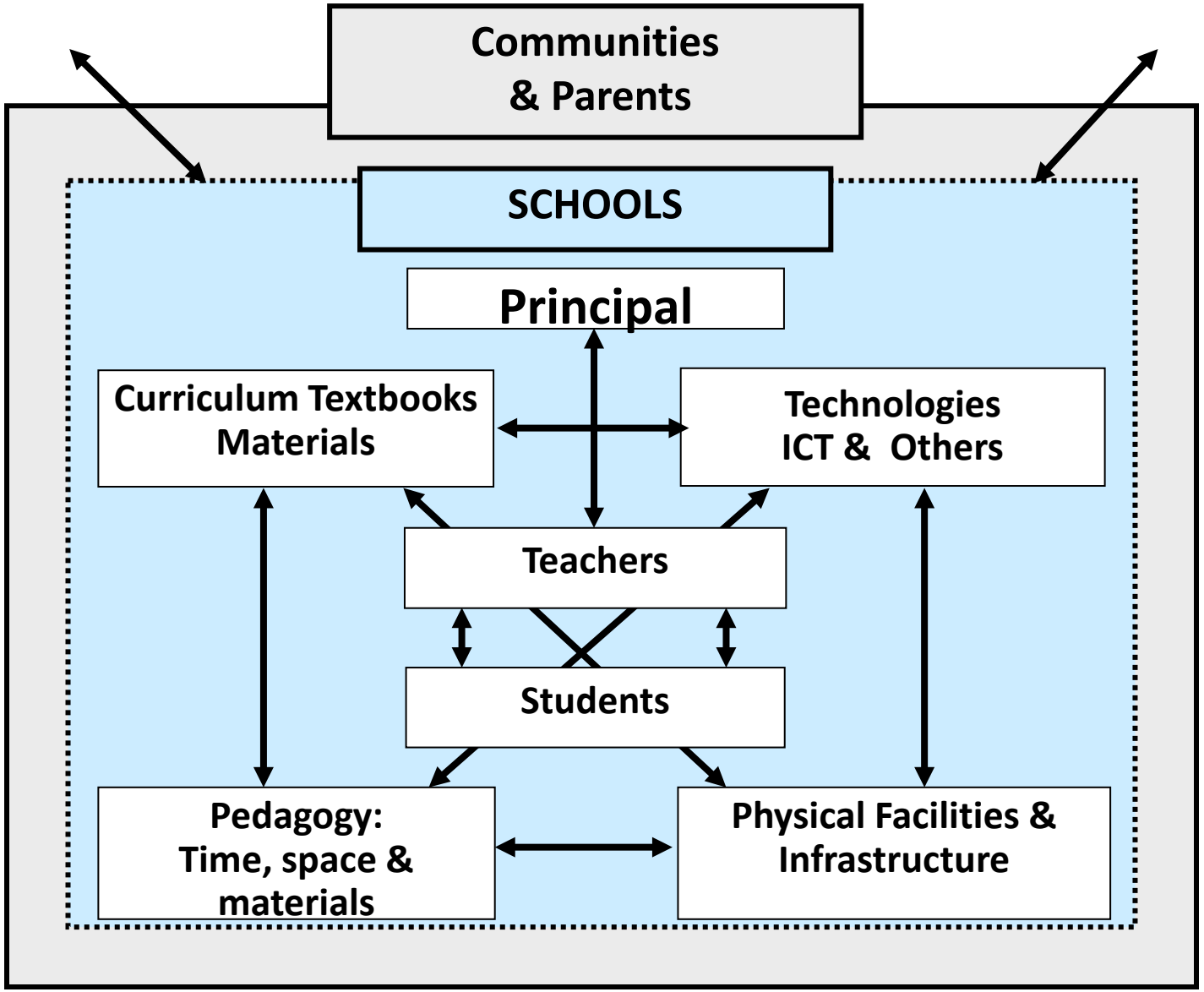
Think systemically and dynamically

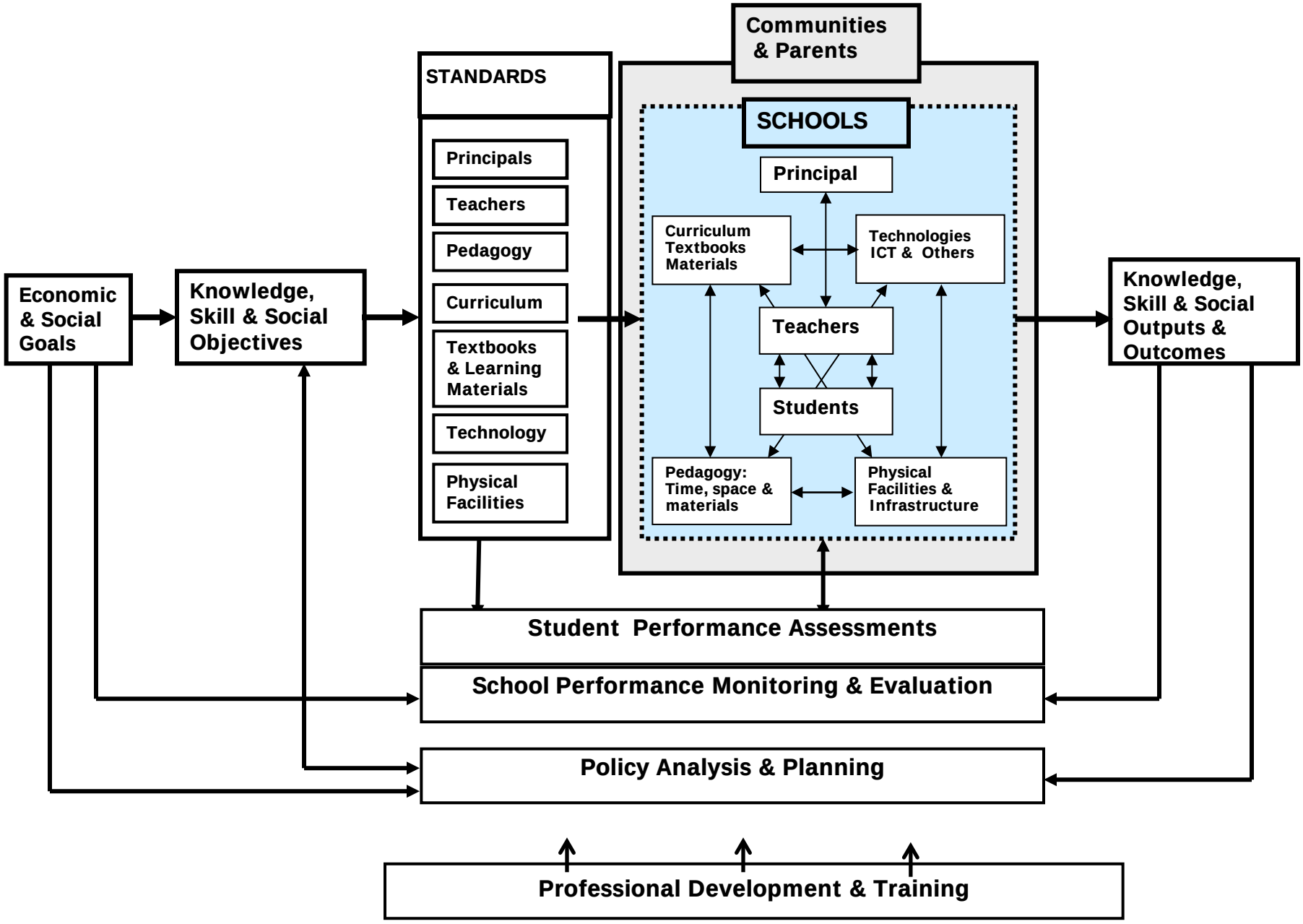
