The Only Constant Is Change

14 Lessons from a 25-Year SRE Career

Andrew Ryan
Production Engineer

SRECon Asia
June 2023

Meta

25 years ago...

[LISA'98]

December 6-11, 1998

12th Systems Administration Conference

Marriott Copley Place Hotel, Boston, Massachusetts

Registration
Program at-a-Glance
Program Committee
Tutorials at-a-Glance
- Overview & CEUs
- Tutorial Instructors

Advanced Topics Workshop
Global LISA Workshop
Keynote Address
Technical Sessions
- Wednesday, Dec 9
- Thursday, Dec 10
- Friday, Dec 11

Important Dates to Remember

Pre-Registration Deadline *Friday, October 30, 1998*

Hotel Discount Deadline *Monday, November 16, 1998*

Program at-a-Glance Registration

An Invitation from the Program Chairs

"Learn to take advantage of the unique and innovative methods that sysadmins from around the world are using to manage their large scale systems."

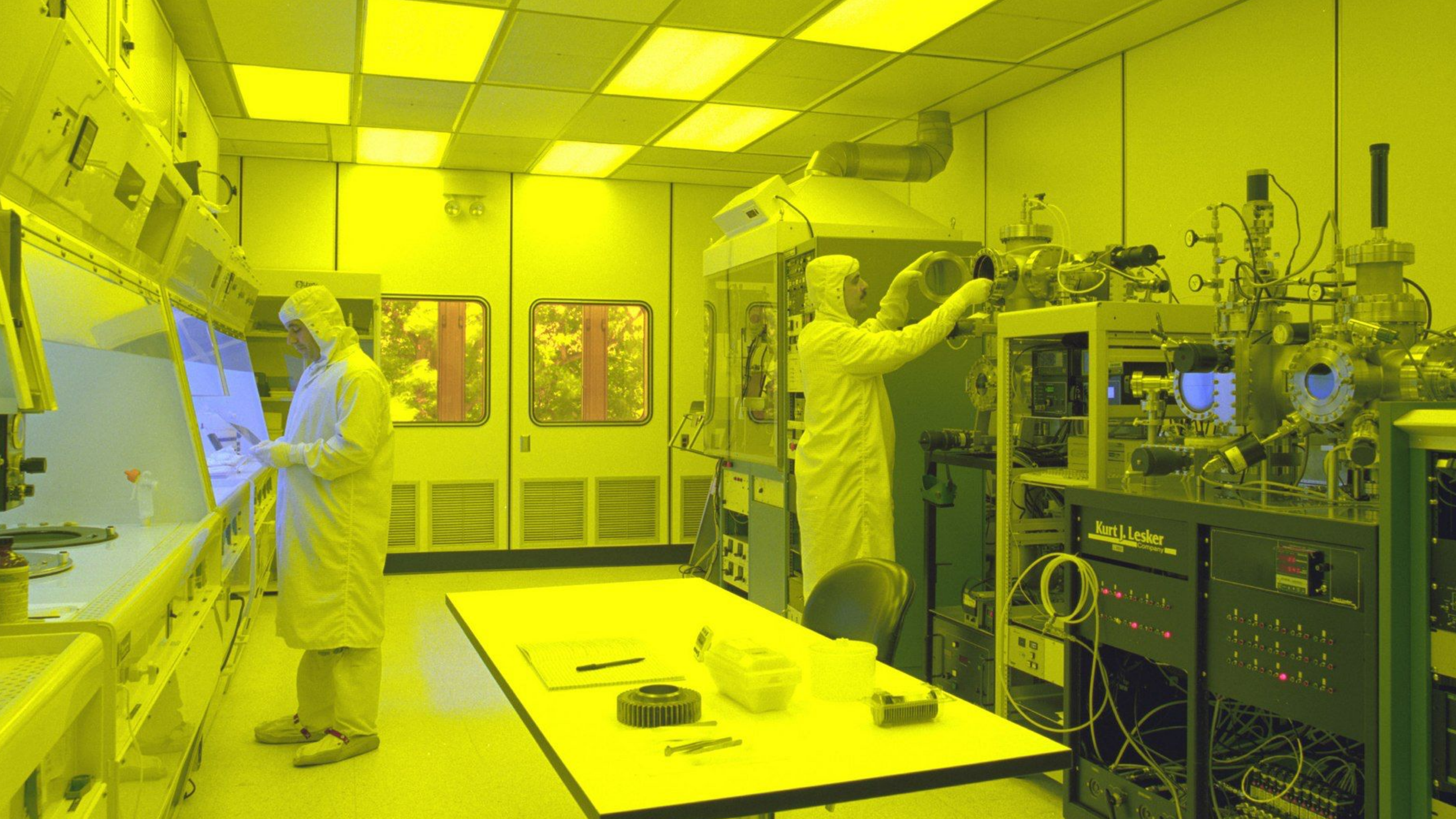
Source: https://www.usenix.org/legacy/publications/library/proceedings/lisa98/brochure/index.html

20 years ago…
SRE was born

The “SRE Bible”:
Site Reliability Engineering: How Google Runs Production Systems

by Beyer, Jones, Petoff, Murphy

Published by O’Reilly Books, 2016


Kurt J. Lesker
Company

Lesson 1

The best SRE’s often come from non-traditional* backgrounds. Learn how to leverage yours.

