Executive summary

In this the first rapport from the AI@LU project, we will describe the overarching project ambitions; describe what we have found in terms of AI-related education at LU at this point; describe how we look for related teaching capacity, and what we have found so far; introduce the database that is a separate deliverable, and how it can be used to help disseminate information about AI-related teaching to and between different stakeholders. With the caveat that this is in effect an interim report, and that data gathering and analysis is still ongoing – some key findings:

The analytical situation

The LU “metadata” situation is far from satisfactory for these kinds of studies. LUBAS and related systems (possibly including LUCAT) could potentially include a component allowing for metadata inclusion (LUCRIS seems to do just that). We provide suggestions how this might be alleviated in future.

Syllabus data stringency and level of detail is notably lacking.

AI as a concept is nebulous which complicates analysis. We provide a project-internal coding scheme to cover the full range of potential AI foci.

LU and AI education: the information-structural situation

Linkages between faculties/units as to AI education is severely constrained. There are few logical pathways for such trans-organisational information flows. There is a risk that this will lead to redundancies if available resources/competencies are undiscoverable.

The research situation looks much better with AIML actively disseminating information between stakeholders from different parts of the university about AI. The question is if educational AI information can piggyback on this structure or if a complementing one needs to be established in the longer run.

Current resources (courses and teaching capacity) are gathered in a project database (discussed in the main text) that can potentially be used as a blueprint how to keep track of course/teaching capacity metadata aiding future analysis.

Courses

In this report we only provide the briefest of overviews of the courses, as data gathering and data analysis are still ongoing. From an initial long-listed group of appr. 260 courses, 39 are currently deemed truly AI-relevant. Eight of these courses seem to overlap, even though they have unique course codes, and are offered by two faculties. 40 further courses are currently classified as potential candidates, and will thus be included in a list of courses to undergo more detailed analysis.

Technically oriented courses dominate the included courses and LTH, N and E are the major contributors, with remaining faculties offering far fewer related courses.

Teaching capacity

Scraping web pages related to the found courses, we have (so far) found some 130 teachers at work in these courses. These teachers were been asked to self-assess their proficiency in each of the eight sub-areas that we use in our coding scheme by means of a survey. A list of responding teachers who agreed to have their details shared is included and has already been put to use by LUCE.

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1 Project ambitions and timeline

1.1 Operative project ambitions

In this project we have the following operative ambitions:

A. Fact-finding: fundamental questions
   - *What* AI-related courses are LU offering on the undergraduate and master levels?
   - *What sort* of AI-related courses are being offered?
   - *Where* are these courses hosted (faculty/cross-faculty)?
   - *How do* LU’s offerings *compare* to a range of national and international universities?
   - *What related teaching capacity* does LU have access to?

B. Based on the processed information: furnish strategic suggestions/development ideas how to bolster/complement AI education at LU.

The project will come up with several concrete suggestions both of a long-term strategic kind, and of concrete on-the-ground measures. Such advice is only intended as input to the core Lund University leadership to aid future decision-making, and should not be construed as political statement what *should be done*.

C. Facilitating information exchange about AI education between different stakeholders (*e.g.*, AIML, LUCE, RL, Faculties)

LU course and teacher data in the project can be made useful as soon as it is collected as resources and needs in the organisation can be better matched – provided the data is properly disseminated. An ambition is that the project should facilitate such matching efforts.

D. Representing LU in national and international fora where AI in education is a major focus

To put LU on the map as well as to better understand the larger educational context LU is situated in, an original ambition was for us to represent LU in a variety of national and international fora where AI in education was a core focus. The Corona situation has thrown plans off kilter, but we hope that the period ahead will probe more amenable to the realisation of this priority.
1.2 Overarching “end zone” ambition

The above operative ambitions all feed into a common overarching ambition: to suggest and help set up university-wide AI-focused courses.

1.3 Project timeline and major deliverables

The project was initially slated to start on February 1, 2020, but was delayed for a further month, and went live in March. It is intended to finish on December 31, 2021. The project was impacted by the Corona virus in the spring and early summer, but additional resources furnished by the Faculty of Social Sciences in part allayed the associated negative effects. We are for that reason roughly aligned with initial timeline planning.

Figure 1. Overarching project timeline
The project will produce three core reports, and an infrastructure solution to aid collection, analysis and dissemination of data about LU courses and teacher capacity, and course data about a range of Swedish and international universities.

Beyond these hard milestones, we continuously link with the AIML group, and present the project to other entities as requested.

