Yanina Ledovaya & Olga Lvova

JET BRAINS

Three words to remember when working with people's motivation and productivity:

autonomy

competence

relatedness to others

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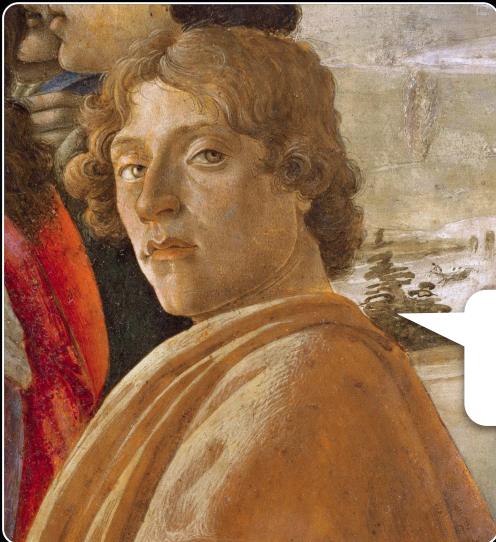
Yanina Ledovaya & Olga Lvova

Three words to remember when working with people's motivation and productivity:

autonomy competence

relatedness to others

It's not three words, it's five

Sandro Botticelli – Self-portrait

We are experts in how people are functioning

Yanina Ledovaya
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Olga Lvova
Developer Experience Research Team Researcher
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Improving productivity is **crucial** for business

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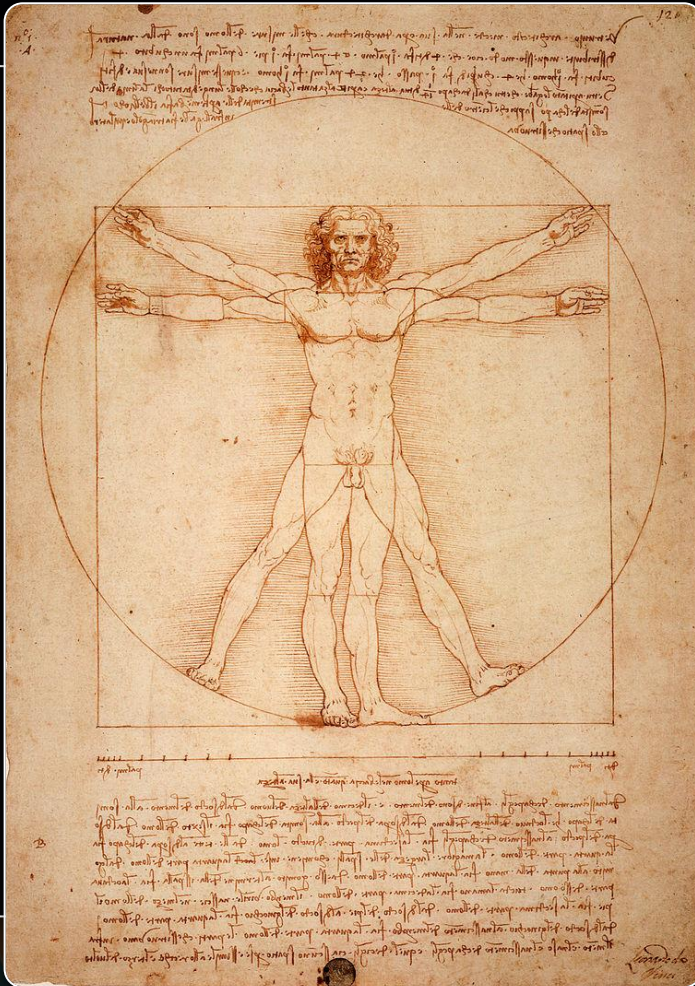**Developer productivity**
is so hard to measure

*Auguste Rodin
– The Thinker*

The idea of a developer as a **human being** is often missing

Pablo Picasso – Accordionist

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Productive humans are **motivated** humans

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What **drives** human **motivation**?