* “Traditional” meaning a background in computer science or software engineering

Lesson 2

When you get offered a seat on a rocketship, take it

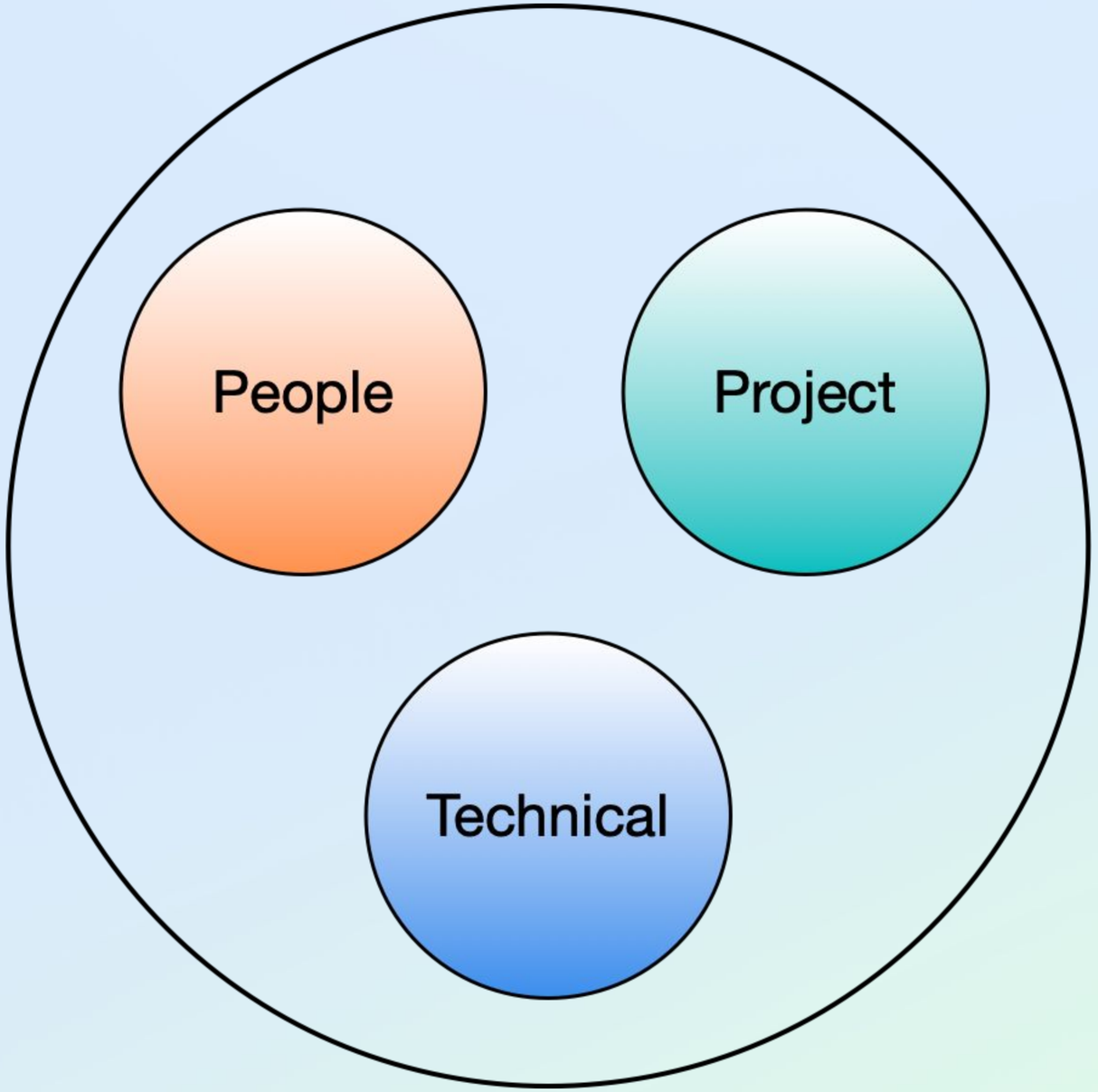
Lesson 3

When no one’s an expert, you can be an expert

Lesson 4

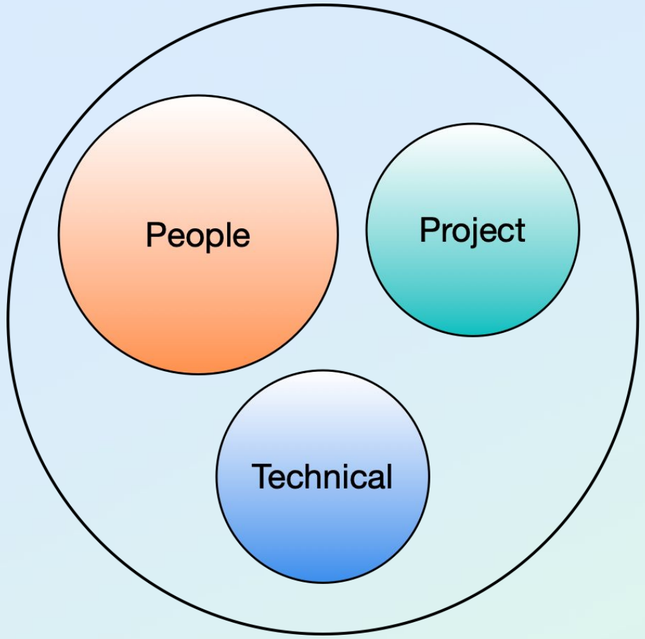
Your moat of expertise isn’t as deep or wide as you think it is

The “25-year skills” for an SRE



Lesson 5

Every SRE uniquely combines the three skill areas of People, Project and Technical. You need to be the best “you” that you can.



Me! With a larger “People” circle

25-year People skills for SRE

1. Cooperating: Can you get along with other people?
2. Managing/Influencing: Can you get groups of people to work together?
3. Mentoring: Can you teach people how to do what you do?

Lesson 6

Always have mentors, and always try to find people to mentor

🎯 Targeted mentorship 🎯

Getting the most out of mentoring

1. **Visualizing the future**
   How did <*mentor*> get where they are in their career? Can I do that too?
2. **Avoiding known pitfalls**
   What could I learn about my <*upcoming thing*> from <*mentor*> who has done something similar?
3. **Learning a thing**
   How is <*mentor*> so good at <*thing I would like to be good at*> and can they teach me?

25-year Project skills for SRE

1. Project planning: Figure out how to do the thing
2. Risk assessment: What could go wrong?
3. Project management: Actually do the thing
4. Incident management: What happens when things go wrong

Incident management resources: https://sre.xyz

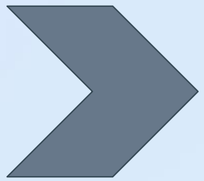
Lesson 7

Project and incident management skills allow SRE’s to turn “past mistakes” into “future successes”

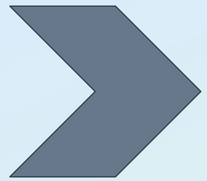
25-year Technical skills for SRE

1. Programming: Interfacing with the computers around us

- C
- perl
- Bourne Shell
- awk/sed



- PHP
- Python
- Java
- Go
- C++



- Rust
- Hack
- ?

Lesson 8

Over the course of your career you should expect to:

1. Master at least 2-3 programming languages
2. Become conversant in a new programming language every few years

25-year Technical skills for SRE

1. Programming: Interfacing with the computers around us
2. Troubleshooting: Finding and fixing broken things

🙀 under pressure 🙀

Single machine troubleshooting

The USE Method