**Report 1 – December 2020**  
*Lund University AI-related courses and teaching capacity: a first look*

**Contents**

- General analytical framework description (including the typology that will be used throughout the project)
- Gathering *course information*: description of methodology, opportunities, challenges
- Analysis phase 1: coding methodology explained
- Analysis phase 2: tentative findings (“tentative” as data gathering continues past the report and findings will be revisited in about a year’s time in the final report)
- Gathering *teaching capacity information*: description of methodology, opportunities, challenges
- Analysis phase 1: coding instructions to surveyed teachers explained
- Analysis phase 2: tentative findings (“tentative” as data gathering continues past the report and findings will be revisited in about a year’s time in the final report)
- Explanation how the first analytical leg links to the remaining two reports and their ambitions.
- Description of the database/infrastructure, and how it can be used outside of the core project to aid information gathering and dissemination about AI-related resources at LU.
- Concluding points about findings so far, and the road ahead, including comments about LU data sources and how they can and could be used to aid similar comparison efforts.

**Report 2 – June 2021**  
*Lund University AI-related education in a national context*

**Tentative contents**

- Selection of Swedish universities – an explanation
- Data search methodology
- “Fingerprinting” a university’s AI education: describing the analytical approach and coding.
- Use of the database/infrastructure to gather and analyse University AI “fingerprinting”
- Lund AI education in a national comparison: some findings
Report 3 – December 2021
Lund University AI-related education and an international outlook

Tentative contents

• Data gathering and analysis methodology explained
• Updates to LU data explained
• Updates to national data explained
• International data selection and analysis explained
• LU and AI education: an international comparison pilot
• LU AI teaching capacity now and in the future
• The project summed up: methodological challenges and how future efforts (including but not limited to AI-related ones) can be better and more systematically supported.
• The project summed up: where can LU go from here?
  • Capacity building
  • Focus
  • Inter-faculty efforts
  • Inter-university efforts
• Strategic ambitions? Organic growth? Aiming for excellence?
2 This report – ambitions

2.1 Introduction

In this first report the main ambitions are:

• A view at the data situation at this point (courses + teaching capacity @ Lund University). We will continue to gather data after this report, and report #3 will provide a final summary and analysis.

• A limited analysis based on gathered data. Again, report 3 will furnish more complete findings.

• A brief description of the database, how it works, what it contains and how it can be used.

2.2 Managing data: analysis infrastructure as a deliverable

The data we are working on and with is highly volatile. New courses are created, old ones discarded, teaching teams change. A report on the state of the situation is almost by definition obsolete as it is being fixed. Yet a main priority is to facilitate the exchange of the freshest information available. Our solution is to give selected partners access to the live database we are using to gather and analyse information.

The database contains all LU, national and international courses we have considered for inclusion in the coding phase and, for the LU courses, all teachers that we have been able to locate that are associated with these courses.

For personal (teacher) data, we only store information that is publicly available on LU web pages, and/or teachers who answer our survey about self-assessment of AI-related expertise. Surveyed teachers are given the option to forego inclusion of that information in the final data set.

The data set could potentially be limited to project-internal analysis, as in most research efforts. That would mean regular reports (see previous chapter) where fundamental data would be secondary to what can be gleaned at the aggregate level.

For that reason the database itself is designed to be immediately usable by selected partners outside of the core project group. The screenshots below (figures 1.1 – 1.4) are intended to give an idea of how users interface with the data. Sorting, finding and combining are design priorities to quickly probe different combinations of courses and included staff members.
2.2.1 Course data examples

**Figure 1.1 Storage of fundamental course data**

- The database contains links to related web pages, syllabus texts etc.
- A separate details pane stores information about teaching teams and other pertinent information.

**Figure 1.2 Faculty home (estimated %)**

- Formal ownership is almost always limited to a single faculty – but in some cases the same course is given by two faculties.
- The same database contains courses from all included universities too for easy comparison and management.
2.2.1 Staff data example

- As can be seen, a course can be coded as having multiple foci, and we attempt to gauge the “intensity” of each based on syllabus information. This is discussed in greater detail later in the report.

- This example uses fake data (project member Mikael Sundström has nowhere near this AI-related proficiency!) to demonstrate how data is being managed.
- The many sorting options is to make it easier to quickly home in on the sort of proficiency a user is looking for.
- Department home is also used to automatically detect faculty home to aid future aggregate analysis.
3  What is AI? – the winding road to a coding scheme

One major problem when studying anything related to “AI” in its generic form is just that: that the concept is generic. It is understood in wildly different ways by different stakeholders – yet all those conceivable forms are, or at least potentially may be, something that research and education include or perhaps ought to include. For that reason, serious analysis requires an analytical framework and a coding methodology that can catch and make sense of this variety.

3.1 Presenting an AI Typology – Warts and All

In this report, the ambition is indeed to catch as much of the total breadth that we can, from deep-under-the-hood technical fundamentals to how AI is perceived or presented in general societal debate or even fiction – as all those aspects can and are discussed, and potentially taught, under the generous “AI” banner.