Leonardo da Vinci – The Vitruvian Man

Our plan for today

Theory

Application

AI

Takeaway

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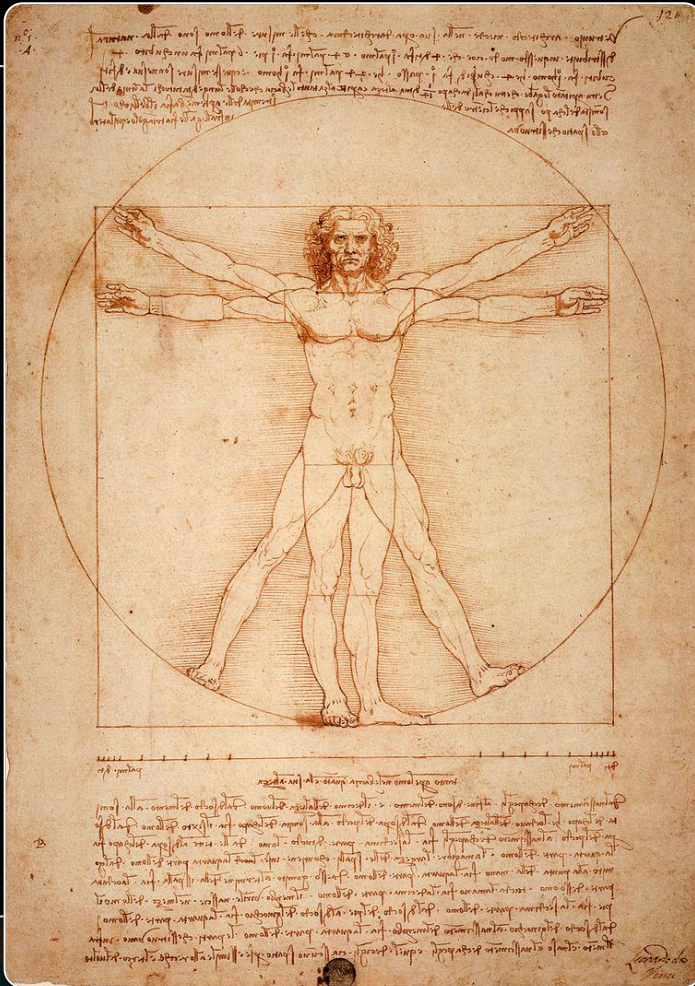
Our plan for today
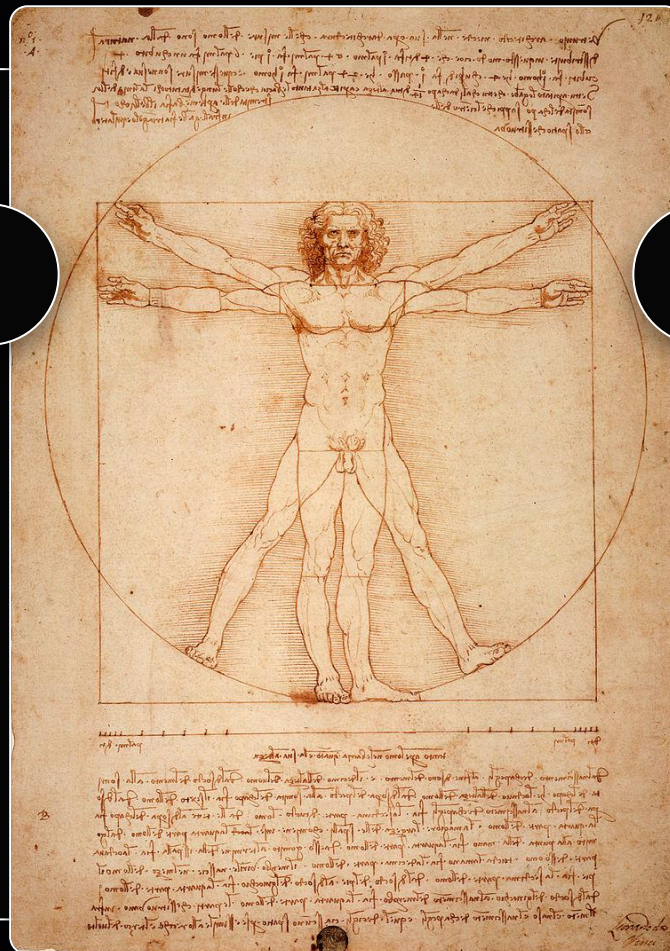
Theory

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Why people
do what they do?

