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TRIZ SOLUTIONS FOR SYSTEMS DYNAMICS MODELS OF A SMALL COMMUNITY DOWNTOWN REVITALIZATION PROJECT

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ABSTRACT

The analysis of complex systems with multiple simultaneously dynamic variables can be addressed with Causal Loop or System Dynamics models. These models can provide an initial assessment of the operation and functionality of the existing or proposed elements of the system, but may not offer explicit direction for improvement or innovation. TRIZ concepts and techniques applied to the System Dynamics models provide that explicit tool set for problem resolution and new concept generation. This paper will demonstrate how Systems Dynamics models are helping identify key variables in a small community downtown revitalization project in northern Illinois, and how TRIZ techniques can then help identify and develop approaches to resolve problems and take an innovative approach to project implementation.

INTRODUCTION

Communities, villages and cities are complex and dynamic systems. They are formed through and constantly subject to a bewildering array of social, cultural, economic, and civic (governmental) issues. These influencing factors are always in a state of flux.

The downtowns or market centers of these communities are likely the most complex sub-systems of the entire community. They contain a wide variety of business types, mixed use of properties and buildings for residential, commercial, service, and municipal applications, and have complex property ownership patterns. They also are subject to diverse usage and visitation patterns by residents and non-residents of the community.

The community of Lake Zurich, Illinois is a far suburb of Chicago. Its downtown has a unique resort village history and character, but is in need of a facelift. The centerpiece of the area is a small lake that is directly bordered by the downtown. The downtown area has been undergoing revitalization efforts for a number of years. Those efforts have recently escalated from a residents and business driven effort supported by the village government into a major redevelopment campaign driven by the municipality. The

author of this paper has served as an officer of the citizen's group for a number of years, and has recently begun to use TRIZ and Systems Dynamics modeling to aid in planning and problem avoidance for the redevelopment effort.
Much of the information presented in this paper about the town and the revitalization / redevelopment program is adopted verbatim or modified from Lake Zurich Revitalization Partnership, Inc. brochures, from the village's downtown Tax Increment Financing "Redevelopment Plan" (1) and from the Downtown Lake Zurich website (2). All architectural drawings were created by Lucien Lagrange Architects.

A COMMUNITY DOWNTOWN REVITALIZATION PROJECT

The Scene: What's Happening Downtown?

"Our Vision: The village of Lake Zurich is moving closer to its goal to build a stronger, unified downtown where local businesses can thrive and residents can gather and live. Part of the village's collective vision already has become reality with the construction of the lakefront promenade last spring and two new public buildings – the Ela [Township] Area Public Library and a new police station.

During more than a decade of community meetings and discussions, residents and business owners articulated the following principles that have guided our redevelopment plans [See Figure 1]:

- Create an environment where new businesses flourish and existing businesses can grow & thrive
- Make the downtown pedestrian friendly
- Build a stronger, unified community identity and gathering place
- Relocate State Route 22 now centering downtown
- Capitalize on lakefront vistas
- Encourage public facilities to remain or relocate downtown
- Address parking with on-street and below-ground parking
- Retain and improve existing parks
- Replace dilapidated and obsolete buildings
- Rebuild aging streets and sidewalks

Figure 1. This early master plan was developed by Burnidge, Cassell & Associates with community input and guided current efforts.

- Substantially increase property and sales tax revenues"

From "Our Vision" page of - **http://www.DowntownLakeZurich.Org**

History

Much of the work described above was facilitated by The Lake Zurich Revitalization Partnership, Inc., a **501(c)(3)** (not for profit) organization formed in the mid 1990's. The LZRP is dedicated to the future of the community through broad participation centered in the downtown. Participation in the LZRP has offered benefits for everyone involved: Property owners have the opportunity to increase their cash flow and income and create a lasting memorial to the village. Business owners can operate in a more appealing environment, realizing the dream of owning their own successful business. For the residents of Lake Zurich a successful revitalization project will allow citizens to enjoy many benefits, such as higher property values, increased funding for schools and the feeling of accomplishment and pride that creating a lasting heritage will bring.

The LZRP mission has been to create a center of activity, and help insure economic stability in the heart of Lake Zurich through concentrated efforts of planning, design, organization and economic development. Significant accomplishments have been:

- Managing the development and adoption of a Downtown Plan (Figure 1).
- Focusing Village efforts on the Lakefront Promenade, now completed.
- Promoting and helping plan a new Streetscape, now in place.
- Supporting formation of a Tax Increment Financing District and development of the current Redevelopment Plans.

The author is the current President of the LZRP.

Tax Increment Financing (TIF) – A technological system element for guidance and control

In 2001, the village government, always supportive of the downtown revitalization efforts, initiated a feasibility study for a Tax Increment Financing (TIF) program. TIF initiatives are tightly governed under state law, and require careful analysis of a comprehensive set of criteria for a defined geographic area. TIF is a program that allocates future increases in property taxes from a designated area to pay for improvements only within that area. The program lasts for 23 years from the creation of the TIF district. (1).

