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Sowing and Tending Seeds of Change in a Field of Stone

System Dynamics-Based Spatial Visualization and Dialogue-Informed System Dynamics as Public Engagement-Enhancing Resource Management Tools in Door County Wisconsin

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Abstract

This paper reviews our experience using visual system dynamics-based scenarios to invite, encourage, and support community dialogue about how Western Lake Michigan's Door County, Wisconsin might cope with its experience of the intense development pressures confronting accessible and attractive communities everywhere. Recent efforts reported here seek to adapt or develop workable and cost-effective approaches to limiting and mitigating culturally, ecologically and economically degrading impacts on a community challenged by a worrisome combination of attractiveness, accessibility, and ecological fragility. The paper outlines our experience with a continuing process of pragmatic, and sometimes clumsy, use of dialogue, system dynamics modeling and state-of-the art spatial visualization tools to encourage and support community planning. This preliminary report on the evolving experience is offered both as perspective for other community applications and to lend intriguing context for advancement and application of methods and tools to further the, still under-supported, community application of systems modeling.

Key Words

Visualization, System, Spatial, Public, Modeling, Engagement, Dialogue, Community

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Introduction

As civilization grapples with how to arrange itself into sustainable habitations modeling emerges as a powerful ally of the thoughtful. Open public engagement in visual, dynamic and believable "what if" scenarios for communities help convince skeptics of system modeling's merits as a useful agent of and practice field for change. The problems Door County, Wisconsin faces are common around the globe as development presses insistently on attractive places. Ironically, these attractive places are almost always collections of farms, hills, mountains, shores or other forms of open space valued by the general public for their openness and natural assets.

So far as we can tell, the community-based effort in Door County to respond to pressure for evermore development by seeking to integrate system dynamic, spatial and three-dimensional models is unique. But we believe this effort to seed and inform honest, open and dynamic community dialogue to thoughtfully explore alternative futures for this or any community can be shared. The growing marriage of technology and process is intended to help ordinary citizens quickly see (perhaps) unintended consequences likely to accrue from the aggregation of small, narrowly rational, choices over time. Flying in 3D through the houses, 'burbs and roadways 40 or so years into the futures sown by alternative development paradigms can be a real eye-opener. We hope it can also open more minds to the potential value of careful system dynamic modeling in many realms, but, for now, we are only at the preliminary stages of that much-needed awakening.

In the late 20th Century Lake Michigan's Door Peninsula, with Wisconsin's Door County as its upper two-thirds, always a jewel of North American Great Lakes ecosystem abundance and diversity, became both more accessible and more culturally diverse and attractive. Results of this process feed concern that the Peninsula's allure may lead to overshoot of its bedrock-constrained capacity to absorb human impacts. In context of this evolving, and for attractive places seemingly universal, story a group of citizens initiated attempts to understand, and bring pressure to address concerns for, the Peninsula's future. This paper reviews these evolving efforts and focuses on the search for tools, which led to dialogue-informed and spatially-visualized system dynamics, to enhance the project. Perhaps a future report will review how it all turned out, but for now we only aspire to share the early parts of the story and to review the struggles and collaborations that feed it.

Overview

It should especially interest this audience that some who started on this search with confidence that solutions were only a matter of diligent concerned exploration have begun to accept some unsettling implications of system complexity. This preliminary acceptance leads at this point to tentative and reluctant acknowledgement by some participants of the related conundrum that no fully satisfactory solution may be feasible and that reducing adverse impacts may require deliberate compromise of, at least broad awareness of, the much-prized attractiveness or accessibility or both. These implications are, of course, difficult to make visible, much less acceptable, in a culture long dedicated to the ideas that accessibility, and a widely promoted image, enhance economic viability; and that, in general, all "tax-base" and employment enhancing "development" is desirable.

Highlights in the County's half-century of formal planning experience are summarized in Table One below. But this includes only the official part of the story. And, while that official story is important, in the past several years unofficial citizen action, while also always part of the story, has increased in significance and in sustained and growing effort and allocation of resources to influence the process. The tension between the "official" and "unofficial citizen action" contingents implied above is quite real. It seems grounded in different world views and, at least as seen from the citizen action contingent, leads to foot dragging, if not outright obstructionism, by the official system whenever thoughtful skepticism about the real long-term value of (at least some kinds of) "development" are suggested or attempted. How and why this happened and its part in the larger process through and from which it evolved may provide insights for responses to similar experiences in other problematically attractive places around the globe. Perhaps most significant for this audience, it may also point to ways and tools to help bring system dynamics to bear on otherwise seemingly intractably complex public-interest problems.

System Dynamics of New Community Methods and Processes

Our early public engagement efforts grew through continuing and increasingly intensive interactions. Early in the process many participants seemed to think that success in the effort to engage the public more meaningfully with resource management issues was just a matter of finding the right perspective, gimmick or consultant. In that phase the project was mostly treated as a problem of finding a new and hopefully effective tool, raising funds to support use of the tool and finding a practitioner to come in, hired-gun-like, to administer the tool.

For core participants, however, this, buy-it-off-the-shelf, perspective was short lived and soon replaced by the frightful realization that meaningful progress would require steady practice to cultivate and empower local resources and unthinkable fortitude to persist in the face of the immense inertia of the status quo. It was this perspective that brought the centrality and essential interactive nature of three perspectives and tools: sustainability, dialogue and system thinking, clearly into focus and set the context from which these perspectives began to inform our efforts.

At about the same time, the core participants started meeting to actively practice dialogue on a regular, mostly weekly, basis. This effort, even now, more than three years into it, is often still halting, clumsy, and, sometimes, painful; but the group, with some attrition but more new members, continues to find time and energy to meet and all who continue to share it celebrate the experience. Thoughts on that experience and on its relationship to sustainability and system thinking are covered in more detail in Appendix Two. The central aspect of the experience for this paper is simply that it continues, regularly, and sometimes still even surprisingly, to reiterate the essential interactivity among the three perspectives: sustainability, dialogue and system thinking. Thus, while we mean to emphasize system dynamics in this presentation, we cannot honestly focus entirely on it without stressing the interactivity that lies at the heart of what we have to share. To balance the pressures of time, and probable perceived reader interest, we have delegated most of our discussion of dialogue to Appendix Two and here only mention its significance and challenge any who hope to bring system dynamics to the solution of collective problems to investigate dialogue, and to give it the time and attention required to learn to appreciate the significant role it can play in any group process.

Table One

Official Public Engagement in Resource Management: Door County, Wisconsin

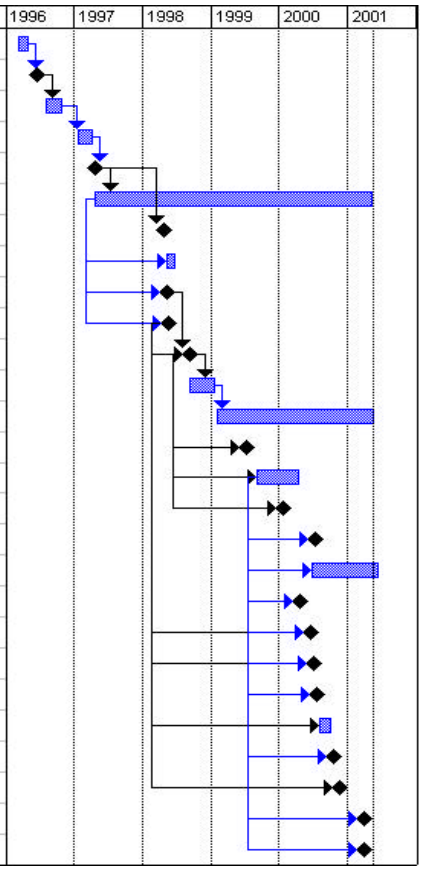
Date	Activity	Product	Participants
Pre 1950	State initiated for Door County (1939)	Rudimentary and tentative map for zoning districts - Not accepted by the county.	Document provide to the county by the Wisconsin State Planning Board
1952	Initiated by the County Board	Zoning Ordinance - Brief 7 pages - 5 zoning districts, with permitted uses	Four towns initially approved of ordinance (a few more later)- no implementation or enforcement
1964	State Initiated County wide Comprehensive Planning Initiative	Comprehensive Plan 300 Pages, maps, tables, etc. lead to a zoning ordinance in 1968 (Excellent Document)	Wisconsin. Dept of Resource Development & various co. agencies and citizens. Co. accepts, includes some enforcement procedures implemented.
1968	State-supported full time planner resident in County.		
1970	County hires full time planner		
1982	Advisory Planning Initiative	Small 30 page document of land use and community living recommendation and priorities	60 citizens selected based on local involvement and interest. Coordinated by U. of Wisconsin Extension
1986	Phase I of a Comprehensive Planning Project1995 Report on public concerns 1986 Advisory Only	Facilitated workshops 15 meetings in 5 geographical areas of county	Multiple interest groups - 185 people. Assisted by Dept of Landscape Architecture - U. of Wisconsin - Madison
1995	Door County Zoning Ordinance and Door County Development Plan	County Development Plan 115 Pages and accompanying zoning ordinance	8 year process started with a citizens planning organization (CPO) many dropped out of process for a variety of reasons finished by County officials

New efforts at this work

Table Two presents an overview of unofficial efforts of the last several years.