Leonardo da Vinci – The Vitruvian Man

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Extrinsic motivation

Intrinsic motivation

Leonardo da Vinci – The Vitruvian Man

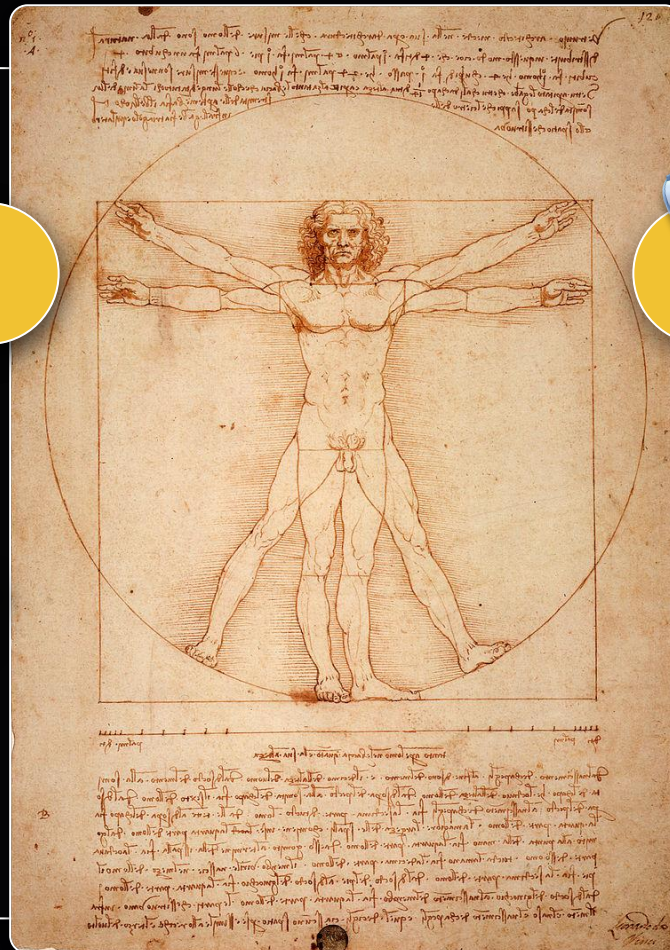DPE SUMMIT

Extrinsic motivation
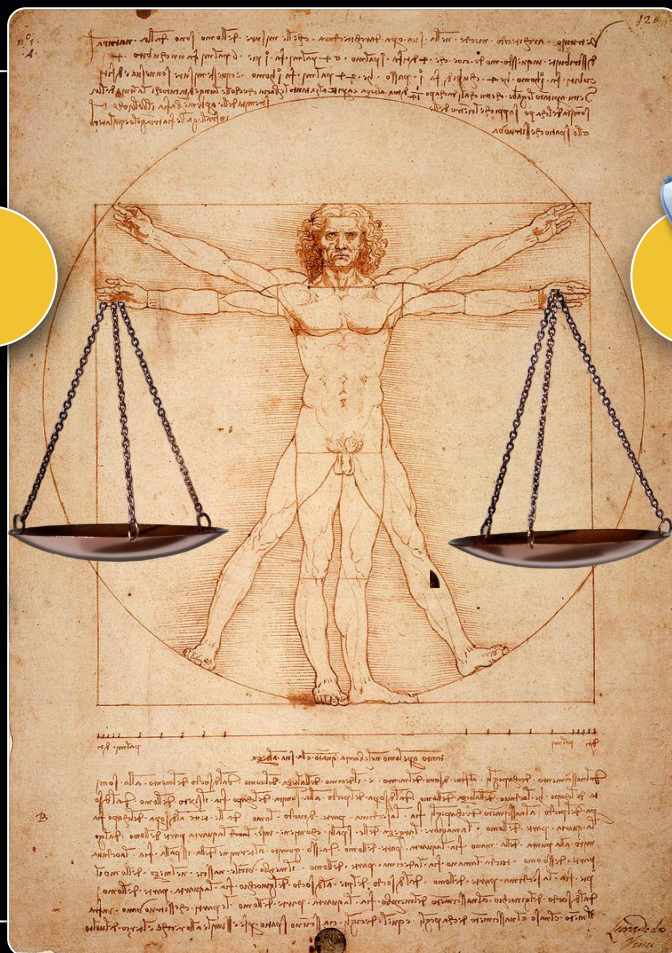
Intrinsic motivation

Leonardo da Vinci – The Vitruvian Man

Extrinsic motivation

Intrinsic motivation

Leonardo da Vinci – The Vitruvian Man

Intrinsic motivation

3 basic
psychological
needs

Deci, Ryan, 1985

1 autonomy

2 competence

3 relatedness to others

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Intrinsic motivation

It is an axiom – all people have basic psychological needs
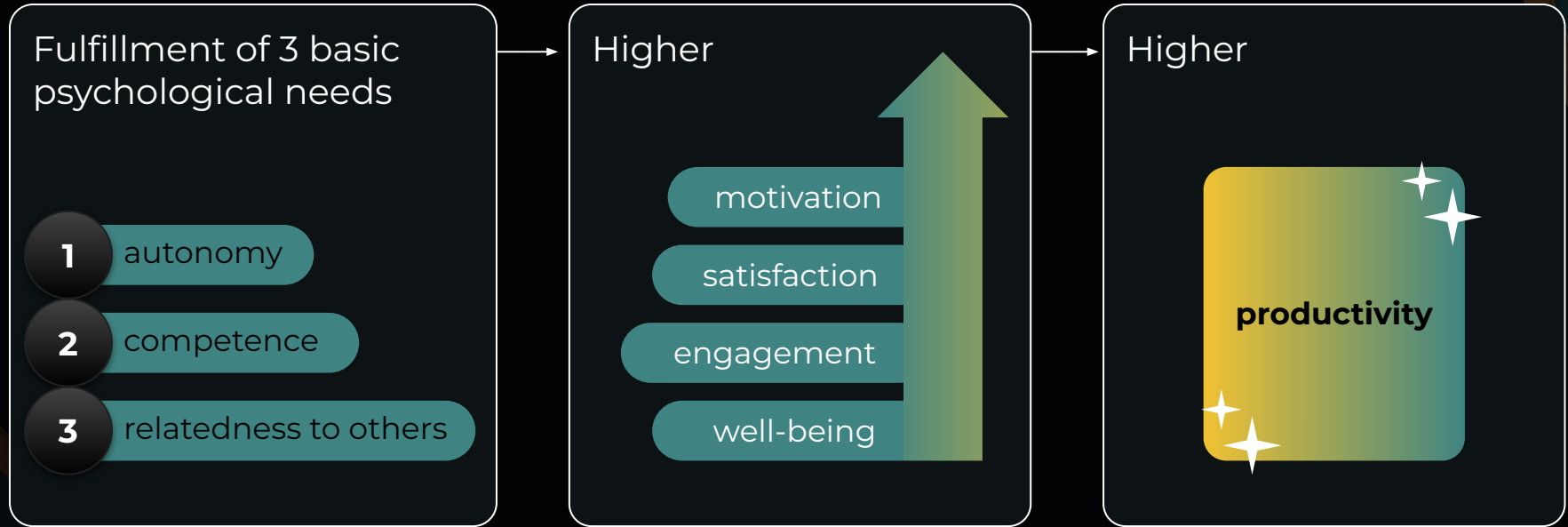
3 basic psychological needs

Deci, Ryan, 1985

1 autonomy

2 competence
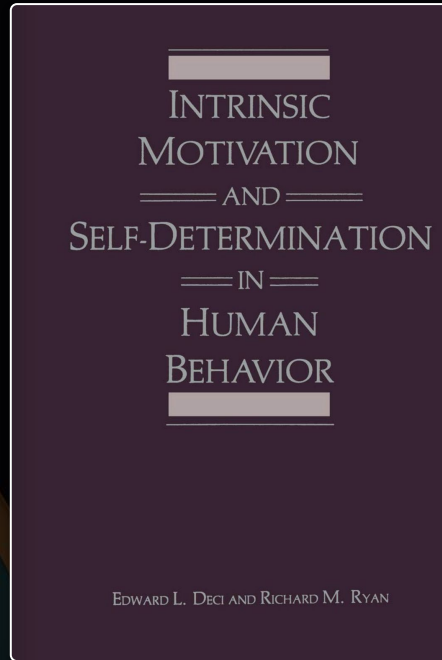
3 relatedness to others

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Fulfillment of 3 basic psychological needs

1. autonomy
2. competence
3. relatedness to others

Higher

motivation

satisfaction

engagement

well-being

Higher

productivity

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Self-Determination Theory (SDT)

1985

Edward L. Deci

Richard M. Ryan

INTRINSIC MOTIVATION AND SELF-DETERMINATION IN HUMAN BEHAVIOR

EDWARD L. DECI AND RICHARD M. RYAN

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Self-Determination Theory (SDT)

1 autonomy

feeling of volition and choice in actions,
feeling that you are an agent of your own behaviour, freedom to experiment

? Do you feel you can be yourself at work?

