Curtis Tuckey

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I specialize in creating new technologies and putting together crack software and hardware development teams.

I have 20+ years of experience as a software development manager and director (Motorola, Oracle) in emerging technologies (internet, mobility, speech, collaboration, cloud). I am a researcher (University of Wisconsin and Bell Labs) and a teacher (Loyola, DePaul, and Northwestern) and, in general, a problem solver. I have co-written 7 U.S. patents. I have a PhD in mathematics and a bachelor's degree in physics. I'm a capable programmer in many languages. I communicate comfortably, accurately, and well, and I am an award-winning technical-expository writer.

I believe that lean, agile teams—carefully chosen, appropriately equipped, and intellectually prepared—can do significantly better work—more quickly and with higher overall quality—than massive teams of even very capable workers. In small teams and in start-ups, everybody must be hands-on, everywhere. I know what it's like and I thrive in that sort of environment. I know very many, very smart people, and over the years I have studied under, worked with, and hired many of the best of them.

I believe in using science, not mere instinct, and evidence, not mere conviction, to deliver reliable, maintainable, scalable, and verifiable solutions to difficult problems in science, technology, business, and the public sphere.

See my LinkedIn profile and Google Scholar citations.

INDUSTRIAL RESEARCH AND DEVELOPMENT EXPERIENCE

Impossible Problems Force, *Principal* (2018–)

- I lead recombinant teams of professional engineers and students in short- to medium-term consulting projects involving full-stack web/cloud development, telecommunications, speech technologies, data analytics, artificial intelligence, and machine learning.

Oracle Corporation, *Director of Software Development* (2000–2018)

- **Oracle Cloud Infrastructure.** I led the development of the Oracle Cloud Message Service, a communications backbone that connects internet-based applications, and the Oracle Telemetry Service, which mediates between Oracle Cloud Storage and a full-stack open-source search and analytics platform (ELK).
- **Oracle Unified Communications.** I led the design, development, integration, test, release, and wide deployment of the multimedia components of tightly integrated multimedia collaboration and communications services within Oracle Collaboration Suite and its successor, Oracle Beehive**.**
- **Oracle Voice Laboratory.** I founded Oracle's first product-development group in Chicago, the Oracle Voice Laboratory. I recruited and led a staff of twenty engineers and designers building a speech-controlled voice portal for Oracle Mobile. I later identified a voice start-up (Indicast) for acquisition, assisted with corporate due diligence, and after its acquisition by Oracle, I led the new development team in San Diego.

Motorola, *Engineering Manager* (1998–2000)

- **Internet & Connectivity Services Division.** I recruited, led, and worked side-by-side with a group of fifteen software developers and engineers building consumer applications for small-screen devices and ordinary phones using speech and mobile technologies. I also wrote an important patent on getting information to your mobile device depending on your location, and (with a Sprint engineer) wrote Sprint's first automated location-based service in 1999. The showpiece, for which my team provided most of the applications, was Motorola's voice assistant, Mya. Watch this 60-second TV ad for Mya, which aired during the Academy Awards broadcast, 2000. See also New Motorola Technology Offers Voice Commands for the Internet, WSJ.

AT&T Research (Bell Labs), *Member of Technical Staff* (1991–1998)

- **VoiceXML Co-inventor.** I am one of several co-inventors (with David Ladd, Chris Ramming, and Ken Rehor) of VoiceXML, a W3C standard for specifying interactive media and voice dialogs between humans and computers. I championed the adoption of VoiceXML and its supporting network hardware and software systems broadly, both internally at AT&T and at major conferences, and I taught the technology to beginners in web-programming courses at area universities. I also wrote many demo applications myself, including a corporate voice dialing app and a web-and-phone-based social networking app for my department. See our early paper, Web and Telephone Service Creation, *Bell Labs Technical Journal,* AT&T, 1997. Twenty-five years later, this technology is still in worldwide use. [I would do much more in 2022, given a fresh start with current, state-of-the-art voice technologies.]
- **Database Specification & Analysis.** I co-developed a language for the specification, analysis, and maintenance of large, complex databases. It is deployed within AT&T's Class 5 network switches. See our paper, Generating Update Constraints.