Systems Performance, Enterprise and the Cloud, 2nd Edition

Brendan Gregg,

Published by Addison Wesley, 2020

Distributed system troubleshooting

Foundational concepts include:

- Thundering herds
- Cascading failures
- Queue overloads
- Tail latencies
- Load balancing
- Load shedding
- Jitter
- … and many more!

Sociotechnical troubleshooting

- How can we release new versions of our software to our cluster without causing downtime?
- How can we safely launch a new feature to production?
- What is the best way to make our service resistant to outages from our cloud provider?

Lesson 9

Master troubleshooting, under pressure, at least one of:

1. Single machine
2. Distributed systems
3. Sociotechnical systems

Grace under pressure =

Study +
Practice without pressure +
Shadow with pressure +
“Fly solo” with pressure

25-year Technical skills for SRE

1. Programming: Interfacing with the computers around us
2. Troubleshooting: Finding and fixing broken things under pressure
3. Providing the “Missing Manual”

What are the optimal config settings for this brand new hardware accelerator?

How do I scale past previous known limits?

Lesson 10

Provide the “Missing Manuals”

How do I launch this code production on a tiny budget in just a few weeks?

How do I operate this proprietary internal service?

25-year Technical skills for SRE

1. Programming: Interfacing with the computers around us
2. Troubleshooting: Finding and fixing broken things under pressure
3. Providing the “Missing Manual”
4. Know how and when to use duct tape

Duct tape example 1: Drop filesystem caches

```
5 * * * * echo 1 > /proc/sys/vm/drop_caches
```

Duct tape example 1a: “stfu” in Linux kernel on cache drop 🤣

```
if (write) {
        static int stfu;

        if (sysctl_drop_caches & 1) {
                iterate_supers(drop_pagecache_sb, NULL);
                count_vm_event(DROP_PAGECACHE);
        }
        if (sysctl_drop_caches & 2) {
                drop_slab();
                count_vm_event(DROP_SLAB);
        }
        if (!stfu) {
                pr_info("%s (%d): drop_caches: %d\n",
                        current->comm, task_pid_nr(current),
                        sysctl_drop_caches);
        }
        stfu |= sysctl_drop_caches & 4;
}
return 0;
```

https://git.kernel.org/pub/scm/linux/kernel/git/torvalds/linux.git/tree/fs/drop_caches.c