? Do you feel that your job tasks are in line with what you really want to do?

? Do you feel free to do your job the way you think it could best be done?

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Self-Determination Theory (SDT)

2 competence

feeling that you are effective,
able to achieve goals, develop and demonstrate your knowledge and skills

? Do you feel that you have the skills and resources needed
to perform your job effectively?

? Do you feel that you are able to apply your knowledge and skills
to make meaningful contributions?

? Do you feel that your job tasks and responsibilities
align with your skills and strengths?

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Self-Determination Theory (SDT)

3 relatedness to others

feeling that you are included, seen, needed, appreciated and supported

? Do you feel supported and valued by your colleagues and manager?

? Do you feel like you belong to your team / organization?

? Do you receive feedback or recognition that you are doing a good job?

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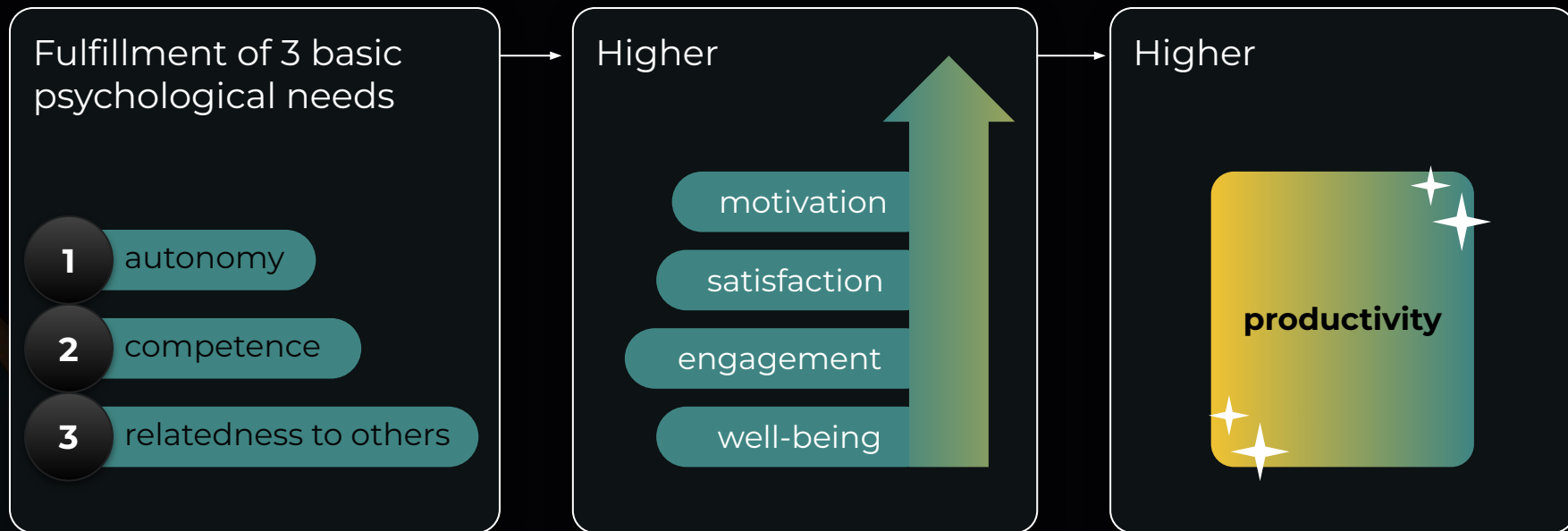Which one is the most important for boosting productivity?

1 autonomy

2 competence

3 relatedness to others
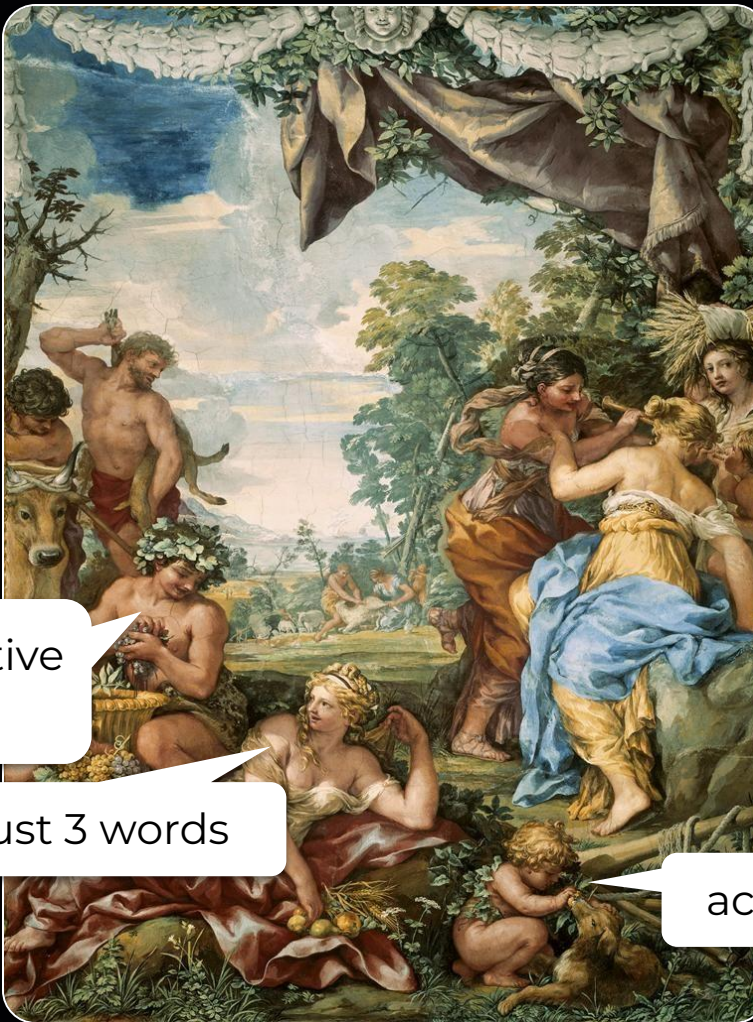
Remember your answer, we'll get back to it later