The feasibility study clearly supported formation of a TIF district, and the district was established in early 2002. This allowed the village to issue bonds for fund raising, and to begin a search for development groups to more fully implement the concepts and goals called out in the previously developed Downtown Plan.

Excerpts from the DowntownLakeZurich.org web site (2) explain the TIF approach and the current goals and expectations for the expanded downtown redevelopment project:

"What is the benefit of the TIF District and how does it work? The benefit of every TIF District is that it creates additional tax revenue by rejuvenating properties that are undervalued due to their rundown conditions. That new tax revenue can be used to address conditions that no private developer would be able to afford to fix including deteriorated buildings, inadequate or insufficient infrastructure, need for additional roadways, parking facilities, and other problems impeding development. Thus, a TIF District can spur new development that never would occur but for the use of TIF funds to fix the existing bad conditions. And the revenue needed to do the work can all be generated within the area where the work is being done.

The creation of the Lake Zurich Downtown TIF District has meant that the village now is able to fund infrastructure improvements and purchases of property for the redevelopment project where no money previously existed to do so. The village can demolish obsolete buildings, help fund the construction of new streets and sidewalks, fix environmental problems, and otherwise eliminate rundown conditions that no private developer could possibly do on its own. So, the downtown can now accomplish with public help what it has been unable to accomplish in the private market for decades—that is, to revitalize itself.

The state TIF law was created precisely to achieve these goals, and the redevelopment project in Lake Zurich is a perfect illustration. Here is a quick technical look at how it works: The taxes paid by the properties within the TIF District are now "frozen" at the amount paid when the TIF was created. The tax dollars at the frozen amount will continue every year to be paid to [School] District 95, Lake County, Ela Township, the village and the other taxing bodies, as always. Then, as the values of the properties within the TIF District increase during the redevelopment project, the additional tax dollars generated by those value increases are "captured" by the TIF District to be reinvested in downtown, as provided by the State TIF law. Thus, money is generated by downtown to help downtown rebuild itself without any new taxes or rate increases." (2)

The author is currently chairman of a Joint Review Board commissioned under state law to provide annual review and recommendation regarding progress on projects authorized under the adopted TIF. That board is largely comprised of representatives from the various taxing bodies potentially affected by the TIF initiative.

Redevelopment – Expectations, Plans and Actions

"Redevelopment Advantages: Lake Zurich's ambitious downtown redevelopment project offers the village and its residents economic opportunities and benefits even beyond the beautiful new gathering places, residences, retail spaces and pedestrian ways that will be constructed. Turning this viable but dilapidated area into a vibrant retail and

living center will spur economic growth throughout the village—extending well beyond downtown itself**.**

"Improvements to Downtown: The most tangible benefits from the redevelopment project of course will be to the physical attractiveness and viability of downtown itself. Here is what to expect:

- More than 50 new businesses are expected to move into the new downtown, including restaurants and food boutiques, booksellers, home furnishings stores, jewelers and apparel boutiques.
- The best of the village's existing businesses will have the opportunity to stay in downtown in efficient and attractive new spaces. The village is working with those businesses on how to accommodate their needs.
- The new construction in the first phases of the master plan will add new storefronts and residences from Old Rand Road to the lakefront promenade, bringing:
    - More than 125,000 additional square feet of retail space and 23,000 square feet of office space. Much of the planned office space already is in demand by existing Lake Zurich businesses.
    - More than 390,000 additional square feet of space for downtown living, including more than 300 spectacular new town houses and condominiums.
    - More than 1,000 convenient new parking spaces for shoppers and residents. With the residential parking spaces tucked underneath the new buildings, outside spaces will be available to shoppers and visitors.
    - New streets, paving the way for smoother, more logical traffic flow throughout downtown.
    - New pedestrian ways complete with trees, shrubs, flowers, benches, lighting and other amenities.
    - New landscaped gathering spaces and plazas, and better access to existing parks, all to take advantage of the natural beauty of the downtown area that too long has been obscured.
- In the end, redevelopment is expected to generate more than 350 permanent jobs in the area.
- Building the new downtown will create more than 700 construction jobs, with more than 1 million workers ' hours.

"Economic Growth: The redevelopment project will bring both immediate and long-term economic benefits to the entire community. The project has commenced, and will be completed, without increasing existing taxes or imposing new taxes anywhere in the village.

- The project will generate nearly $36 million in additional tax revenue just during the life of the TIF District. This is the money the village will be able to reinvest into downtown improvements.
- Equally important, with TIF funds in hand the village no longer will have to spend general corporate funds to maintain the downtown area, as it has for years. This means more of those general corporate funds will be devoted to services and improvements throughout the village—again without any new or increased taxes on residents. In the future, those general funds can be spent to repave streets, repair water and sewer mains, maintain landscaping and create bike paths.
- The market value of the new retail, office and residential development is expected to grow as high as $90 million and beyond when redevelopment is complete. These high values mean that increased tax revenues are not just a short-term promise, but also a long-term probability.
- As the redevelopment project unfolds, it will be creating the economic engine that eventually will be able to generate $1.2 million annually of new money for School District 95. This is new tax revenue that the downtown simply has been unable to generate for decades because of its dilapidated condition. And none of it could be generated without the creation of the TIF District and the infusion of TIF funds into the project. There has been no other source for those funds and no private investors willing to embark alone on the project now spearheaded by the village." (2)

Early Applications of TRIZ

There were several early but very informal applications of TRIZ to the Lake Zurich Downtown Revitalization effort, before any use of Systems Dynamics modeling. One of these was a simple contradiction matrix analysis. The other was a simple trimming exercise applied to street layouts.