Duct tape example 2:
Disable GC ; restart the server instead

Dismissing Python Garbage Collection at Instagram

Instagram Engineering · Follow
Published in Instagram Engineering · 8 min read · Jan 17, 2017

1.8K 13

By dismissing the Python garbage collection (GC) mechanism, which reclaims memory by collecting and freeing unused data, Instagram can run 10% more efficiently. Yes, you heard it right! By disabling GC, we can reduce the memory footprint and improve the CPU LLC cache hit ratio. If you're interested in knowing why, buckle up!

https://instagram-engineering.com/dismissing-python-garbage-collection-at-instagram-4dca40b29172

Lesson 11

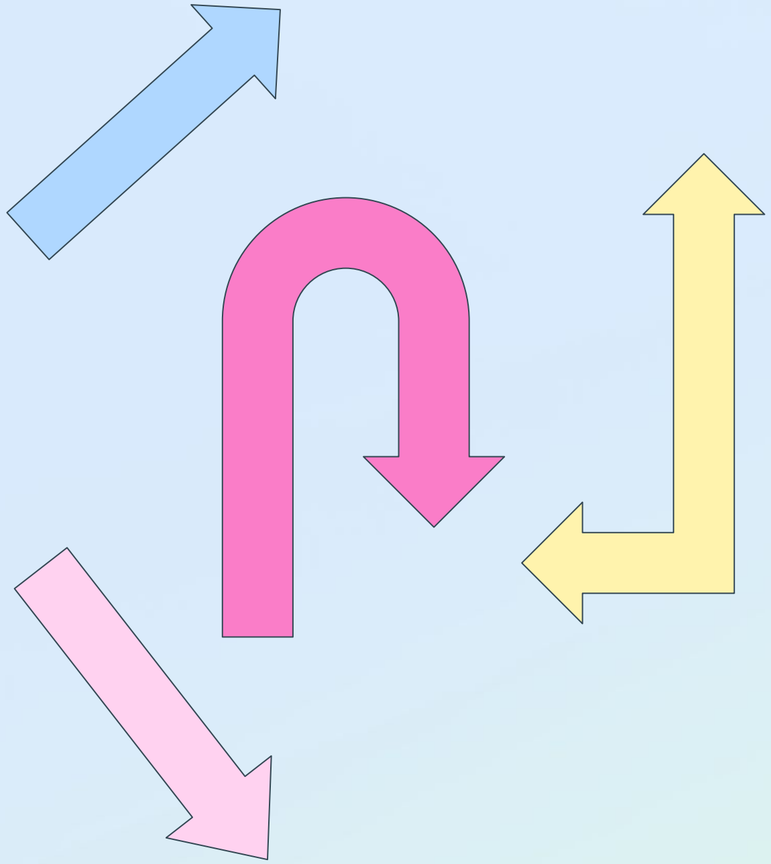
Know how, and when, to use duct tape

Lesson 1

The best SRE’s often come from non-traditional* backgrounds. Learn how to leverage yours

