How it all began...

1999:
University is unable to assign rooms for all classes.

2000:
University purchases software to help with room assignments.
Academic Process Improvement Working Group (APIWG) is formed by the Vice-Principal (Academic) and JCAA.
How it all began…

2002:

Vice-Principal (Academic) approves the University Timetable Committee (formerly APIWG) recommendation for a university-wide coordinated timetable.

UTC develops:
> Principles of Timetabling
> Basic Rules of Timetabling
> Timetable Responsibilities – Academic Unit Heads
WHY? - Benefits of a coordinated timetable

Allows for:

- modeling and testing (program/enrolment changes, timetable patterns, room availability)
- interdisciplinary and cross-Faculty program and course scheduling
- conflicts to be readily identified and remedied
- space-usage monitoring and forecasting of space requirements
- reduced departmental staff workload and stress
The Evolution of a Timetable

2003/2004
• simulated live timetable

2004/2005
• first live timetable
• objective to produce viable timetable
• Data Collection Utility introduced
• process is cumbersome and redundant
• result achieved with much work and effort
• preregistration is delayed
The Evolution of a Timetable

2005/2006

- second live timetable
- greater emphasis on:
  - communication
  - identifying course conflicts
- timetable online change form introduced
- preregistration delayed
The Evolution of a Timetable

2006/2007

• third live timetable
• emphasis on:
  – improved processes (carried information forward)
  – quality of information to build the timetable
  – reducing departmental efforts
• improved timetable available on time
• preregistration proceeds as planned
Since 2001…

- Enrolment has increased by:
  - 1,500 full-time undergraduates
  - 600 full-time graduates

- Research intensiveness has increased (funding up 66% to $156 million)

- Faculty complement has remained stable, with increasing demands on time

- Programs, courses, and delivery patterns have increased and changed
Since 2001...

• Enrolment in interdisciplinary and interdepartmental programs has increased

• Budget constraints (collapsing sections, increasing class sizes) have continued

• External constraints (forced times, clinical placements, research teams) have increased

• Pedagogical changes (more group work, interactive learning)
- Increased competition for teaching space, no strategic direction for planning teaching space

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<tr>
<th>Capacity</th>
<th>Number</th>
<th>Blackboard</th>
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Example: increasing competition for space

06-07 Fall Room Usage Auditoriums

- WLH (200) 67%
- ETH (289) 63%
- HUM (215) 71%
- DUN (425) 73%
- DUP (216) 64%
- BIO (450) 88%
- STI D (240) 67%
- CHE (250) 63%

65% is optimal use for Universities…. >70% seriously compromises ability to timetable
2006/2007 Timetable - Complexities

# of courses

# of course sections

# of deliveries

# of unique course combos

# of degree programs

# of students

# of rooms

type/capacity of rooms

# of course groups/ties

# of sequencing demands

# of forced times

# of instructor constraints

department meetings

interdisciplinarity

# of professors

# and pattern of labs and lab requirements

team-taught/multiple instructor courses
2006/2007 Timetable - Complexities

Some examples:

- there were 6558 unique course combinations by program level (the core courses taken by each student in each year) to attempt to schedule conflict-free

- 93% of these unique course combinations were attributed to only one student (6100 students)

- instructors made 396 Tier I requests; ~25% of course sections were associated with at least one Tier I request

- instructors made 94 Tier II requests; ~6% of course sections were associated with at least one Tier II request

- 744 courses had sequencing requirements (e.g., lab before lecture, tutorial after lab)

- there were 478 sections requiring a forced time (i.e.: the course needed to be at a certain time on a certain day each week)
two departments had the highest number of Tier I requests representing 24% of the total number of Tier I requests

several departments requested maximum student choice (e.g.: schedule all third year courses conflict free)

many departments deliver courses that are required (core and elective) in multiple programs

80% of departments had at least one forced time request

proliferation of degree program offerings (e.g.: Arts and Science has >1900 separate and unique degree programs)
Labs:
- there are 167 Science and Engineering courses with labs
  - this equals 580 lab sections
  - only 27 lab sections are offered in the evening
- labs were blocked off approximately 600 hours/week each term for set-up and tear-down
- almost all lab set-up and tear-down occurs during the normal teaching day, 8:30 – 5:30
2006/2007 Timetable - Complexities

• Scheduling

  – scheduling departments independently of each other:
    • 9 out of 46 departments could not successfully schedule when only room, instructor, and forced times were considered
    • 17 out of 46 departments could not successfully schedule when group and sequencing requirements were added in

  – scheduling all departments together:
    • 33 out of 46 departments could not successfully schedule when all requirements except for course combinations were added in
    • NO departments could successfully schedule when all considerations were added!
# 2006/2007 Timetable - Complexities

## PATTERN STATISTICS

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<th>Pattern</th>
<th>Definition</th>
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<td>MEV</td>
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2006/2007 Timetable - Complexities

• Added complexities after the preliminary timetable:
  – course sections were added or dropped
  – changes in instructors and instructor requests/preferences were made
  – changes were made in the term a course was offered
  – room changes were made

  Overall, there were 1229 changes from the preliminary to the final timetable in 2006/2007.
  – only 206 out of 1229 changes from the preliminary timetable to the final timetable (17%) were due to timetable problems such as time conflicts, the rest were related to instructor and course changes

  There were 1084 changes from the preliminary to the final timetable in 2005/2006.

• Changes made after preregistration:
  – request to drop a section and re-assign enrolment, without conflicts!
  – room requests processed more efficiently
  – course enrolment increases during pre-registration
Change

If nothing changed from year to year, the timetable would not need to change; however...

• Several factors change, such as enrolment numbers, room availability, sabbaticals, the addition of new courses, etc.

E.g.,

  – 2006-07: 2088 courses (2005/06 1983) = + 5.3%
  – 4337 course sections (4273)
  – 5048 deliveries (4862)
  – 1484 instructors (1390) = + 6.8%
2006/2007 Timetable - Successes

• 99.39% of Tier I requests were successfully accommodated in the preliminary timetable

• 79% of Tier II requests were successfully accommodated in the preliminary timetable

• modeling is being undertaken to determine the impact of proposed course delivery room changes

• more data to inform teaching space planning

• better data (less garbage in, less garbage out!)

• better timetable (fewer problems and complaints)
• **Departmental staff more satisfied, less stressed**

  – "... I wanted to give you some impressions of the process and results to date this year. Overall, the draft timetable that arrived very recently appears to have very few problems. The undergraduate chair reports that, overall, the process has been relatively smooth this year. It would appear that the early teething problems are being worked out."

  – “Coordinated timetabling policies take the pressure off of me when saying ‘no’ to instructors.”

  – “Just a few words of grateful thanks to you and the whole timetable team…”
The Future

Objectives – 2007/2008

- Review slot system
- Improve communication
- Improve room inventory information
- Delay information collection in 2007 (March 1st)
- Allow more time for review of preliminary timetable

Beyond...

- More automated data validation
- Automate scheduling of departmental meetings
- Continuous process and communication improvement