



Universidade do Porto
Faculdade de Engenharia
FEUP

um doutoramento... um caminho...

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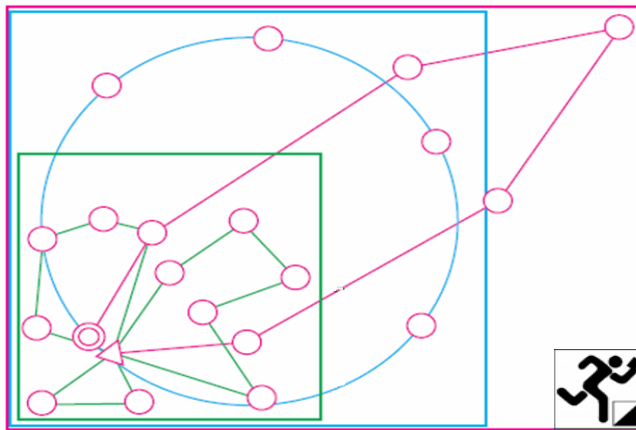


um doutoramento...

- “um caminho a percorrer entre um *ponto de partida* e um *ponto de chegada*, num *meio desconhecido*, ao longo do qual se tem que passar por diversos *pontos de controlo*”
- O caminho entre os pontos de controlo não está especificado à partida e é da inteira responsabilidade de quem o percorre.
- A habilidade de escolher o caminho e de navegar nesse meio desconhecido é essencial para esta actividade.

uma corrida de orientação...

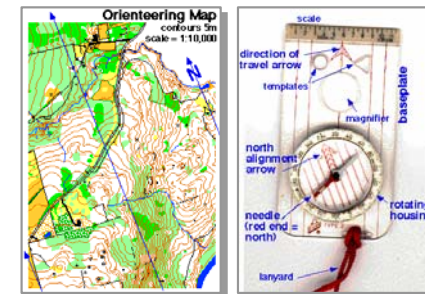
- Ponto de partida, pontos de controlo, ponto de chegada...



▷ partida ○ controlo ⊙ chegada

- Recursos essenciais

- Mapa: para se “*aprender*” o terreno
- Bússola: para nos orientar no terreno e ajudar na escolha do “*nosso caminho*”.



um caminho...

- Quais são os principais pontos de controlo?
- Em que etapas se podem agrupar?

(Referirei o meu “caminho” por ser aquele que eu melhor conheço.)

“Patterns for the Doctoral Student”

- Um trabalho de Joseph Bergin, sob a forma de padrões, que tem como objectivo guiar um estudante de doutoramento, identificando os problemas mais recorrentes e apontando soluções típicas para eles.
 - <http://csis.pace.edu/~bergin/patterns/DoctoralPatterns.html>
- Joseph Bergin é um especialista em diversas áreas relacionadas com desenvolvimento de software, das quais destaco a de padrões (Design Patterns, Pedagogical Patterns, Organizational Patterns).
 - <http://csis.pace.edu/~bergin/>
- Joe é também um conceituado membro do Hillside Group, o grupo que impulsiona o tópico de padrões na comunidade de software.
 - <http://hillside.net>

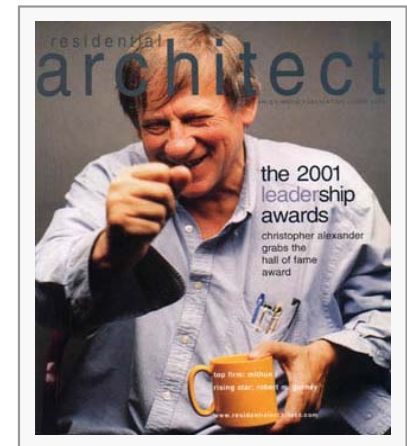


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Sobre “Patterns”

Cristopher Alexander

- A noção de “padrões” tem as suas origens no trabalho do arquitecto Cristopher Alexander.
- Durante 10 anos, Alexander recolheu e documentou soluções genéricas para problemas recorrentes no domínio da arquitectura.
- O objectivo inicial foi o de habilitar não-especialistas a projectar as suas próprias casas e comunidades.
- O resultado deste trabalho originou vários livros:
 - “A Pattern Language”
 - “The Timeless Way of Building”
 - “The Oregon Experiment”
 - ...
 - “The Nature of Order”, vol. I, II, III, IV.
- Ver mais em <http://c2.com/cgi/wiki?ChristopherAlexander>