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Self-Determination Theory (SDT)

Deci, Ryan, 1985

It is an axiom – all people have basic psychological needs

Fulfillment of 3 basic psychological needs	Higher	Higher
1 autonomy **2** competence **3** relatedness to others	motivation satisfaction engagement well-being	**productivity**

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Pietro da Cortona – The Golden Age

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"What Predicts Software Developers' Productivity?"

Murphy-Hill et al., 2021

MIT

"What Predicts Software Developers' Productivity?"

Murphy-Hill et al., 2021

"Our results suggest that the factors that most strongly correlate with self-rated productivity were non-technical factors, such as job enthusiasm, peer support for new ideas, and receiving useful feedback about job performance ."

"What Predicts Software Developers' Productivity?"

Murphy-Hill et al., 2021

We assume, that

job enthusiasm	**1** autonomy	**2** competence

useful feedback about job performance	**2** competence	**3** relatedness to others

peer support for new ideas	**1** autonomy	**2** competence	**3** relatedness to others

Which social and technical factors impact job satisfaction and perceived productivity?

Storey et al., 2021

1

Towards a Theory of Software Developer Job Satisfaction and Perceived Productivity

Margaret-Anne Storey, *Member, IEEE*, Thomas Zimmermann, *Member, IEEE*, Christian Bird, *Member, IEEE*, Jacek Czerwonka, *Member, IEEE*, Brendan Murphy, *Member, IEEE*, Eirini Kalliamvakou, *Member, IEEE*

◆

Abstract—Developer satisfaction and work productivity are important considerations for software companies. Enhanced developer satisfaction may improve the attraction, retention and health of employees, while higher productivity should reduce costs and increase customer satisfaction through faster software improvements. Many researchers and companies assume that perceived productivity and job satisfaction are related and may be used as proxies for one another, but these claims are a current topic of debate. There are also many social and technical factors that may impact satisfaction and productivity, but which factors have the most impact is not clear, especially for specific development contexts. Through our research, we developed a theory articulating a bi-directional relationship between software developer job satisfaction and perceived productivity, and identified what additional social and technical factors, challenges and work context variables influence this relationship. The constructs and relationships in our theory were derived in part from related literature in software engineering and knowledge work, and we validated and extended these concepts through a rigorously designed survey instrument. We instantiate our theory with a large software company, which suggests a number of propositions about the productivity in software engineering.

constructs such as satisfaction, happiness, and motivation [9], [10]. Combined, this work enhances our understanding by indicating the things that could contribute to developers feeling satisfied or feeling productive. However, we lack an understanding of the *relationship* between these elements and how it could improve software engineering outcomes.

The research we present in this paper aims to understand and explain the relationship between job satisfaction and perceived productivity for software engineers. Our investigation was informed by seminal work in organizational psychology by Judge *et al.*, where job satisfaction is widely accepted to be positively correlated with work performance [10]. We build on this work to investigate which factors influence the relationship between developer satisfaction and perceived productivity in software engineering.

https://ieeexplore.ieee.org/abstract/document/8851296

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Which social and technical factors impact job satisfaction and perceived productivity?

Storey et al., 2021

Top factors of perceived productivity are:

a good manager

feeling productive

being fairly rewarded

having a positive team culture

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Which social and technical factors impact job satisfaction and perceived productivity?

Storey et al., 2021

Top factors of perceived productivity are:

We assume, that

| a good manager | **1** autonomy | **2** competence | **3** relatedness to others |

| feeling productive | **1** autonomy | **2** competence |

| being fairly rewarded | extrinsic motivation | **1** autonomy | **2** competence |

| having a positive team culture | **1** autonomy | **3** relatedness to others |

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Let's look
at **developer productivity**
more **holistically**

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SPACE framework

Forsgren et al., 2021

SPACE framework

Forsgren et al., 2021

Satisfaction & Well-being

Performance

Activity

Communication & collaboration

Efficiency & flow

SPACE framework & SDT

Satisfaction & Well-being – how fulfilled, happy, and healthy one is

1 autonomy ------- I am satisfied with the autonomy I have at work

2 competence ------- I am satisfied with how much my tasks and responsibilities are aligned with my skills

3 relatedness to others ------- I am happy to be a part of my team

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SPACE framework & SDT

Performance — an outcome of a process

1 autonomy ---- I feel free to do my job
in the way I believe will lead to the best outcomes

2 competence ---- I have enough skills to master tasks
that often don't have predefined algorithms for