Think systemically & dynamically when managing change



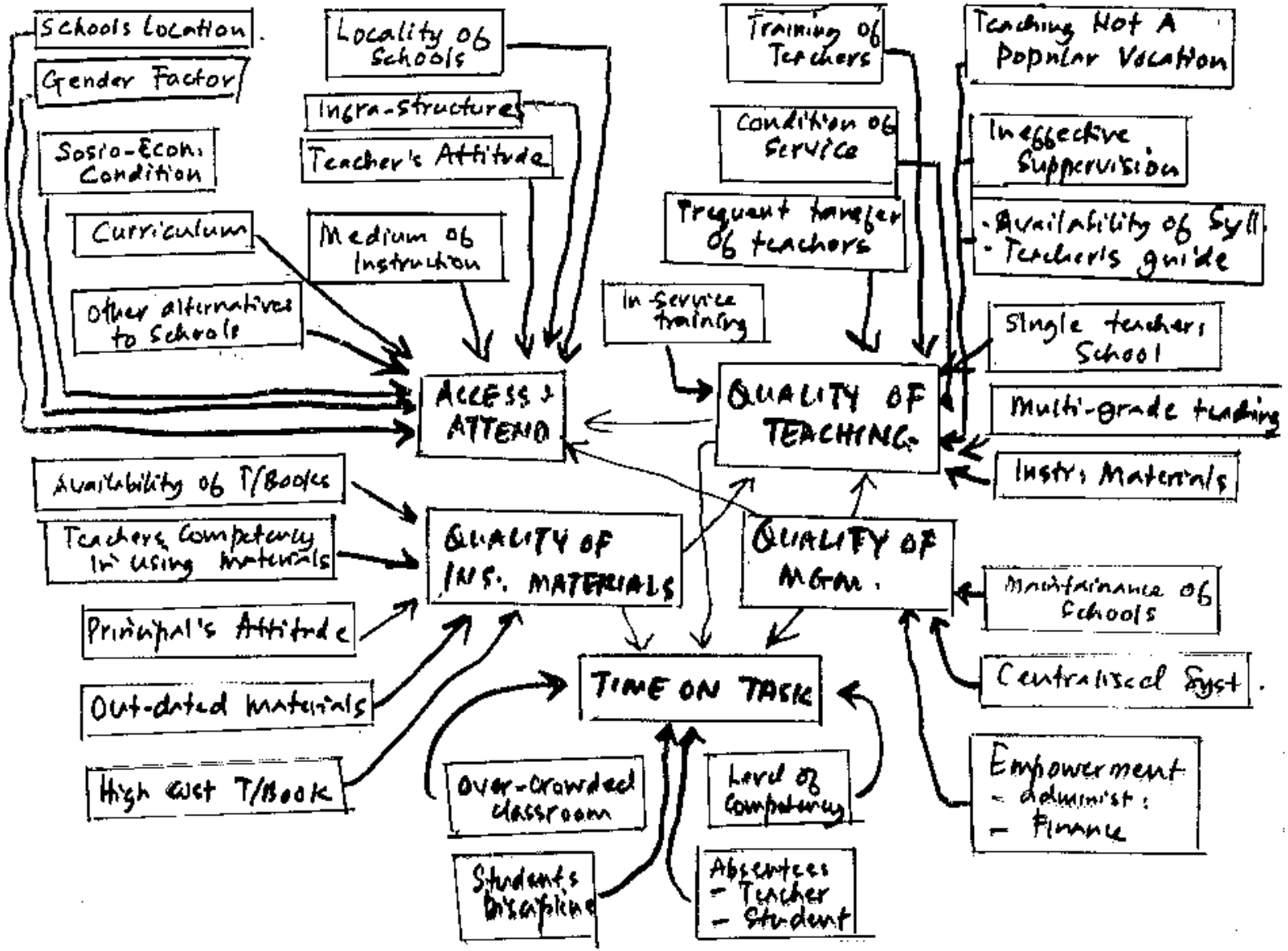
Adapted from work by Leavitt, 1965)