Our solution has been to attempt to establish a typology comprising AI-related topics/fields that together cover the entire gamut of conceivable term usage scenarios. We spent serious time and effort on it and have tried it on numerous stakeholders before settling on its current form.

The framework comprises three main categories, which each have a set of sub-categories.

3.1.1 Overarching category #1: fundamental techniques

This is a category intended to capture technical under-the-hood aspects; elements that together make AI in some applied form possible.

Sub-category 1.1: Theory foundation

With apologies for the simplification, we might use transportation technology as an analogy: transportation tech makes use of a range of fundamental physics and engineering principles, concepts, paradigms etc. Internal combustion and mechanical power transfer principles can be studied isolated from any desire to relate to transportation or vehicle development. Similarly, scientific insights from a variety of fields (e.g., computer science, statistics, neuroscience) that are crucial in AI systems can be and are studied without a guiding “AI development imperative”.

Sub-category 1.2: techniques/methods

At some point a number of such fundamental building blocks are assembled/combined into an at least theoretically viable system where AI as an approach (in some form) is the explicit design ambition. The imperfect transport analogy might be the developing of a
viable drivetrain based on the many insights gleaned from fundamental research and established principles.

Sub-category 1.3: solution complexes

The perceived potential offered by this system or a combination of systems are finally made to address a particular larger-scale problem or category of problems. Examples could include Computer Vision, Natural Language Processing and Voice Recognition. The transportation analogy (yes, still imperfect as most analogies tend to be) could be transportation over land, on and under the sea or airborne; manual or automatic etc. etc. The most important thing is that a problem is now at the forefront, and AI techniques and methods are perceived as viable solutions or sub-solutions.

3.1.2 Overarching category #2: application

Here the focus is where AI has been commoditised and so turned into usable tools – maybe as applications or APIs where fundamental understanding of what is happening under the metaphorical hood is not necessary to be able to extract utility from the underlying systems. In the trusty transport analogy, we would now be at the vehicle stage, where users can operate complex systems without any detailed, or indeed any, knowledge of how they actually work.

Sub-category 2.1: “applied” (sciences)

Some AI applications can be used as special tools to further scientific research – an archaeologist might be able to use an app to analyse drone data of a landscape to find indications of roads or buildings for instance. We decided to detach such usage, and how it is possibly being taught, as we provisionally assume that such users will often be better acquainted with the fundamental techniques aspects, and be included in closer feedback loops with that overarching category. This potential interface between the two categories seemed important to try to keep track of.

Sub-category 2.2: “applied” (end-user)

This is expected to be the much larger of the two sub-categories: apps and systems with user interfaces expressly hiding much of the underlying complexity, meant for businesses or even consumer use.

3.1.3 Overarching category #3: links to society

AI will impact society in a range of ways, and those effects will need to be understood in order to organise relevant governance principles, and understand ethical implications. But AI is also perceived in different ways in society, through literature and other cultural communication channels. To wrap up the transport analogy, the impact on society of cars or air traffic, and the
need to regulate these new aspects, and how they are understood in society would be the equivalent here.

**Sub-category 3.1: Impact on society**

The effects of AI on communities, markets, individuals, organisations or other parts of society, both long-term and short-term. This could include filter bubbles, polarisation, surveillance, dictatorships, democracy, economic growth, business innovation, trust, employment and/or production where AI and its mechanisms is specifically studied as a cause.

**Sub-category 3.2: Governing AI**

How AI is regulated by hard and soft law, such as law, practice, policy, standardisation, and recommendation. Examples may include ethics guidelines, big data regulation, data protection laws, organisational policies on AI methods and usage, aimed at governing AI in one way or another.

**Sub-category 3.3: AI perceptions**

This area concerns representations and conceptions of AI in the past and present. Examples include AI in religion, ethical concerns from a philosophical perspective, AI in media and AI in literature and art.

**3.1.4 Extra category #3: other**

Realising that some empirical data might prove not to fit the thus pre-conceived categories, we have added an “other” category to store such potential instances, and use them to guide later framework evaluation and (possible) revision work.

**3.2 Identified framework weaknesses**

This stab at setting up an analytical framework is not the final word, far, far from it, and our analytical solution can be justly criticised from a variety of perspectives.

A significant but unresolvable problem is that our categories are not discrete. Overlaps will inevitably occur, and when we code course syllabi or ask teachers to self-assess their proficiency relating to one or many of these categories, interpretation of how the categories overlap will also sometimes differ. We have gone for a fairly relaxed categorisation, meaning that occurrences that sit in a grey zone between two categories are typically coded as pertaining to both.