* “Traditional” meaning a background in computer science or software engineering

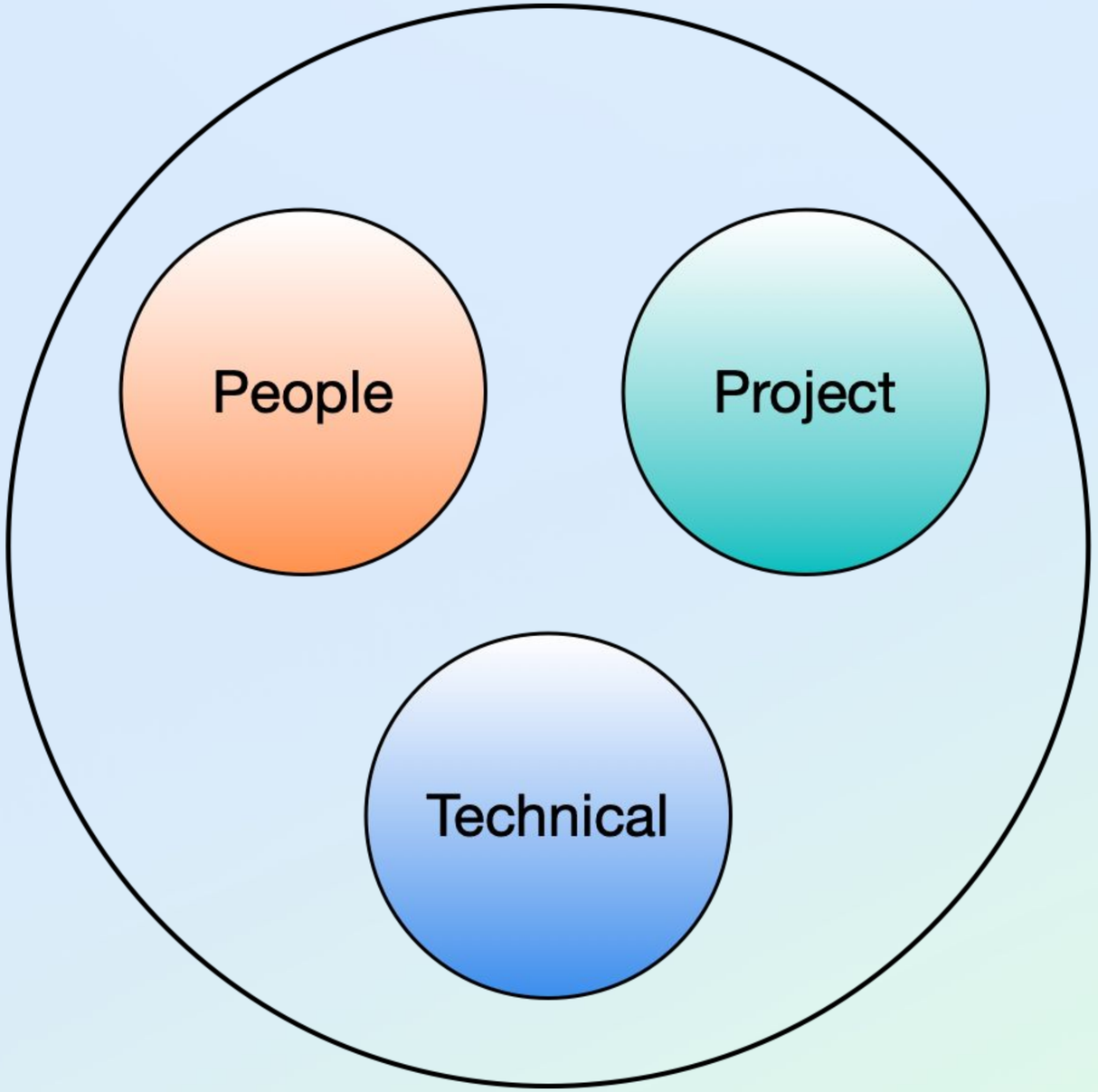
Career Directions For SRE’s



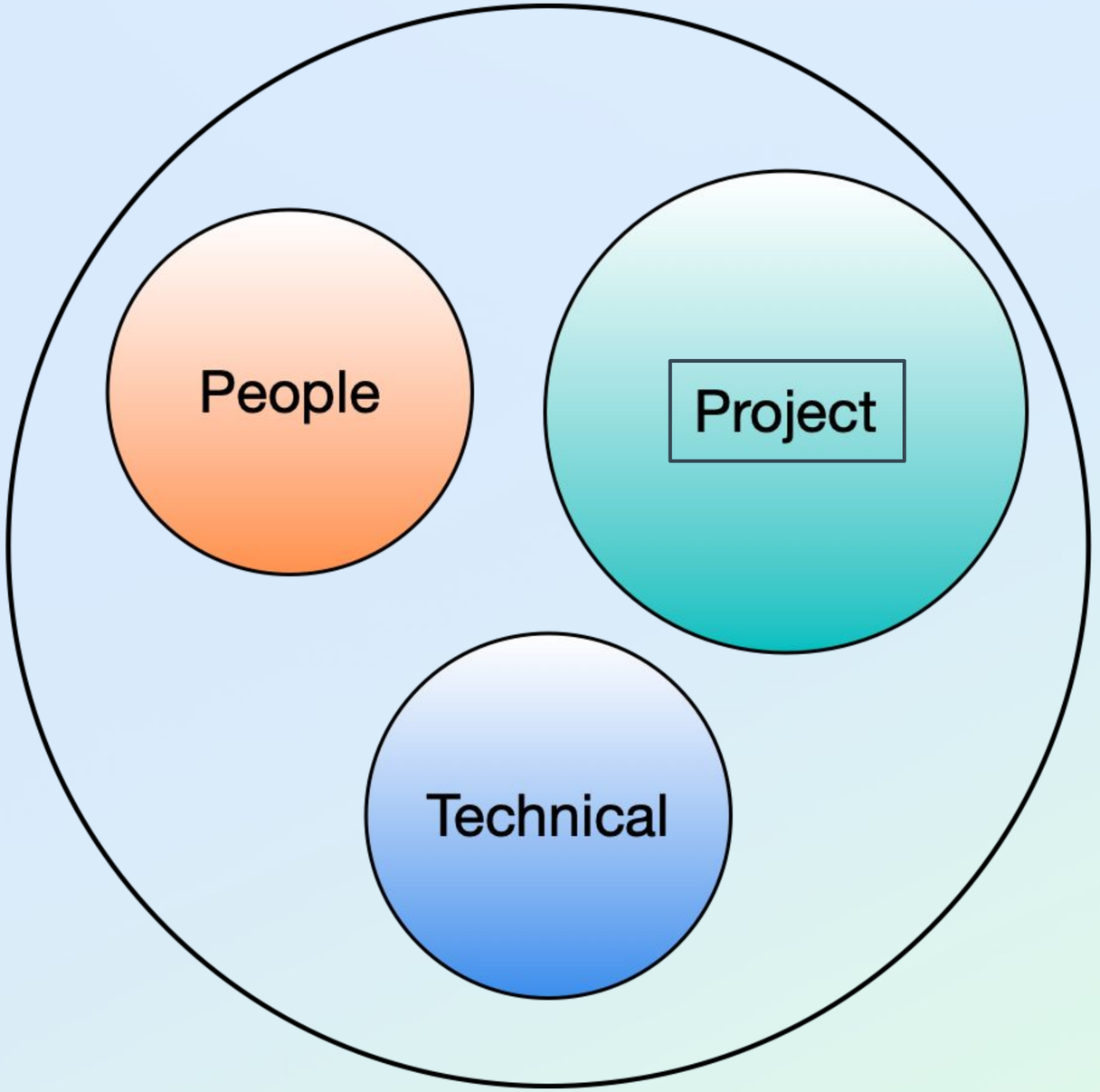
Lesson 12

You will have many jobs in your life, and you may not always be an SRE

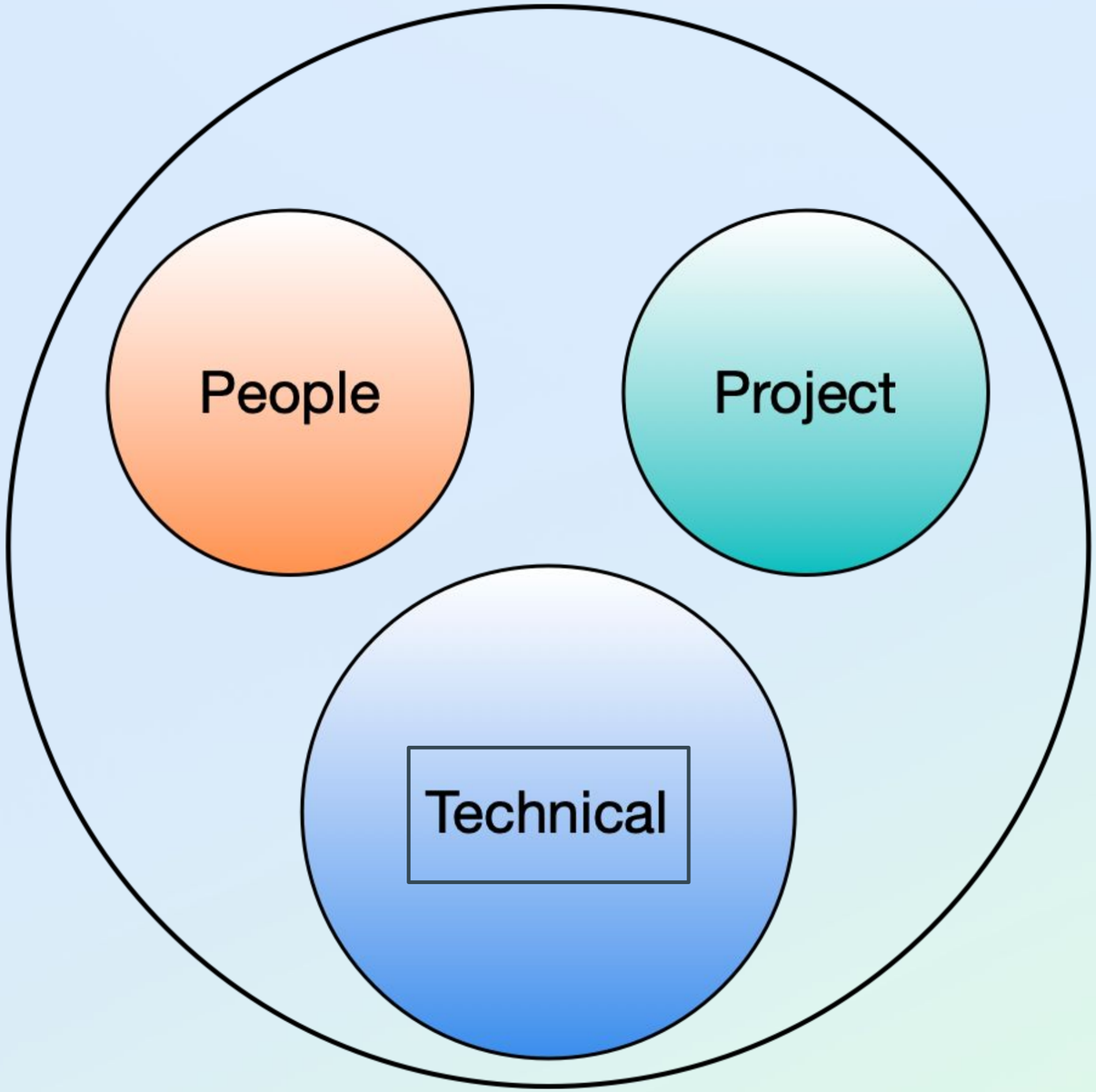
The “25-year skills” for an SRE