A Systems Model of a School




Communities & Parents
STANDARDS
SCHOOLS
Principals
Teachers
Pedagogy
Curriculum
Textbooks & Learning Materials
Technology
Physical Facilities
Principal
Curriculum Textbooks Materials
Technologies ICT & Others
Teachers
Students
Pedagogy: Time, space & materials
Physical Facilities & Infrastructure
Economic & Social Goals
Knowledge, Skill & Social Objectives
Knowledge, Skill & Social Outputs & Outcomes
Student Performance Assessments
School Performance Monitoring & Evaluation
Policy Analysis & Planning
Professional Development & Training

A Mind Map


Schools Location
Gender Factor
Sosio-Econ. Condition
Curriculum
Other alternatives to Schools
Locality of Schools
Ingra-Structures
Teacher's Attitude
Medium of Instruction
ACCESS & ATTEND
Training of Teachers
Condition of Service
Frequent transfer of teachers
In service training
QUALITY OF TEACHING
Teaching Not A Popular Vocation
Ineffective Supervision
-Availability of Syll.
-Teacher's guide
Single teacher School
Multi-grade teaching
Instr. Materials
Availability of T/Books
Teachers Competency in using materials
Principal's Attitude
Out-dated materials
High cost T/Book
QUALITY OF INS. MATERIALS
QUALITY OF MGMT.
Maintainance of Schools
Centralised Syst.
Empowerment
- administ.
- Finance
TIME ON TASK
Over-crowded classroom
Students Discipline
Level of Competency
Absentees
- Teacher
- Student