In the end, we don’t think this will harm the study given its ambitions: even with the resulting fuzzy edges, we trust we will be able to detect overarching clumps of foci and self-assessed expertise across the entirety of Lund University.
3.3 Making use of the framework

The framework and its typology is used throughout the project to maintain consistency. After pilot trials to see that it did indeed work the way we intended, we have used it to code both courses and teaching capacity. Going forward it will be similarly adopted when we code extra-LU courses, which will make comparison efforts viable. We believe that it could conceivably be deployed to analyse aspects beyond the project focus, such as how AI has been debated politically, or commercially – and that maintaining such a common framework could that way produce interesting analytical synergies.
4 AI courses @ Lund university

4.1 A tentative first look at LU courses with an AI focus

In this report we look at a snapshot of courses that we have so far located and processed. We stress that this is not a finalised and complete set of courses: data gathering is ongoing, and report #3 will include a more comprehensive data set. In this report we also detail the data gathering methodology in order to facilitate feedback on it; feedback that can inform tweaks to the process itself going forward.

4.2 Locating relevant courses to survey

Figure 4.1, below, provides an overview of the course identification process. Each step will then be presented in turn. We will also explain some of the challenges we have encountered in this work.

Figure 4.1 Course identification methodology

The mapping of the courses at Lund University is in essence a two-step operation. 
First (1a), we have been conducting course syllabi keyword search. To ensure that we used a relevant set of keywords, we consulted a group consisting of researchers who work with AI in
various fields and disciplines. With their help, we compiled a relatively comprehensive list of words and concepts (see Appendix).

The timing of the actual search was the spring of 2020. This means that we (in this report) capture courses running in the spring and autumn terms of 2020, as well as courses given in the spring of 2021.

The keyword search risks producing many false positives—courses that in their syllabi contain words and concepts that we were indeed looking for, but are nevertheless not courses properly related to AI. We are trying to systematically detect such courses and remove them from the analysis.

A major part of this work is the second step (1b) that has recently been initiated, and that comprises a survey to a number of directors of study based on the search in step 1a. Questions we are asking these directors of study include: in your view, do the courses we list (the lists contain subsets of courses that the Director in question should be familiar with) contain AI elements? If not: which courses can be deleted from the survey and why? Are there additional courses beyond those we have listed that in your view include AI elements? If so: which ones (please provide details)? Are there any plans for new courses with such a focus? What teachers are working, or will work, in these courses.

This step is generally intended as a secondary net with which to catch relevant courses and exclude unreasonable ones. It will be employed only in internal LU searches. Beyond improving the eventually included set of courses, it will also allow us to evaluate the efficacy of the keyword search itself. This is important as the plan is to only employ keyword searches when we assess courses beyond LU (reports 2 and 3), and we need to understand the drawbacks of such a methodology.

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Data inclusion and quality caveats

The quality of the identification and sorting process is of course intimately connected with the quality of the data in the sources we use. We have found that course descriptions and learning outcomes vary a lot in terms of level of detail and language usage. Keywords too are used very differently.

We also note that LUBAS in particular lacks developed ways to add metadata to foundational information about courses. Metadata is easier to custom-tailor for analytical purposes than "primary" data, which tends to have a particular audience—and not necessarily analysts—in mind. This deficiency generally makes analyses focusing on our educational offerings much harder to accomplish.

We have not searched for programmes; nor have we decided to link courses to any programmes. Such linkages might have turned out to be useful: when we look at the content from a course perspective and not from a programme perspective, we risk missing out on how different courses in a program complement each other. In the end we have perforce had to rein in the study ambitions and have so decided to focus only on the smallest common education component, i.e., courses.

We have not consciously attempted to catch PhD courses with an AI focus, as that was explicitly outside the remit of the project. This could presumably be a valuable addendum to the project at a later stage, and could employ the same identification and coding methodologies.
Aided by the survey answers, we then finalise the list of courses that we proceed to code for type of AI content. A final checkpoint is the actual coding process (discussed more below): if the coding yields no linkages to our AI categories, the course is removed from the list of viable candidates.

4.4 Coding methodology

Let us now turn to coding and extraction of information as described in figure 4.2, below.

**Figure 4.2 Course coding and information extraction**

We have catalogued each course as belonging to one or more of the categories that are included in the analytical framework, as presented in chapter 3.

The categorisation is aided by a *codebook* – a manual that explains, concretises and exemplifies the different categories in the classification scheme to make it clear what criteria need to be met for a course to be attributed to a certain category and when a course is deemed to have a *strong*, *medium* or *weak* coupling to the category in question. If no such couplings can be found, the course is removed from the list.