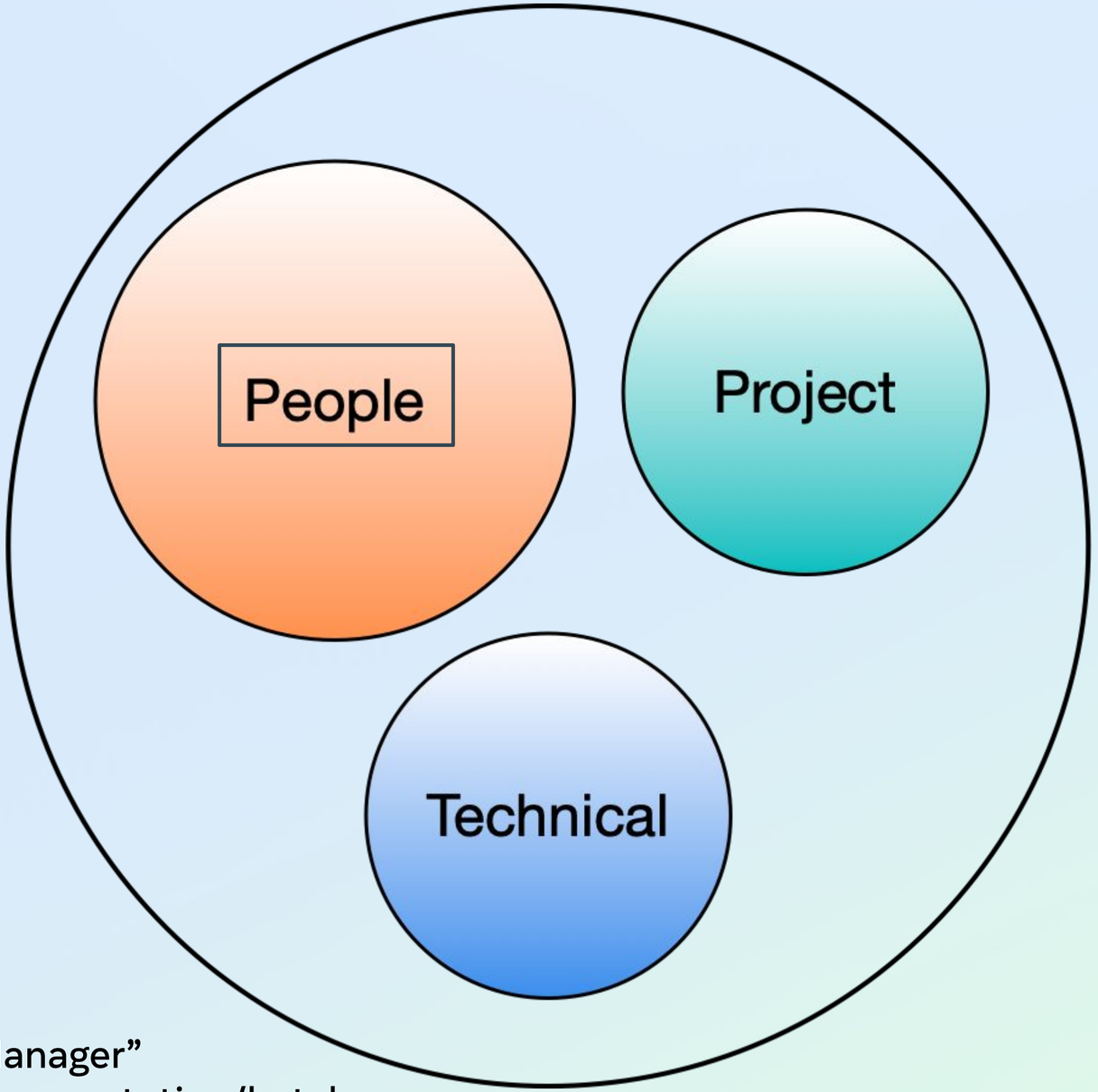
Project Manager



Software Engineer

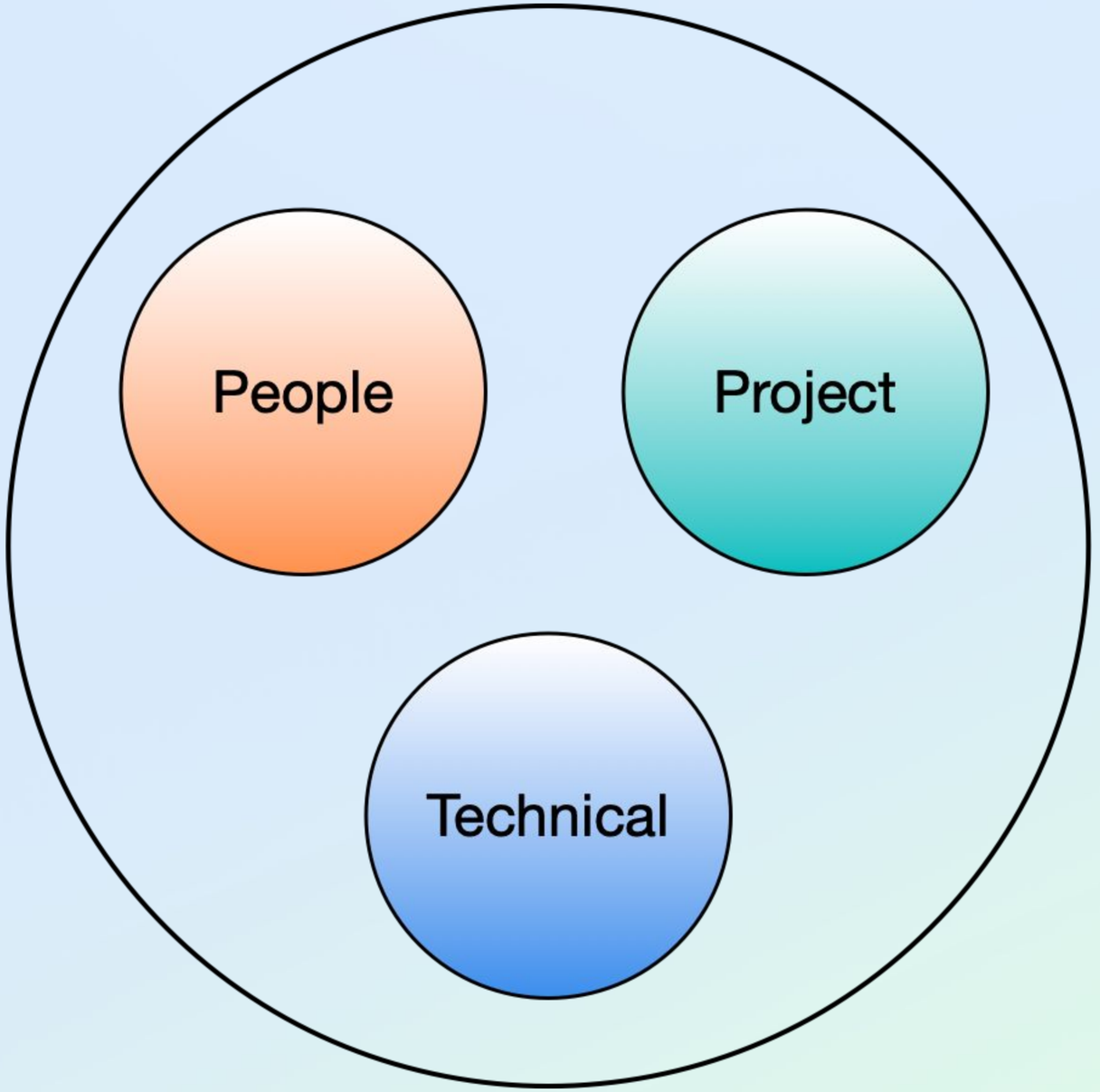


People Manager



Recommended: Andrew Hatch “Confesions of an SRE Manager”
https://www.usenix.org/conference/srecon23americas/presentation/hatch

Tech Lead



Recommended: https://staffeng.com

Lesson 13