A Dynamic Systems Model

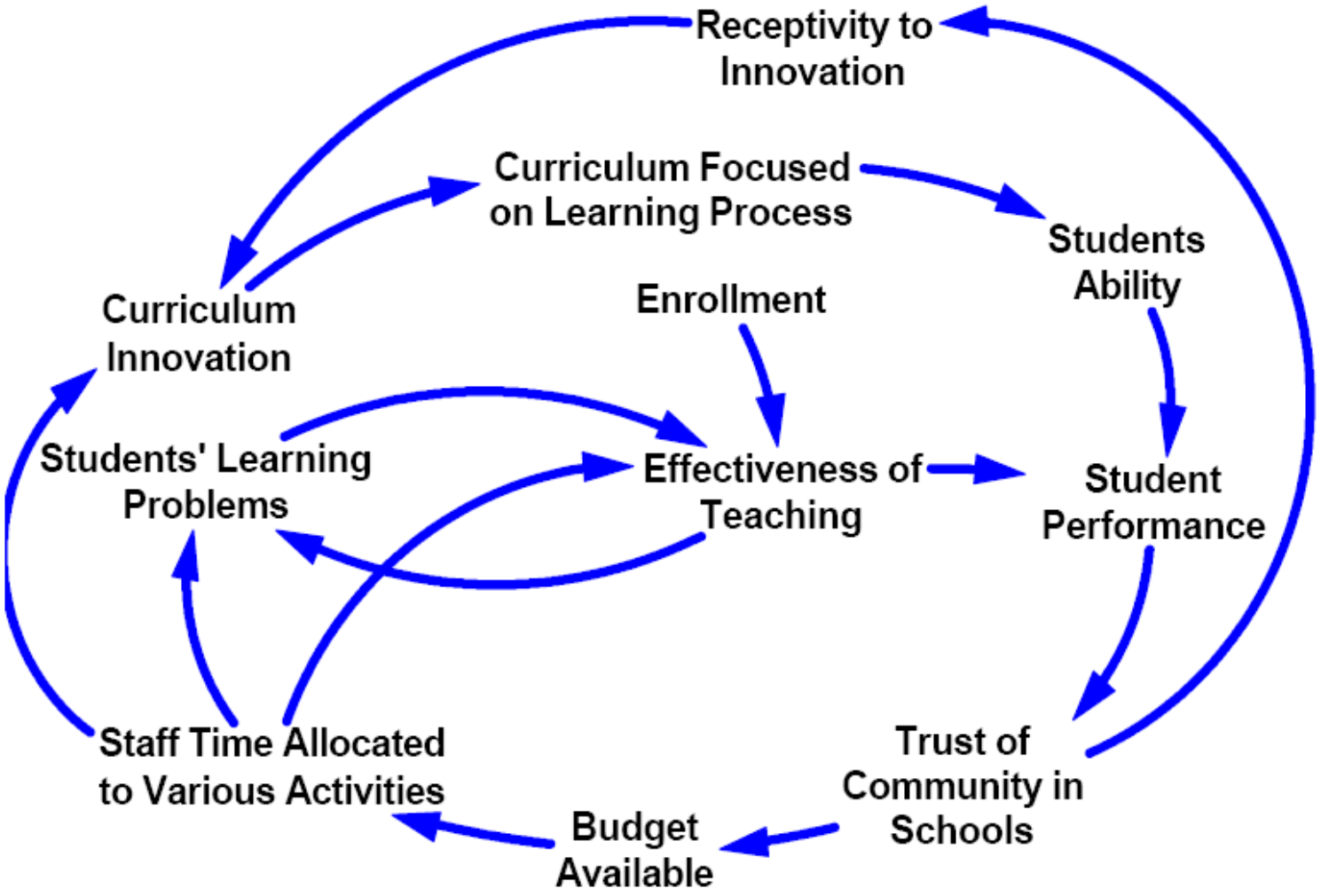


Figure 1: Overview: Model of Innovation and School Performance

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Another Dynamic Systems Model

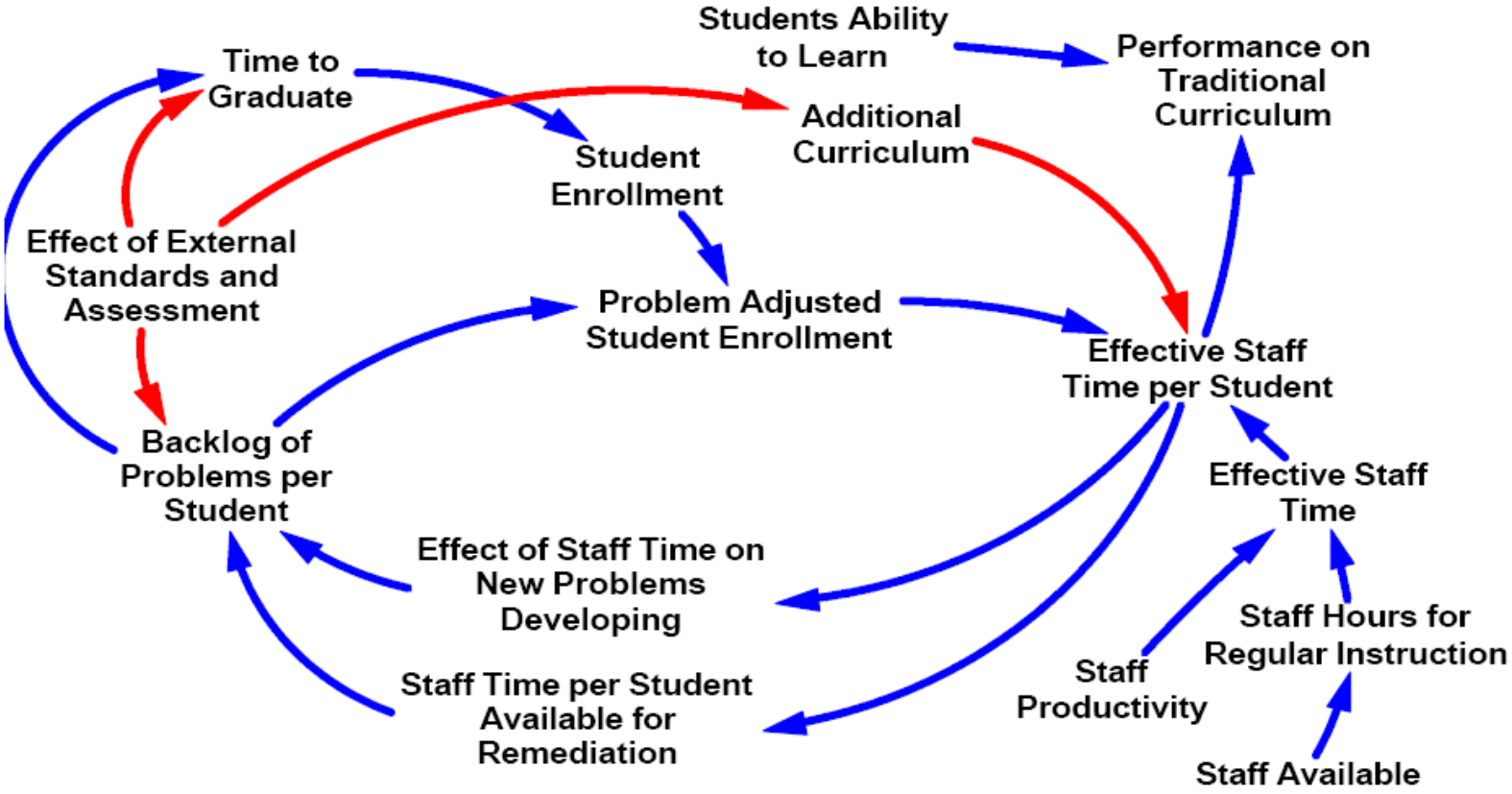

Figure 5: Reinforcing Loops That Exacerbate Problems Caused by Imposing Stringent External Standards

