ULB

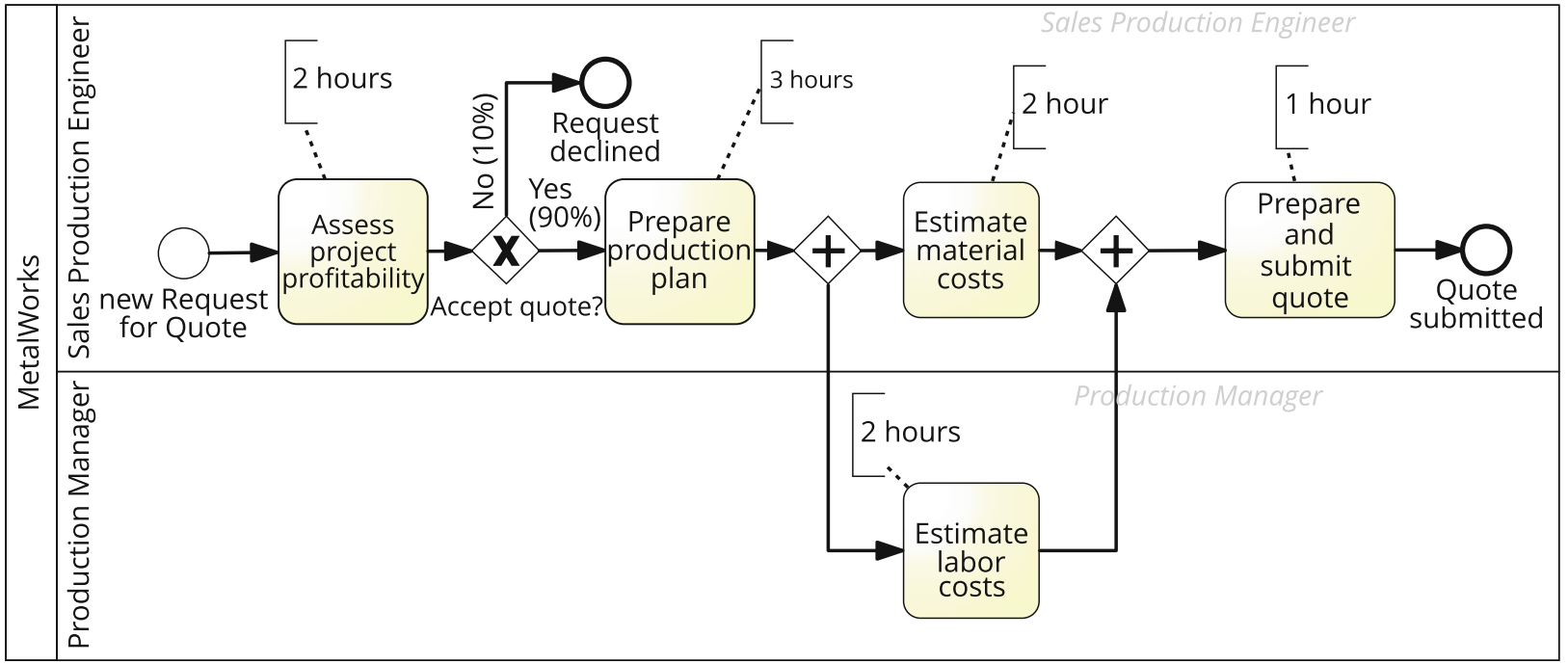
INFO-H420
Management of Data Science and Business Workflows
Practice Session – Solutions
Quantitative Analysis