TRIZ Contradictions Matrix - Early example - Underground or decked parking
The quantity, location and ease of access for parking spaces appears to be one of the most pervasive problems of downtown areas, and therefore of any downtown revitalization effort. Early on, a committee of the LZRP, discussing how to solve perceived lack of sufficient parking adjacent to business and residences, attempted to resolve this issue through survey of actual spaces, negotiations for access and revision of village ordnances.

A simple review of parameters such as area, productivity, loss of time, and ease of operation pointed to using Principle 17: Shift to another dimension. This led to a suggested solution of a multi-layered parking garage, centrally located for the most convenient access. This option was simply not considered feasible at the time due to lack of funds, and the perceived complexity, and was never given serious consideration.

Today, the current plans call for precisely the multi-layered and underground parking suggested by the early identification of those technical contradictions (Figure 2):

"Parking Options: The amount of downtown parking will more than double. The redevelopment will include a significant investment to create underground parking that allows downtown residents to park underground, leaving street spaces for shoppers and visitors. The plans include new parking lots that fit into the overall design of the new downtown and angled parking along Main Street for added convenience." (2) See Figure 2.

Figure 2. The proposed plan details that the amount of parking downtown will more than double.

TRIZ - Simplification and Trimming

In the early fall of 2003, a variety of potential building options and future usages for key areas of the downtown were under consideration. An especially prominent area, directly facing the lake and across the street from the village's newly built promenade, was limited by an acutely angled side street intersection. The author reviewed several of the proposals for possible ways to improve or simplify them, and suggested eliminating, or in TRIZ terms, trimming, the troublesome intersection. This trimming resulted in substantial gain of footage in one of the optimum locations. The site is now planned as the signature 'Gateway' building for the longer-term redevelopment:

"Gateway Building: The construction of a gateway building will connect the new lakefront promenade to the downtown. This commanding building will take advantage of beautiful views of Lake Zurich and will include a signature restaurant, retail shops and residential condominiums. The front of the gateway building will host a landscaped plaza – an extension of the promenade where residents can gather to enjoy beautiful views of the lake." (2)

Figure 3. Proposed Gateway Building

These examples demonstrated the potential

usefulness of very simple TRIZ in applications of this type. However, the scope of the overall downtown redevelopment has now both expanded and intensified. The amount of effort, the investment, and the time required to achieve the desired benefits has increased.

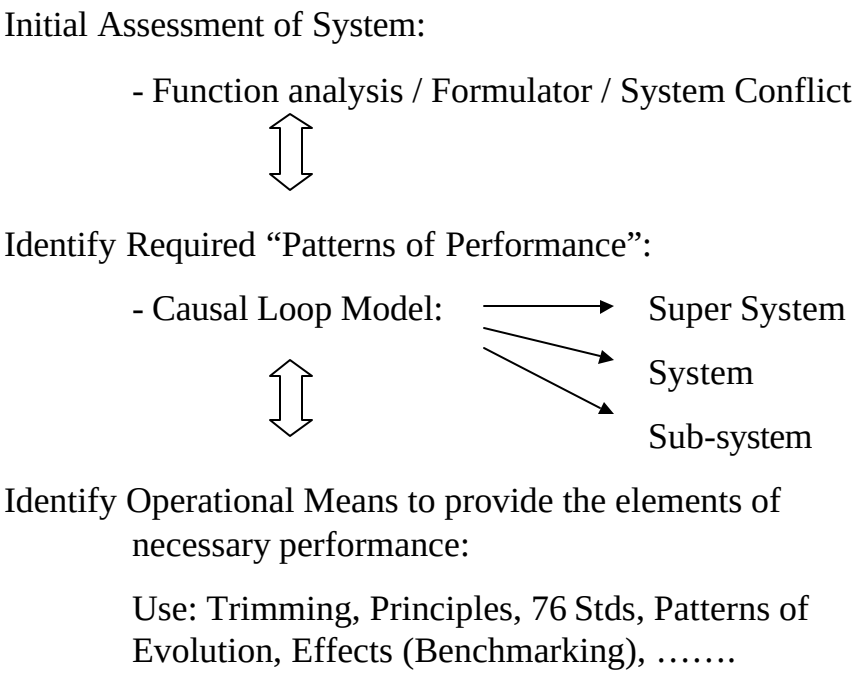
This increased scope and potential complexity led the author to consider using Systems Dynamics Modeling and TRIZ together to hopefully help insure success in downtown.