Table Two
Unofficial Efforts to Enhance Public Engagement with Resource Management in Door County, Wisconsin

ID	Task Name
1	Explore Citizen Involvement Approaches
2	Door 2000 - Community Land Use for the 21st Century Conference
3	The Omelet Conference & Continuance
4	Imagining Together Steering Committee Formed
5	Future Search Conference
6	Community Stewardship Core Group Established
7	Future Search Conference Participants Reunion
8	Attempts to form a Coalition of Environmental Activists Groups
9	Community Building Retreat-Systems Thinking and Dialogue Emerge
10	Door County Land Use Forum (501.3.C) Incorporated
11	Community Stewardship Academy
12	Community Stewardship Council - Charter Development
13	Community Stewardship Council Monthly Meetings
14	Teachers Attend Waters' Center One Course
15	Formal Instruction in System Dynamics
16	Spatial Modeling-Initial Public Presentation
17	University of Wisconsin System Dynamics Evaluation Grant
18	High School Classes in System Dynamics Offered
19	Teach the Teachers Seminar
20	NASA/Prescott College Presentations
21	Creative Learning Exchange K-12 Modeling Conference-Portland, OR
22	Waters Center Course One Offered Locally
23	Community Modeling Sessions
24	SD Presentations at Governor's WI Educ. Tech. Conf.
25	NASA/Prescott College HS & Community Presentations
26	Teacher Presentations @ WI Council for Social Studies Meeting
27	Additional System Dynamic Courses Offered At Sturgeon Bay HS



Appendix One discusses these and other related efforts in more detail.

Toward system dynamics informed dialogue

A note on a note from the work we report on here is both brief enough to reproduce in its entirety, and speaks powerfully and systemically to potential for interaction between dialogue and system dynamics in relation to Door County's problems and context. The notes that triggered this note were written in summary of a very preliminary dialogue–item number 9 in Table One above–early in the process discussed here. Some interactions among sustainability, dialogue, and system dynamics are profoundly systemic and illustrated by the note, which is so informative of the interactions that we reproduce it here in its original form.

Notes on the Relationship between Dialogue & System Dynamics

by Paul Newton, July 17, 1998

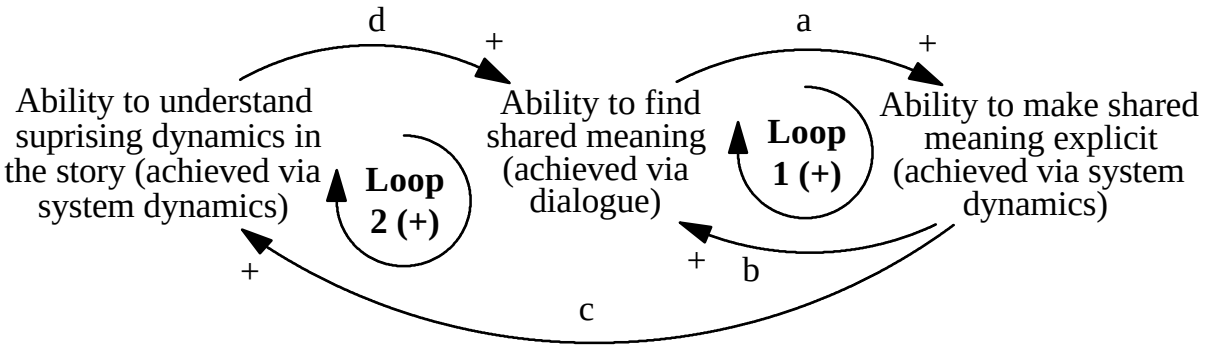
Roy Aiken[i] gave me a copy of some notes by John Shibley[ii] that develop a story of Door County development. [The story is based on a dialogue among Roy, John and about a dozen other people who shared concern, interest, or professional experience with development related problems in or beyond the County on May 11, 1998.] John's notes progressively develop the story via gradual exposition of layered causal loop diagrams and associated narrative.

The last paragraph in John's notes states, "These notes represent a very rough draft of one person's theory of the dynamics of development in Door County. They do not reflect 'the truth': they reflect a mental model that is open to challenge, refinement, and influence. The best way to use a treatment of this nature would be as a point of departure for dialogue. I hope you can see how having such a point of departure might enrich that conversation."

I agree with John. I also think that a story of the sort that John's paper describes is an excellent starting point for, not only dialogue, but also a system dynamics study. Further, I believe that it would be useful for a group of people who are trying to determine ways to improve the story's future outcome to alternate between dialogue sessions, and system dynamics modeling sessions. The dialogue sessions[iii] would help the group to surface "fundamental assumptions" in their thinking about the story and to gain "insight into why they [these assumptions] arise," for the purpose of creating "shared meaning" about the story. The system dynamics modeling sessions would make explicit the group's thinking about the story, would enrich their learning about the dynamics (the various behaviors-over-time and the relationships between them) inherent in the story, and would enable identification of strategies (combinations of policies) that would lead to a more desirable ending to the story. A portion of the relationship between dialogue and system dynamics can be expressed as shown in Figure 1.

Figure 1

The relationship between dialogue sessions and group system dynamics modeling sessions



Beginning in the middle of Figure 1 with the statement 'Ability to find shared meaning (achieved via dialogue)', the ability to achieve shared meaning in the group results from the group's practice of dialogue. Once the group is beginning to improve its ability to develop shared meaning, it can then, following arrow 'a', begin the process of creating together a system dynamics model of the story. The process of creating a system dynamics model forces individuals and groups to become more explicit in their thinking about the story. Now following arrow 'b', the group is confronted with how it will resolve the issues raised by the system dynamics model's forcing the group to be more explicit. Therefore the group's ability to create shared meaning via dialogue comes into play once again. The group then continues multiple times around Loop 1 until, at some point, following arrow 'c', the model is robust enough to begin to show dynamics (behaviors-over-time) that are surprising to the group. Following arrow 'd' to complete Loop 2 for the first time, the group's ability to create shared meaning is once again challenged as it tries to understand the surprising dynamics of the story, leading to new group insights about the behaviors-over-time in the story. Then the group process continues ad infinitum, sometimes around Loop 1, sometimes around Loop 2, or simultaneously around both loops, until the group has reached a level of understanding of the story that is adequate to address the problem statement that led to the need for creating a story in the first place.

The relationship between dialogue and system dynamics in the context of a group of people has a parallel in the context of an individual. In an individual, the 'dialogue' mechanism represents an individual's observation of her own thought processes, which is, in a sense, developing 'shared meaning' between the individual as the observer of thought processes and the individual as the observed thought processes. On the other hand, the 'system dynamics' mechanism plays the same roles (enforcing explicit thinking and enabling dynamic understanding) within the individual as it plays within the group.

[i] Executive Director of Door Property Owners, Inc.

[ii] Shibley, John J., (May, 1998), "Some System Notes From our Conversation 5/11/98 Regarding Development in Door County, Wisconsin".

[iii] Isaacs, William N., "Taking Flight: Dialogue, Collective Thinking, and Organizational Learning", *Organizational Learning*, August, 1993.

Making Progress Against The Odds

This story of our evolving efforts over the last several years, and the larger story of earlier attempts to bring some semblance of stewardship to "development" in Door County over the last half century are emblematic of similar stories around the planet. But the story is writ somewhat larger and more indelibly in places that "enjoy" the reinforcing combination of attractiveness and accessibility. Of course Door County is not the only or anywhere near the first among such places. Just in the United States the East, led by Manhattan, Boston, Cape Cod, Long Island, Chesapeake Bay, the Intercoastal Waterway, Florida… the West, led by Southern California, San Francisco, The Columbia River, Puget Sound, Hawaii…and the South Coast's Houston, New Orleans… and other places, like Door County, of the great middle; Ski havens in Colorado and other mountain areas, the Big-Sky country especially where it is accessible, sun-cities of Arizona and elsewhere…share similar experiences and similar frustrations.

As is true for many other attractive and accessible places, our focus on issues of immediate community concern and attempts to head off future problems by bringing new perspectives and practices, and resources to finance them, to the task, clearly confront systemic inertia. Still, we also hope, and our evolving understanding of and confidence with systems perspectives lead us to believe, that, in the wonderful metaphor of the snowball icon for reinforcing feedback, the change we hope to initiate will someday become self-reinforcing.

