

Appendix 3 - Background for a new system for tests and examinations Introduction

Developing and administrating tests and examinations is one of the customer's most critical assignments. The digital systems used for testing and examinations are key to fulfil this assignment and they are used across all levels of primary and secondary education. Every year more than 300,000 examinations are held along with around 650,000 digital tests. The examinations in May-June account for around 80 per cent of all examinations, the examinations in November-December making up the rest. Some 480,000 national tests are administrated in September. The remainder are mapping tests and voluntary, formative tests and summative tests administrated throughout the year.

A large proportion of primary and secondary pupils sit the tests every year, and every pupil will encounter them more than once during their years in school. Exam results are important for each individual candidate, and test results is used for formative assessment.

A large number of teachers use the exam system to mark examinations and to follow up on test results. The systems generate data for statistical analysis. Schools and school owners use these data for development of school quality, to provide important input for quality development and for policy development in the education sector. The systems are expected to become even more central in the education sector going forward since they encompass two priority areas: the digitalisation of the public sector and quality development in the education sector. Demand for automation and digitalisation is growing, as is the need to effectively manage ICT development and realise the benefits of ICT initiatives in the public sector.

Expected outcomes

- The customer's systems for tests and examinations meet the statutory requirements for universal design.
- All tests are developed and administered in a new shared system.
- All examinations are developed and administered in a new shared system.
- As many test and examination tasks as possible are marked automatically.
- The customer has a flexible solution for testing and examinations that enables new ways of assessing attainment.
- The customer has trialled one or more adaptive tests.

The customer's examinations and tests

The customer conducts a number of different examinations and tests. You can read more on the customer's website: <https://www.udir.no/eksamen-og-prover>.

Examinations

Written examinations are a final assessment in which the candidate is given the opportunity to demonstrate their abilities by solving tasks of various complexity.

Written examinations are held in a large number of subjects, each with its unique characteristics.

National tests

The purpose of national tests is to provide schools with information about the pupils' skills in reading, numeracy and English. The results from the tests form the basis for formative assessment and quality development at all levels in the education system.

The reading and numeracy tests take place in Years 5, 8 and 9 and the English tests in Years 5 and 8.

National tests provide information about individual pupils, groups, year groups and schools that teachers and school leaders need in order to improve quality.

Mapping tests

There are both obligatory and voluntary mapping tests in reading, numeracy, English and digital skills. The tests are aimed at pupils in Years 1 to 4.

The tests are designed to identify pupils who require additional help and support.

Formative tests

Formative tests test the pupils' basic skills and can be used as a tool in formative assessment and help the teacher sustain a formative dialogue with pupils at all levels. The tests are voluntary, and schools decide for themselves when they want to conduct the tests.

Summative tests

Summative tests in science and social science are designed to assist with formative assessment in the subjects. Information from the tests should also help link formative assessment to the final assessment.

System portfolio for testing and examinations

The customer's system portfolio comprises a system for curricula (GREP), systems for management, and systems for statistics and archiving. The management systems comprise an authentication system, an examination management system (PAS-eksamen) and a test management system (PAS-prøver). The Authentication System is integrated with Feide (the Ministry of Education and Research's chosen solution for secure authentication in the education sector) and ID-porten (ID-porten is a system used for secure authentication in the public sector in Norway).

The authentication service adheres to the Open ID Connect (OIDC) standard and has guidelines for single sign-on and single sign-off. This functionality will be used for all authentication of users in the new system. The single sign-on function is especially important in relation to pupil authentication.

The service also offers machine to machine authorisation for the systems in the portfolio using OAuth 2.0 Bearer Token. Machine to machine authorisation is used to access crucial end points for authorisation data and information exchange, amongst other things.

The exam and test administration systems (referred to as PAS) handles the management of pupils, candidates, teachers, invigilators and administrators, and it authorises these users in the affiliated systems. PAS handles the scheduling of registration, administration and assessment, and handles communication with school management systems. The entire process of grading examinations takes place in PAS-eksamen today. PAS does not manage and authorise test writers.