Analytic Methods for the Downtown Redevelopment Project

The author and Dr. Ellen Domb originally suggested approaches to incorporating System Dynamics Models into TRIZ applications (3, 4, 5). The general approach reported here is similar to that suggested by Domb and Miller in 2002.

A potential application pathway for these tools might well be to first do either a high level Formulator or Function Model analysis, then develop an animated Systems Dynamics / Causal Loop Model to gain further understanding of the dynamics and interfaces, review those iteratively with process team members and involved parties, and finally to apply TRIZ tools to specific elements of interest in the system. See Figure 4. Recently, Mr. Andreas Jost has also presented recommendations for interfacing Systems Dynamics models and TRIZ that appear to be consistent with this approach. (6).

Figure 4. One Approach for Combining Systems Dynamics Modeling and TRIZ



TRIZ and Systems Thinking have much in common. Both focus on how things work, rather than simply how they correlate. Both disciplines view systems as hierarchical elements of higher and lower systems. Both systems rely on the existence of prior solutions for many problems. A common purpose of both techniques is causing systems to operate so they result in effects that we desire.

Systems Dynamics Operational Modeling

Concepts

This methodology is based on the systems thinking discipline popularized by Peter Senge (7,8). The modeling method actually utilizes a 'stocks and flows' nouns and verbs representation of the elements of a system. 'Stocks', or nouns, are amounts, quantities, accumulations, things, states of being, or levels, etc. The 'flows', or verbs, are activities that cause change, either positive or negative, in the magnitude (condition) of the nouns.

The Actors and the Plan for Downtown – Who's Involved

Principle elements and interrelationships for the redevelopment project are shown in Figure 5. This diagram is constructed as a network of partial System Conflict diagrams. Please note that this is merely an overview, and does not capture all of the interactions. Also please note this 'system' will operate over an extensive period of time, and that the very structure of the 'system' will almost surely change as events occur and trends develop and affect the recognized elements over the years. Additional changes may be due to already existing but unrecognized elements and/or relationships within the 'system', or may be due to outside influences. Elaboration of all the additional existing and recognized relationships, and mechanisms already or to be put in place to guide them, is well beyond the scope of this paper.

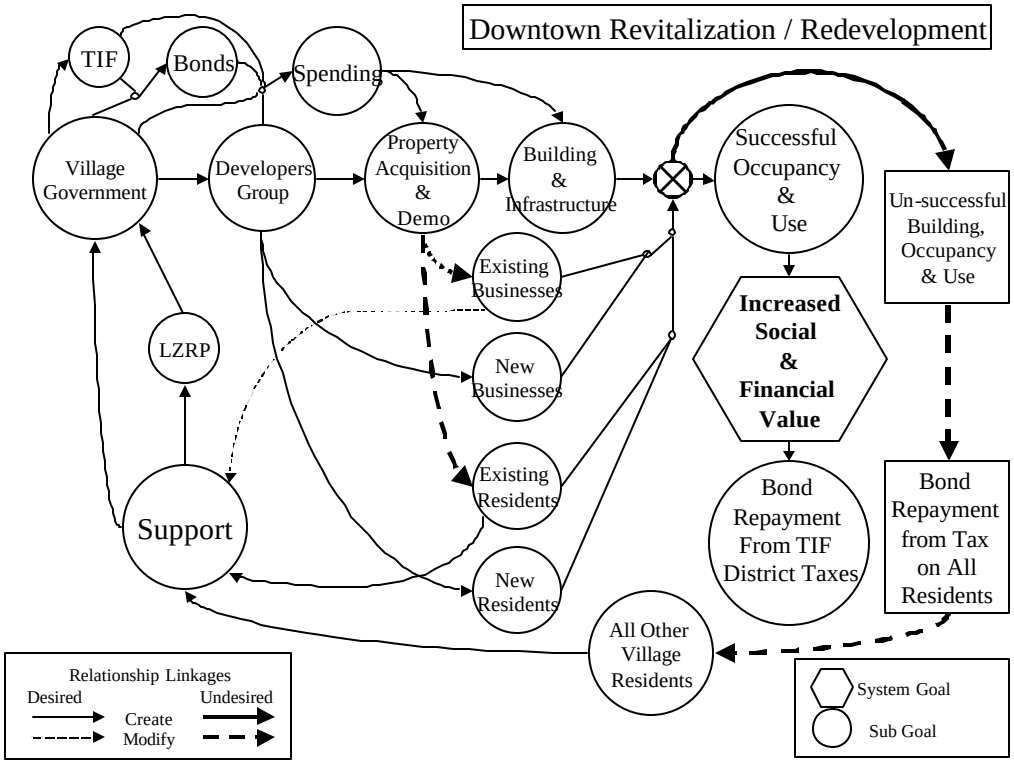
The Variables

Construction of the system overview diagram is consistent with the general approach common to both TRIZ and Systems Dynamics: Be sure of the purpose of the application, and understand what the key measures of performance (functionality) really are. For the downtown development project, the key variables/indicators of performance appear to be:

Time	**Buildings**
Money	**Occupancy**
Land	**Community Support**

We must also understand that the system shown in Figure 5 is very 'Porous', i.e. changeable, especially regarding these variables. For example, people are the source of 'Support', so new people in the community, new companies in the community, or people or businesses leaving the community constantly change the 'system'. These fluxes are an inherent part of the system's interface with the super-system. Even partial system models can help provide an awareness of their possibility. This awareness has helped develop an open willingness to deal with changes for the best overall benefit of the entire community. The state's 2003 postponement of building a long planned highway bypass paralleling the main business street instead of disrupting the downtown is just one example. The community and the village government were aware of this possibility, and were mentally and psychologically ready to deal with the delay when it occurred.

Figure 5. Elements and relationships for a Downtown Revitalization / Redevelopment Initiative. The ⊗ symbol identifies the start of alternate pathways, with legs that may be active simultaneously or exclusive of each other. Diagramming conventions per dialogue with Mr. Greg Yezersky and Dr. John Terninko, 2003.



Relation to TRIZ' Systems Operator - 9 Windows Model

TRIZ utilizes the System Operator – 9 Windows Concept to provide a System – Super-system – Subsystem, Present – Past - Future view for its ability to view operation over time and to see the roll-up of various levels. But even with use of the Systems Operator, it is sometimes difficult to visualize what happened in the past to cause today's operations and 'performance'? What will today's operations and 'performance' cause in the future? It can also be difficult to recognize what system performance provides output or effect to / upon the Super-system or sub-systems? What operations could be transferred to the super-system?

Systems Dynamics modeling is a way to 'operationalize' the Systems Operator model. This capability provides a way to do "What Ifs" as part of a TRIZ application. These 'What Ifs' may be performed iteratively as alternate approaches to system improvement or correction if desired.

Techniques

Modeling Conventions

The Systems Dynamics modeling method utilizes 'stocks and flows' to represent the elements of a system. 'Stocks', or nouns, represented by rectangles, are amounts, quantities, accumulations, things, states of being, or levels, etc. The 'flows', or verbs, are activities that cause change, either positive or negative, in the magnitude (condition) of the nouns. Verbs are shown as directional pipes or flows, with regulators.

Additional graphic elements are also useful in representing Systems Dynamics model elements. First is the cloud, which can serve as an infinite source or sink for the noun elements. This allows models to be bounded for practicality, and allows a focus on sub-systems of particular interest. A second element, represented as a simple circle and referred to as a converter, provides for entry of values, parameters, and/or to perform various mathematical functions. The final additional element is an action connector, shown as a solid curvilinear arrowed line, to show value and/or information linkages, inputs or outputs, between model elements.

A clear distinction of this modeling system is that it not only shows dynamic coupling and linkages, it can include changing the relative importance of the different factors being modeled over time to support 'What Ifs?', and provides for alternate operational paths within a model.

One automated version of this modeling method, the I-Think Software by High Performance Systems, is described in Reference (9), and is among several software products available (6).

Patterns of Performance

An important step in developing Systems Dynamics models for a system is to identify an expected pattern of performance for one or more key variable or parameters of the system, and then create stock and flow models to produce that pattern. The model may then be refined, made more detailed, broadened, or linked to other models as required. It may then be used for simulations to either gain basic understand or to aid in decision making, depending on the specific model structure and level of detail. (9)

Expected Patterns of Performance for two aspects or views of the downtown redevelopment effort were selected from the key variables identified in the system map above. Those two patterns were:

Money – Growth of Equalized Assessed Valuation (**EAV**) in $ for the TIF district
Building Occupancy Rates - Commercial and / or residential

Recognizing these potential patterns enables us to look for modeling elements / events that may cause them. The elements and interactions in these models can then serve as a basis for understanding the necessary performance of real system elements, and the interactions between them, before they are actually put in place.

Systems Dynamics Models of Downtown Redevelopment Issues

System Dynamics models for the selected views are shown in Figures 6 and 7. A graphic output of one simulation iteration is shown for each of the models. First is an EAV model.

Figure 6a. Model Anticipated Growth of Equalized Assessed Valuation of Residential and Commercial Properties in the Downtown