“A Pattern Language” [Alexander77]

- 253 padrões
 - O livro apresenta os padrões de Alexander, i.e., descrições textuais de soluções para problemas recorrentes em arquitectura civil.
- Padrão de Alexander

“Each pattern describes a problem that occur over and over again in our environment and then describes the core of the solution to that problem in such a way that you can use this solution a million times over without ever doing it the same way twice” [Alexander77, p. x]
- Definição
 - Os padrões são uma descrição *textual* de uma *solução genérica* para um *problema recorrente* num determinado *contexto*.

“A Pattern Language” ...

- “the quality without a name” (QWAN)
 - O objectivo de Alexander neste trabalho de pesquisa de padrões, consistiu em identificar o que distingue uma construção com ‘qualidade’ de uma outra.
 - Segundo Alexander, as agradáveis sensações que uma construção nos transmite de liberdade, conforto, harmonia e vida são tudo reflexos da presença ou não desta multifacetada ‘qualidade’.
 - A linguagem de padrões que documentou em livro auxilia na detecção dos elementos que contribuem para o aparecimento ou ausência desta ‘qualidade’, referida por TQWAN.

“A Pattern Language”: exemplos

- 253 padrões: apresentados do global para o particular
 - Em “A Pattern Language” são descritos 253 padrões, interrelacionados, que variam no nível de detalhe, sendo a sua apresentação iniciada pelos padrões de nível mais global e seguindo depois para os de nível mais particular.
- Alguns exemplos destes 253 padrões:
 - 1. Independent Regions
 - 2. The Distribution of Towns
 - 16. Web of Public Transportation
 - 83. Master and Apprentices
 - 134. Zen View
 - 251. Different Chairs
 - 253. Things from your life

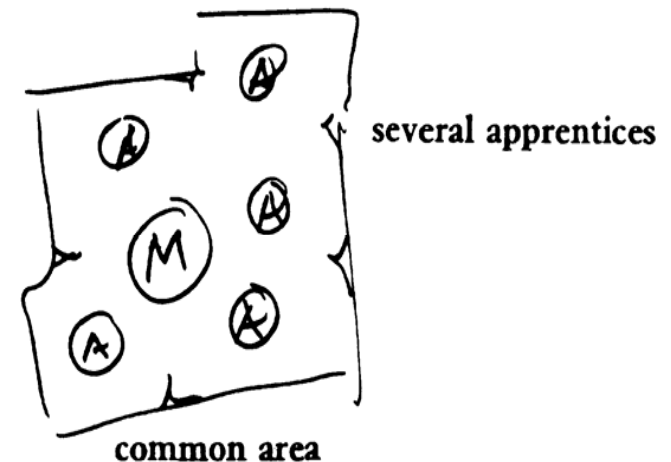
“83. Master and Apprentices”

- Problema

“The fundamental learning situation is one in which a person learns by helping someone who really knows what he is doing.” [Alexander77, p. 413]

- Solução

“Arrange the work in every workgroup, industry, and office, in such a way that work and learning go forward hand in hand. Treat every piece of work as an opportunity for learning. To this end, organize work around a tradition of masters and apprentices: and support this form of social organization with a division of the workspace into spacial clusters - one for each master and his apprentices - where they can work and meet together.” [Alexander77, p. 1159]





“Patterns for the Doctoral Student”

- Joseph Bergin
Pace University
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<http://csis.pace.edu/~bergin>

Context

- You are considering a Doctoral level degree or are engaged in one.
- You have many sub goals, but one overriding goal:
 - completing the doctorate and getting on with your life.
- How should you proceed?