Descriptions in this document of proposed interactions between the new system and other parts of the system portfolio have been placed in light blue text boxes.

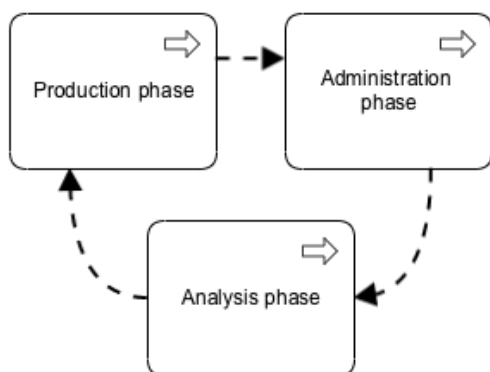
General flow – authentication/authorisation between PAS and new system:

User A is logged into PAS and wants to preview test X in the new system. A is redirected to the new system with a URL containing the ID of test X. The new system redirects to the Authentication System for single sign-on. A is already logged in and is directed back again with information about the user. The new system asks PAS whether A is authorised to preview X. If the answer is yes, the test is displayed. This procedure is used when the text reads “PAS provides information about ...”.

Process for tests and examinations

The customer’s process for tests and examinations includes three main phases:

- Production phase
- Administration phase
- Analysis phase



The phases are repeated cyclically to ensure continual improvement of exam and test content.

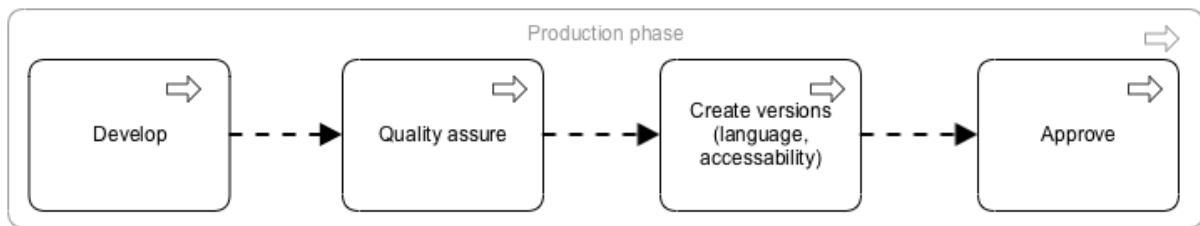
The production phase involves the production of tests and examinations. The output from the production phase is tests and examinations.

The administration phase involves administering registrations, scheduling test/exam dates, administration and monitoring (invigilation). The output from the administration phase is test/examination answers.

All assessment (automated marking, manual marking, grading), reporting and completion activities are part of the analysis phase, which also includes processes for other types of analysis and post-processing of the results. The output from the analysis phase is data on the candidates’/pupils’ level of attainment and on the characteristics of the examinations, tests and individual tasks.

The output from the analysis phase is then used in the next production phase to be able to make continual improvements to the examinations and tests.

Production phase



The persons involved in developing examinations and tests are hereafter referred to as test writers. Test writers need access to the directory/exam/test to be able to work on the content while keeping the content secret from others. Future examinations and tests remain confidential until the time of the examination/test, and strict access control is therefore important.

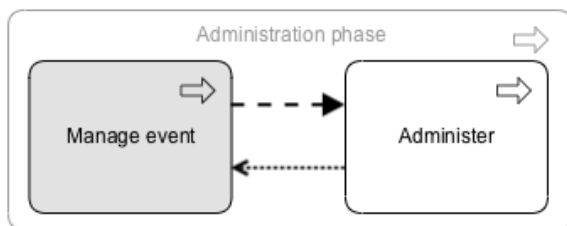
The test writers build the examinations/tests by creating tasks and compiling them into tests and examinations. The tasks must also be linked to relevant metadata (such as learning objectives and categories). The customer employs several hundred test writers, so it is important that the system is user-friendly and intuitive.