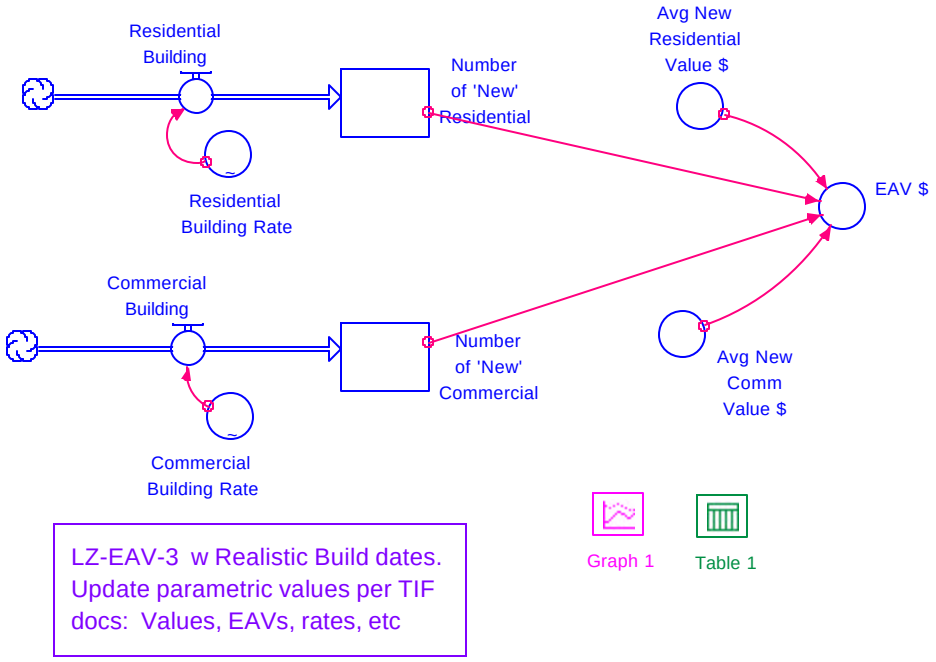
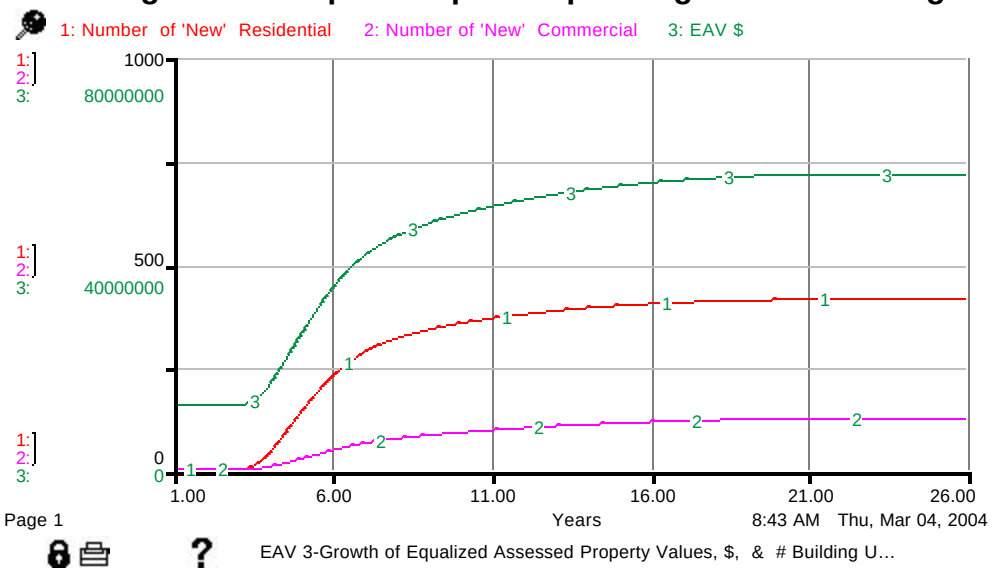


Figure 6b. Graphic output of operating the model of Figure 6a.



Review and Comments

EAV - Identify questions raised by modeling and analysis?

As part of establishing the TIF district for downtown Lake Zurich Redevelopment Project Area (RPA), it was established that the EAV for downtown properties was approximately $12.5 Million, and that growth in that EAV was substantially lagging the rest of the village and the township. EAV is determined at approximately one third the market value of a property. The TIF feasibility estimated that the RPA EAV would grow to some $59 Million over the 23 year course of the project.

The simple simulation constructed and executed above confirms that increasing EAV is primarily a matter of two factors; increasing (building) the number of taxable properties, and assuring that the market value of those parcels is sufficient. It graphically demonstrates that until buildings are complete and on the tax roles, there is no mechanism to change the EAV.

This simulation is very simple. It could be made more complex; to include issues like inflation factors; variations in market valuation of either residential or commercial properties, various timing scenarios for buildings, etc., but the basic issue appears to be the building schedule. If the EAV did not grow as predicted, and actual tax rates had to be changed, it would be possible to incorporate that feedback into the model as a potential cyclic or depressing factor.

Model responses to changes in input, such as step increases or decreases in the number of buildings in a year period, could be explored in detail, but did not provide significant increased understanding of the basic issues.

The simulation demonstrates that for very simple situations, or for overview or high-level perspectives on a system or super-system, a simple model can be sufficient to help gain understanding of the basic dynamics.

To further explore issues potentially impacting the success of the downtown redevelopment, occupancy patterns for new commercial properties in the area were modeled, as shown if Figure 7a below. This model is typical of situations where a population is segmented, and can enter a system, stay resident, or exit the system. A similar model for residential properties could also be constructed and combined with the commercial property model. These models, together with the one above, could also be extended until all aspects of the overall initiative Map shown in Figure 5 were addressed.