Many contributors to dialogue's renaissance also utilize systems insights and, at least some, maybe many, system dynamicists understand the power of dialogue. But in our experience the dynamic and inherently systemic aspects of engaging a community–as opposed to corporate, or purposeful public, entities, like schools–in dialogue are minimally visible in the literature and everywhere under supported. Our frustrations and the many roadblocks we encounter, including especially the difficulty of accessing commitment and resources to support general cultural purpose, help us understand why explicitly public efforts to leverage dialogue's power with system dynamics perspectives, or vice versa, are rare. Everywhere, it seems, public and collective interests and understanding are subordinate in the competition for resources that otherwise support more explicitly self or at least neighborhood interests and, often, negatively impact more collective concerns.

It is in context of such frustrations that we are optimistic about and find hope in the Prescott College/NASA Project to bring NASA's tools and data to the service of communities concerned for their futures. Though our collaboration with this project is still preliminary, we are convinced that it is already serving a most critical role by bringing otherwise reluctant players to the circle and by providing incentive for them to stay and dialogue long enough to develop an, at least preliminary, system dynamic model of the problems and processes. It is the project's power to catalyze meaningful community-oriented dialogue, on which hopefully significant system understanding can be based, that feeds our enthusiasm to share it with this conference and the world. In short, and in context of the literature on dialogue, we believe, and hope that, this tool will give us the leverage to make concern for the future the "practice field" for dialogue and system dynamics wherever it is taken.

Spatial Visualization Modeling: *Ugrow*© A New Tool: A New Beginning

As is elaborated above, a renewed effort to bring meaningful citizen engagement to planning issues in Door County had been growing since at least early 1996. Late in 1998 this effort took a more explicit turn toward modeling when Paul Newton's efforts to catalyze system dynamics instruction in public schools in Northeastern Wisconsin led he and Roy Aiken to approach administrators of Sturgeon Bay High Schools to support such a course. As a result, in September of 1999 Paul started teaching an extra curricular course at Sturgeon Bay High for a total of five Monday evening and Saturday morning hours per week to four teachers (1 biology, 1 economics, and 2 social studies), five high school sophomores, and four community members. Though continuing participation dropped in the second semester to three teachers, one student, and the four, intermittent, community members, the course was successful enough to feed three conference papers, a trip to the System Dynamics in K-12 conference in Stevenson WA in June of 2000 for five of the participants, and, perhaps most important, three classroom applications in two different Door County High Schools during the 2000-01 school year, with more including a second course for students from this year now planned for 2001-02, for which ongoing formal evaluation is funded by a University of Wisconsin-K-12 collaborative initiative. While these still nascent efforts are early in the process they represent our commitment to eventually "grow our own" system dynamics modeling capability and interest in the community.

Moreover, on a bitterly cold day in January, 2000 Wil Orr, with only a foolishly light desert jacket, and, a more reasonably attired, Craig Martinsen of the NASA-funded Sustainability and Global Change Program at Prescott College in Arizona faced Wisconsin winter for the first time. Evidently the promise of collaboration overcame the chill since this became the first of three visits in 2000 to Door County and Wisconsin generally by Wil and Craig to demonstrate ever more locally-focused versions of the **Urban Growth Model *Ugrow*©** program. This agenda has now initiated a context that, before 2000 was out, saw several community groups whose interest had been tweaked by Ugrow presentations meet twice with system dynamicist Andrew Jones, and at the second of those times Don Seville supported Drew's facilitation with active systems modeling, to identify background context for and to begin to model issues triggered by increasing land use pressures in the region in general and Door County in particular.

The visualization tools provided by the NASA/Prescott College Program apply NASA's technological capabilities to project possible land-use patterns and portray disaster scenarios before they happen by using remote sensed data as the basis for ever more locally-focused versions of the Personal Computer-based Ugrow model**.** The model both portrays a community a generation or more into the future based on alternative presumed growth policies and offers capacity to visually "fly" those scenarios in three dimensions, while zooming in on detail whenever useful. The result effectively and emotively shows, for example, flood water levels and patterns, even to the inside of (so far only mock, but that's a fixable detail should "real" become important) houses if wanted. The visualization results, typically presented in a seamless, active, three-screen projected computer image format, invite citizens to visualize the long-term consequences and disaster potential of the incremental changes allowed or encouraged by existing and alternative policies. The visualization readily invites and encourages participation in exercises to identify forces behind the processes projected and portrayed by the computer simulation. In Door County (for the first time, among Ugrow applications in Hawaii, Arizona,

Montana, New York, and California, with New Jersey and West Virginia in the queue) that participation is explicitly guided by a second level of locally initiated system dynamic modeling of forces thought to drive the macro processes made visual by the 3D images.

Three presentations of the Ugrow model, in January, June and November 2000 reached around 400 people, including 200 high school students, from or interested in Door County. One of the visits was in conjunction with a statewide sustainability-enhancing conference, held in the urban SE corner of the State, for city and minor governmental unit officials where the model was highlighted as a keynote presentation. One of the system dynamic spin-offs we hope for from the conference keynote is that credibility will be given the Door County project as the tools we are pioneering (for the State as far as we know) here are adopted elsewhere around the State. It is worth noting that we see this paper in similar terms. If we succeed in getting it published by a reputable organization the reprints should greatly facilitate our other work by lending "credibility" to what now seems to some local participants to be only a relatively "home grown," and thus dismissible, Door County project.

Ugrow is a 300 plus equation Powersim© model that defines the basic relationships among the economic, social and environmental sectors of a community. This model also quantifies local sustainability and couples a given locale to climate change via CO_2 emissions. A range of local climate change and variability impacts may be tested, primarily through a variety of weather/hydrologic scenarios that affect (for example) groundwater availability and storm damage to local infrastructure. The model runs from 1950 to 2100 with pauses at any selected time for policy interventions. It is designed to test proposed policies and can be stopped at any year to produce the community status as a scenario responding to the proposed policy(s). The model characterizes an area as the confluence of built, human, and natural environments and projects variables grouped into major sectors such as*: Quality of Life, Economic & Business, Housing, Population, Land Use, Transportation, Climate Change Impacts, and Energy.*

The model produces a variety of future scenarios based on changes in local development policy, input conditions or external variables. There are presently ten policy option categories which encourage/discourage efficiencies in, for instance: *housing density, energy consumption, transportation, land use/land cover, and business activity:* Each of these may be adjusted for "intensity," representing the strength with which the policy is implemented. The visual and simultaneous running of all the variables within the assigned temporal scale is designed for citizens and decision-makers, informed on local issues, but with limited time to understand the complex impacts of climate change and the interactions with current problems, e.g. sprawl, public safety, infrastructure financing, etc.

The model's results, much aggregated from the detail available from the Powersim model, are typically presented in public sessions through a visual Geographic Information System component linked to a Three Dimensional model of the area based on digitized visual images, including maps or photos including aerial photos, of the region that makes the results accessible and comprehensible to general audiences without experience with data analysis or system dynamics. A Discussion Support System (*MeetingWorks)* for guiding and recording the public process of debating local issue(s) is also included. Our Door County innovation goes beyond the DSS to incorporate another level of system dynamics modeling of perspectives generated from community dialogues to further identify drivers of and leverage points in the system.

The evolving Ugrow model is currently available, with presentations supported by Prescott College/NASA Project staff, to selected applicant communities at the cost of staff travel. Negotiations are on-going to have the model commercially available in a version that can be run on ordinary personal computers by locals with no more than modest system dynamics and GIS backgrounds within a couple of years. More complete discussion of the ***Ugrow*©** model is available from Wilson W. (Wil) Orr, Director, NASA Program, Prescott College, 220 Grove Ave, Prescott, AZ 86301, (520) 717-6070.

From Visualization to System Dynamic Modeling of Drivers

The power, of the Ugrow model for the Door County project has so far come not from specific insights it offers, though these are both interesting and sobering, but from its ability to attract interest and gain attention. Between the second and third presentations in late June and early November of 2000 respectively, first for three days in late July and then, with Don Seville, for another three days in late September, Andrew Jones provided system dynamics-oriented facilitation first for a broad group of about 75 interested County folk and second for a series of meetings among about 80 "representatives" of several community interest groups. These meetings and follow-up work sessions with a team of about 20 people committed to working to develop a system dynamic model of a county issue led to the preliminary perspectives summarized below and represent the largest and most sustained input of community energy we so far have been able to achieve.

The Door County Modeling Project

The following note is reproduced from materials provided by Andrew Jones after the second modeling session. It is offered verbatim both to illustrate the iterative nature of our process and to emphasize that the Door County models sketched below are quite tentative, not yet tested, and subject to major, perhaps even total, revision. The models do, however clearly illustrate the tone and direction of the process to date.

The Door County Modeling Project Narrative
By Drew Jones following two preliminary system dynamic modeling efforts

(Drew's Note: "This is rough and unedited. It is how I would verbally frame the story of where we've come and where we might go.")