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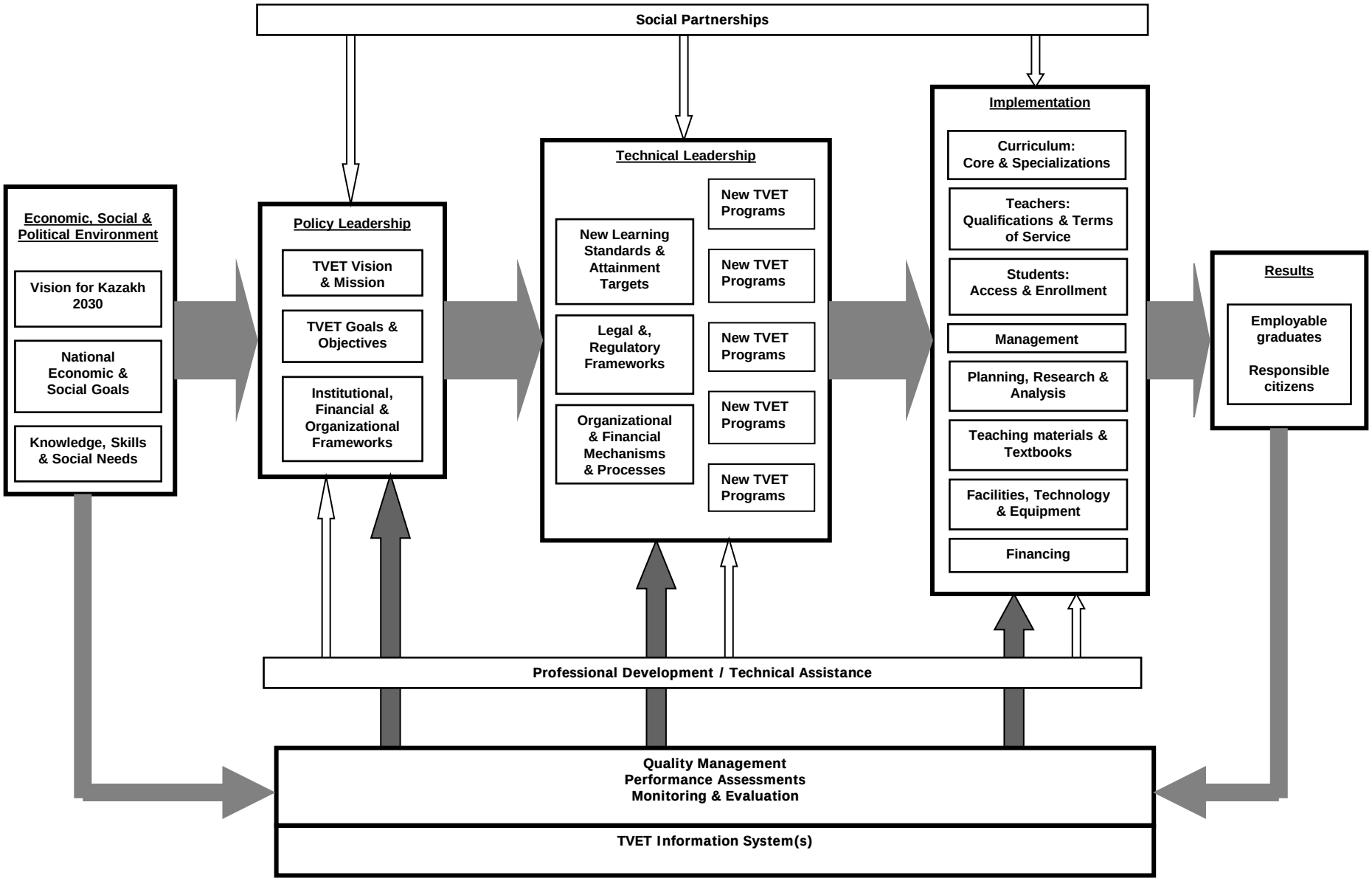