At this stage we also look specifically for *teachers* connected to the course (2 in the figure) – usually by locating the associated web pages on the LU web – as this is what makes us able to
compile a list of candidates that will later be asked to provide data about (self-assessed) AI proficiency.

We finally extract and log “hard” technical information, such as where the course in question is hosted; how many credits it comprises; what level it is being taught on; which year and term etc. To provide an idea of the numbers so far, the project database contains appr. 250 LU courses that resulted from the initial keyword sweep and went on to be checked if they were viable. Just under 40 have passed the hurdle in this viability check round (we will return to look at all courses again when preparing for report 3), and are for that reason included in the by far most arduous part of the analysis – the AI type/focus coding.

4.5 Data coding in practice

We categorise the data set course by course in several “rounds”. This approach makes it possible for us to switch between examining each course in separation and checking how the coding practice works more generally. That means that the coding process is continually and gradually honed to ensure, to the extent possible, uniform and accurate categorisation. This is extra important as a major coding operation using the same tools will be integral to the comparison efforts in reports 2 and 3.

Data quality caveats

Many courses have proved hard to categorise – in some cases as they do not seem to align with any categories; in others because they seem to align with too many. In the latter case we prefer to be relatively lax and code the course as belonging to all noted categories.

We wish to emphasise that qualitative categorisation of the kind we do in this project are in the end subjective, and so open to related criticism. We believe that it is a workable approach that will give an overarching idea of the situation, however.

A final caveat is that coding practices may still be tweaked before the end report, expected in late 2021, which may necessitate re-coding of courses that have been included in this report..
4.6 Brief overview of the current snapshot of courses

In this report we only provide the briefest of overviews of the courses, as gathering and coding is still ongoing – but we still want to introduce the sort of data we will be working much closer on and with in reports 2 and 3.

The first diagram (diagram 4.1, below) shows the distribution of courses per faculty.

It demonstrates the possibly unremarkable fact LTH, N and EHL conduct courses with an AI content to a greater extent than other faculties and that LTH dominates. Most notable is perhaps the marked difference between the "big 3" and the other faculties (even though we should say that a few more courses from these other faculties have been detected late in the process, and will be included in the final tally).

Diagram 4.1 Course distribution per faculty

Nb. Eight of these courses seem to overlap, even though they have unique course codes, and are offered by two faculties. Seven overlap between LTH and N. One between HT and LTH. In the diagram, these courses are counted as if they were separate, ie they are counted as LTH, N and HT courses. Note that these eight courses should thus be deducted from the total number of courses (47) stated in the diagram.
In the second diagram (diagram 4.2, below), we see that when it comes to course content, one overarching category in the typology, *Fundamental techniques*, (AI1-AI3) dominates. As might perhaps be expected, LTH and N dominate not only *fundamental techniques*, but also *application* (AI4-AI5).

*Diagram 4.2 Number of categorised “hits” per faculty 1*

![Diagram showing categorised “hits” per faculty 1]

<table>
<thead>
<tr>
<th>Faculty</th>
<th>LTH</th>
<th>N</th>
<th>EHL</th>
<th>S</th>
<th>HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI1-AI3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AI4-AI5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AI6-AI8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Nb. A single course can engender multiple categorisation “hits”. We have not here taken into account whether the couplings are strong, medium or weak.

<table>
<thead>
<tr>
<th>AC1-AI3</th>
<th>= Fundamental techniques</th>
<th>AI4-AI5</th>
<th>= Application</th>
<th>AI6-AI8</th>
<th>= Links to society</th>
</tr>
</thead>
</table>

We can also take a look at course content per sub-category and faculty (diagram 4.3, below). The difference between diagrams 4.2 and 4.3 is not only cosmetic: it shows how we have decided to gather and code data in a way that allows us an option to decide how deep to “drill”. Had we only opted to gather couplings to the overarching three categories (*fundamental techniques, application* and *links to society*), it would be impossible at a later stage to delve deeper than that. Report 3 will be analysing sub-category specifics to a notable degree.

*Diagram 4.3 Number of categorised “hits” per faculty 2*

![Diagram showing categorised “hits” per faculty 2]

<table>
<thead>
<tr>
<th>Faculty</th>
<th>LTH</th>
<th>N</th>
<th>EHL</th>
<th>S</th>
<th>HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AI2</td>
<td></td>
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<tr>
<td>AI3</td>
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<td>AI4</td>
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<td>AI5</td>
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<td>AI6</td>
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<td>AI7</td>
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<td>AI8</td>
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<tr>
<td>AI9</td>
<td></td>
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</tr>
</tbody>
</table>

Nb. A single course can engender multiple categorisation “hits”. We have not here taken into account whether the couplings are strong, medium or weak.