General Motors Corporation, *College Student Intern* (1980-1987)

- **Data Analysis Programming & Research.** I spent five summers in the automotive divisions and in the research division of GM while I was an undergrad and graduate student. My work in statistical control of manufacturing processes, data modeling, and analysis resulted in my first research publication, Finding Small Rotations and Translations in Imperfect Part and Die Models, *Journal of Manufacturing Systems*, 1992. This paper continues to be cited regularly as of 2022, most recently in relation to 3D printing.

ADJUNCT ACTIVITIES AT UNIVERSITIES

- **Loyola University**, Adjunct Professor of Computer Science (1997–)
  I teach courses in internet programming, Python, algorithms, and foundations.
- **Loyola University**, Fellow, Center for Textual Studies and Digital Humanities (2010–2013)
  I investigated the importance of mathematics in the works of Jorge Luis Borges, the Argentine poet.
- **DePaul University**, Adjunct Lecturer, College of Computing and Digital Media (1996–1997)
  I taught master's level courses in algorithms and data structures using C++.
- **Northwestern University**, Adjunct Lecturer, Department of Mathematics (1994)
  I developed and taught a new course in the Knuth-style analysis of computer algorithms.

U.S. PATENTS

- **[8,693,541]** *Multimodal Session Support on Distinct Multichannel Protocols*, with V. Shao and J. Chone
- **[7,016,845]** *Method for Providing Speech Recognition Resolution on an App. Server*, with A. Vora, et al.
- **[6,757,544]** *Method for Determining a Location Relevant to a Communications Device*, with J. Rangarajan.
- **[6,587,822]** *Web-based Platform for Interactive Voice Response*, with M. K. Brown, K. G. Rehor, et al.
- **[6,459,774]** *Structured Voice Mail Messages*, with T. J. Ball, M. Benedikt, P. Mataga, C. Puchol, K. G. Rehor.
- **[6,393,107]** *Method and App. for Creating and Sending Structured Voice Mail Messages*, with T. J. Ball, et al.
- |**6,240,391]** *Method and App. for Assembling and Presenting Structured Voice Mail*, with T. J. Ball, et al.

EDUCATION

- **University of Wisconsin**, Madison, Ph.D. (mathematics)
- **Michigan State University**, East Lansing, B.S. (physics)

The Seven Pillars of Human-centered Engineering Management

I believe that the *human* qualities of a manager (meaning an engineering or product-development manager at any level from beginner to executive) are at least as important as a manager's technical expertise. It is essential to a productive and healthy workplace that a manager's interactions with employees, peers, executives, partners, customers, and others, always be handled with a keen sense of empathy, personal responsibility, and respect. In this one-page document, I shall focus on the **First** of the **Seven Pillars of Human-Centered Engineering Management**, then sketch the other six.

The **First Pillar** of engineering management is a manager's duties to his or her staff in these areas: **recruitment**, **leadership**, **guidance**, **championship**, and **reward**. **Recruit** the best people available who are appropriate for their positions and projects, and ensure that they will enjoy their work and be able to contribute meaningfully. **Lead** them toward important goals. **Guide** them in making *their own* decisions along the way. **Champion** them and their work not only within their teams but to other teams and to other managers, ensuring that their work is seen, used, and appreciated. **Reward** them materially with bonuses and promotions to make this appreciation clear, concrete, and understood. If a manager takes care of these five items, then **morale**, **personal productivity**, and **retention** will take care of themselves.

Collaboration, a component of good leadership, is essential to the success of any project involving more than one person. Team, division, and corporate productivity all rely on healthy, open, and honest collaboration. In group-level collaborations, progress can only ever be made through **influence** and **persuasion**. In cross-corporate collaboration, all the more so. **Productivity**, which is a consequence of good leadership, means much more to engineers than merely completing as many assignments and producing as many artifacts as possible on time and under budget. Engineers by nature desire to *build useful things*. And not useful merely in the sense of *possibly useful* but in the tangible sense of *actually used.* It is a manager's duty to use his or her own judgment – in collaboration with other development, sales, and marketing managers, and in close communication with executives – to ensure that engineering talent not be spent on anything that does not have an excellent potential to be *useful*, *actually used,* and to benefit either the corporation or the industry in general.