Dimitris SACHARIDIS

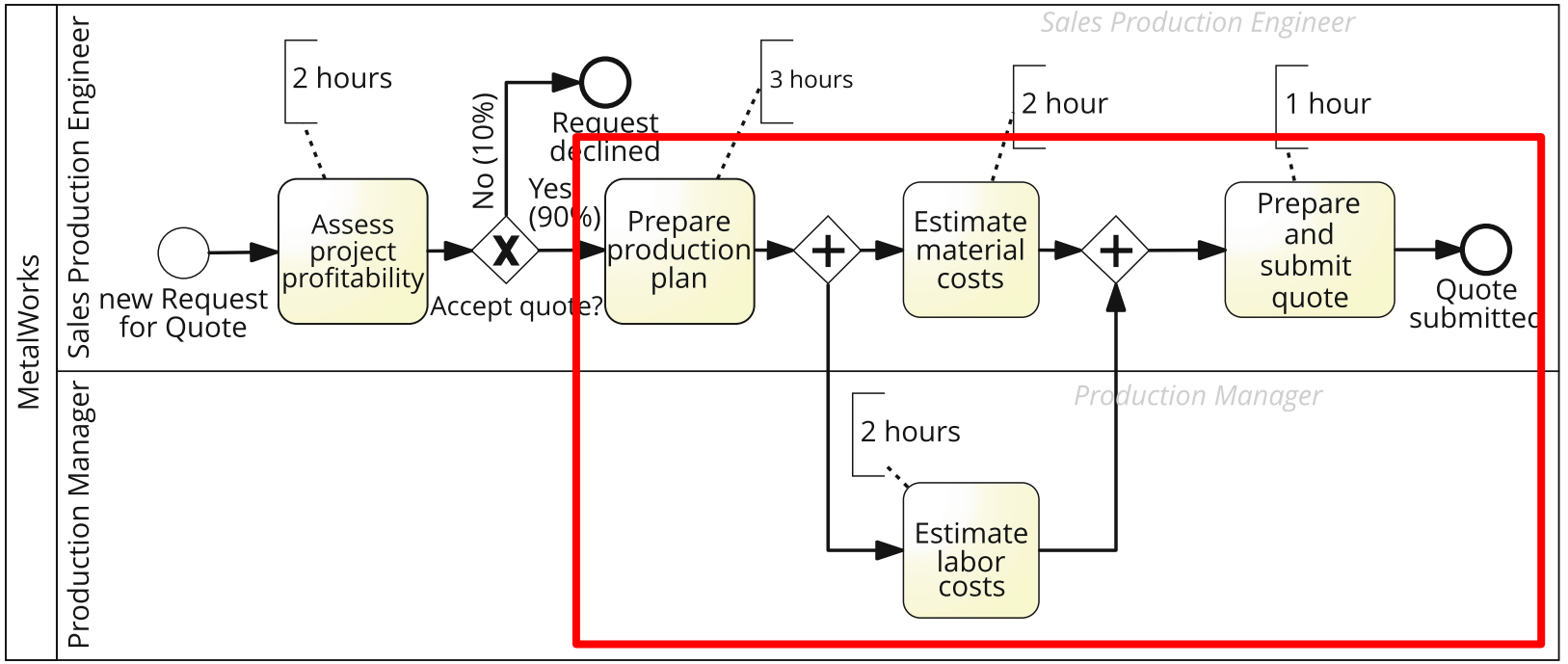
Exercise 1

Consider a simplified process for handling a Request for Quote (RFQ) for custom-made metal products at a company called MetalWorks. The process model shows processing times and branching probabilities. Assume that the cycle time of this process is 2 business days.

Calculate the processing time, and cycle time efficiency.



