POSTGRADUATE RESEARCH INDUCTION MPhil AND 3-YEAR PHD STUDENTS

Dr Eva M. Navarro López
PGR Manager
School of Computer Science
University of Manchester
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• Over the years, they have been modified and adapted by Alvaro Fernandes.

• The mistakes on the other hand are, alas, all mine.
WHAT THIS TALK IS AND IS NOT ABOUT

• This talk is an attempt to sketch the most important aspects of the relationship you are entering into with the School of Computer Science at The University of Manchester.

• It is not a substitute for your reading the Handbook and familiarising yourself with the various websites that are pertinent to you within the University.

• The Handbook is in the Web (and you should consult it often over the course of your time with us):


• You should get into the habit of consulting it often over the entire duration of your degree.
WHY ARE WE HERE?
WE ARE ALL HERE...

- To do research!
- We are research-led: research is core to our mission.
- We accepted you in this programme of postgraduate studies by research (PGR) because we believe that in achieving your research goals, you will make a significant contribution to our own research.
AND WHAT IS SO COOL ABOUT DOING RESEARCH?!

• We do research because we want to find new, or better, ways to solve non-trivial relevant problems!

• What is new or better, whether it is non-trivial, whether it is relevant is decided by our peers, i.e., other researchers in our area.

• You are here to learn how this is done and to do it while you’re here.

• Doing a PhD is probably completely different from anything you’ve done before.

• We are here to help with the consequent insecurity and inherent uncertainty that arises from this break with your past.

• But you must remain focused and motivated by doing your best to learn fast and by working hard.
BUT... IS THAT ALL? ISN’T THERE SOME GREATER GOAL?

- Yes! There is!
- The goal, in the limit, is to change the research landscape!
- In computer science, for sure, and, we hope, beyond it too.
- We aim to change for the better
  - the way things are done
  - or understood
  - within computer science
  - or in the myriad areas of knowledge and human activity that rely on computer science now and, increasingly so, in our common, global, human future.
OK, LET’S DO RESEARCH! BUT… HOW DO WE DO IT?

- We look for **relevant** problems (e.g., security in the presence of quantum computation).
- We strive to find **novel** ways of solving them (e.g., web-scale, logic-based knowledge representation).
- We perform new, **non-trivial** analyses of existing methods (e.g., theoretical and empirical investigations of the effectiveness and efficiency of machine learning techniques).
- We strive to acquire and convey **new, non-trivial insights** or knowledge or understanding of computer science principles and methodologies (e.g., in automated theorem proving).
- We aspire to create **exciting** new artefacts.
  - For example, the first stored-program computer [1948]
  - Or the first million-neuron neuro-computer [now]
- We aim for our research contributions to be **broad** and **deep**.
We are all ultimately judged by our peers, i.e., experts like us.

Novel is what experts didn’t know before.

Non-trivial is what experts believe would require significant effort on their part to solve (rather than a modest amount of their thought and time).

Exciting is what experts didn't expect to be quite doable (or doable so well) just now.

As for breadth and depth, we typically aspire to create new knowledge that solves many problems over broad areas of human endeavour and that solves them thoroughly, comprehensively, exhaustively, fundamentally, deeply.

In general, depth is more valued. So, go for depth if achieving both breadth and depth seems impossible. It typically is, at least in three years.

Remember, your life as a researcher is but starting when you get your PhD! This is just the beginning!
BUT… HOW DO WE REASSURE OURSELVES ALONG THE WAY?

- Research is **not (just) searching**, looking for something given.
- Research is coming up with **novel, non-trivial, potentially useful contributions** to computer science.
- Potentially useful? How do we know?
- We **evaluate**. Evaluate, mind you, not test for correctness against requirements (as in code we write).
- Research contributions are **evaluated against a goal** (e.g., going faster/cheaper, or larger/smaller, than the state-of-the-art, or the best-of-breed), or against a background of prior research (e.g., showing that a problem that has been proved to be intractable has a practically useful close-approximate solution).
- And, bear in mind that many research contributions (but not all, and not always) will only prove their usefulness into the **future** (e.g., Turing’s idea of a machine that can simulate an arbitrary machine on arbitrary input in 1936, and Von Neumann’s idea of a stored-program computer in 1946-1948).
HOW HARD CAN IT BE?

- Being a research student is probably very **different** from anything you have been through before!
- So far, you were "just" a student.
- You learnt a body of established material that teachers decided for you that you should care about.
- You found the answers to the problems your teachers had put in front of you in order to check whether you had learnt what they themselves already knew and wished to pass on to you.
- The topmost success criterion was *to learn what was already known*.
- At most, you analysed and critiqued claims, ideas, theories.
NOW FOR SOMETHING COMPLETELY DIFFERENT!

• From now on, you will still do all that, but the difference between success and failure does not lie there!