At the highest level, DC seems to be struggling with balancing the costs and benefits of development. On one hand, growth in housing and in tourist visits has created some financial prosperity for many via economic growth. On the other hand, many people are concerned about threats to quality of life, the environment, and the rural culture.

So the Land Use Forum hosted a set of workshops that would help people explore this fundamental tension shared by many attractive areas.

The group held four facilitated sessions with diverse stakeholder groups – government, agriculture/conservation, hospitality/manufacturing, and realty/construction. These sessions helped the core modeling team start with a question that had diverse appeal and further surfaced peoples' theories about the important drivers of change in the system.

Several key issues that emerged included

- the labor shortage and the significant effect of housing affordability in the shortage
- housing affordability in the face of rising property values
- concern over loss of agricultural land and other open space
- the disproportionate growth of seasonal housing.

With the issues surfaced at the previous meetings in mind, a 15 person modeling team identified a more focused challenge that they wanted to address with the modeling -- *How can Door County have a diversity of housing while maintaining open space?*

More specifically, they identified three behaviors that they would like to explore – the accelerating increase of local housing price, the faster growth of seasonal housing relative to local housing, and the gradual decline of open space. With each behavior, they asked, "Why have we seen this behavior happen over the past decades? And what can we do about it into the future?"

Using facilitated causal loop diagramming; the group answered their own question by drawing out their theories for the drivers of change in the region. Loop by loop, the group built a feedback map that captured various perceived causes and effects in the system.

The heart of the theory that the group diagrammed (and later modeled) was this: Because of its natural setting and beauty, DC is more attractive than many other areas, and thus is growing. The high demand for land on which to build houses relative to a smaller supply of available, developable land (the supply is small not because of its overall size, but because only so much is up for sale every year) drives steadily rising land prices. The rising land values boosts the values and prices of both seasonal/retiree housing (owned by people who are not dependent on the local economy for income) and the local housing (owned by people who are dependent on the local economy). That's the theory about rising housing cost – greater demand than supply. The high housing costs have different effects on the attractiveness of the region to seasonals and locals, however. Locals are sensitive to these costs, while seasonals are not. So the rising housing costs depress growth of local housing but not seasonal housing. That's the theory about the disproportionate growth of seasonal housing. Overall, both types of housing eat up open space, explaining the loss of open space.

But how much confidence do we have in this theory? Is it sufficient to explain the behaviors the group identified? What will be the effects of various policies and uncertainties on this system into the future?

Building a simulation model can help us begin to answer these questions. So after the model workshop and in the next morning, the modelers pulled together a rough model to begin exploring the questions.

At a high level, the model of the theory showed the following: There were two distinct periods of development – a growth period and a leveling period. The leveling happened when the rising housing costs finally deterred seasonal homebuilders from continuing the high construction rates.

The transition period between the two periods includes a spiking of housing price and then a crash.

While the overall number of housing units mostly levels out, local housing actually falls.

The modeling and the discussions that supported the modeling brought out four top questions amongst the group.

If a perfectly attractive region would soon be overwhelmed by unmanageable rates of growth, what "targeted unattractiveness" are people willing to tolerate in order to grow at a more manageable rate?

Does the region need to endure some sort of crisis before finding a balance between development and quality of life or will the system naturally make a smooth transition to balance?

Can people in the system recognize the need for land protection soon enough to protect sufficient open space, or will the problem not show itself until it is too late to protect land?

Could the policy of minimum lot size severely exacerbate the housing affordability problem by reducing land supply and increasing demand for land?

During the workshop, the group offered many additions to the theory – only one of which has been added to the model:

What if the farmers' and other landowners' willingness to sell were captured as a function of the land price. That is, higher prices pull more sellers into the market?

What if seasonal home-buyers are buying homes because they forecast continued increases in housing price – using the housing as speculative investment? How would that effect the behavior?

What if the loss of open space detracts from the overall attractiveness of the region, causing potential seasonal home buyers to be less interested in the region?

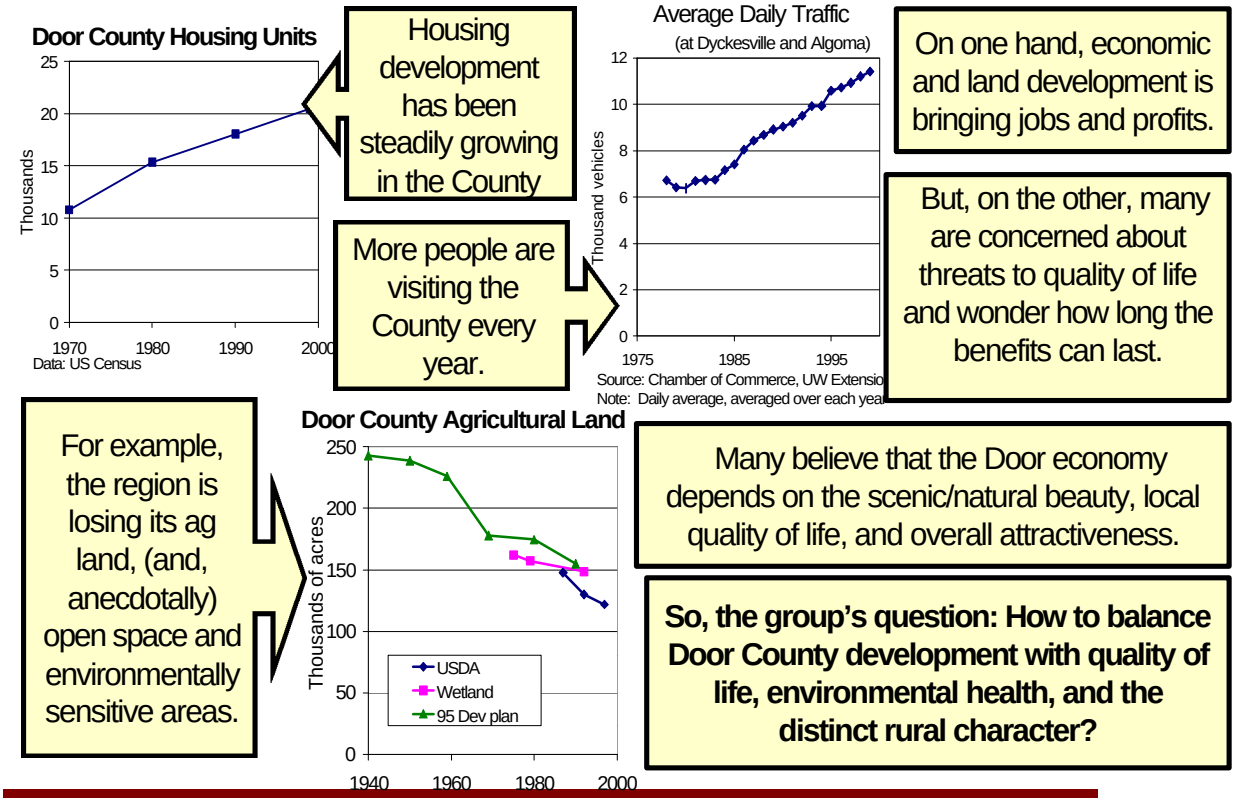
What if the lack of affordable housing leads to a persistent deficit of retail/service workers and government workers, leading to a drop in the quality of services in the County? How would that effect attractiveness and future development?

What would be the effect of other policies and uncertainties such as a downturn in the stock market, development fees, minimum lot sizes, and other factors?