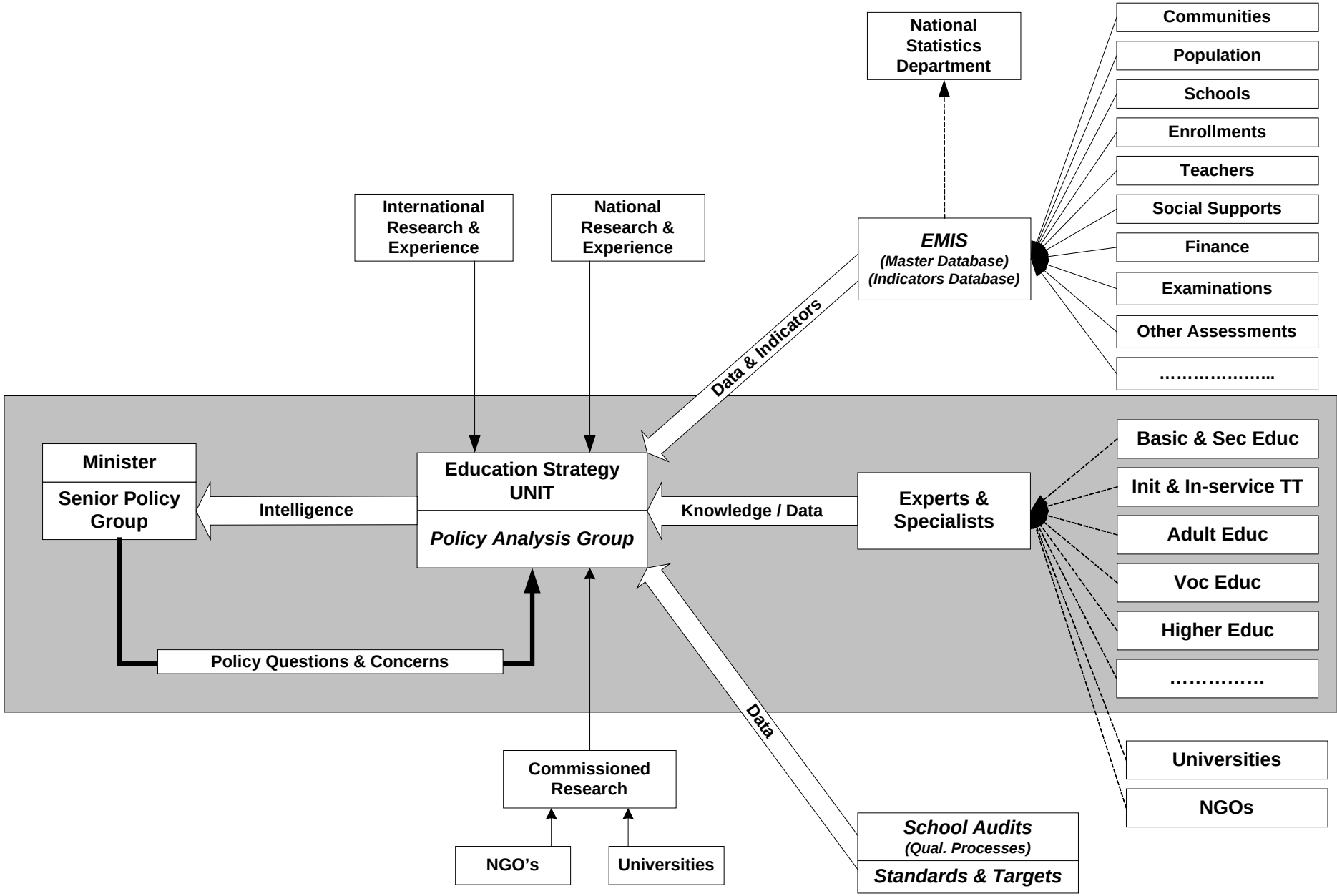
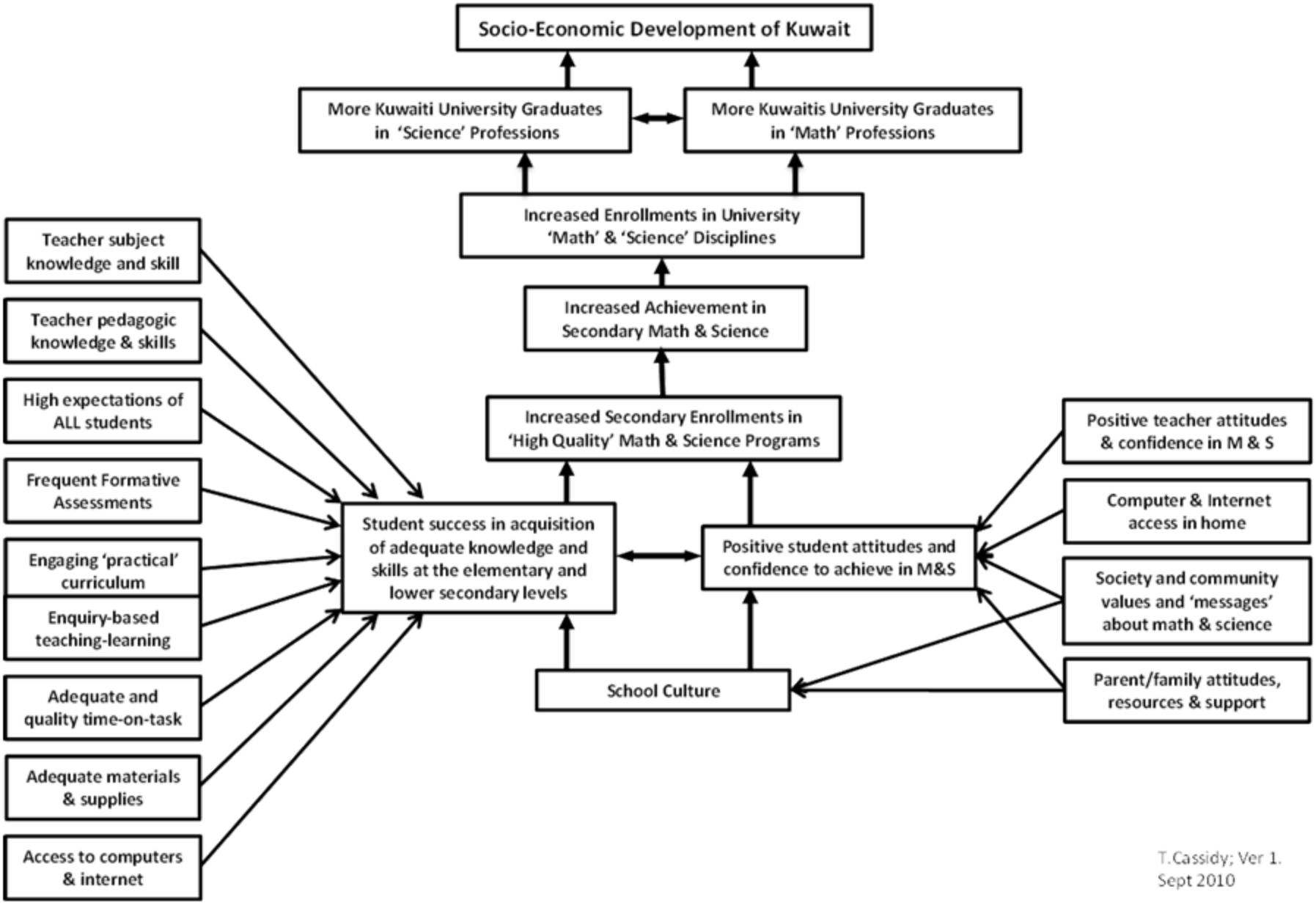
Kazakh TVET System Development Scheme