• *You will need to come up with new, relevant knowledge* either by creating it or by analysing, picking, synthesising and combining existing knowledge.

• You will need to become reasonably comfortable with the idea of working on problems that may not be well-defined yet and then *look for answers that no one* (including your supervisor) *knows* or indeed that no one (including your supervisor) can tell you for sure that they do exist.
WHAT IS A SUPERVISOR FOR?

• You will have one main supervisor. You may also have co-supervisors with different degrees of participation in your research supervision.

• You will meet your supervisor regularly (typically weekly) for in-depth discussion of your research.

• Your supervisor is your main source of support, advice and feedback concerning your research (including focus, depth, breadth, pace, quality, etc.).

• Your supervisor will always aim to impart to you her knowledge and experience in terms of
  • day-to-day things (e.g., how the School works, whom to speak to if you need admin support, etc.),
  • method (e.g., how to do research-related tasks and what standards to aspire to),
  • topic, focus, timing, goals (e.g., what, when, how and why to read; what, when, how and why to write; what to focus your time and thoughts on; what to aim for by, and when, in terms of presentation, discussion and publication, etc.)
YOUR SUPERVISOR AND YOU…

• Your relationship with your supervisor is the most important predictor of success.

• Your supervisor and research group provide you with a research environment where you can learn how to become sufficiently independent technically and intellectually to achieve your own research results.

• But, never ever forget that the ultimate responsibility for your research lies with you.

• On the basis of her deep expertise, your supervisor will advise, guide and provide informed feedback but, at all times, **your research is yours and yours only**.

• You will write joint papers with your supervisor to communicate your research results, but your supervisor will be careful to stand back and let your ideas and discoveries flourish.
IN A NUTSHELL?

- **Decide** what problems are important to work on.
- **Find** ways to **contribute** to solving these problems.
- **Carry out** thorough, thoughtful investigations, empirical or otherwise.
- **Communicate** the results proactively, cogently and well.
- **Seek and heed** peer response (local and global) to your research results.
- And all of the above in constant, frequent, thorough, objective consultation with your supervisor.
WHAT IS STRICTLY MANDATORY FOR YOU?
RTFM!
RTFM?
GIYF...
YOU MUST...

- **be engaged** at all times (and meet the conditions, if any, that apply to your being allowed to study in the UK),
- **attend** the three Scientific Method courses,
- **attend** a 1-week Faculty workshop in January 2019
- **participate** in the annual Research Students’ Symposium,
- **use** (and respond to) eProg at all times,
- **satisfy** progression requirements (i.e., reports, presentations, interviews, etc.) timely,
- **submit** your dissertation before the deadline,
- **pass** your viva.
YOU WILL BE GIVEN OPPORTUNITIES TO...

- participate as Teaching Assistant in the undergraduate and taught postgraduate programmes,
- attend and give research seminars to your co-students, to your research group, to the School and beyond,
- attend courses provided as part of skills training,
- travel to workshops and conferences to present your work and network with your peers,
- engage with the broader world, including industry.
WHAT SHOULD I EXPECT TO HAPPEN TO ME OVER TIME?
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• **In Year 1**, you will:
  - **meet** with your supervisor(s) on a regular basis (typically, weekly),
  - **take** the compulsory course units,
  - **seek** to master the research literature and attend research seminars,
  - **make** a concerted, substantive effort to integrate yourself into your research group,
  - **explore** your research area, focus on a problem, think of approaches to solving it.
WHAT SHOULD I EXPECT TO HAPPEN TO ME OVER TIME?

- **In Year 2**, you will:
  - **continue** to explore the literature,
  - **delve deep** into working out the technical detail of potential approaches and solutions,
  - **submit** papers, starting with workshops, then moving on to major conferences, culminating in journal publications,
  - **attend** workshops and conferences to present your accepted papers,
  - **become** intellectually **independent** of your supervisor.
WHAT SHOULD I EXPECT TO HAPPEN TO ME OVER TIME?

• **In Year 3**, you will:
  
  • **become** more of an expert than your supervisor in your narrow area,
  
  • **integrate** with the international community in your area (e.g., be invited to referee papers, or be part of conference programme committees, or give talks in other universities, or collaborate with internal and external groups),
  
  • **nail down**, technically, potentially through experiments, your research contributions in order to assess and assert their merit and relevance,
  
  • **write up** your contributions as PhD dissertation.
HOW DO YOU KNOW WHETHER YOU'RE DOING WELL?
YOU’RE DOING WELL IF YOU ARE…

- **meeting** your supervisor regularly and getting positive feedback on your progress and results;
- **integrated** into your research group: attending group meetings and group seminars, talking to other PhD and postdoctoral researchers;
- **reading** papers and starting to discover papers your supervisor does not know about;
- **starting** to produce new insights and knowledge (i.e., some results);
- **lying awake** at night, trying to think of a solution to your problem (or is that just me?!), i.e., feeling fully engaged;
- **writing** often and getting better and better at it.
YOU’RE PROBABLY NOT DOING WELL IF YOU ARE...