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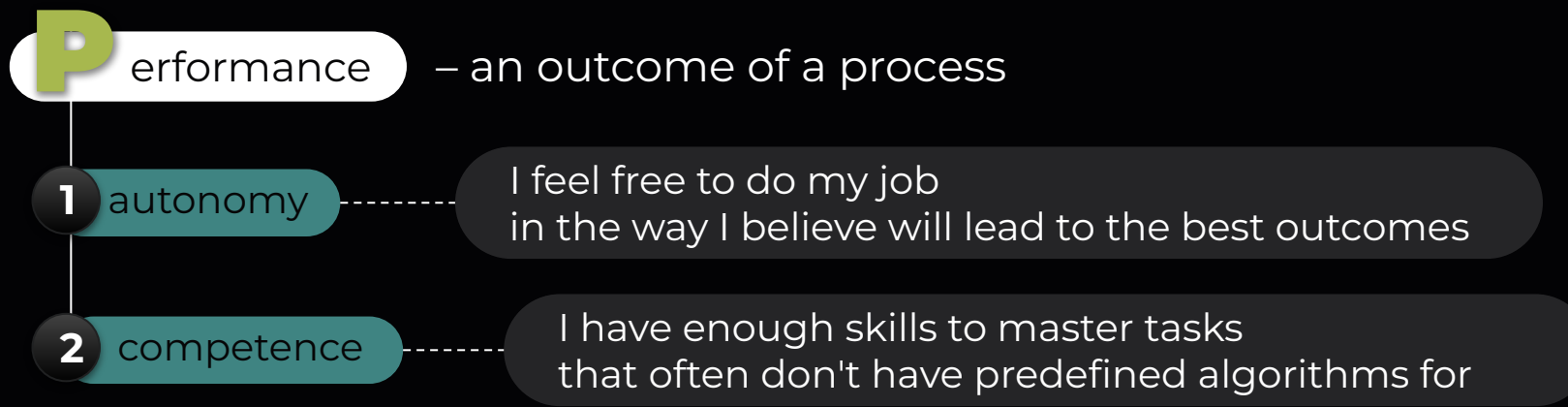
SPACE framework & SDT

Activity — the number of actions or outputs (data from logs and systems)

Lucas Cranach the Elder – Adam and Eve

SPACE framework & SDT

Communication & collaboration — how people communicate
and work together

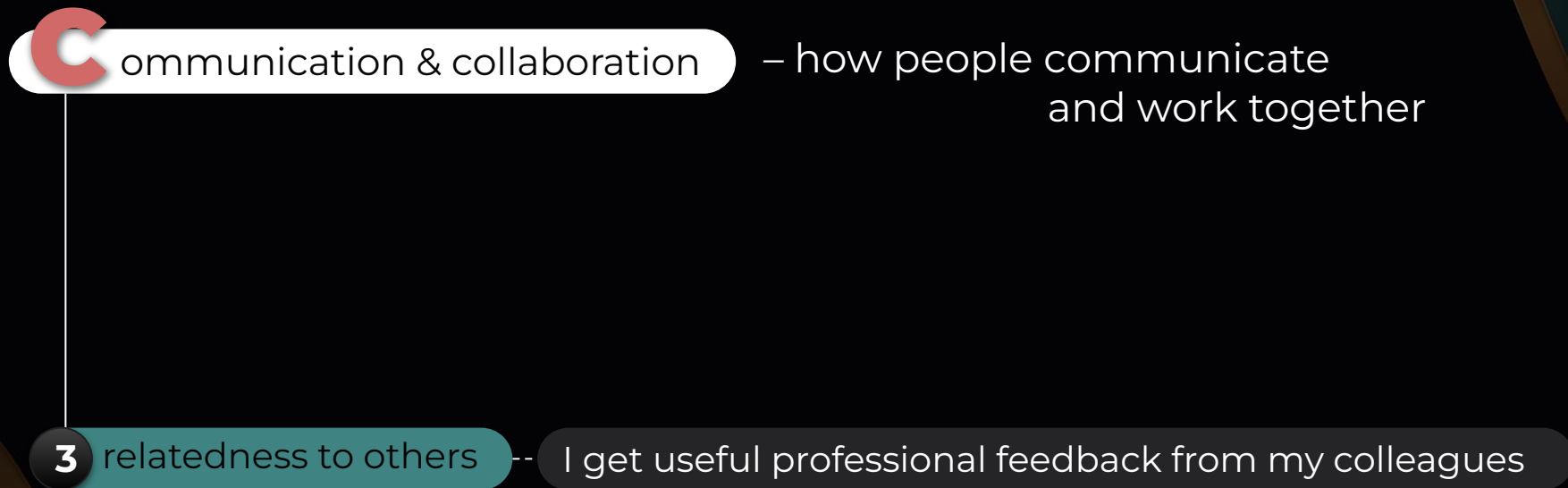**3** relatedness to others -- I get useful professional feedback from my colleagues

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SPACE framework & SDT

Efficiency & flow — doing work with minimal delays or interruptions

1 autonomy ----- I have freedom to schedule my work
the way it will provide me with enough focus time

2 competence ----- I have tasks that require my full competence
and allow me to get into a flow state

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SPACE framework & SDT

We assume that

Satisfaction & Well-being — **1** autonomy — **2** competence — **3** relatedness

Performance — **1** autonomy — **2** competence

Activity

Communication & collaboration — **3** relatedness

Efficiency & flow — **1** autonomy — **2** competence

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Fulfillment of 3 basic psychological needs

