

## Instructions for the Auto Industry “Brownfield” Transformation Simulation

### Learning Objectives:

- Ability to balance short-term and long-term priorities in leading systems change
- Deeper understanding of interdependencies between social and technical systems
- Awareness of the impact of strategic choices – with scarce resources – on performance outcomes

**Setting:** Automobile Assembly Plant with a current model and a new model to be launched – with a focus on four areas of the plant (Paint, Body, Trim, and Final). See companion case study, “Passing the Point of No Return.”

**Time Frame:** A series of quarterly strategic choices to be made over 3 years (12 quarters)

**Strategic Choices:** Six major strategic choice categories with many options in each category

- Product Development (10 options)
- Manufacturing Operations – Quality (12 options)
- Manufacturing Operations – Workforce (23 options)
- Manufacturing Operations – Support Functions (17 options)
- Supply Chain (14 options)
- Customer Order Fulfillment (7 options)

**Resources:** Limited resources – some groups are limited to 15 choices per quarter, some to 20 and some to 25 choices per quarter (note that some choices stay in effect for more than one quarter – for example an investment in certain types of equipment or training might last for 2 or 3 quarters before needing additional resources).

**Outcomes:** For the pilot module, only one outcome is listed – First Time Through (FTT) quality, which is the throughput in a given area (Paint, Body, Trim or Final) that is perfect quality (needing no rework). Outcomes for the prior eight quarters are displayed – so you can see the patterns prior to your making strategic choices

**Running the Simulation and Preparing for Class:** Before beginning the simulation, think through your strategy. Beginning with the first quarter, go through the various menus, checking off resources (staying within your constraint for that quarter). Each time, be sure to check the button at the bottom of the screen that incorporates the choices checked – otherwise they won't be recorded. After completing your choices, examine your outcomes and make your next set of choices. Once you have completed 12 quarters, print out your outcomes. If you are happy with your performance, you are done. If not, try running it again until you are satisfied.

## Downloading the Software:

1. Make a folder on your C:\ drive entitled: C:\sloan
2. Go to this web site: <http://smartwells.mit.edu/auto/sloan/>
3. Download the four files: setup.lst, auto97.mdb, autoJan02.cab, setup.exe to C:\sloan  
It is recommended that you use Microsoft Internet Explorer for the download – it does work with Netscape but some people have experienced complications  
When you are at the website, “right click” on each filename;  
Choose 'Save Target As';  
In the box which pops up, save file to the directory “C:\sloan” as type 'All Files';  
Make sure that Windows saves the file as setup.lst and not 'setup.lst.txt' (if it does add “txt” rename the file without this as part of the name)
4. Click on 'setup.exe' file to run it from your local computer c:\sloan
5. The files will guide you through the installation
6. If there is any pop up error messages while installing the setup files, choose “IGNORE”
7. Once installation is complete, go to: 'Start' and then to: 'All Programs' and then to: 'autocase' (which should be listed among your programs) – click on this and the simulation will begin

Here is additional information on a rare, but possible installation errors and resolution:

### Error:

"Cannot start main setup program! (Create Process) returned error code 0x000000C1H)" when installing autocase, what do I do?

### ReSolution:

Go to Windows Explorer;  
Go to "Tools|Find" and search for "autoJan02.cab." If found, delete the ".cab" file;  
Search for "vb6skit.dll." If the file size is 0 bytes, delete the file;  
Search for "st6unst.exe." If the file size is 0 bytes, delete the file;  
Search for "setup1.exe." If the file size is 0 bytes, delete the file;  
Search for a folder called "msftqws.pdw" (if it exists, it should be in Windows\Temp). If found, delete the folder "msftqws.pdw;" and  
Install autocase