<table>
<thead>
<tr>
<th>AC1 = Theory foundation</th>
<th>AI4 = “Applied” (sciences)</th>
<th>AI7 = Governing AI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI2 = Techniques/methods</td>
<td>AI5 = “Applied” (end-user)</td>
<td>AI8 = AI perceptions</td>
</tr>
<tr>
<td>AI3 = Solution complexes</td>
<td>AI6 = Impact on society</td>
<td>AI9 = Other</td>
</tr>
</tbody>
</table>
4.6 Going forward: finalising and analysing the set of LU courses

As stated, we will continue to gather courses and parse related course data with the aim to present a final list in report 3. That list will have passed through all vetting stages, and should provide a good and reliable overview of what is on offer. That set will also allow for much more actual analysis, that will in turn feed into suggestions how LU can approach the question of AI education strategically. The database will be available for snapshot data extraction at any point between now and the presentation of report 3.

One thing we will definitely include is an investigation of courses that somehow straddle faculty divides as well as “typology” divides, as these could provide bridge-building blueprints.

We will also compare LU’s full range of courses with what is being offered by other seats of learning, whether in Sweden or beyond. That should aid strategic discussions about potential partnerships, and about whether LU should specifically try to move the education profile in certain directions.
5 AI teaching capacity @ Lund university

5.1 A tentative first look at teaching capacity

As previously described, one ambition of the project is to provide a clearer picture of the teaching capacity that exists when it comes to teaching courses in AI. There is so far no unified source of teacher data focusing on knowledgeability in specific fields, outside of departmental/disciplinary “home” which is of course a central identifier, and some local lists aiming to aid media to find relevant expertise. Aspects not neatly coinciding with departmental setting are for that reason very hard to keep track of. This is certainly the case with AI expertise which can potentially span the entire university, but also includes fields like sustainability, diversity and much else.

In this project, this situation leads to the following four ambitions (three primary, one secondary):

1) Locate as many of LU’s AI-competent teachers as possible.
2) Code discovered teaching capacity according to our developed typology.
3) Disseminate this information as widely as possible to aid linkage opportunities
4) (secondary ambition) Analyse the gathered data. While presentation of the located data in various ways is of course pivotal in order to facilitate linkage opportunities (without visibility, new connections are impossible after all), analysis of, say, teacher composition, faculty home etc. are considered more of a bonus at this stage. Provided the yielded material allows for anything substantive in this respect, an analytical component is nevertheless planned for report #3.

5.2 Locating relevant staff candidates to survey

The course identification process (described earlier) yielded a set of courses with one or more included AI components. We then gathered data about staff members associated with those courses from related course pages on the LU web.

GDPR compliance note

The data source is protected and stored locally at Lund University. All contact information etc. is sourced from LU’s publicly available web site. The listed staff members listed below have explicitly consented to

a) have related data stored in the project database, and
b) be included in reports (such as this one) and other disseminated material.
5.3 Gathering capacity data by means of a questionnaire

We then turned to the located teachers with a questionnaire in which they were asked to make a self-assessment of their competence in AI-related matters, based on our developed typology in order to catch the full gamut of potential takes on AI. Each category was extensively introduced to make respondents able to interpret what we mean by each.

Survey respondents who claimed knowledgeability in one or more of the AI categories (as adopted from our AI typology) were included in the final group of staff members that we then process and list in this report and elsewhere.

For each of the eight detailed categories (see figure 5.1, below), respondents could self-assess their proficiency as strong, medium, weak (= some) or none. Technically, these answers were then converted to numerical values as per: Strong = 3; Medium = 2; Weak (some) = 1; None (or empty): 0.

The three overarching categories (e.g., “Fundamental techniques”) simply sum the calculated numbers to get a category score (see figure 5.1, below), which are in turn mainly there to aid pedagogical presentation.

Figure 5.1. From category self-assessment to assessment scores

A typical database entry can look like this (figure 5.2, below)

Figure 5.2. Database management of self-assessment data (example record with fake data). We also keep track of internal contact information and faculty home to aid later analysis.
5.4 An early list of teachers with AI competencies

In the first survey batch, sent to 129 recipients, 32 respondents stated their willingness to appear in reports (like this one) to aid information dissemination and linkage opportunities. More respondents carried out the self-assessment, and were happy to let us use this data in aggregate analyses, but preferred to be left out of reports etc. where individual records were on show.

Normally, a survey response rate below some 35% would be highly problematic, but in this context it is less so. While higher response rates would of course be preferable, and further survey batching will in any case take place to possibly bump up this number (more about this below), every individual who is added to our data source improves linkage opportunities, which is a major ambition guiding this effort.