1 autonomy
2 competence
3 relatedness to others

Higher

motivation
satisfaction
engagement
well-being

Higher

productivity

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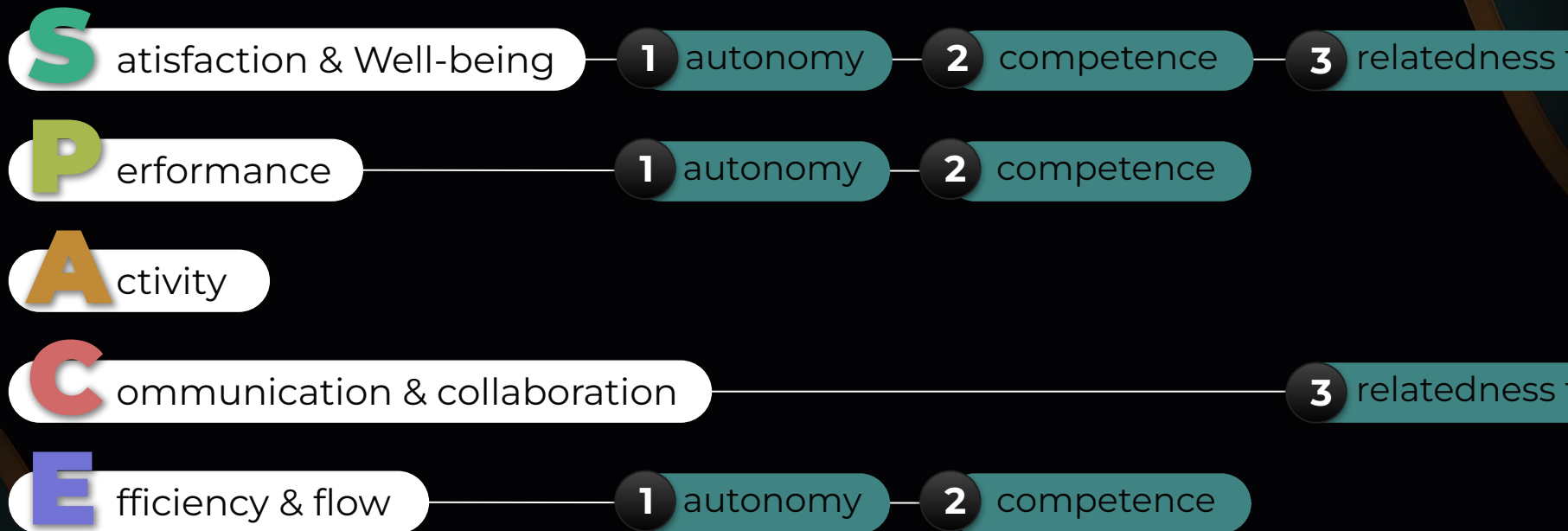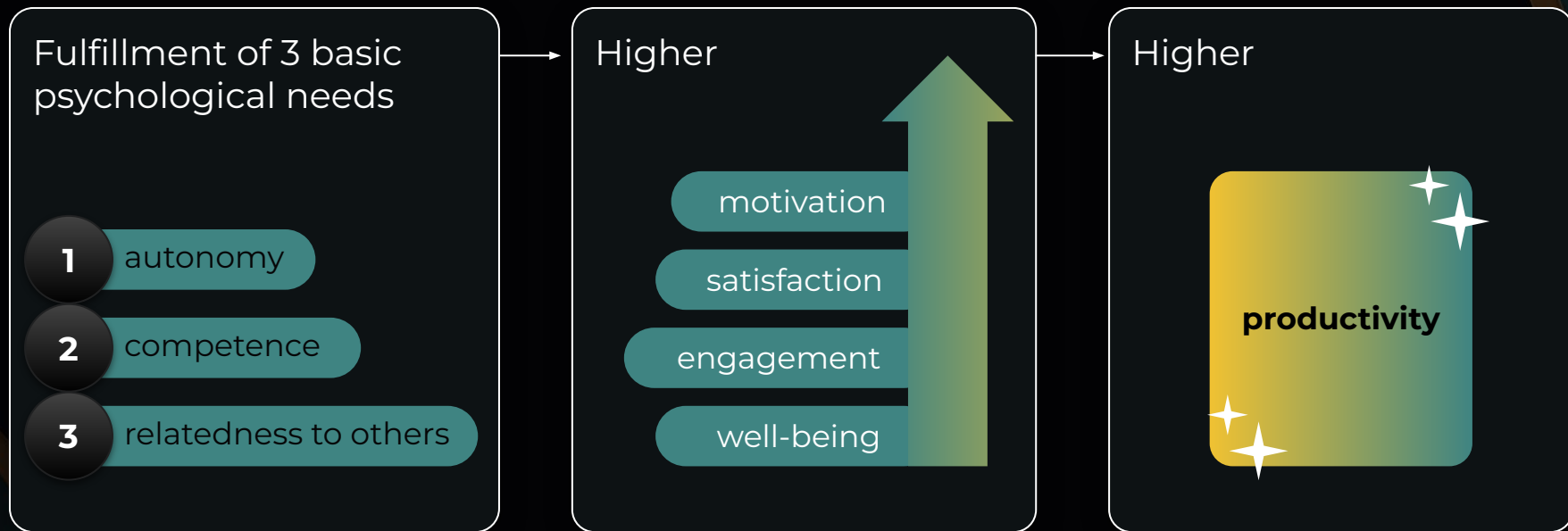
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"Toward Effective AI Support for Developers"

Khemka, Houck, 2024

https://dl.acm.org/doi/abs/10.1145/3675416

"Toward Effective AI Support for Developers"

