Information Systems 01PDWOV

31 January 2018

Books, notes are not allowed. Write only on these sheets.

Application and registration to primary/secondary/tertiary school.

Some time before the beginning of each academic year (September) the parents of a student have to apply, on behalf of the student, to register the student to a certain school.
Schools can be primary (6 to 11 years), secondary (12 to 14), tertiary (15 to 18). School attendance is mandatory from 6 until 16 years.
The parents select a school (any school they want in a certain type, ex primary) and apply for the student. The school may or may not accept the application, in case too many students apply vs the capacity of the school.

In the AS IS situation the process is handled on paper. The application is made on a paper form and submitted to the secretary of a chosen school, before a certain deadline common for all schools (ex Jan31). Since the student may not be accepted the application is typically repeated in more schools. Each school then publishes the list of accepted students within a deadline (ex February 27). Then parents can confirm or not the application, until another deadline (ex March 31). At this point each student must be in one list only (one school selected only), and each school publishes the final list of students, and their allocation to classes. Finally parents have to finalize the registration (paying taxes, possibly providing other documents) until another deadline (ex April 30) so a student is registered to attend in a specific school for the next academic year.
(Changes are possible during the whole year, for instance because of students who change home address, but we will not consider this case).

In the TO BE situation the process is completely paperless.
The ministry of education manages a web site (one for all schools in the country) to support this process. Each school has a unique ID. Each parent has to define an account, with username == fiscal code, and password. (Remind that students don't have right to decide until they are 18, so one parent manages everything on their behalf). (Students with separated parents are a special case that we will not consider, so any of the two parents can manage one student).
For a specific school a number of employees (with defined roles, such as school principal, deputy principal, head of secretary) have also an account.

In a first phase a parent applies to one school for a certain student. He or she also lists 3 other backup schools, in order of preference. This phase closes at the first deadline (ex Jan 31).
Then for each school an employee, working on the web site, defines the list of accepted students (and the ones in a ordered waiting list). These lists are published within the second deadline. Then the process continues as in the AS IS case.

In the following, model the TO BE situation.

1 IT Model / Technological model: describe the hardware architecture of the system

Client (Smartphone / PC):
Server: data server (schools, parents, students), application server (registrations,)

2 Organizational model: list roles or organizational units involved

School: head of secretary, principal, deputy principal
Ministry of education
Parent (on behalf of student)

1 IT Model / Technological model: describe the hardware architecture of the system

3 Functional model: Design and model (using BPMN + UML class diagram) the process (subdividing it as needed in subprocesses)
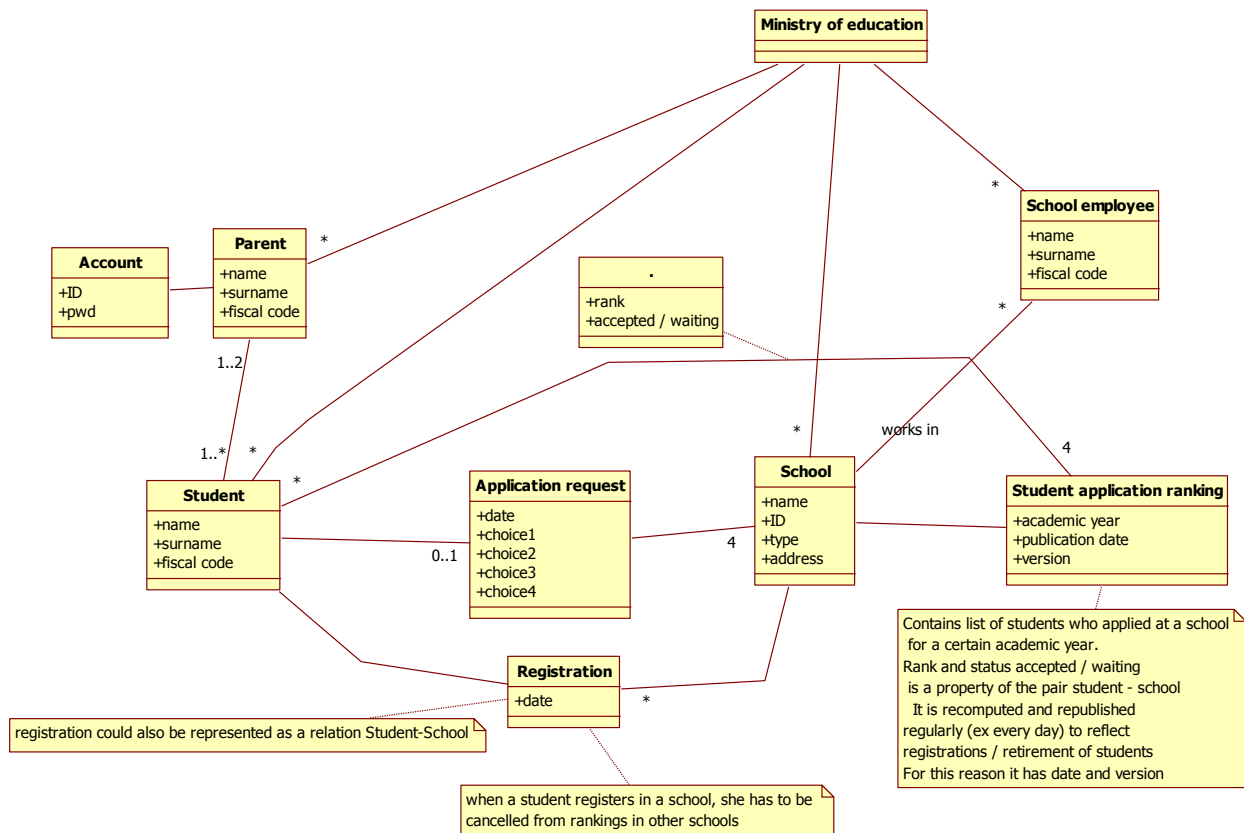