Figure 7a. Occupancy Of Commercial Buildings in the Downtown

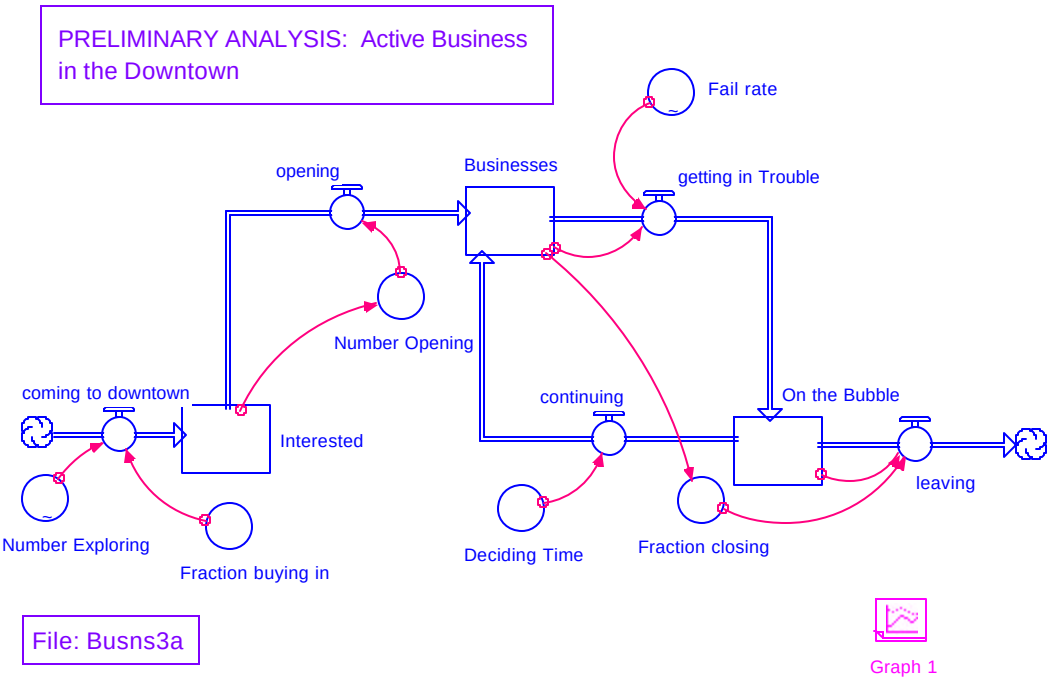
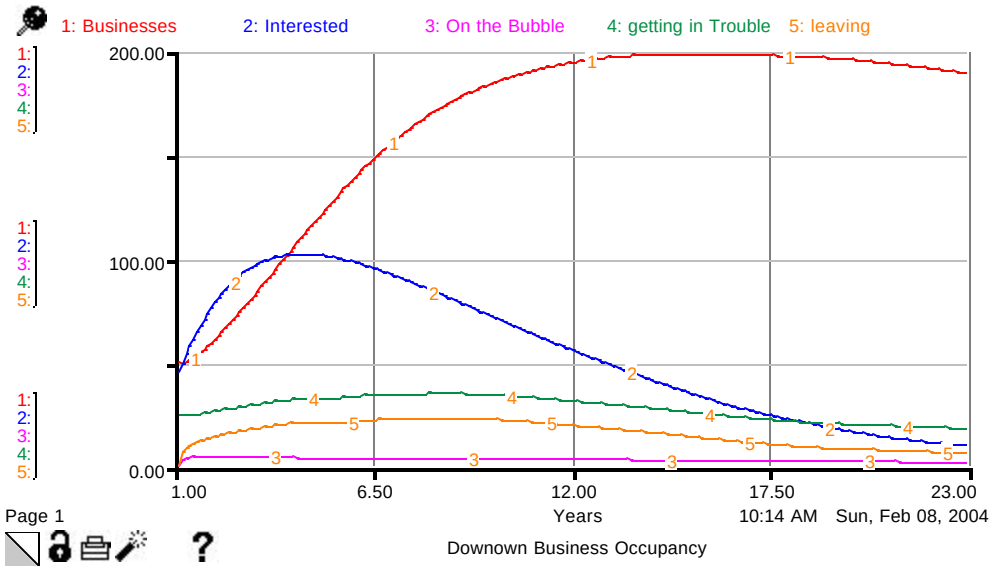


Figure 7b. Graphic Output of Model of Active Businesses in the Downtown



Review and Comments

Identify questions raised by modeling and analysis?

A similar model can be constructed for residential properties, condos or town-homes. These models could be combined to help identify and understand any interactions between the residential and commercial properties. These issues have already been the subject of much discussion and planning, but are still very actively discussed today. The desired 'mixed' use for the entire downtown will be new for the village; new issues will surely emerge.

'Recruitment' of businesses is a big issue. It takes time. If it takes too long, the desirability of the location might fall. Even with successful recruiting, the model responses emphasize that there is a time lag before occupancy actually occurs (see early segments of curves 1- Businesses, and 2 – 'Interested'). How can recruitment be shortened and streamlined?