National Statistics Department
Communities
Population
Schools
Enrollments
Teachers
Social Supports
Finance
Examinations
Other Assessments
……..
International Research & Experience
National Research & Experience
EMIS
(Master Database)
(Indicators Database)
Data & Indicators
Minister
Senior Policy Group
Intelligence
Education Strategy UNIT
Policy Analysis Group
Knowledge / Data
Experts & Specialists
Basic & Sec Educ
Init & In-service TT
Adult Educ
Voc Educ
Higher Educ
……
Policy Questions & Concerns
Data
Commissioned Research
NGO's
Universities
School Audits
(Qual. Processes)
Standards & Targets
Universities
NGOs

Factors Associated with Increasing Enrollments and Achievement in Secondary School Math and Sciences and Beyond



T.Cassidy; Ver 1.
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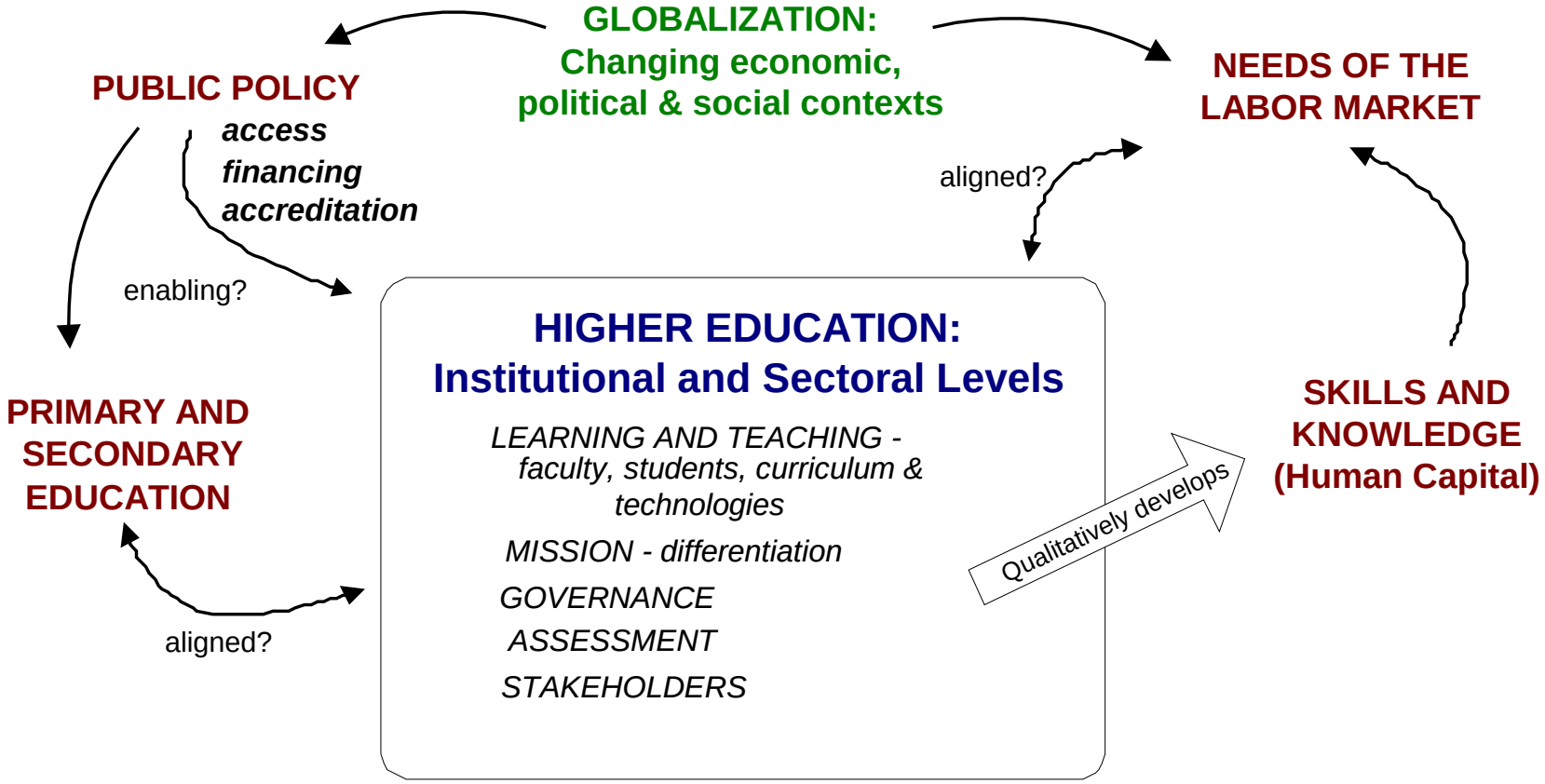
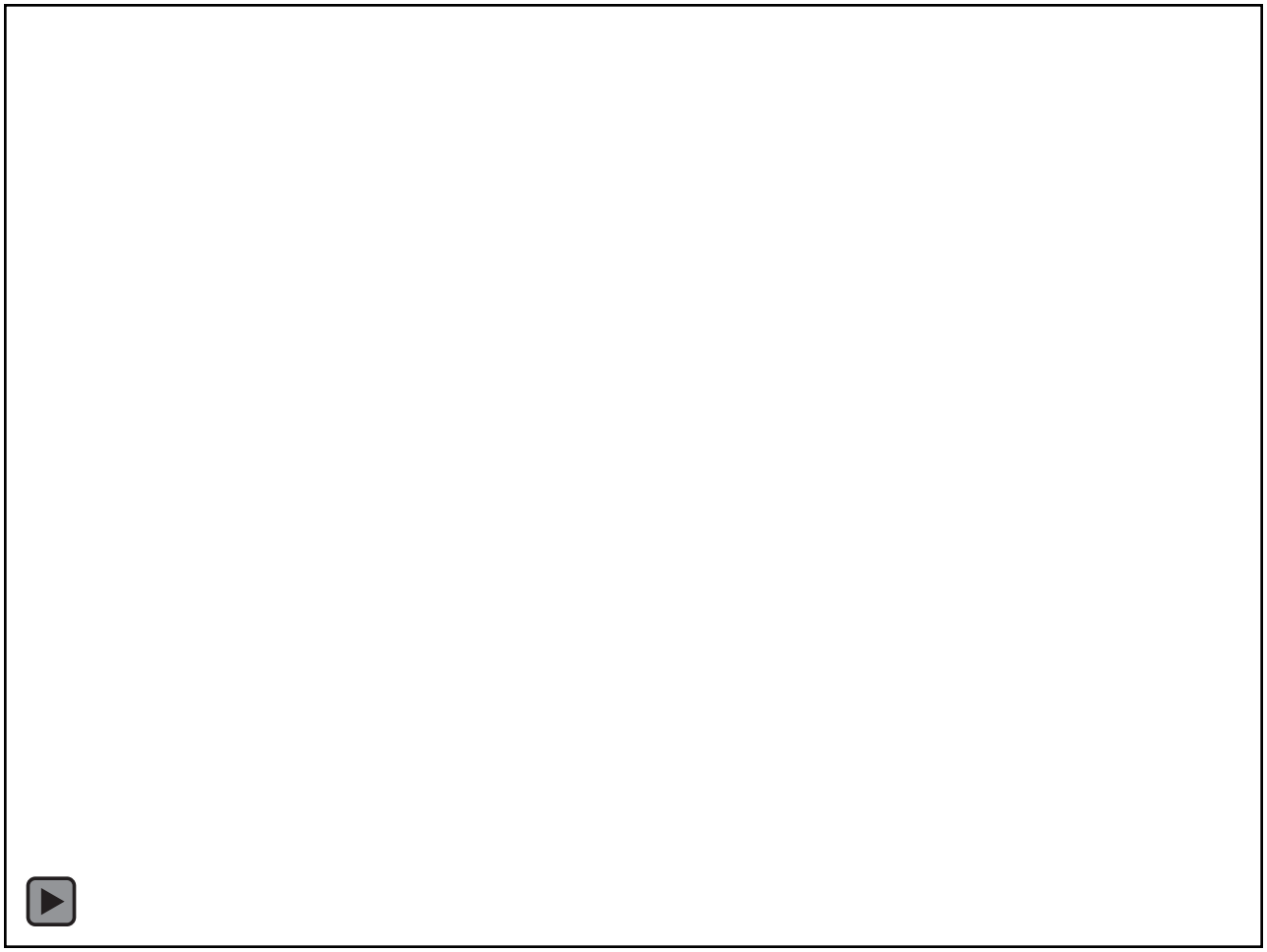
HIGHER EDUCATION CONTEXT