Career changes to/from SRE are not “one way doors”

SRE in 2043?

- Will SRE still exist in 20 years?
- Will AI take all our jobs?
- How can I “future proof” my career?

Will AI take all the SRE jobs?

No…

“AI-resistant” job paths

1. Coordinating people
2. AI Values & Safety
3. Technology

SRE Opportunity in AI

Lesson 3

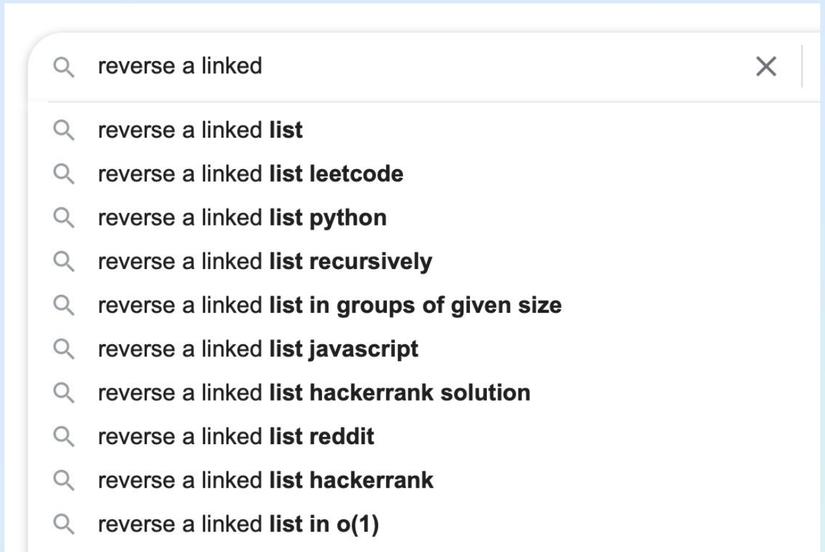
When no one’s an expert, you can be an expert

Lesson 14

AI is not a fad: learn to use AI-based tools and technology or risk being left behind

The C Programming Language (aka “K&R”)

Kernighan & Richie
Published by Prentice Hall, 1988




```
> CodeBot, write a program in ANSI C to reverse a linked list in O(1)
```

Thank you!

Questions?

Meta