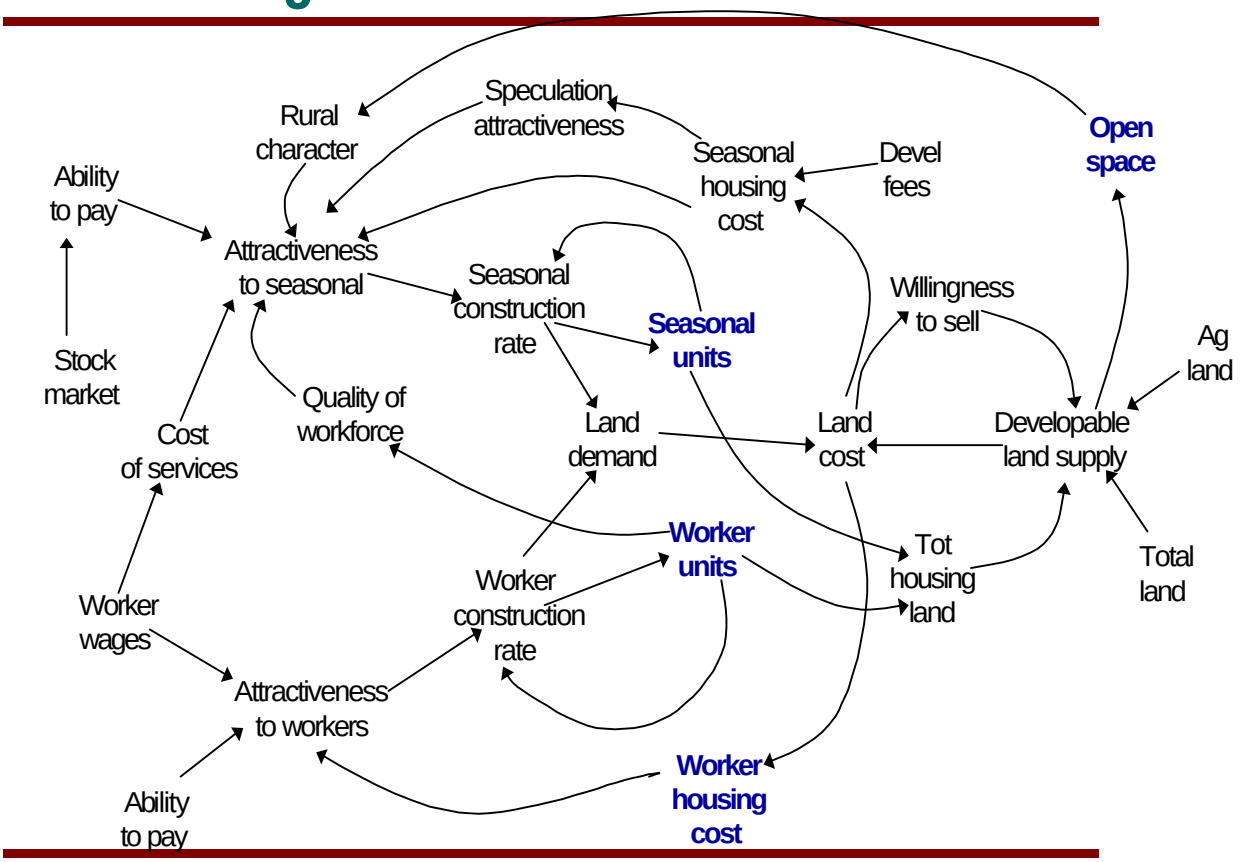
One next step would be to add the theories to the model to see how the new structure would change the behavior of the system. A second next step would be to clean up the model and begin to look for data that could help by building our confidence in the model structure and calibrating the model better. A third step would be to add a control panel so it was easier to change assumptions and ask "what-if" questions.

A few screen captures from the modeling efforts and the current models are presented on the following pages to give a flavor of the local Door County modeling process at its current preliminary stage.

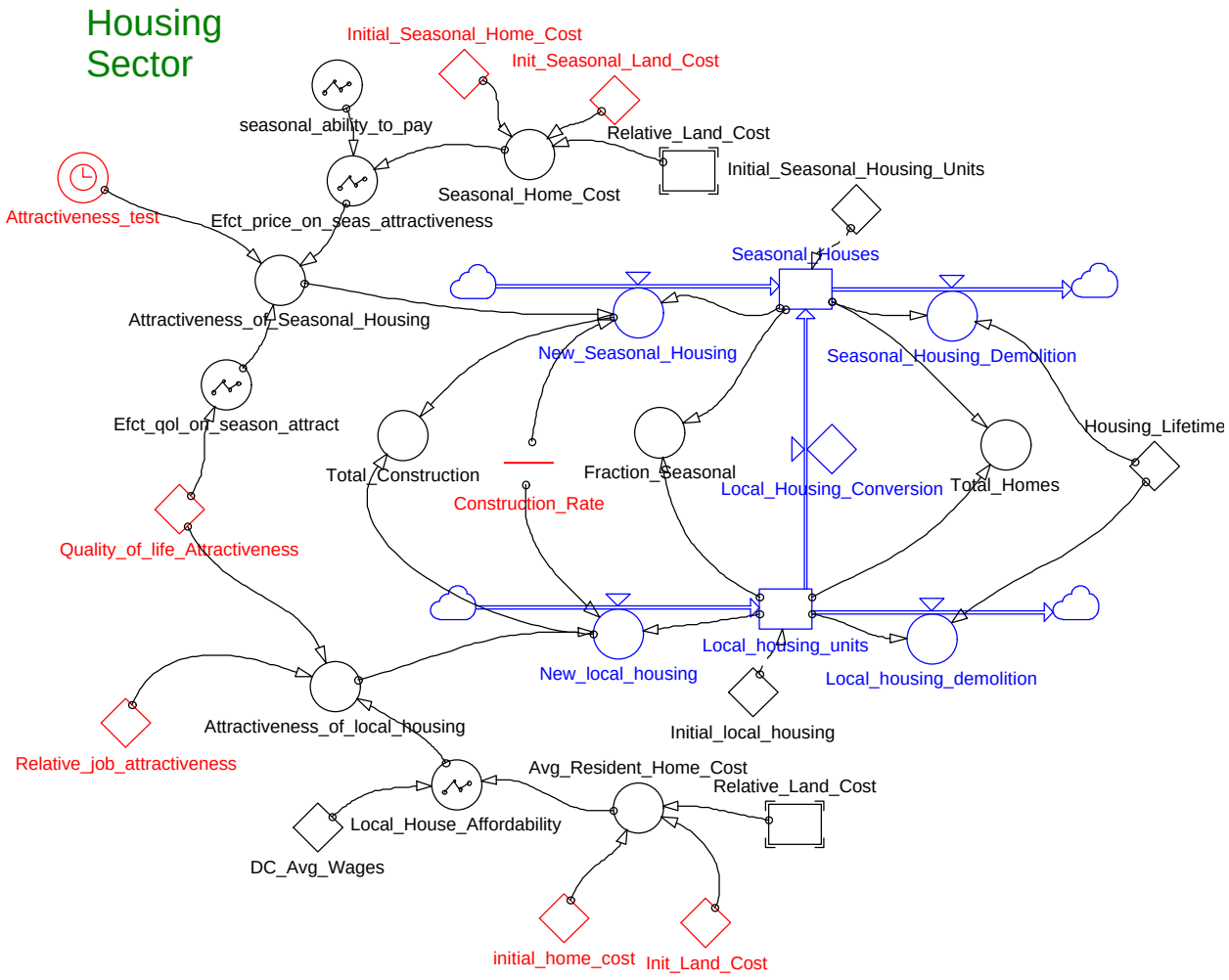
At the Highest Level, Door County Seems to Be Struggling With Balancing the Benefits and Costs of Development