Exercise 1 – Solution

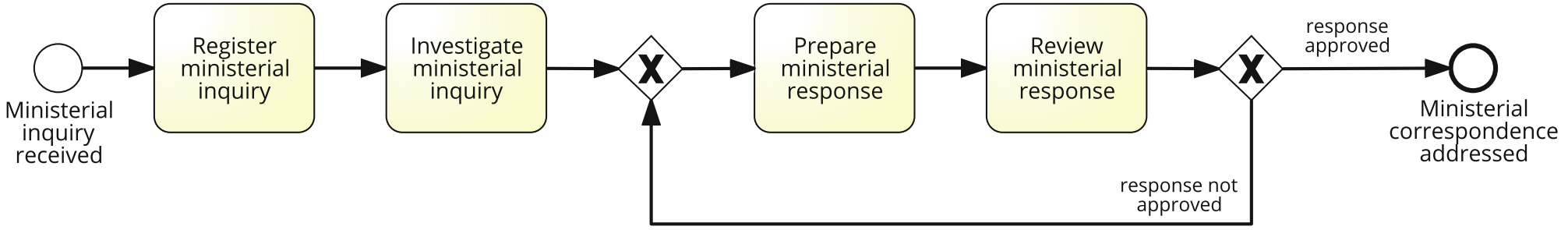


Processing time 2+0.9*(3+2+1) = 7.4

Cycle time efficiency 7.4/(2*8) = 0.4625

Exercise 2

Calculate the overall cycle time, processing time, and cycle time efficiency of the ministerial enquiry process. Assume that the rework probability is 0.2.



Task	Cycle time	Processing time
Register ministerial enquiry	2 days	30 min
Investigate ministerial enquiry	8 days	12 h
Prepare ministerial response	4 days	4 h
Review ministerial response	4 days	2 h

Exercise 2 – Solution

Cycle time 2+8 + (4+4)/0.8 = 20 days

Processing time 0.5+12 + (4+2)/0.8 = 20 hours

Cycle time efficiency = 20/(20*8) = 0.125

Exercise 3

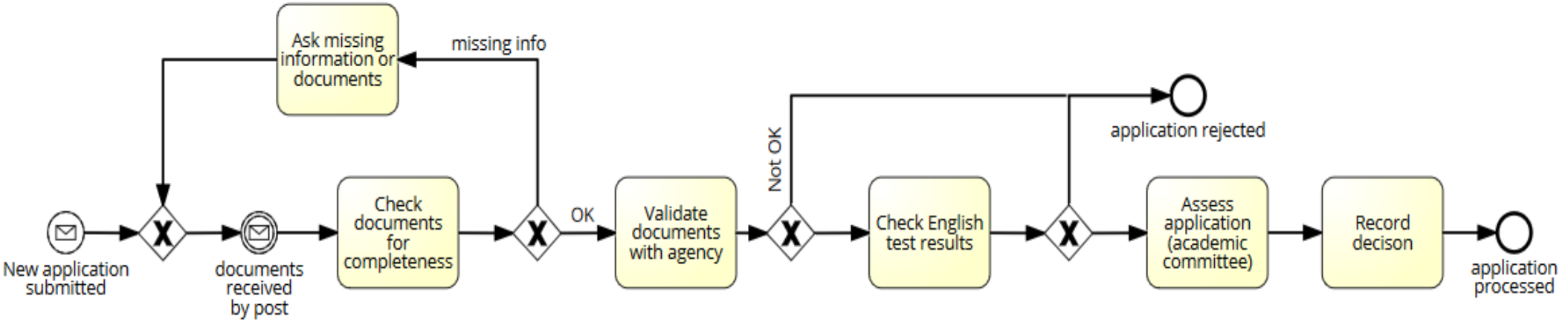
Calculate the cycle time, cycle time efficiency, and cost of the university admission process

- It takes on average 2 weeks (after the online application is submitted) for the documents to arrive to the students service by post.
- The check for completeness of documents takes about 10 min. In 20% of the cases, the completeness check reveals that some documents are missing. In this case, an email is sent to the student automatically by the university admission management system based on the input provided by the international students officer during the completeness check.
- A student services officer spends on average 10 min to put the degrees and transcripts in an envelope and to send them to the academic recognition agency. The time it takes to send the degrees and transcripts to the academic recognition agency and to receive back a response is 2 weeks on average.
- About 10% of applications are rejected after the academic recognition assessment.
- The university pays a fee of € 5 each time it requests the academic recognition agency to accept an application.