Khemka, Houck, 2024

Developers want AI to assist them with:

generating tests

████████	44%

analyzing code

████████	42%

writing documentation

████████	37%

Dear AI, please do these tasks for us

Sano di Pietro – Scenes from the Life of Saint Jerome, fragment

Developer Ecosystem Survey

DX Research & Survey Teams at JetBrains

JETBRAINS

Developer Ecosystem

Highlights ▼

The State of Developer Ecosystem 2023

This report is the culmination of insights gathered from 26,348 developers from all around the globe. The world of developers is

https://www.jetbrains.com/lp/devecosystem-2023/

MIT

Developer Ecosystem Survey

DX Research & Survey Teams at JetBrains

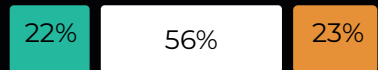|	would delegate / would do by myself	enjoyable / neither / unpleasant	time-consuming
writing code comments / documentation	56% / 21%	35% / 50% / 15%	29% / 71%
writing tests	55% / 18%	27% / 45% / 28%	21% / 79%
searching for code fragments inside the codebase	55% / 19%	22% / 56% / 23%	9% / 91%
understanding code	23% / 51%	51% / 36% / 14%	47% / 53%
writing code	17% / 54%	82% / 14% / 3%	79% / 21%
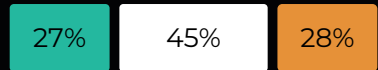
DPE SUMMIT
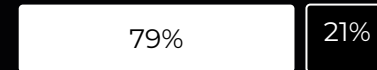
Develop
features and tools so that
they **enhance** developers' senses of

autonomy   competence   relatedness to others

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Our plan for today

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Takeaway

How likely your decisions will increase or decrease developers'...

✓ feeling autonomous

✓ feeling competent

✓ feeling related

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Which one is the most important for boosting productivity?

1 autonomy

2 competence
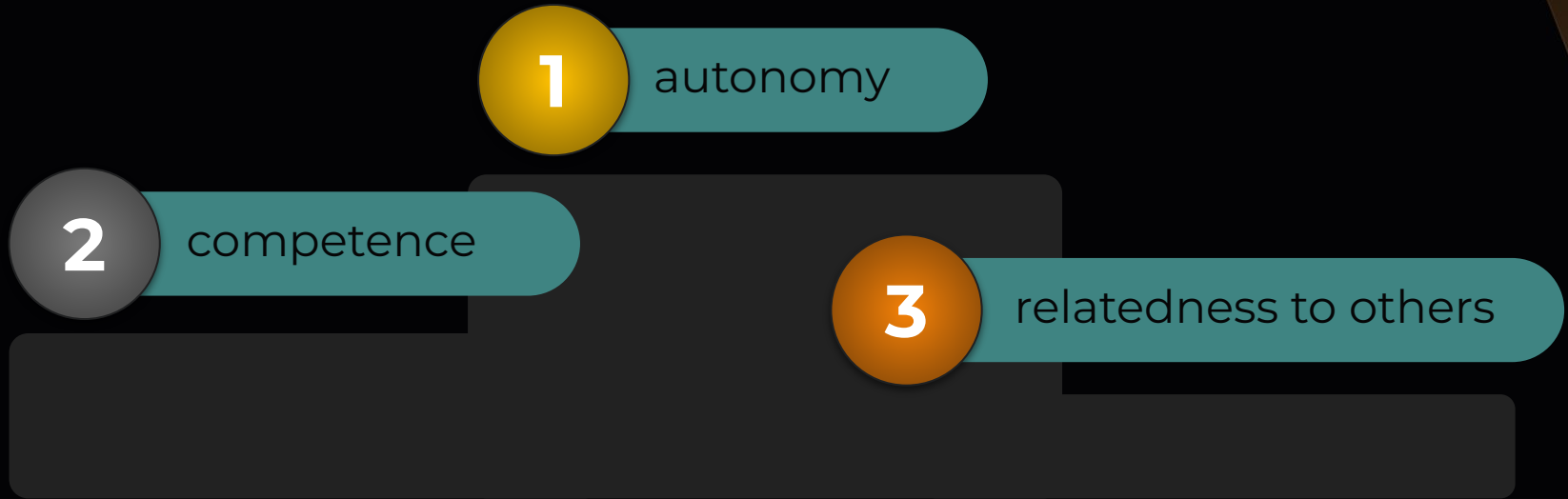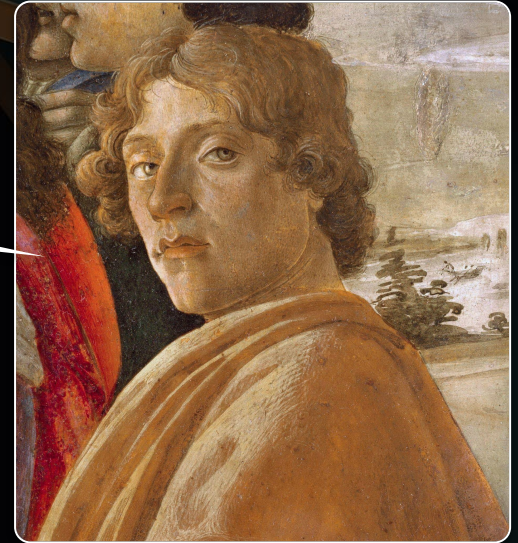
3 relatedness to others

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1 autonomy

2 competence

3 relatedness to others

According to the research, fulfillment of the **need for autonomy** has the greatest impact on productivity

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Be an autonomy supportive manager

☑ Acknowledge the employees' perspectives

☑ Offer choices, where possible
(or make it at least look like choices)

☑ Provide meaningful feedback

☑ Encourage initiative

☑ **Talk to your developers**

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But we are doing business here, it's not a fantasy

Sandro Botticelli – Self-portrait

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But we are doing business here, it's not a fantasy

But still we can balance tasks and decisions that hinder a sense of

autonomy   competence   relatedness to others

with those that booster them.

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Pablo Picasso – Acrobat on a Ball

Yanina Ledovaya & Olga Lvova

We invite you to be a part of our **research on DPE** problems, pain points, and solutions in the industry.

Sign up for an interview or survey.

https://surveys.jetbrains.com/s3/jetbrains-dp-conference-2024