Total Diagram

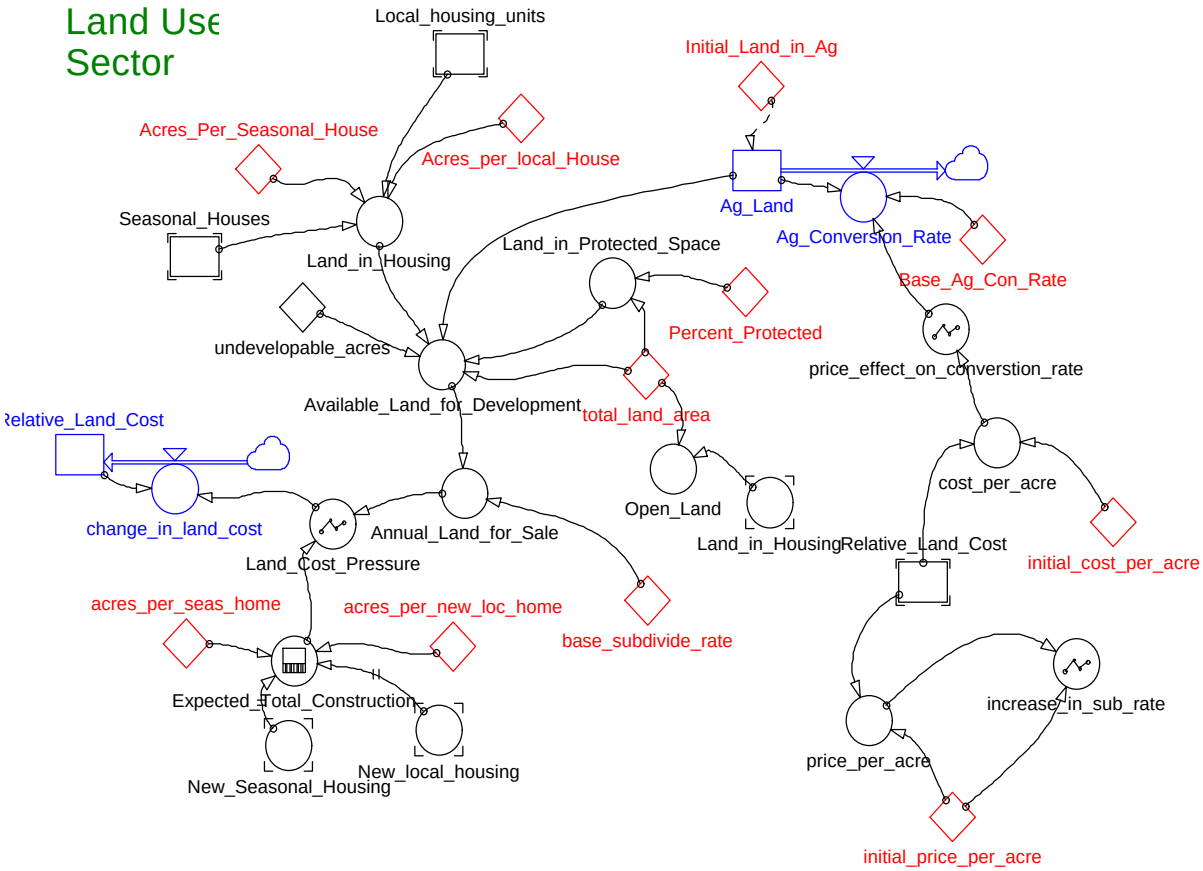


The Housing Sector: How Regional Attractiveness Drives Two Types of Housing



The Land Use Sector: Open Space,

Agricultural Land, and Land Cost



Next Steps

Except for maintenance through our weekly dialogue sessions and occasional, now issue-focused and episodic, Stewardship Council meetings and especially through continued efforts to maintain on-going projects that have grown from the efforts surveyed above, current efforts focus mostly on the search for resources to further support the process. We hope that this paper will add credence to the project and thus assist in that search. In fact, the recursive processes of:

- identifying desirable or possibly productive activities to further the processes reported here
- locating competent providers of those resources and negotiating terms to make them available
- seeking support to finance or otherwise implement those activities
- lobbying in the community to generate interest in and cultural support for the activities and
- conducting the activities and moving ahead

never end. A final chapter in this saga will only come if those willing to struggle for a more sustainable future simply give up. That, in today's culture would allow the western end of the Niagara Escarpment, which underpins Door County, to "progress" even more rapidly to resemble "development" on the United States side of its border with Canada at the Escarpment's eastern namesake landmark.

Summary and Conclusions

The story of development pressure on attractive places presented here, though specific to Door County Wisconsin at the turn of the 21st Century, is probably both geographically and historically universal. While the system dynamics models of the Door County process that we have developed to date are quite elementary, they represent an immense leap in public engagement and bootstrapped public education to make more sense of problems faced by our community. The more sophisticated systems dynamics applications that underpin ***Ugrow's©*** scenario visualization capability enhanced the public engagement essential to the development of these models tremendously. We believe a similar process can help attractive accessible communities around the planet. We are confident that the paired tools of spatial visualization and system dynamic modeling of scenarios offer real hope for developing responses now to problems likely to manifest in painful and culturally and ecologically very expensive, even tragic, ways in the future. We are delighted to be able to bring these tools together, so far as we know for the first time, in addressing development pressures in Door County Wisconsin and we hope to be able to share in making these and related tools universally available on accessible terms.

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Appendix One

A brief review of recent efforts in this process

This review of recent efforts is offered to illustrate something of the process we are learning about and to provide context for demonstrating some of the tools we use to try to influence the County's future, including dialogue, causal loop diagramming, system dynamic modeling, and spatial visualization of alternative scenarios.

During spring 1996 a small group of Door County citizens started to explore different approaches to citizen involvement in meaningful dialogue and action on local issues and concerns. The first community event to grow from this exploration occurred in June of 1996.

Door 2000 - Community Land Use for the 21st Century Conference - June 1996

This daylong workshop sponsored by the Chamber of Commerce and a local property owners association featured insights and tools used in other places facing similar issues. Topics covered included Political Action, Purchase of Development Rights, Land Use Issues-Zoning & Impact Fees, and Affordable Housing. Approximately eighty people attended but developers, homebuilders and elected officials were notably absent.

The Omelet Conference & Continuance - August 1996

Shortly after Door 2000 several participants gathered to continue discussions. More than a dozen small group conversations were held during the next three months with over one hundred residents participating. Most people brought feelings of powerlessness and hopelessness about the community's ability to cope with the forces of growth. However, on many occasions the meetings ended with a renewed sense of hope and vision. In January 1997, several participants from the small group discussions formed a steering committee, Imagining Together: Door County, which sponsored a Future Search Conference in April of 1997.

Future Search Conference - April 1997

Using the future search process (Weisbord and Janoff 1995), a two and one-half-day professionally-facilitated workshop addressed the question: How Do We Enhance the Quality of Life and Economic Future of Door County, While respecting its Character, Beauty and Natural Resources? A massive effort to recruit 9 representatives from each of 9 stakeholder groups brought together 78 participants who found eleven significant issues and concerns impacting the future of the community they could agree about unanimously. This provided groundwork for numerous follow-on initiatives. Interestingly, proceedings of the Future Search are painfully similar to those from a similar community engagement eleven years earlier. The previously identified issues and concerns were evidently not resolved in the intervening decade.

Future Search Follow-up - Summer 1997

Follow-up meetings to spread the results of the Future Search effort as widely as possible throughout the County were held in three locations in the three major regions of the county during Summer 1977. A total of about 150 people attended theses sessions to review and expand the results of the Future Search and begin to take them further

Community Stewardship Core Group follow-up to Future Search - April 1997 forward

Following the Future Search a small group of participants, who had contributed to the organization, implementation, and fund raising to finance the Future Search, started gathering regularly. These early gatherings provided our first experiences practicing dialogue. Some of the basic texts about that discipline were core readings for these efforts (Baldwin 1994, Bohm 1996, Ellinor & Gerard 1998, Jaworski 1998). Many of the ten or so participants look back fondly on those self-organizing non-meetings and on our clumsy attempts to learn to listen deeply and with respect. We sometimes used a "talking stick" to enforce silent listening. We also adopted statements, some gleaned from a daily Zen calendar, that reinforced useful insights. "Don't speak unless you can improve upon the silence," remains our best example.

Future Search Conference Participants Reunion - April 1998

Approximately half of the original search conference participants attended a three-hour evening gathering to celebrate some successes that grew out of the first year after Future Search. Discussion and thought were given to future initiatives. Efforts to seek common ground between the development and environmental communities shortly after the 1997 conference produced few positive results, and attempts to find shared purpose among local environmental and conservation organizations were only slightly more successful. The essential insight from both efforts is that "turf" is a major hurdle to creating shared agendas.

Attempts to form a coalition of environmental activists groups - April & May 1998

Two Saturday morning summits attempted to move local environmental activists and several of their organizations toward collaboration. While organizers of these two meetings tried to introduce dialogue principles during the discussions, these meetings were largely unable to rise above being skeptical "gripe" sessions fueled by attitudes hardened by years of sparring with growth and development interests. The most significant of these attitude-hardening experiences is the lack of meaningful implementation of the County's Comprehensive Development Plan of 1995. The zoning ordinance that resulted from this Plan and its implementation consistently favor development over even the minimal resource protection called for in the Plan. Thus those concerned for protection and willing to push for it find themselves drawn into ever-more expensive legal action when they persist. In this context supporters of protection see little opportunity to do anything but continue to oppose one development proposal after another, and, quite naturally, find themselves labeled "nay-sayers."

Retreat at the Bjorklunden Conference Center - May 1998

This small gathering sought methods and processes to further community-building activities by bringing four organizational consultants and community process practitioners from different perspectives and eight local community activists together in an all-day conversation at a secluded conference center on the shores of Lake Michigan. This was the occasion where most of the core participants in the larger project were first exposed to systems thinking and causal loop diagramming as is reflected in Figure 1 in the main body of the paper above. At day's end many felt that the marriage of a local issue with the disciplines of dialogue and systems thinking in a forum or workshop setting could yield new insights and offer a better chance for problem

solving. This idea spawned Door County's deep engagement with an initiative from the local state university campus: a stewardship academy.

Door County Land Use Forum (501.3.C) Incorporated May 1998

The Land Use Forum was created to provide a means for education, open discussion forums, and exchange of ideas to emphasize advanced land use planning and concepts. The continuing efforts of community dialogue needed a source for financial support that could receive tax-deductible donations from the community and allow for receipt of donations from foundations. The Forum has helped to organize land use planning workshops, support stewardship council activities, provides funding support for work in public education that is promoting the use of system dynamics and computer simulation modeling as a teaching tool in K-12 classrooms. The spatial modeling and future growth simulation project currently in process in the county has been mostly supported by financial resources developed by The Forum.

Community Stewardship Academy (CSA) September 1998

The Academy, a collaborative effort of several programs at the University of Wisconsin-Green Bay, presented a one and one-half day curriculum September 17-19 1998 focused on an issue challenging each community. The Academy's vision was for a team of six to twelve key participants from each community to be introduced to dialogue, system thinking and stewardship principles and encouraged to develop a set of action scenarios to take back to the community to address the team's selected issue. Through dialogue and interaction each team grappled with its project from holistic perspectives. Two teams, one from Racine, Wisconsin and the other from Door County, Wisconsin, worked in combined and separate sessions, to experience using dialogue and systems thinking to uncover assumptions and bring previously hidden aspects of the issue to light. A Door County-wide task force on affordable, now called attainable, housing continues to work on the problem addressed in the CSA by the Door County team.