- **working in isolation**, from home, never meeting with other members of the research group;
- **skipping meetings** with your supervisor (when you least want to see them is when you most need to see them!);
- **reluctant to show** anyone your work until it is perfect;
- **feeling depressed** when you get stuck (get help!);
- **failing to work** full time on your research.
HOW DO WE KNOW WHETHER YOU'RE DOING WELL?
RTFM!$^2$
PROGRESS MONITORING

- You will go through **yearly examinations** in order to demonstrate that you are making satisfactory progress towards production of novel, non-trivial, relevant research results leading to a Doctorate.

- Every year you will produce a **short** (about 1K words) **report** summarising your research area, topic, problem and indicating clearly what progress has been made, and the consequent plan for the subsequent year(s).

- At **month 9** of Year 1 you will go through a **Research Progress Review** with your supervisor and an independent assessor.

- The purpose of this interview is to provide an initial assessment of your progress in the form of feedback, and, if necessary, assigned remedial actions or achievement milestones to help get a faltering student back on track.

- At the end of **Years 1 and 2**, you will undergo a so-called **End-of-Year (EoY) interview**.

- This should be viewed as an **oral exam**, because it makes the formal decision whether the student progresses into the next year.

- The possible outcomes are: progress into the next year or do not progress.

- In the case of non-progression, the possibility of submission for a lesser degree may be offered, typically an MPhil.
OTHER ASPECTS OF PROGRESS MONITORING

• Throughout the degree programme you and your supervisor will write up in eProg:
  • Quarterly review reports,
  • Self-assessment comments
  • Achievements
  • Supervisor comments
• These build up into a record of formative evaluation and feedback from/for both you and the supervisors.
WHAT HAPPENS AFTER SUBMISSION?

• After submission, you undergo "the oral", i.e., a **viva voce examination**.
  • You and your thesis are examined by an **external examiner** (from another university, in the UK or abroad) and an **internal examiner** (from the School), who are experts in your field.
  • This is a long (3-4 hours) and detailed scrutiny of your dissertation, dominated by logical argument, pouring over the documents, its claims, the evidence produced, etc..
  • The two broad goals of the examiners are to convince themselves that
    • The work is truly yours.
    • The work meets the requirements (i.e., a novel, non-trivial, relevant contribution to human knowledge).
  • The examiners can
    • pass it as is,
    • pass it but require small corrections are made, where small is what can be done without much thought and quickly (typically a couple of weeks or so),
    • ask you to make changes and/or additional work and resubmit the thesis, possibly undergo another viva, or
    • deem it unworthy of a PhD and fail it outright.
  • The two extremes of the spectrum are uncommon.
  • **Small corrections are the mode**, resubmissions are rare, and viva resits rarer still.
DOES IT SOUND SCARY?

• Your decision to submit should benefit from the advice of your supervisor.

• (Unless you’ve run out of time, which you shouldn’t do.)

• Your supervisor cannot guarantee you will not fail, only you can do that.

• The viva is culmination of a process: you should be confident, even eager, by the time you get to it.

• Remember! By definition, you are the only expert in the world on the matter: you have created that knowledge yourself!
WHERE CAN YOU GET HELP?
RTFM!
"Help! I need somebody! Help! Not just anybody! Help! You know I need someone! Heeeelp!"

- Your **supervisory team** is the most important source of help and advice.

- Your **research group** (colleagues, postdocs, academics) is very important too.

- There is a **peer mentoring scheme**, i.e., colleagues in Years 2-4 that volunteer to share their own experiences of how it felt to them to be in your position now.

- The **PGR team** (i.e., the cohort advisor, the PGR Manager, the PGR Director) is always ready to help.

- For all administrative questions, the **Student Support Office (SSO)** is the place to go.

- For some tasks (e.g., arranging travel) you’ll be helped by the **Academic Support Office (ACSO)** and by the **Finance Office**.
IN CASE OF ACADEMIC PROBLEMS

- Speak to your supervisor, and if that does not help,
- Speak with the leader of your research group, and if that does not help,
- Speak to your advisor, and if that does not help,
- Speak with the PGR Manager, or the PGR Director, and if that does not help,
- Speak with the Head of School.
IN CASE OF REGISTRATION/EXAM/VISA/ATTENDANCE ISSUES

• Speak to **SSO**, and if that does not help,

• Speak to the **University Student Services Centre**.
IN CASE OF PROBLEMS OF A PERSONAL NATURE

- If you’re comfortable sharing it, use the same route as for academic issues (i.e., supervisor, advisor, etc.), otherwise
- Speak to the University Counselling Centre.
Welcome to Manchester and to the excitement of doing research!

We feel privileged that you are here!

We look forward to learning from your discoveries and watching from our front-row seat how you change computer science forever!