A Note on the Form

- The patterns all follow a common form:
 - Name of the pattern
 - Context
 - Problem (in **bold**)
 - Solution (Therefore...)
 - Additional comments

Patterns

▪ Prepare yourself

- Investigate and apply to several programs
- Join the highest quality program that will take you
- Have passion for the program to avoid burnout
- Avoid complications in your life
- Know the requirements

▪ Commit yourself

- Set a time goal and a path to it
- Take (only) courses that get you to the research frontier and get you through the exams

▪ Learn, learn, learn

- **Read, Read, Read**
- Drop everything to pass the preliminary exams
- Ask Questions (research starts with unanswered questions)
- Seek insight rather than details

▪ Advisors

- Find a compatible advisor
- Find a well known and respected advisor
- Find an advisor who knows how to manage a dissertation

▪ Start

- Find a solvable problem (or three) that interests you
- So What?
- Always be able to simply state the essence of your research
- Always maintain a sustained effort even if each step is tiny
- (Computer Science only) The code is not the dissertation.
- If your research is quantitative make sure that you can live with either a Yes or No answer for a result.
- If your research is qualitative make sure your conclusions are well supported by the evidence.
- You are the expert. (Not your advisor)
- Your dissertation is your first piece of research, not your last or best
- Consider the social impact of your research
- Make sure you have a solid research plan before you begin
- Follow the advice of your advisor (and committee)
- Rewrite
- Write up brief summaries of auxiliary questions that arise for later projects

▪ Finish

- Get solid letters of recommendation
- Review your letters of recommendation or have someone you trust do so
- Prepare a paper (distilled from the dissertation research) as you finalize the manuscript
- Publish your dissertation



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o meu caminho...

- (pattern sequence)

Have passion for the program to avoid burnout

- You are about to make a final decision about really doing this.
- Doctoral programs are hard. Burnout is frequent. Sacrifices are many.
- Those who succeed best are those who are compelled in some way to do this.
- **Therefore, have passion for the program you choose.** This passion will need to carry you over rough spots. You will need it to justify the sacrifices you will inevitably make.



Avoid complications in your life

- You are in a doctoral program or about to begin.
- Every major change in your life will postpone your degree completion.
- You have a life to live, but the degree must be a commitment of major proportions if you are to be successful.
- Therefore, avoid other complications in your life. Postpone major life decisions until you finish your degree.



Know the requirements

- You are about to begin the program or have begun.
- The requirements of the program are usually rigid and sometimes change.
- The requirements are set by others. The institution and department set some. Your advisor and committee will set others.
- Therefore, know the requirements and adapt to changes in them.



Set a time goal and a path to it

- You have chosen a program and know its requirements.
- You need to have a realistic expectation of when you should complete your degree.
- Setting a definite goal is the best means of achieving it. Since it is a big goal, you need a time scale with sub goals.
- Therefore, set a time goal and choose a path to it with critical points along the path marked.



Read, Read, Read

- Your degree is progressing.
- To do well in a dissertation you need to go deep, but you need enough breadth to know how your research relates to the rest of the field and to the rest of human knowledge.
- Courses give you one perspective. But there are many others. Text books are another perspective, but not completely adequate. What is written in text books generally does not have the flavor of research. You will need a variety of perspectives to do well at this.
- Therefore, read everything relevant to your research. Read for both depth and breadth.



Ask Questions (research starts with unanswered questions)

- You are taking a course or doing some reading for your degree.
- A dissertation answers some important unanswered question. Without the question there can be no answer.
- Questions are everywhere. There is more that is not known than there is that is known. Every paper you read had left some questions unanswered. Generalizations are possible. Specializations are possible. Similar questions in related fields are possible.
- Therefore, ask questions whenever you read. Write these questions in a notebook with an appropriate reference.



Seek insight rather than details

- You are reading or taking a course. There is a lot of detail in what you are reviewing.
- It is easier to derive the details from the big picture than is true of the reverse
- Often you are taught the details. Insight can be difficult to achieve.
- Therefore, seek the key insights in what you are studying. Ask about the big ideas if you can. Derive them if you can.



Find a solvable problem (or three) that interests you

- You have been asking many questions and answering a few of them. You need to choose a problem to solve as the basis of your dissertation.
- You want a problem that is interesting to you and doable, but not too easy.
- Good problems are hard to find. You may need to work on more than one before you find the one that works. If it is too easy, no one will think you are ready to graduate. If it is too hard you won't be able to solve it at all or at least do so in reasonable time.
- Therefore, choose one or more problems that interest you and seem to be possible to solve in a few months. If it takes you five months to solve the crux of your problem, it will probably take you a year to gather the evidence for your solution and to present it suitably. This is probably about the right scale.