Community Stewardship Council - Charter Development - October 1998

In Door County considerable discussion followed the Stewardship Academy workshop about how we might use what had been learned during the workshop. These continuing discussions led us to convene a full-day strategy session with several system thinking and dialogue practitioners. Many of those present had been involved with the larger process since June of 1996. During these discussions we began laying groundwork to create a partnership, among various citizen organizations and several local and state government agencies. The partnership's purpose was to draw on the technical, financial and human resources of participants, particularly the Wisconsin Department of Natural Resources, and to seek creative ways to cooperate in resolving controversial local resource management issues. Over the next five months, ten informational gatherings were conducted to inform people of the initiative to create the Door County Stewardship Council, and to invite their participation in working toward the Council's purposes.

Community Stewardship Council - Beginning - February 1999

The initial council meeting was a mid-day session in February 1999 with about 35 people attending. An organizing group planned the event to be well structured and to incorporate many

components of dialogue. Regular meetings of the council, with varying attendance, have continued one Monday evening a month. An effort to focus the council on a special issue in November of 2000 led to changing the regular meeting time to accommodate a broader constituency. This resulted in the largest and best attended meeting to date. While the Council has not had professional facilitators, a local participant with national conflict resolution experience who was involved with most of the preliminary work, including the Stewardship Academy, has now volunteered to serve as a very light-handed facilitator and her efforts seem to have positively impacted the last several meetings. The Council regularly takes time to emphasize, experience, discuss, and reinforce selected attributes of dialogue and system thinking in short segments of these meetings.

Attendance at the Council is spotty. More than one-hundred people have come one or more times and two thirds or more of a core of about a dozen regulars usually attend to talk about efforts to bring clarity to some of the more difficult issues in our community. A tension clearly exists between those who want action and those who see value in continued conversation about difficult issues. Several worthy resource management projects initiated by relevant entities are underway in the county; many of these projects have been the focus of Stewardship Council dialogues, but the Council typically does not initiate projects. Some see the Council as a place to develop understanding and a common language across subcultures within the community. We who share this view think we have seen positive results from these seemingly unstructured conversations. But attempts by the organizing team to minimize control and direction by implementing ideas of shared leadership and shared responsibility for the council's conduct have frustrated some irregular or one-time participants, who tend to respond with something like "Let me know when you decide to DO SOMETHING and I will consider getting on board." Recent meetings are becoming more action or project oriented, especially under the recent casual facilitation mentioned above. We are by no means where we would like to be with implementation of our vision of partnership and collaboration, but we believe we are making slow but certain progress.

Formal Instruction in System Dynamics-CSA and class-September 1999-April 2000

John Shibley introduced systems thinking and causal loop diagramming by circulating notes he took and later embellished at a day-long session focused on Door County and its problems, at the Bjorklunden Conference Center in May of 1998. In September, John and Paul Newton introduced focused system thinking and system dynamics instruction at the Community Stewardship academy, which dealt with the problem of affordable housing. This session was too brief to do more than introduce concepts and a few tools. It did not create any local ability to model issues. But early in 1999, Paul and Roy Aiken, in an effort to blend concerns of business, government, and charitable organizations' and public school instruction in system dynamics approached administrators of Door County High Schools with an offer to help bring instruction in system dynamics into their programs. With hope that the project might help their students respond more successfully to pending state-mandated "high-stakes" testing the Sturgeon Bay High School administrators approved offering an experimental extra-credit course in system dynamics for K-12 students, teachers and community participants.

Despite some communication snafus it all came together. After playing a bit with Stella on the computer in his basement, Don Ziegelbauer, a high school social studies teacher, became interested in co-teaching the class with Paul. In July, he and Paul attended Course 1 of the

Waters' Center's 5 course sequence for teachers at Trinity College in Burlington, Vermont. Don recruited three other teachers (1 biology, 1 economics, and 1 social studies) to take the course, as well as five high school sophomores. Four adults enrolled in the course, including Roy Aiken (director of the Door Property Owners Association), Larry Smith (a social sciences professor at the University of Wisconsin - Green Bay), Pat Miller (a retiree who is very active in Door County community issues), and John Jessup (a business process modeling consultant). The high school students receive elective credit for the course, with Don responsible for grading their work. The class met each week for two hours on Monday evenings and three hours on Saturday mornings.

System Dynamics Course Participants Attend Creative Learning Exchange K-12 Modeling Conference, Stevenson, WA-June 2000

Reports on the Sturgeon Bay course and its relationship to the larger project described here were presented at the Creative Learning Exchange K-12 Modeling Conference in Stevenson Washington June 25-27 2000. Five participants in the course, Aiken, Newton, Smith, Steve Schmeltzer, a social studies teacher, and Rob Watson, the most engaged among the five students, attended this conference presenting two papers and participating in the conference follow-up networking session (Aiken et al 2000, Newton and Smith 2000).

System Dynamics Classes: Sturgeon Bay and Sevastopol High Schools 2000-01 and 2001-02

As follow up to the extracurricular course described above, in both semesters of the 2000-01 academic year, Don Ziegelbauer taught an administratively approved elective course on system dynamics in Sturgeon Bay High school. Approval for continuing the course has been secured and a second level follow-up course is also planned for 2001-02. Also, two of the other teachers, Jim Adams and Steve Schmeltzer, both social science teachers in Sevastopol and Sturgeon Bay H.S.s respectively, used system dynamics to supplement some of their regular social science courses during 2000-01 and plan to continue and expand this agenda.

Follow up From First Two Years of System Dynamics Instruction

Two important successes followed from the first two years of first extracurricular and second regular system dynamics courses in Door County. First, student and administrative response was positive and a second-level system dynamics course is planned for 2001-02 along with continuation and improvement of the entry-level course. A student from the first informal effort reports with great pleasure that he looks forward to taking that second level course and both he and Don are pleased that female students are expected to participate in the first level course next year.

The other success that was fed by informal support from participants in the networking session following the CLE conference in June 2000 was the securing of funding of formal evaluation of the Door County system dynamics courses by a University of Wisconsin – System Grant starting in July of 2000. The results of this evaluation project promise to lend leverage to both the local and, based on discussion at the CLE event, global efforts to bring system dynamics more fully into K-12 curricula. This evaluation project and the larger system dynamics agenda were reported on by participating teachers and UW-Green Bay faculty in Wisconsin state- and Door County-wide forums during the 2000-01 academic year. Jim Adam's website documents

some of these activities and generally advertises system dynamics activities in the County http://www.sevastopol.k12.wi.us/hs/sysdyn.html.

Waters' Center Course One offered July 2000

In July of 2000 half a dozen additional Regional Teachers a State Department of Public Instruction Administrator, a local citizen advocate, and an activist from Minnesota took advantage of a week long presentation of the Waters's Center's Course One at Sturgeon Bay High School. Several of the teachers and community members who had participated in the first, extracurricular, course attended some of the sessions and renewed their engagement with system dynamics. Further engagement with the Waters' Center to support activities in the County is anticipated.

Spatial Modeling-Initial Public Presentation-January 2000

In November of 1998 four key contributors to the Community Stewardship Academy (CSA) traveled to the Tools for Community Design and Decision-Making Conference in Chattanooga TN to both present the CSA experience and to learn more about tools for enhancing community sustainability. The four CSA participants were able to attend many of the parallel presentations at the conference. Spatial visualization utilizing Urban Growth Model **Ugrow** software and techniques developed by the joint effort of the National Aeronautical and Space Administration (NASA) and Prescott College in Arizona, because of its relatively low cost to communities and the warm enthusiasm of its presenter/champion became a critical tool in the continuing effort and is discussed in more detail in the attached document. It is most often presented in a three interactive computer screen mode that can show several alternative development scenarios for any given place. The tool has been used in several communities from Hawaii. California and Montana in the West to New Jersey in the East and it has now landed, with renewed vigor drawn from hybridization of it with system dynamic modeling, in Door County and Wisconsin generally.

Spatial Modeling-Additional Public Presentations-June and November 2000

In June and October of 2000 Wil Orr and Craig Martinsen returned to the County, each time with more detailed Door County data included in the ***Ugrow*©** model to present the model to various County groups. These presentations reached perhaps 400 people, including about 200 high school students, interested in the County's future.

System Dynamic Modeling of Public Perceptions-July and September 2000

Following on the June spatial modeling presentations, in late July Andrew Jones facilitated two meetings with a total of about 75 County residents and developed preliminary causal loop diagrams of County issues reflected in those discussions. In late September Drew returned with Don Seville to follow-up on the July efforts and to work more explicitly, first with several county interest groups and, finally, with a volunteer "modeling team" of about fifteen people to begin to develop a more formal system dynamic model of critical County issues. The preliminary diagrams and models presented above resulted from these sessions.