Related contradiction: To ease recruiting, properties should be configured for known businesses, but businesses aren't known until they're recruited.

There may be 'new' businesses that get 'in trouble', go 'on the bubble', and may actually leave, very early in the process. On reflection, this is a potentially realistic situation. What can be done about that now?

The occupancy model could be linked to the EAV model; Buildings cannot be occupied until they're built, but if they don't 'sell' or 'rent' when they are available, then market values may drop, and then …

Sensitivity studies of model response for the various parameters are helping reveal which model parameters and corresponding real life variables are real leverage factors.

Model responses to changes in input, such as step increases in the number of interested business, can be easily explored, and serve as a catalyst for discussion and planning.

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These are just partial lists of issues potentially affecting the downtown redevelopment. Further issues will likely be identified and explored as these models and models of other segments of the overall endeavor are further developed and refined. A number of these issues are amenable to further analysis and innovation through TRIZ.

Identifying Application Points for TRIZ

Contradictions and Resources

Technical Contradictions: Improving this degrades that? The simulations such as those above are proving useful in identifying technical contradictions in the system. Example: If the planning and construction of commercial buildings needs to accelerate, but the specific requirements of potential users of those spaces are not known, flexible design and layout approaches and features can be utilized.

Contradictory conditions or states of being? Current Residents and business able to stay in downtown (The problem / contradiction: New buildings require displacement of residents & businesses in time and space.) We're working on this issue, actively pursuing several options.

Use of existing Resources: The downtown and those parties working to revitalize and redevelop it are rich in non-monetary resources such as:

Community Support
Financial standing
Growth patterns
Park properties
Buildings
Streetscapes
The lake vistas – Developers frequently build 'water features'. We already had a fantastic one….

Much of the time and planning effort that has already gone on has been to understand how best to improve those resources, while at the same time protecting and preserving them for the overall good. Both Systems Dynamics and TRIZ cause a better understanding of resources. We are using these techniques interactively to support our efforts and achieve our goals. Including an entity in a Systems Dynamics model now causes us to think in TRIZ patterns: Could some other element already in the system provide that influence or functionality? How can that element ($'s, land, community support, etc.) or functionality (acquiring, planning, building, etc.) be improved? How can elements (a poorly laid out street intersection) be trimmed with no effect on the system?

Technological System

Completeness? The concept of a technological system: Object, tool, source of energy, transmission, and a guidance and control system, certainly is represented here. We are using this TRIZ concept to ask:

Complete model?
Complete real System?

Guidance and Control: Much of the task of providing guidance and control for this redevelopment project falls to the village elected officials. Organizations like the Lake Zurich Revitalization Partnership work to influence how that task is done, and what the outcomes will actually be. These tools help us propose and explain how initiatives can work, why they would be of benefit, and what the results of actions may be.

System Evolution and Prediction? Patterns of evolution of technological systems certainly apply to the downtown community. Gaining a better understanding of how the system functions, and how proposed change actions may function, and how those systems may evolve, will facilitate revitalizing the downtown.

Ideality

We hope you will be able to come to Lake Zurich in the future and see it in our Downtown.

PROGRESS AND CONCLUSIONS

Systems Perspective

What is really being developed here is an approach and a methodology to make large, diffuse and obscured systems more amenable to the application of disciplines like both TRIZ and Systems Thinking. Existing TRIZ methods don't deal well with time dependencies, and Systems Dynamics doesn't deal well with suggesting ways to improve or extend systems.

The appropriate depth and breadth of modeling, in dimensions of time, space, economics, society, energy, etc., will produce the most powerful set of insights and choices about the solution level as well as the solution itself.

An interesting opportunity here is the potential application of TRIZ techniques to help improve the models developed while using Systems Dynamics; TRIZ methods to generate structured suggestions may help identify possibilities the modeler / analyst would not otherwise see. The real challenge is still to better utilize TRIZ, Systems Dynamics, and any other techniques together to better understand and improve the real system.

Application Perspective

Downtown revitalization efforts are widespread in the United States and to some degree in Europe. They range from simple façade improvements and maintenance programs to major urban redevelopments. This in fact has become an industry, with special government regulations and an extensive array of architects, consultants, developers, and marketing firms and individuals at work. There are today thousands of revitalization / redevelopment projects underway in the United States and many more will initiated as towns age and populations grow. Similar projects have been observed in Europe, Australia, and New Zealand by the author. Some of those have provided benchmarks for the current effort.

TRIZ can not only be directed to problem solving for one time, one-of –a-kind problem situations, but is frequently applied when a systems change may result in multiple outputs (products) of the system or design. From the above, it is clear that while each downtown revitalization / redevelopment effort is unique; these are widespread endeavors with generally systematic approaches. Formal and informal benchmarking between communities and the supporting consultants, planners, architects and developers is common. It is hoped this application and the benefits expected to arise from it will help make the techniques of Systems Dynamics modeling and TRIZ more recognized and utilized in other downtowns.

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