In report #3, this issue will be revisited, and an updated list will be compiled. Meanwhile, the live database is available to our partners so that they can at all stages see the then-current list, and search for specific competencies.

The data is presented by means of three tables – one per overarching category. Each table includes only staff members who have indicated some knowledgeability of one or more of the included sub-categories. Overlaps are of course inevitable for staff members who straddle divides between the larger categories.

Each table is in turn sorted into three self-assessed “levels” of expertise: “high”, “medium” or “some” – but it should be noted that even “some” is described in the survey as feeling confident taking on some teaching tasks in that field. The database allows for much more granular sorting/finding.
Table 5.1 – Fundamental techniques

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**SELF-ASSESSED KNOWLEDGABILITY: STRONG**

(aggregate assessment score > 3 and/or at least one subcategory assessed as "strong")

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**SELF-ASSESSED KNOWLEDGABILITY: MEDIUM**

(aggregate assessment score = 4 or 5)

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**SELF-ASSESSED KNOWLEDGABILITY: SOME**

(aggregate assessment score = 1, 2 or 3)

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### Table 5.3 – Societal links

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<td>Markus</td>
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**SELF-ASSESSED KNOWLEDGEABILITY: STRONG**  
(aggregate assessment score > 5 and/or at least one subcategory assessed as “strong”)

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**SELF-ASSESSED KNOWLEDGEABILITY: MEDIUM**  
(aggregate assessment score = 4 or 5)

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5.5 Going forward: locating more teachers

The survey route was a first way to contact probable AI-savvy teachers. The response rate was disappointingly low, but general survey fatigue is a growing and understandable concern here. As we are still locating more courses, and will keep this effort going for at least six more months, a second survey will be sent out to related teachers.

However, we will also need complementing strategies to locate teachers. As one of the survey respondents put it:

“I have a gut feeling that the people involved in the technical aspects of AI are visible to a much greater extent than people from social science, economics, and humanities. Of course, the technical guys outnumber those of us who are interested in AI from a societal perspective, but that makes it even more important that we also are visible at internal and external events. I think teaching plays an an important part here, and hope that the mapping that you are doing could be a useful tool to capture those social scientists, economists, and people from the humanities that have an interest in AI, but are not very well known as such.”

We recognise this concern as valid, and believe we will need to take this into account going forward and try bespoke approaches to alleviate the problem. One way we aim to explore is to ask surveyed teachers who responded to help us both locate still more teachers than we have found via the “course route” and possibly to act as liaisons to the project – the hope being that such a personal touch will prove more engaging. Special outreach efforts to under-represented faculties may also be employed.

Report #3 will list all teachers we have managed to find using the various approaches – and who have stated their willingness to be included of course.

5.6 Going forward: planned analysis

As we initially stated, we aim to carry out some analyses on the aggregate level once we have gathered all the capacity that we are able to. Faculty home, inclusion in cross-faculty teaching teams, AI focus, ability to teach (given other commitments) and qualitative statements about AI/teaching are some of the things we will study. This analysis will be included in Report #3, slated for late 2021.
6 Some concluding remarks

Chapters four and five outline some data-focused findings, and where we aim to go in subsequent reports. In this chapter we will focus on the larger analytical situation. We feel that LU can potentially develop an analytical infrastructure that would radically simplify and so make both quicker and less expensive, analyses of this ilk.

6.1 Analysing courses – a challenging data system situation

Finding and sorting relevant course information has been a non-trivial task, as such information is scattered across a variety of data sources. Speaking solely from an analytical perspective (we realise that there must be reasons for the prevailing situation) it is for instance sub-optimal that LTH maintains a separate major database for these matters.

Conducting more advanced searches in many cases also require assistance by system administrators. We hasten to add that such aid was freely and generously given, but systems could conceivably offer more user-facing levers that aid detailed searches and analysis. This could, for instance, help course coordinators and individual teachers find courses, and via them staff, in other parts of the university in order to initiate more cross-faculty collaborations.

6.2 Analysing courses – a challenging metadata management situation

The work required to find relevant courses and add the necessary metadata to conduct serious analysis is in itself illuminating. It indicates that Lund University lacks a sensible infrastructure to aid proper and efficient inward analysis of this kind. Such efforts will for that reason by necessity be bespoke, very time-consuming and thus inordinately, in some cases probably prohibitively, expensive. With the caveat that we do not at all consider possible political and other implications, we suggest that to add a meta-data layer to course information data sources and develop processes to more quickly gather the required metadata from relevant stakeholders might be one way to drastically reduce costs associated with such analyses.

A course is an incredibly complex data node and data is interlinked in equally complex ways. LU stores information about all of this in many different data sources on the central, faculty and department levels (and beyond). To add “blank” storage for analytical categorisation as and when needed and proper contact information relating to the course (a “course spokesperson” whether a course coordinator or a Director of Studies) would be a minimalistic but workable solution.