So What?

- You are developing your research.
- You will be asked to explain your research by many people, some of whom can affect your future.
- Some research is very esoteric, but it is still related to the rest of human knowledge.
- **Therefore, know the meaning of your research.** Why is it important to know the answer to this question? Be able to state the relevance in a few sentences at most.



Always be able to simply state the essence of your research

- You are developing your research.
- You want your research to be tightly focused.
- You will often be asked to explain it.
- Therefore, be sure you can state the essence of your research in a few sentences at most.



Always maintain a sustained effort even if each step is tiny

- You are engaged in your research. The road is long and sometimes hard. Many things get in the way of your success.
- You need to keep advancing toward your goal.
- Continuous progress is hard, but small steps can be taken when large ones are elusive. You have a plan and a schedule, of course.
- Therefore, always make progress even if it is very small progress.



(Computer Science only) The code is not the dissertation.

- You are doing a dissertation in computer science. You are writing code as the basis of your research.
- If you build code it will feel important to you, but it is not.
- Computer scientists build things, but only to understand underlying principles and to advance the state of the art.
- Therefore, remember that your dissertation is what you learn from the code, not the code itself.



Your dissertation is your first piece of research, not your last or best

- You are developing your dissertation and wonder how much to put into it.
- The dissertation is meant to prove your worth as a researcher, not to catapult you to the top of the profession.
- If it is too good it will take you too long. It needs to teach you research methodology and build a bit of mental muscle, but it is only your first step in a long research career.
- Therefore, don't try to solve all the world's problems (or even all your discipline's problems) in your thesis.



Consider the social impact of your research

- You are developing your research
- Your research results may affect many people. It may advantage some and disadvantage others.
- Communication systems and information systems empower people only if they can take advantage of them and only if they are not used by others to disadvantage them.
- Therefore, consider the social impact of what you do. Do No Harm.



Make sure you have a solid research plan before you begin

- You are about to start your research.
- Your research needs to be focused on a specific question and must use a specific methodology.
- Sometimes you don't know enough to do this. Sometimes you need to conduct a pilot project, but this needs to have the same characteristics. But being smaller, it takes less time, so if you fail you lose less.
- Therefore, write down your research plan. Include every step you will perform. If your research is quantitative (statistical) this has a formal meaning that includes what questions will be asked and what statistical tests will be run and what confidence levels will be used. Do not compromise this.



Follow the advice of your advisor (and committee)

- You are conducting your research and have a committee.
- Your committee may have specific ideas about what you should do. These may differ from your own ideas. The same may be true of your advisor.
- You are the expert, but your advisor and committee may have something valuable to contribute. In any case, they will have the last say in when you are finished.
- Therefore, don't disagree too much with your advisor or committee.



Rewrite

- You are writing your dissertation.
- Writing is hard. Writing about technical topics is harder.
- You will need to please your advisor and your committee. They will ask for several re writes of (at least) sections not clear to them.
- Therefore, plan on rewriting your dissertation several times before it is accepted.



Write up brief summaries of auxiliary questions that arise for later projects

- You are doing your research and writing it up. Other questions occur to you along the way
- You want to form the basis of a solid research career.
- You don't have time to answer all these questions now, but you will in the future. The more unanswered questions you have, the more prolific you can be.
- Therefore, write up brief summaries of questions that occur along the way, with pointers to relevant papers that you come across.



Prepare a paper (distilled from the dissertation research) as you finalize the manuscript

- You are doing one of the final rewrites of the dissertation.
- You will want a publication soon after completing your degree.
- Research is only useful if it is published. In many fields your reputation is determined by what you publish.
- Therefore, abstract one or two key parts of your research into a paper that can be published in the scholarly press.



Publish your dissertation

- You are done.
- Research is only useful if it is published. In many fields your reputation is determined by what you publish. You have an important work here.
- Therefore, find a publisher for your dissertation.



Congratulations

- Congratulations on finishing your degree and good luck to you in your career. Don't forget that you have been building up several debts over the last few years, to your family and others. Don't forget to repay them.





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Questões



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FIM

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