The Seven Pillars

- **Staff management.** Recruiting, leading, guiding, championing, and rewarding employees, all while maintaining a team working environment that is vibrant, exciting, productive, efficient, and fun.
- **Engineering.** Designing for use; choosing the appropriate team and tools; building software; reviewing code, testing, and iterating. Working hand in hand with development engineers, managers, executives, and customers. Coordinating with PM, QA, and release teams. Coding side by side with engineers when introducing newcomers to particular patterns and algorithms, or when exigencies of schedule require it (but never to micromanage).
- **Customer Management** and **Sales.** Communicating with current and potential customers about their needs and the company's current and future offerings **with a focus on human-centered design principles**. Working with the internal sales force to develop and promote new products and services, and assisting with technical sales.
- **Technical Communications.** Presenting internally and at conferences, conventions, universities, and to customers. I write and speak comfortably and well, and I have done a great deal of this.
- **Collaboration.** Establishing collaborative relationships not only within the group and with other departments within the company, but also with researchers and engineers at other companies and at universities working toward similar or joint goals.
- **Intellectual Property.** Contributing to applied research and technical publications in the relevant disciplines, with appropriate U.S. patent and other relevant intellectual property protection
- **Standards.** Working with relevant internal and external standards organizations to promote compliance, interoperability, and widespread use.

I learned these Seven Pillars from the best engineering managers I've ever worked with, and I take these lessons to heart in all my engineering and product development projects.

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Key to my Technical Expertise, Competencies, and Interests

I believe in using tools appropriate to the task. This entails mastery of an application domain and sufficient engineering and programming expertise to know which tools ought to be applied, and how. Here are some of the programming languages, tools, and mathematical techniques in which I have expertise, competence, and special interest.

Programming Languages. Java, C++, C, Python, Go, JavaScript, SQL, Ruby, Scala, SML, Haskell, Rust, Perl, Raku, R, S, SAS, AWK, BASIC, Lisp, Fortran.

Java. JDeveloper, EJB/J2EE, Struts, Spring, Sling, Spark, Hibernate, MySQL, JUnit, Javadoc, NetBeans, Eclipse.

Python. NumPy, SciPy, Matplotlib, TensorFlow, Pandas, Scikit-learn, PyTorch, Pyjs.

Web Application Tools. JavaScript, JQuery, jQuery UI, Node.js, React.js, AngularJS, HTML, CSS, REST, SOAP, Django, Flask, Sails.js, Angular, Ajax, JSon, Ruby on Rails, Sling, Perl templates, basic CGI.

Cloud. Oracle Cloud, AWS Cloud, Microsoft Azure, Google Cloud. Kubernetes, Docker, SaaS, PaaS, IaaS, DaaS, cloud messaging and queuing.

Data Analytics. Statistics, neural networks, machine learning, supervised learning, linear and logistic regression, decision trees, support vector machines, recommendation engines. Oracle DBMS, SQL, PL/SQL, database integrity constraints, CAP, and ACID.

Software Engineering. Microservices, SoA, SaaS, PaaS, IaaS, DaaS, modular programming, domain-specific programming languages, separation of concerns, Patterns, modeling, Agile, Scrum, Lean, CI/CD, SDLC. Reliable, maintainable, scalable, and verifiable software production. Human-centered software engineering. Product management, technical documentation, testing.

Unified Communications. Telecom, mobile, voice, email, voicemail, SMS, IM, calendar, workspaces, VoIP, video conferencing, speech recognition, voice recognition, dialog design, video conferencing, WebRTC.

Voice and Telephony. Unified communications, Amazon Alexa, Google Assistant, VoiceXML, SRGS, SISR, JSML, SSML, PLS, SCXML, SAPI, VoIP, SIP, VoIP, RTP.

Search. ELK = Elasticsearch, Logstash, and Kibana.

Learning Management Systems. Blackboard, Sakai, Google Classroom, Thinkific, Kajabi.

Mathematics. Logic and foundations, model theory, set theory, nonstandard analysis, classical analysis, statistics, data analytics, linear algebra, regression analysis, abstract algebra, history of mathematics.

I have been a longtime proponent of special-purpose programming languages and tools in the context of deep knowledge of an application domain, whether it be in science, technology, engineering, mathematics, business, education, or public policy. My modus operandi is to gain firm knowledge of a given domain, to choose an appropriate team and tools, to focus on human-centered design and engineering, and to iterate rapidly, through cooperation, communication, and understanding among all stakeholders, to a solution. If this list looks lengthy, it's because I've solved a lot of different problems.

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