Exercise 3

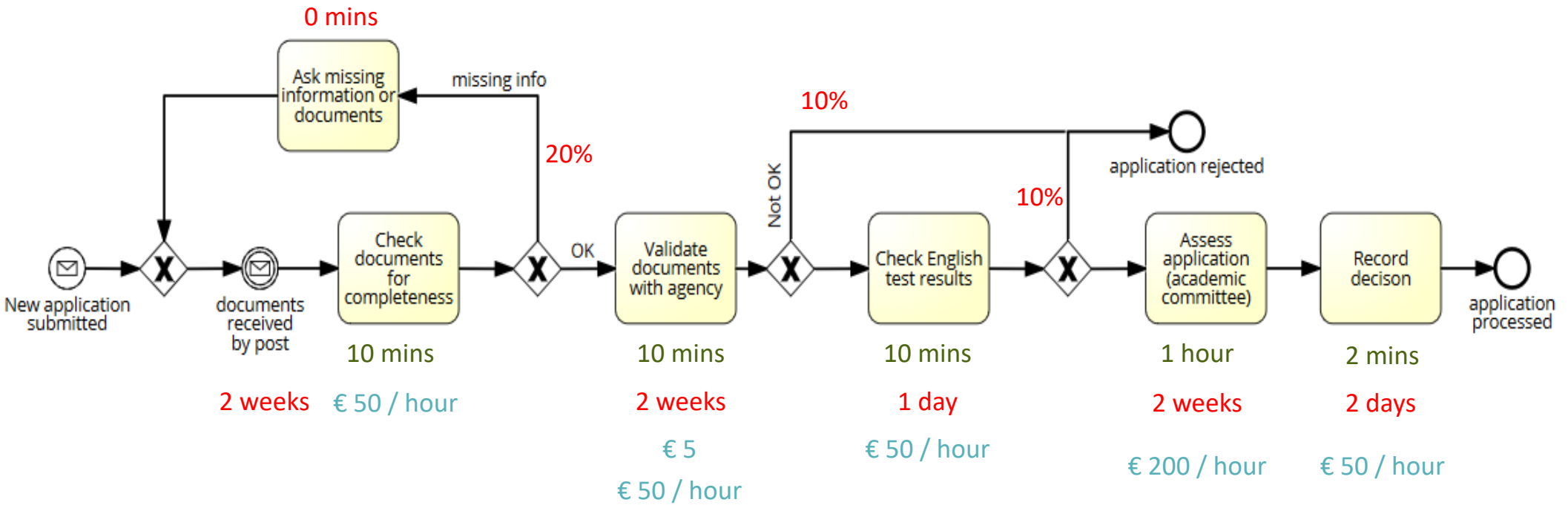
- Checking the English language test results takes 1 day on average, but the officer who performs the check only spends 10 min on average per check. This language test check is free.
- About 10% of applications are rejected after the English language test.
- It takes on average 2 weeks between the time students service sends the copy of an application to the committee members and the moment the committee makes a decision (accept or reject). On average, the committee spends 1 h examining each application.
- It takes on average 2 days (after the decision is made by the academic committee) for the students service to record the academic committee's decision in the university admission management system. Recording a decision takes on average 2 min. Once a decision is recorded, a notification is automatically sent to the student.
- The hourly cost of the officers at the international students office is € 50.
- The hourly cost of the academic committee (as a whole) is € 200.