Assuming that each parent has an account on the Ministry of education web site, and each student has a record, these subprocesses are needed: application of a parent for a student, within first deadline; for each school, production of list of accepted students / waiting line students (within second deadline); for each parent/student, selection of one school, and update of waiting list of other schools (within third deadline); for each parent, final registration of student to school (fourth deadline).

Remark that in the AS IS each school handles all the process, and has no control on repeated applications. In the TO BE the ministry centralizes all the process (gaining control on repeated applications) and leaves to the schools only the ranking of applications for that school (and later the composition of classes – the rationale being that this ranking requires specific knowledge of students and their history and the school context). The big advantage is that a parent makes ONE application to the ministry (and not 4 to 4 schools).

Therefore a key activity is the recomputation of rankings of students for a school. As soon as a parent/student selects a school, the student must be canceled by the ranking in 3 other schools. This activity can be easily automated if it is centralized at the Ministry level. The student application ranking for a certain school is therefore updated (ex once per day) until the deadline for selection of schools by parents. This is also the reason for having two specific phases, selection and registration.

Application
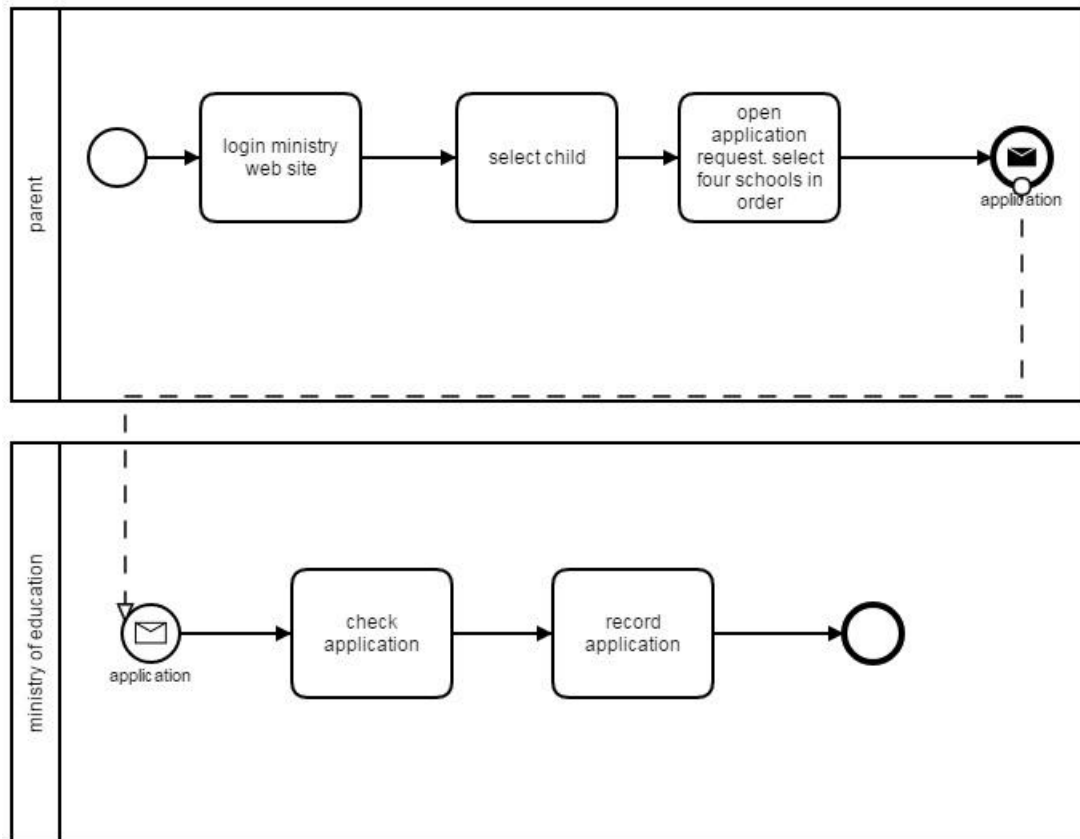
Selection and
registration
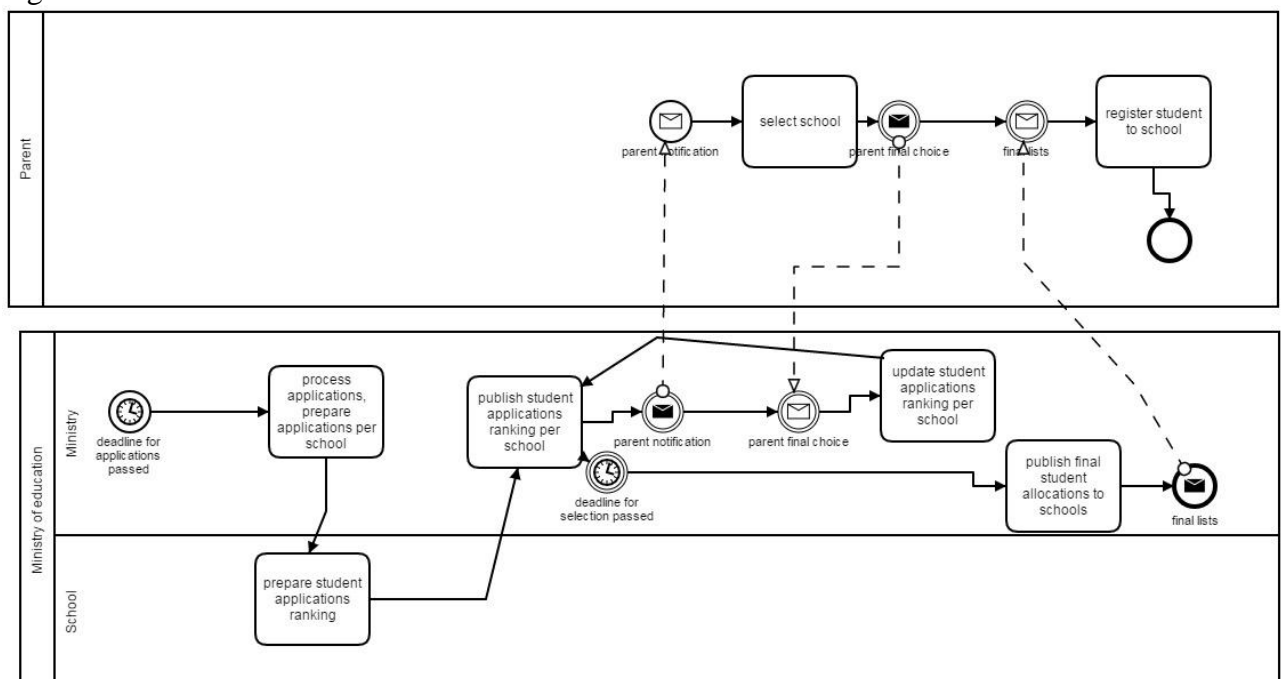
Business rules
  (Any of the following or other –remind that a BR must evaluate to true / false, a BR is not
a long descriptive story, neither an algorithm)

4

An application must be sent by date XX
A student can apply to 4 schools at most
A student aged <X must be accepted at least in one school (by law school attendance is mandatory until age X)
A school can accept students up to its capacity
A class must have between X and Y students

4   Define the KPIs, considering these high level business goals (or CSF), CSF1 increase parent satisfaction, CSF2 minimize cost of the application / registration process. In the table below show the correspondence CSF – KPI