## Appendix: Full List of Possible Strategic Choices

Variables	Strategic Choices for Each Variable
<b>Product Development</b>	
PD1. Co-location of engineering design teams	<input type="checkbox"/> PD1a=co-location of powertrain design teams for new model <input type="checkbox"/> PD1b=co-location of body/frame design teams for new model <input type="checkbox"/> PD1c=co-location of interior design teams for new model
PD2. Training in team-based operations for design teams	<input type="checkbox"/> PD2a=training for all design teams in group process skills <input type="checkbox"/> PD2b=training for all design teams in "lean" principles
PD3. Machine tooling equipment strategy	<input type="checkbox"/> PD3a=flexible/programmable tooling for new model <input type="checkbox"/> PD3b=vendor training in use of flexible/programmable tooling
PD4. Design for manufacture	<input type="checkbox"/> PD4a=production workforce representation on design teams <input type="checkbox"/> PD4b=current model engineers assists production process improvements
PD5. Design for quality	<input type="checkbox"/> PD5a=Design new product to incorporate in-station process control for quality
<b>Manufacturing Operations -- Quality Strategic Choices</b>	
M1. Quality control "andon" system	<input type="checkbox"/> M1a=installation of "andon" red/yellow/green buttons on engine line <input type="checkbox"/> M1b=installation of "andon" red/yellow/green buttons on final/trim area
M2. Quality inspection	<input type="checkbox"/> M2a=movement of inspectors from end of line to line-side support on engine line <input type="checkbox"/> M2b=movement of inspectors from end of line to line-side support in final/trim area <input type="checkbox"/> M2c=empowering operators to conduct in-station process control on engine line <input type="checkbox"/> M2d=empowering operators to conduct in-station process control on final/trim area
M3. Quality training	<input type="checkbox"/> M3a=training for engine line in quality control principles <input type="checkbox"/> M3b=training for final/trim area in quality control principles <input type="checkbox"/> M3c=training for body shop in quality control principles <input type="checkbox"/> M3d=training for paint shop in quality control principles
M4. Quality dimensional control equipment	<input type="checkbox"/> M4a=installation of dimensional control equipment in body shop <input type="checkbox"/> M4b=installation of dimensional control equipment in paint shop
<b>Manufacturing Operations -- Workforce Strategic Choices</b>	
M5. Team implementation	<input type="checkbox"/> M5a=restructuring engine line into teams <input type="checkbox"/> M5b=restructuring body/weld shop into teams <input type="checkbox"/> M5c=restructuring paint shop into teams <input type="checkbox"/> M5d=restructuring final/trim area into teams
M6. Team leaders	<input type="checkbox"/> M6a=selection of team leaders for engine line <input type="checkbox"/> M6b=selection of team leaders for body/weld shop <input type="checkbox"/> M6c=selection of team leaders for paint shop <input type="checkbox"/> M6d=selection of team leaders for final/trim area
M7. Team training	<input type="checkbox"/> M7a=team training for engine line <input type="checkbox"/> M7b=team training for body/weld shop <input type="checkbox"/> M7c=team training for paint shop <input type="checkbox"/> M7d=team training for final/trim area
M8. Team leader training	<input type="checkbox"/> M8a=team leader training for engine line <input type="checkbox"/> M8b=team leader training for body/weld shop <input type="checkbox"/> M8c=team leader training for paint shop <input type="checkbox"/> M8d=team leader training for final/trim area
M9. Supervisor/superintendent training	<input type="checkbox"/> M9a=supervisor/superintendent training for engine line <input type="checkbox"/> M9b=supervisor/superintendent training for body/weld shop <input type="checkbox"/> M9c=supervisor/superintendent training for paint shop <input type="checkbox"/> M9d=supervisor/superintendent training for final/trim area
M10. Union-management partnership	<input type="checkbox"/> M10a=shared vision developed by union-management steering committee <input type="checkbox"/> M10b=support for union-management plant implementation team

## Manufacturing Operations -- Support Function Strategic Choices

- M11. Preventative maintenance support teams
  - M11a=establishment/support for maintenance repair teams on engine line
  - M11b=establishment/support for maintenance repair teams in body/weld shop
  - M11c=establishment/support for maintenance repair teams in paint shop
  - M11d=establishment/support for maintenance repair teams in final/trim area
- M12. Preventative maintenance procedures
  - M12a=plant-wide preventative maintenance schedule re-invigorated
  - M12b=shift-to-shift maintenance hand-off intervention
- M13. Material flow systems
  - M13a=installation of material flow systems in engine line
  - M13b=installation of material flow systems in final/trim area
  - M13c=establishing of "kitting" operation for targeted supplier parts
  - M13d=establishment of parts "marketplace" for targeted supplier parts
  - M13e=appointing supplier contact people on all production teams
- M14. Information system support
  - M14a=implementation of information tracking system for quality feedback
  - M14b=implementation of information tracking system for work group issues
  - M14c=implementation of bar-code parts tracking system for material flow
- M15. Continuous improvement "kaizen" system
  - M15a=establishing support for a continuous improvement suggestion system
  - M15b=dedication of engineering resources to help implement suggestions
  - M15c=dedication of maintenance resources to help implement suggestions
- M16. Targeted Interventions
  - M16a. Targeted organizational development effort targeted at improving communication on performance measurables
  - M16b. Targeted organizational development effort targeted at improving overall trust and respect in the organization
  - M16c. Targeted organizational development effort targeted at improving the training support infrastructure
  - M16d. Targeted organizational development effort targeted at improving the cost accounting infrastructure
  - M16e. Team building efforts for the management leadership team
  - M16f. Extra preparations for executive visits
  - M16g. Targeted efforts to benchmark other organizations
  - M16h. Targeted efforts to prepare for benchmarking visits from other organizations

## Supply Chain

- S1. Supply chain value add
  - S1a=Supplier agreement to provide major engineering design support for new model
  - S1b=Supplier assignment of contact people for production teams
- S2. Supplier location
  - S2a=Location 1-3 suppliers in "supplier park" near plant
  - S2b=Location of 4-6 suppliers in "supplier park" near plant
  - S2c=Location of 7-9 suppliers in "supplier park" near plant
- S3. Supplier delivery flow
  - S3a=Supplier agreement for more frequent deliveries in smaller batches
  - S3b=Supplier agreement for in-line vehicle sequencing of parts
- S4. e-commerce
  - S4a=Agreement of 1-3 suppliers to use on-line pricing and logistics system
  - S4b=Agreement of 4-6 suppliers to use on-line pricing and logistics system
  - S4c=Agreement of 7-9 suppliers to use on-line pricing and logistics system
- S5. Information transparency
  - S5a=Agreements with 1-3 suppliers on sharing process improvements gains
  - S5b=Agreements with 4-6 suppliers on sharing process improvements gains
  - S5c=Agreements with 7-9 suppliers on sharing process improvements gains

## Customer Order Fulfillment

- C1. Customer delivery
  - C1a=Improvements in road and railway logistics system
  - C1b=Begin migration from forecast planning to "pull" system for orders
- C2. Product variety -- new model
  - C2a=Add 5 new options and features for new launch model
  - C2b=Add 10 new options and features for new launch model
- C3. Product variety -- current model
  - C3a="Refresh" current model with 5 new options or features
  - C3b="Refresh" current model with 10 new options or features
- C4. Customer contact
  - C4a=Establish system for customer contact phone calls from workforce