Each task is quality-assured by piloting with pupils, or by consultation with subject experts. When the tests or examinations have been fully completed, they are checked by external quality controllers (subject revision, proofreading, calculation checks). The external quality controllers should not edit the content but comment, propose changes and suggest potential answers.

After quality control the examinations and tests are translated into other language versions and versions for candidates/pupils who are entitled to individual adaptation not covered by universal design.

Once all the versions have been completed, all the test material is collated, configured and linked to an exam or test event in PAS.

Administration phase



The customer creates an event in PAS which is linked to an exam or test in the new system. Candidates and pupils are registered for the event, and test supervisors, invigilators and examiners assigned their groups of candidates and pupils. All this takes place in PAS, and the new system uses the end points to authorise access to examinations, tests and results.

Some tests are voluntary, and teachers need to be able to preview these tests to plan their use in the classroom.

PAS provides information about which examinations/tests a teacher may preview.

PAS provides information about which examinations /tests the candidate/pupil is due to take.

The pupils solve all the tasks in the test/exam and then submit them.

The customer needs to be able to conduct:

- closed examinations (no access to internet or other tools)
- restricted examinations (access to selected websites/tools)
- open book examinations (access to internet)

Pupils/candidates, including those who are entitled to adapted arrangements, must be able to demonstrate what they can do without distractions. The goal is for as many pupils as possible to complete the standard version of an exam/test. This means that the system should contain a high degree of universal design both during administration and development of exam/test material.

There are different ways of allowing the pupil/candidate to show what they are capable of, and the customer is looking for a solution with flexibility and scope for alternative assessment forms (e.g. the pupil could choose which task they wish to answer).

PAS provides information about which candidates/pupils and examinations /tests a teacher or invigilator may monitor.

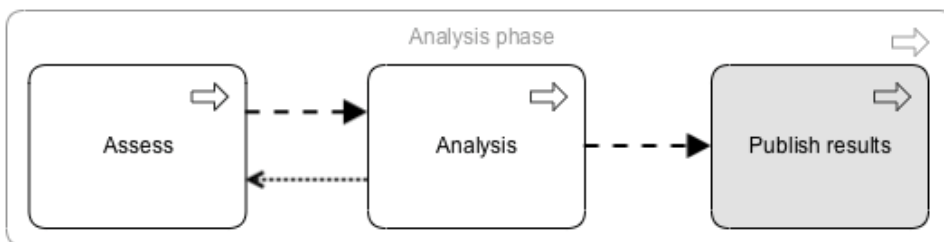
Teachers need to monitor their pupils during the test in respect of the pupils' progression, use of other tools etc.

Invigilators need to monitor candidates during the exam in terms of starting the exam, cheating, requests for assistance and submission of answers etc.

A status message is sent to PAS when the test answers are submitted.

When results are ready the new system sends a status message to PAS with a link to the results. PAS then extracts the results for presentation in reports.

Analysis phase



The customer wants as many tasks as possible to be marked automatically. For tasks requiring manual marking, the teacher/examiner needs suitable tools for fair, easy and quick assessment.

PAS provides information about who should be marked by whom.

Reports on national examinations and tests require advanced analysis of the tests and the pupils, e.g. IRT analysis. The customer conducts such analyses and needs this process to be supported, either by exporting/importing data in the new system or by enabling the system to perform similar calculations itself.

PAS needs data on the degree of difficulty and attainment level of all questions and pupils after a completed exam/test in order to aggregate data at a school/municipal/county level. This data must be sent to PAS.

When review the reports, the teachers need to be able to view individual tasks and individual answers.

PAS provides information about who has access to certain questions and answers.

Once the exam/test has been completed, all collected data must be able to be archived and deleted.