CSF name	KPI Category (General, cost ..)	KPI Name	KPI Description	Unit of measure
	General	N_A	Number of applications per year	
		N_S	Number of students per year	
		N_SCH	Number of schools in the country	
		N_E	Number of employees involved in the administrative processes for application / registration (part in schools, part in ministry)	
CSF2	Efficiency	U_C	Unit cost to manage one application = ((effort by employees considered in N_E, in hours * average cost per hour) + infrastructure cost)/N_A Infrastructure = IT support and / or paper /printers /ink	Euro
CSF1		E_APP	Effort for parent to manage application	time
CSF1	Service	LT_APP	From submit application to ministry (Event 'application') to final list published (event final list)	time
CSF1, CSF2	Quality	Q_A	Number of applications with defects/ N_A Defects: lost application, application managed beyond deadline, applications with wrong data of student, ..	%

5   Compare the previous and the current situation, using the KPIs defined above

KPI	AS IS	TO BE
N_A, N_S, N_SCH		No meaningful change (in theory N_A divides by 4, because previously a parent should have done 4 applications, now one with 4 schools listed –but let's consider N_A unchanged – anyway N_S does not change)
N_E		No change probably (possibly allocated to other work, see later)
U_C	Important effort and paper part	Reduced effort, zero paper, infrastructure cost higher (web site to develop and operate)
E_APP	High	Much lower (no physical presence in schools, no lines)
LT_APP		deadlines fixed by law, remain in the order of months; however the whole process could be faster (especially the selection part), and deadlines could be reduced accordingly

| Q_A | High | Lower, due to automation |

6 Define the TCO for the schools to shift to the TO BE situation

Phase	Cost
Construction	Development of new IT infrastructure (web portal)
Deployment	Deployment of functions of IT portal, training of employees
Operation maintenance	Hardware infrastructure operation and maintenance, web application operation and maintenance
Dismissal	Uninstall web app, Data porting to new future IT infrastructure

7 Considering a 5 years period, define costs and savings (ROI analysis) by adopting the TO BE situation

Year/ cost or saving	Year 1	Year2	Year3	Year4	Year5
Cost	Construction, deployment				
Cost		Op, maint	Op, maint	Op, maint	Op maint
Saving	$(U\_C_{tobe} - U\_C_{asis})*N\_A$	$(U\_C_{tobe} - U\_C_{asis})*N\_A$	$(U\_C_{tobe} - U\_C_{asis})*N\_A$	$(U\_C_{tobe} - U\_C_{asis})*N\_A$	$(U\_C_{tobe} - U\_C_{asis})*N\_A$

Assuming that UC decreases in to be
Dismissal considered later than 5 years

8 Considering the KPIs and the ROI, is the TO BE situation better? (answer Yes or No):

Why?

The LT for the whole process (LT APP) does not change, since it is regulated by the legal deadlines, so it takes months.
However the effort for a parent (E_APP) decreases largely (no physical submission of a form to 4 schools, but only digital interactions), and this should increase parent's satisfaction.
For the ministry and schools there is a reduction in effort (U_C decreases), less errors (Q_A decreases). Overall this means an improvement both in CSF1 and CSF2.
Besides, the ministry can control the processes in all schools (data mining on the applications) with a much better capability of monitoring the process (schools with more / less subscriptions, flows of students from school to school,) and better planning capacity of schools.

9 The taxi company TXI owns and operates taxis. Besides, the company manages a call center that receives taxi requests, and dispatches them to taxi drivers. Recently TXI has introduced an app for smartphones. Customers can call the taxi using the app instead of the call center. The app is developed and operated by company TAXIAPP.

9a Characterize the outsourcing relation between TXI and TAXIAPP over the three outsourcing dimensions
Unicity : probably a standard product, w some adaptation
Location: on premise of TAXIAPP (off site)
Service: it infrastructure + application

9b Define a few (max 3) SLAs to monitor the outsourcing relation from the point of view of TXI

Cost of service (per year, or per unit)
Quality of service (ex customer satisfaction)
Reliability of service

10 Describe the long tail model, and in which contexts it can be applied.

Sell few quantity of a huge selection of items (vs sell huge quantities of few best seller items)
Requires low inventory and distribution cost for item → perfect for digital content (movie, music, book)

11 In terms of organization theory, compare an organization of type 'bureaucracy' with one of type 'startup'

Bureaucracy: large size, high depth in org chart, medium / high formalization and specialization, closer to mechanical system (more efficient than flexible)
Start up: small size, (nearly no) depth in org chart, very low formalization and specialization, closer to natural adaptive system (more flexible than efficient)

12 What has been the effect of the wider adoption of IT on agency costs?

Reduction in agency and bonding costs, possibly limited reduction in residual losses