Exercise 3


Ask missing information or documents
missing info
application rejected
Not OK
New application submitted
documents received by post
Check documents for completeness
OK
Validate documents with agency
Check English test results
Assess application (academic committee)
Record decison
application processed

Exercise 3 – Solution

(10/0.8)*(50/60)+(10*50/60)+0.9*(10*50/60+0.9*(60*200/60+2*50/60))



Cycle time (10*8*60 + 10)/0.8 + 10*8*60 + 0.9*(1+0.9*(10+2))*8*60 = 15910.1 minutes

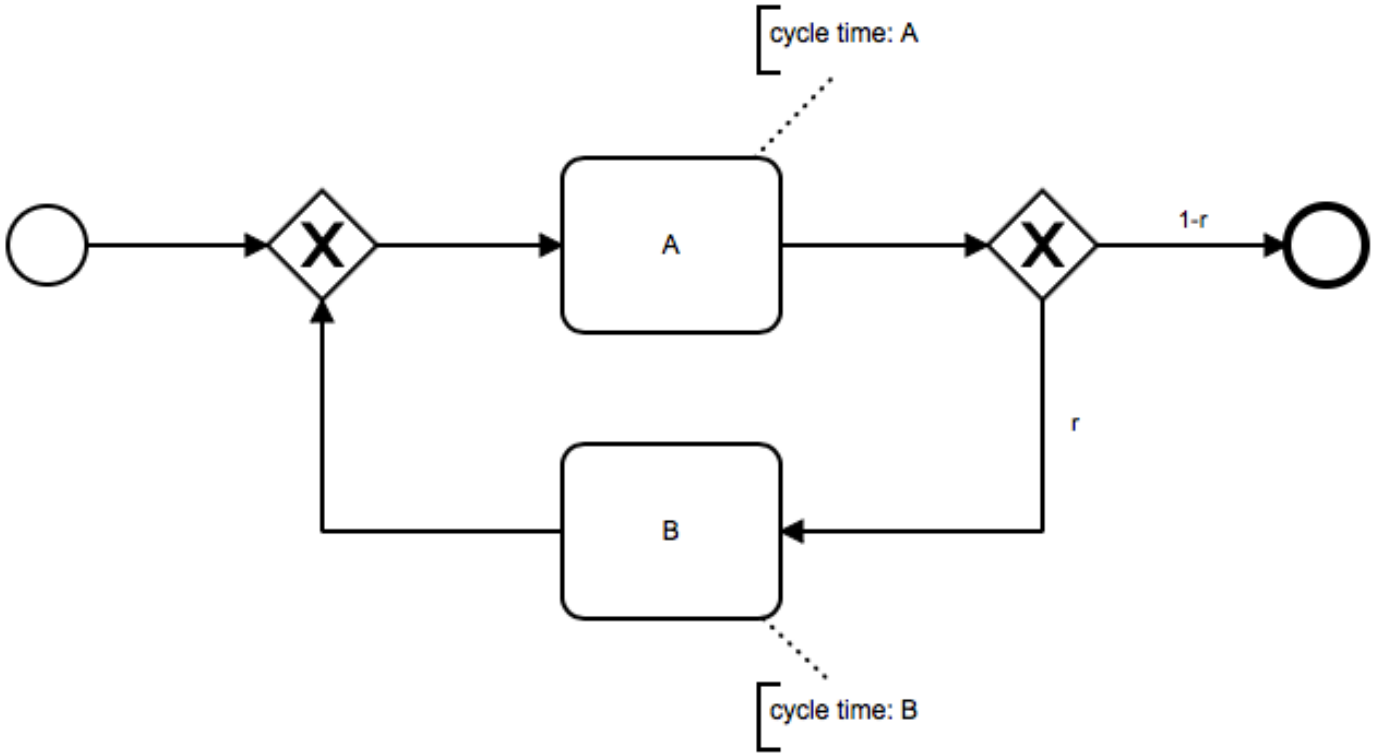
Processing time 10/0.8 + 10 + 0.9*(10+0.9*(60+2)) = 81.72 minutes

Cycle time efficiency 81.72/(33.12*8*60) = 0.00514

Cost (10/0.8 + 10 + 0.9*(10+0.9*2))*(€ 50/60) + 0.9*0.9*60*(€ 200/60) = € 189.6

Exercise 4

Calculate the cycle time of this process.



Exercise 4 – Solution

$(A+B)/(1-r) - B = A + r(A+B)/(1-r)$