‘Habits’ of a Systems Thinker

- Seeks to understand the big picture.
- Seeks to observe how elements within systems change over time and generate patterns and trends.
- Recognizes that a system’s structure generates its behavior; focuses on understanding structures, not assigning blame.
- Seeks to identifies the circular nature of complex cause and effect relationships, i.e., to understand interdependencies, alignments and linkages.
- Changes perspectives to increase understanding.
- Constantly surfaces and tests assumptions to increase insight.
- Seeks to considers an issue fully and resists the urge to come to a quick conclusion.
- Considers both short and long-term consequences of actions.
- Considers how mental models (i.e., attitudes and beliefs derived from experience) can shape and limit actions now and in the future.
- Constantly on the look out for unintended consequences emerge.
- Recognizes the impact of time delays when exploring cause and effect relationships.
- Constantly monitors results and changes actions, if needed.
- Uses understanding of system structure to identify possible leverage actions.



Systems Thinking Resource Sites

- **Creative Learning Exchange**
  - www.clexchange.org
- **System Dynamics Group at MIT**
  - http://mitsloan.mit.edu/faculty/research/dynamics.php
- **Pegasus Communications**
  - http://www.pegasuscom.com/tstpage.html
- **Mind Mapping Software**
  - http://www.mindmapperusa.com/
  - www.visual-mind.com
- **System Dynamics Software**
  - www.iseesystems.com (IThink, Stella)
  - http://www.vensim.com/ (Vensim)
- **Archtype Examples**
  - http://www.systems-thinking.org/arch/arch.htm

Systems Thinking in Schools

Waters Foundation

http://www.watersfoundation.org