What we imagine is the following:
1) A task is set to study course content from a specific perspective (sustainability, say).
2) The analysts claim one of a few such storage slots (which pertain to all active courses across the entirety of LU, or to a defined subset, depending on the set analytical task)
3) The analysts devise possible data indicators to fit the slots.
4) The system allows for automated send-outs to the “course spokesperson” asking him/her to log in and fill out the slot(s) as requested.

The direction might be as simple as a request like “If this course includes aspects related to sustainability, see information below, please state ’yes’”, but could be more complex: “If this course includes aspects related to one of the three indicated versions of sustainability, see information below, please state ’1’, ’2’ or ’3’”.

This is different from, say, coming up with and maintaining a set of regulated keywords and enforce that new courses are obliged to enter such (though that too would be a highly useful addition), as the proposed method would be far more flexible, allowing unique metadata gathering that connect immediately to the task in hand. Also, mandated identification of a course spokesperson will aid more qualitative drilling as people with an intimate knowledge of the course are easy to locate.

As long as a designated analyst can search and sort core information that include all LU courses, and add and manipulate meta information, the suggested utility can be realised either through direct system additions (to LUBAS, the LTH database etc.), or through a separately established data-scraping tool that regularly links to the existing databases to extract currently available information, and store vital parts together with meta-data information (as suggested above).

6.3 Analysing courses – a challenging data content situation

An immediately noticeable aspect when trying to analyse courses based on their syllabi, is how incredibly different these texts are. Some are highly detailed, others vague or generic to the point where it is hard to tell what they actually include. Yet they are a, if not the, primary source when analysing course content. We have no suggestions to offer here (measures that would make an appreciable difference would be very exacting) and simply note this as a serious and multi-pronged problem. Viewed exclusively from the POV of “high-altitude” course analysis, however, the implementation of a proper metadata system, as outlined in section 6.2, would alleviate some associated difficulties.

6.4 Analysing staff capacity – a challenging data situation

Similar problems afflict attempts to locate staff with related competencies but with different departmental “homes”. Overarching disciplinary proficiency will of course usually align with departmental focus, but more granular skills, or skills transcending easy disciplinary
categorisation (AI, sustainability etc. etc.) are harder to track down. Through LUCRIS and listed research team memberships, some related information can be gleaned, but there is no way that we are aware to quickly reach out to LU staff and have them note specific competencies that are currently being investigated.

The ideal, again from the current narrow analytical perspective, would be to be able to ask the system (maybe LUCRIS itself?) to dynamically ask staff members to self-assess a specific, defined competence in, for instance, AI or sustainability, and to state if and in that case how that info can be disseminated – things LUCRIS keeps track of anyway – to aid analysis and linkage opportunities. In short, this would be another addition of a metadata layer explicitly there to aid much quicker (up to) LU-wide analysis. Such a system could conceivably be used by outreach managers too: if a societal problem swings into view, communications officers could turn to the envisaged system and quickly get an overview of LU staff competence in that area.

6.5 Locating AI data: a notably bright point

We wish specifically to highlight the AI Lund network. This group of dedicated and generous researchers has been a major benefit when delving into AI matters, and making sense of what LU offers in this respect. We believe that this strong foundation can potentially be leveraged – with permanently attached information management resources it could conceivably help track and update the sort of information the we discuss here beyond the span of the project.

6.6 A final note of thanks

We wish formally to acknowledge the valuable contributions of student assistant Sara Thiringer in the summer of 2020, and of administrator Helena Falk in the autumn of 2020.
Appendix: search keywords

AI
Artificial intelligence
Artificiell intelligens
Autonoma system
Autonomous robots
Autonomous systems
Big data
Bildanalys
Bioinformatics
Bioinformatik
Cheminformatics
Cheminformatik
Classification
Clustering
Cognitive robotics
Computational linguistics
Computational methods
Computational social science
Computational sociology
Computer vision
Data mining
Datorseende
Deep learning
Digital health
Digital history
Digital humanities
Digitala kulturer
E-health
E-hälsa
Health analytics
Structural modelling
Supervised learning
Unsupervised learning

Health informatics
Human-robot interaction
Hälsoinformatik
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Intelligent robots
Intelligent tutoring systems
Klassificering
Klusterung
Language processing
Machine learning
Maskininlärning
Natural language processing
Neural networks
Neurala nätverk
Neuron nets
Neuron networks
Neuronnät
Neuronnätverk
Patern recognition
Predictive analytics
Reinforced learning
Robotics
Robotik
Semi-supervised learning
Social robots
Språkteknologi
Statistical modelling
Statistical models