Appendix Two
Dialogue

David Bohm, perhaps more than any other in recent time, helped revive the ancient, maybe even foundational, human art of dialogue in search of collective wisdom. This art must have come to us from generations spent around the hearth. Along with other features that distinguish us among animals-tools; self-reflection; abstraction; urges to hunt, gather, store and nurture-dialogue surely must be a collective product of human experience. It must have come with many visual "arts," in the search that became, and continues, as language, and despite modern culture's celebration of individual as opposed to collective wisdom, it must be deeply grounded in our genetic roots.

Humanity's new, science-based tools, which are at most a very few centuries deep, rest on many more millennia, and perhaps millions, of years of experience deeply, genetically programmed into our human essence. That experience, all founded on trying to make sense of observation of surroundings, took the name "ecology" around the turn of the twentieth century.

About the time that ecology was named from Greek, Latin, and German roots with meanings like country household, subsistence estate, farm, neighborhood, region, diocese and such, new ideas shattered the core of human understanding regarding the nature of physical reality. Bohm's participation in that revolution, and his pained observation of the conflict and rupture of friendship it brought, led him, toward the end of his life, to seek alternatives to conflict in the search for agreement about new ideas.

At the core of Bohm's approach is the idea of "the wisdom of the group." From the idea that wisdom is collective comes the insight that if we hold too rigidly to our individual views of "truth" we will not find it. Bohm, and others, (re)created the method that is today called dialogue as a tool for seeking and "growing" or perhaps "composting," collective wisdom. The circle is critical for encouraging dialogue. This may be rooted in the millennia of human experience of sitting in a circle around the hearth. Whatever the origin, the circle provides a critical context for dialogue in which all participants are equal. A further refection of the fundamental democracy of dialogue is that facilitators of dialogue strive to become full participants in the dialogue as rapidly as possible. Each participant is then a leader.

Perhaps the greatest problems for dialogue at this time in human experience are also its greatest strengths. Dialogue takes time and commitment. In this it seems out of phase with today's hurry-up lifestyle. It is difficult to convince skeptics to schedule and take the time to learn the skills and experience the benefits of this powerful approach. The problem of time is further compounded with other requisites that will seem anachronistic to most people today.

Dialogue requires that participants

Attend to, recognize and, at least for themselves, surface and suspend their assumptions

Speak when moved from the heart and then "to the circle" not to an individual

Listen carefully and always leave plenty of silence to encourage thought and to give those less forward room to speak,

and, most important,

> Never argue with, respond directly to, or speak only to another participant, or hold rigidly to your own perspective.

Such guidelines are just that. They will all be broken in nearly every dialogue and by nearly every participant. But for dialogue to work they must be honored and when they are broken it is best if the participant who erred repair the fractured dialogue. Often repair can be effected by simply recognizing and reversing the disruptive or less than thoughtful and collaborative behavior and going ahead with the dialogue. Sometimes one feels a need to mention the disruptive behavior, though it is rarely necessary. Everyone has experienced lapses at one time or another and most recognize them when they occur.

A flood of recent literature on dialogue extends and amplifies these contexts and guidelines. Today, by comparison with what we imagine of indigenous cultures, making dialogue effective tends to be complex. "Dialogue has many levels, starting with observable behaviors, the basics of listening and respecting one another, of suspending one's views and voicing. But what makes these new behaviors possible is not simply trying to act differently. New behaviors that last come from new ways of seeing, from new awareness and sensibilities". (Senge, 1999).

In a related view, ways of seeing and sensibilities may not be intentional or explicit for most participants, but some may purposefully choose to take on different perspectives. Purposeful choice of sensibility comes close to what we think of as the ultimate insight for both dialogue and system dynamics. Donella Meadows in "Ways to Intervene in a System" which may be the most powerful abstraction we have found to date avers that the single most powerful tool for system change is shaking off all paradigms. William Isaacs's "four-player model" introduces a perspective for understanding paradigms and related structures that underlie group behavior developed by family system therapist David Kantor who calls his work structural dynamics. This "four-player" perspective examines "movers, opposers, followers, and bystanders", regarding their relationship to a given issue-focused dialogue and adds another dimension to our understanding of human interaction. In genuine dialogue, these roles can become dynamic, rather than static, and some participants can take on new roles to deliberately influence the conversational energy.

Isaacs, also following Kantor, explores contrasting "system paradigms" that exist in both families and larger social institutions. Isaacs's discussion combines these system paradigms, which Kantor labels *open, closed and random* with languages of "power" (or action), "feeling" and "meaning", to diagnose structural dynamics and seek to overcome structural traps.

> A structural trap is a condition where one part of the system requires people to act in one way, while another part of the organization requires them to do something else that directly contradicts this. This is because different subsystems of any organization often have very different assumptions and ideas about what is wrong and what needs correction, and tend not to communicate well to one another. The net effect is that people feel their efforts to produce change are constantly being undermined and neutralized despite many well-intentioned efforts to reverse the decline.(Isaacs, 1999)

Maintaining individual and/or group interest in and commitment to any reform or change effort is no small task. We experience this constantly as hard-to-recruit participants, especially government officials, caught on a treadmill-like paradigm of "mandatory" decisions and procedures, drop out of dialogues before understanding is achieved. Simply understanding, in a small way, why a system, organization or individual pushes back, helps us fashion a more reasoned response when, "let me know when your are going to DO SOMETHING and then I'll come," is encountered. Access to visualization tools makes responding to such resistance both easier and more bearable too.

When we think of "structures" many of us picture an organizational chart, the layout of a building or its architectural blueprint, the physiology of a life form, or geographic formations. Referring to group dynamics, Isaacs describes structure as the patterns of organizing, thinking, and acting that produce causal pressures on what human beings do in face-to-face interactions. Structure in human conversation and interactions is defined as "the set of frameworks, habits, and conditions that compel people to act as they do." (Isaacs, 1999) These structures can trap us with their internal inconsistencies. Sometimes we spring, or even set, traps ourselves when clumsy responses to volatile social, economic and environmental issues are made worse by our lack of understanding and appreciation of structural traps, or for the defensive routines that individuals and institutional cultures use to protect, defend and perpetuate operating structures. Conventional responses to the resulting impasses and conflicts often make the situation even more difficult and less productive. Again, meaningful visualization of alternative scenarios can be more helpful than using only words to defuse nearly inevitable conflict. Even simple abstractions in graphical or numerical form may be rejected out of hand.

One useful perspective helps uncover habits of thought that foster "thinking alone", and thus, prevent dialogic conversation and thinking together. Isaacs asserts that four "pathologies of thought", abstraction, idolatry, certainty and violence, lie at the feet of most difficulties in relationships with family, friends, organizations and society. Two of these pathologies, abstraction and certainty become more apparent when we realize how thinking systemically bids us to stand back at a distance and look for the larger view, rather than extract out (abstract) only a portion of the whole. Similarly, the pathology of "certainty" limits our ability to broaden our awareness. Without skills to enable us to let go of, or to "suspend" certainty and to release firmly held opinions we bring to issues, we negate the chance for sustained learning to take place.

Issues of sustaining change processes are at the heart of the dynamic of community process and changing paradigms and thus futures of communities everywhere. It is at this nexus that system dynamics and dialogue are needed together. Some of the most useful work we have yet encountered in this regard is associated with Peter Senge, and his series of field books, all written with many collaborators, including *Fifth Discipline Field Book (1994), The Dance of Change (1999), and Schools that Learn (2000)* that provide an extraordinary collection of stories, exercises and tools.

Other issues confronting the effort to sustain meaningful dialogue long enough for the process to impact paradigms and choices include:

Practice: If we only practice dialogue in artificial contexts and circles in pre-selected times, it remains strange, and we fall back into conventional and problematic habits most of the time.

The many tugs on our time and energy: How can we find ways to help people come to the center of community interest and become more involved and concerned. Tugs on time and energy most often lead to the inclination a real and deep need to give up, leaving the only the confrontational aspects of community and cultural politics.

The natural inclinations to resist change, misunderstanding of organizational and human dynamics, learning anxieties, and the pathologies of thought are all factors contributing to the public's disenchantment with engaging and participating in its own affairs.

While these factors sometimes seem overwhelming, it is our belief that such alienation can be overcome with appropriate use of available resources.

Gregory Bateson, biologist, anthropologist, psychologist and systems thinker of the last century once claimed that most of our problems are rooted in "the difference between the way man thinks and the way nature works." We believe that explicit interaction between dialogue and system dynamics can help give Bateson's observation power in public arenas like schools, churches and government by helping participants in those arenas check on the distance between the way they think and the way the world they think they "control" works.